European Distance and E-Learning Network (EDEN) Conference Proceedings

EDEN 2014 ANNUAL Conference

E-learning at Work and the Workplace

From Education to Employment and Meaningful Work with ICTs

EDEN 2014 Annual Conference

University of Zagreb, University Computing Centre – SRCE
Zagreb, Croatia

10-13 June 2014

CONFERENCE PROCEEDINGS

Edited by

António Moreira Teixeira, András Szűcs, Ildikó Mázár
on behalf of the European Distance and E-Learning Network

European Distance and E-Learning Network, 2014

European Distance and E-Learning Network (EDEN) Conference Proceedings

EDEN 2014 Annual Conference
Zagreb, Croatia

Published by the European Distance and E-Learning Network

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Conference Sponsor

Conference organised in collaboration with

University of Zagreb, University Computing Centre – SRCE

ISBN 978-963-89559-7-5

E-learning at Work and the Workplace – From Education to Employment and Meaningful Work with ICTs

Developing human potential has been a persistent EU policy aim even in the recent years of economic crisis. Among the goals of the European Strategy for smart, sustainable and inclusive growth, Europe 2020, we find employment and innovation, featuring education as a major lever.

European education and training systems are often criticised for not properly responding to social needs, and even that employers, education providers, and youth live in parallel universes. Universities' reputation often comes from the visible, high level relations with prestigious corporations **and also the employability of their graduates**.

E-learning, as a system integrator, may help education providers and employers to actively step into one another's worlds. Workplace-based training supported by ICT tools is part of the solution to reduce skill shortages and mismatches. E-learning has become a dominant delivery method in learning settings at work across various sectors and a wide range of company sizes. Its advantages may be many, including flexibility, **economic efficiency**, and new work habits and improved **organizational learning culture**. ICT-enhanced learning may improve organisational performance and lead to increased staff commitment and the generation of new ideas. E-learning is often used by companies to inform and educate not only their employees but also customers, as part of their branding and marketing strategy and activities.

The latest ICT solutions for simulations, virtual worlds, immersive learning and enhanced learning experiences are continuously producing renewed toolkits, supporting the development of authentic **and more personalized** learning settings. E-competences and e-skills are increasingly treated as autonomous elements of personal development to be supported by specific learning activities and patterns.

The year 2014 is important as the start of the new European programme period until 2020. This coincides with intensive developments in ICT-supported learning, educational innovations and, in particular, open educational resources. With present economic trends, the key question being growth and employability, it is highly important how employers accept job candidates with the certifications and competences from the new world of learning, characterised by many innovative approaches and open educational settings.

With the Synergy Strand at the conference, EDEN has followed up its new collaboration initiative. It is a stream of lively, interactive sessions which facilitates the sharing of project outputs, practices and research findings, thus offering platform to develop ideas, create new partnerships by engaging the conference audience. Synergy focuses on the identification of points of synergy amongst presenting initiatives and participants and the elaboration of future collaboration roadmaps.

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Acknowledgement and thanks are given to the Programme and Evaluation Committee

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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

WORK IN THE FUTURE IS CONTINUOUS LEARNING

Ari-Matti Auvinen, HCI Productions Oy / The Association of Finnish eLearning Centre, Finland

Setting the scene

In the modern, constantly changing work environments, continuous learning is more important than before. The ways of learning are changing, because a great deal of on-the-job learning takes place outside the traditional forms of education. Learning in working life is also changing: instead of competences of individuals developing through training courses, learning is increasingly becoming a continuous, community-based activity.

The Finnish TYYNE project (Työelämä oppimisympäristönä – Working life as a learning environment) focused on working life as a future learning environment. The study dealt with the multidimensional relationship between working life and learning. The study funded by the Centre for Economic Development, Transport and the Environment of Lapland and overseen by the Ministry of Education and Culture, forming a part of the ESF Operational Programme in mainland Finland, national section, operational line 3, The Development of Competence, Innovation and Service Systems Promoting the Functions of Labour Market, a part of which consists of the development project The Active Citizen of the Open Learning Environment. The project was implemented under the coordination of the Association of Finnish eLearning Centre 1 October 2012 - 30 April 2013; the participants included, in addition to the Association of Finnish eLearning Centre, the Aalto University (School of Arts, Design and Architecture, Learning Environments Research Group), HAMK University of Applied Sciences and Otava Folk High School.

The key premise for the study was that multi-faceted, extensive and continuous learning will be the most essential aspect of all work in the future. Information processing and new learning are almost without exception involved in all current and future professions - including those that are usually not considered knowledge-intensive. Work in the future will clearly be community-based in nature, and expert tasks conducted alone are already vanishing. High standard competences of individuals will be important in the future as well, but individual expertise will need to be related to the collective competences of the work community.

Methods used in the study

The thematic focus of the TYYNE study required the use of several complementary methods (see Figure 1). The key aspect during the study was to utilize participatory working methods (such as expert panels and Delphi inquiries), and also to use and be present in various social media channels from the very start of the project.

The fundamental idea was also to use the expert panels in two roles: to collect and map trends, ideas and practices, and to validate the work undertaken during the project. The TYYNE project organized in all four expert panels which were based on an open invitation to the members and stakeholders of the Association of Finnish eLearning Centre. The three-hour panels were clearly structured and the participants could join the panels either in Helsinki or by teleconferencing (teleconferences were facilitated and documented by a specialist group of the project). The first panel was mainly mapping and exploring the trends of learning in future working environments, the second panel was validating the results of the literature review, the third panel was discussing the results of the first Delphi round and developing the themes for the second Delphi round, and the fourth panel was assessing the final report and the outcomes of the project. In all, 35 persons from 25 different organisations took part in the work of the expert panels. The reports of the expert panels were published on the TYYNE Wiki.

The literature review concentrated on key trends in three areas: changes in working environments, changes in learning at work and changes in the organisation of learning at work. The literature review was discussed and validated in the second expert panel and also published on the TYYNE Wiki.

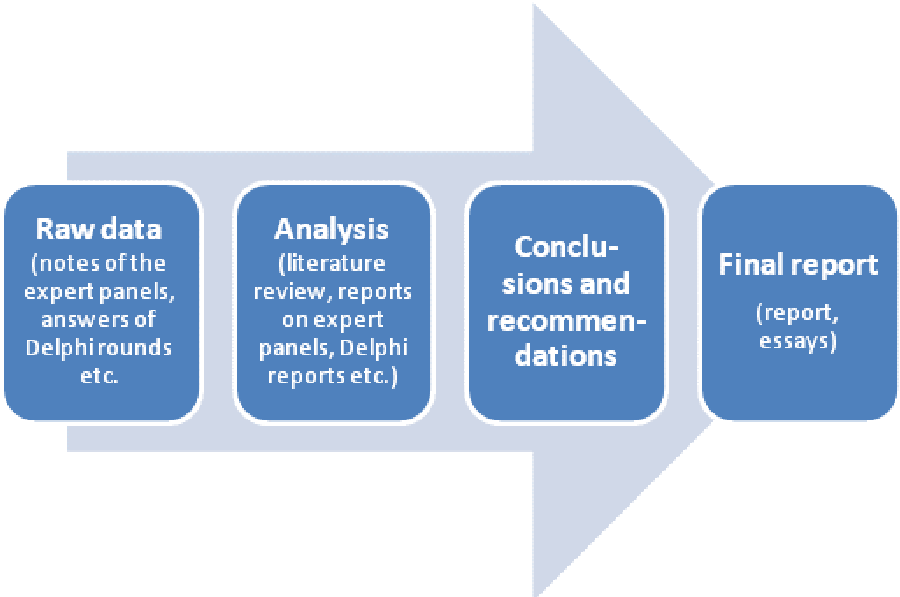

Figure 1. Working methods of the TYYNE project

The first Delphi round forecasted the trends in 2020 in four different thematic categories: Work environments in 2020, Working life in 2020, Organisation of learning in 2020, and

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Learning technologies in 2020. The first round of Delphi inquiry had contributions from 53 Finnish learning experts. The second Delphi round elaborated on nine most interesting aspects identified during the first round and in the discussions of the expert panel. The first round of Delphi inquiry had contributions from 27 Finnish learning experts.

The final report of the project included the report of the work undertaken, and also conclusions and 15 recommendations. In addition, the final report included 19 essays of the future of learning at work. As a part of reporting the results, also three short videos (distributed e.g. at YouTube) were published.

TYYNE project was also actively using various social media and had its own Wiki for publishing the results of various work packages, a Facebook group, a Google+ group and the project was also actively using Twitter. In addition, the project mapped various communities-of-practice as well as active blogs discussing the contemporary changes of learning at work.

Main conclusions of the study

Developments at work will require more extensive and faster learning. In this way, the boundary between working and learning will become artificial: in the future, working will be continuous learning. A key observation made in this study was that the great change in learning can be summarised as learning transforming itself from individual activity to community-based activity. The key word for the community-based learning is network. Learning networks are diverse, multi-faceted and multidimensional – and community-based learning will be increasingly founded on open implementations that do not recognise organisational boundaries. Community-based forms of activity are supported by e.g. trends that increase the significance of communities of practice for learning, promote openness and transparency, and solidify community- based models in the arrangement of work. These increasingly blended types of work arrangements - such as flexi time and remote work -also mean that community-based learning makes better use than before of various information and communications technology solutions and services.

One of the important features in community-based learning is the increase in open sharing. Learning in future work environments will take place at all times and everywhere. Various learning features are increasingly embedded in our tools, and support for learning will become a standard feature of their diagnostics. Continuously developing, diverse mobile solutions will ensure that opportunities for learning – whether we are acquiring or disseminating information – are available at all times.

The significance of informal learning will grow and gain strength in working life. In our quickly changing environment, the traditional course-oriented modes of competence development have their restrictions, because most of our current learning takes place when we work and communicate with the other members of our work communities. The traditional educational methods still have an important but a more specifically defined role.

ISBN 978-963-89559-7-5

In working life, the habits and methods involved in learning both develop and become more versatile. These new modes and forms of learning will supplant traditional classroom-oriented forms of education. Game-like learning contents are rapidly becoming more common in working-life learning, as the concept of games and game-like features is gaining depth and dimensions. The increasing, high-quality supply of open learning contents will transfer the focus of education from supplying courses to supplying mentoring and other types of support for learning; supporting and managing learning will form the most important future challenge for leadership in organisations. Sharing the results of our own work and those of our work community, enriching them and improving them continuously, forms an essential part of the learning process in working life.

We can assume that in future society, a major part of the population is not employed in the traditional sense. However, it is essential that people outside the traditional labour market as well as microentrepreneurs and other persons in small organisations have the opportunity of actively networking as learners.

Resources for learning that have become important include, for example, various communities of practice in which employees of different organisations share professional practices. Peer groups are also an essential resource in modern work communities, producing and refining wikis and other community-originated products. Users are simultaneously information producers and information users, which has an effect on their roles regarding their learning. The ways differ in which different age groups learn. For example, the new communications modes of young digital natives and their community-based activities challenge the present modes of on-the-job learning.

Recommendations

On the basis of the TYYNE study, 15 recommendations were given to promote learning in future working environments in a versatile manner.

1. Instead of focusing on the development of individual competences in work environments, learning activities focus on the development of the competences of communities. This requires that new competences are acquired in work communities to lead them and to support their daily learning through mentoring and other methods, and also to develop learning networks and new leadership modes. Educational institutions and training organisations in Finland should effectively develop and support this change through their actions and educational supply.
2. Learning in the current working life takes place through the learners functioning in different types of networks and sharing openly among themselves. Therefore, it is important to support actively the establishment, early phases and operation of different types of learning networks (e.g. regional and sector-specific networks). Effective learning networks are characterised by a diversity of structure: they involve enterprises, educational institutions and public parties.

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3. Various ICT-based solutions become more important in working-life learning than ever before. The key trends that affect learning include e.g. the maturing of various augmented reality applications and services, the embedding of different types of learning resources into tools and structures, and the fact that mobile technologies are diversifying and becoming more efficient. In order to make use of such new opportunities for learning in working life, we must have a strong national ICT infrastructure, a strong services architecture, and determined cooperation among the various parties.
4. Versatile, multidimensional learning holds a key position as individuals will be required to work in many different professions and jobs during their careers; continuous learning is also important if we truly want to extend the durations of people's careers. The opportunities of individuals for multi-faceted learning and, consequently, for professional mobility should be supported through many different, complementary means.
5. We can assume that in future society, a major part of the population is not employed in the traditional sense. However, it is essential that people working in different ways and in different contexts have the opportunity of actively networking as learners. Similarly, we must actively take care that people such as sole traders and people employed by microenterprises and small public organisations have the opportunity of being included in continuous learning activities. Special activities can be targeted to such groups to encourage them to participate in learning networks.
6. The importance of informal learning in working life is constantly increasing. We should make informal learning more visible, strengthening it through e.g. enhancing competency-based vocational qualification systems. The compilation and publication of individual learning portfolios should be actively supported in many fields. Such measures will help increase opportunities for professional mobility.
7. Information and communication technologies will increasingly enable the automatic saving and analysis of many aspects of our work. It is also an increasing trend that people measure their work and wellbeing on their own. These trends create opportunities for new types of learning in which individuals and work communities reflect on their actions in real time as well as over the long term. The continuous measuring and storing of activities and communication, together with highly-developed information processing methods, may challenge the traditional and competency-based methods of acquiring qualifications. This new mode of operation will require diverse investigations and studies relating to e.g. acceptable practices, privacy of information, various agreements in work communities and the applications and services in use in them.
8. The networked activities of communities of practice are an important form of learning in current working life. We should employ many different means to support the operation of communities of practice and the fluent dissemination of learning. If the establishment of communities of practice is publicly funded, we must make sure that

ISBN 978-963-89559-7-5

the continuation of the operation of such communities becomes a key criterion for such funding.

9. Modes of operation founded on open sharing will probably gain ground in the future learning in working life. The preconditions for open, mutual sharing and flexible co-creation must be promoted and their obstacles must be decreased through e.g. appropriately comprehensive guidance and counselling concerning immaterial rights as well as through technically supported open environments for sharing learning resources in practice.
10. Finnish companies and research institutions have world-class experience of games design and the implementation of games. Game-like features will probably gain ground in the future learning in working life, and therefore, the operation of Finnish actors in this field should be directed towards making use of game-like features in the context of work as well.
11. New ICT applications and services that are currently reaching maturity - such as augmented reality and man-machine cooperation - have significant potential in working-life learning. The development and introduction of these new applications and services should be accelerated through targeted R&D funding as well as through project funding for their roll-out and use.
12. Until now, the current working life, considered as a learning environment, has been the subject of only a few studies, whether Finnish or international. Universities and other institutions of higher learning and research should put forth effort on the creation of many-faceted research-based information concerning working life and learning, as well as developing and disseminating such information.
13. Learning itself and the possibilities we have for learning in working life are critically influenced by the competences we obtain at school. When the national core curricula for pre-primary, basic and general upper secondary education are renewed and the new curricula enter into force, they will impact working life and working-life trends to a significant extent. Therefore, the learning of individuals and communities should be viewed in a comprehensive manner, making sure that continuous learning is supported at all levels in our changing operating environments.
14. A new type of leadership is necessary for maintaining the forces of continuous renewal and change in working life - we need both self-leadership and competence management. Work organisations and working habits are undergoing constant change. We work regardless of time and place. Leadership in new types of environments must be supported and developed. In work communities, leaders must create the frameworks and opportunities for shared learning, for experimentation and for enhancing practices together. Leaders need new types of models and tools to help them lead.
15. Learning in working life, currently under continuous development in Finland, also requires positive role models and the recognition of learning. The first important step would be the development of a framework and a set of criteria for the use of organisations so they may review their own learning in relation to others, similar to the

ISBN 978-963-89559-7-5

way in which quality criteria are applied in quality competitions. This first step could form the basis for the introduction of a new continuous learning award for organisations, in addition to the present awards, so that we might recognise and share good practices, thereby strengthening organisations' desire to continuously improve their learning skills and their desire to learn.

Key outcomes

The work of the TYYNE study was elementary in understanding the challenges of learning in our future working environments. The final report of the study has served well the Finnish learning community in the preparation of the forthcoming ESF call as well as other future activities. In addition, the active use of participatory methods and social media during the TYYNE project has led also to an active community-of-practice in Finland with tens of experts interested in the future of learning.

This paper is based on the final report of the TYYNE project – the full report in Finnish with an English summary can be obtained from

http://wiki.eoppimiskeskus.fi/download/attachments/8226492/TYYNE-raportti_10062013?api=v2

ISBN 978-963-89559-7-5

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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

ICT SUPPORTED WORK-BASED CONFLICT RESOLUTION LEARNING

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Learning at work

The development of work-based learning has traditionally been associated with the need to develop the competences, skills, attitudes and behaviours that produce effectiveness in implementing defined job performance in relation to standards, productivity and outputs. The idea of learning at work and on the job was defined most narrowly in the early literature on the subject. In the heyday of Fordist mechanized production, Frederick Taylor developed the method termed 'scientific management'. While a crude summary of Taylor's position is that of 'time and motion' studies, it is nonetheless among the first time that work itself was systematically observed and quantitatively analyzed. While production was the goal, learning was addressed, even if in the most narrow and circumscribed way. This pseudo-scientific technique was designed to look dispassionately at the production and manufacturing process and to develop a system in which efficiency was developed to the utmost and human factors reduced to that of a near robot. Any learning required was that determined by management to enable workers to do their assigned tasks most productively.

In 1911 Taylor summarized these 'principles" of scientific management:

1. Replace rule-of-thumb work methods with methods based on scientific study of tasks.
2. Scientifically select, train and develop each employee rather than passively leaving them to train themselves.
3. Provide detailed instruction and supervision of each worker in the performance of that worker's discrete task.
4. Divide work equally between managers and workers, so that the managers apply scientific management principles to planning the work and the workers actually perform the tasks.

Work based learning has evolved significantly since then. The modern idea of developing a rounded set of work-based competencies that facilitate complex systemic analysis, foster critical and reflective skills and address more complex issues of environmental well-being and soft-skills regarding human relationships is still however regarded with suspicion by management systems where the critical bottom-line is profitability and efficiency. Emphasis has altered however from a concentration on instrumental conceptions of vocational training on technical skills towards a concept of lifelong learning that is adaptable and transferable. The old dichotomies between general and vocational education, between liberal education and specific job training, are dying away. There is a growing realization that as well as highly specific job-related technical skills, the demands of the globalized workplace make it imperative that social and interpersonal knowledge, skills and competencies be incorporated in any on-job learning program.

Background to comparative conflict resolution training

Traditional companies often saw training as being all that was required – enough to learn to do the job. This stratified and minimalist approach fits badly with the realities of rapidly changing external environments where all employees have to work together in anticipating change and challenge. In this context employees are no longer seen as merely selling their labour. They are also seen as producers who have the capacity and, some would say, obligation to learn. Many companies increasingly see on-job learning as essential to growth and enhanced competitiveness. This is because new skills are continually being acquired. New ways of using old skills are also being learned.

In the area of conflict and dispute at work however, we see an intersection of issues that address work behaviours, lost productivity, system failure and dysfunction – all of which can gravely impair performance and outputs. Developing learning around conflict and conflict resolution techniques at the level of the workplace thus becomes a critical area for the investigation of innovation and creativity in applying ICT supported learning skills to learners in the middle of disputed spaces.

Effective on-job learning strategies focus on staff, management, stakeholders and customers. Effective work based learning calls for a clear strategy and an atmosphere of trust. Investing in people has risks. Staff may leave or take up better opportunities. But it has clear rewards. Most will learn to contribute and improve. Above all, a learning organization is positioned to deal with change. It values creativity. The lifeblood of future organizations is the ability to create new products and innovate.

This paper compares and contrasts two ICT supported work based initiatives that have been developed to address social conflict issues, to support staff competence in dealing with sometimes intractable disputes and to create a rights based approach to the enhancement of professional skills in dealing with conflict, dispute, racism and anti-social behaviours. The examples are drawn from field operatives in international conflict zones attending the on-line course in conflict resolution of UOC, the Open University of Catalonia in Barcelona and the transport employees of Veolia in Dublin who have been participating in anti-racism and diversity training in the conflict resolution programs developed by Universal Learning Systems.

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Conflict and work

Conflict may be any sharp disagreement or opposition of interests or ideas. Conflict is a normal and natural part of any workplace, as it is in all social situations. The impacts however can be severe with a tendency for morale to be lowered, a noted increase in absenteeism, ineffective communications and decreased productivity. It has been estimated that managers can spend at least 25 percent of their time resolving workplace conflicts – causing lowered office performance. Handling and resolving conflicts that arise in the workplace is one of the biggest challenges managers and employees face. Typically there are two responses to conflict: run away (avoidance) or 'battle it out'. In either case, we often feel uncomfortable or dissatisfied with the results because no resolution has been achieved. By learning to resolve conflict constructively, we can turn a potentially destructive situation into an opportunity for creativity and enhanced performance.

There are many causes or reasons for conflict in any work setting. Some of the primary causes are:

1. Poor Communication: different communication styles can lead to misunderstandings between employees or between employee and manager. Lack of communication drives conflict 'underground'.
2. Different Values: any workplace is made up of individuals who see the world differently. Conflict occurs when there is a lack of acceptance and understanding of these differences.
3. Differing Interests: conflict occurs when individual workers 'fight' for their personal goals, ignoring organizational goals and organizational well-being.
4. Scarce Resources: too often, employees feel they have to compete for available resources in order to do their job. In a resource scarce environment, this causes conflicts – despite awareness of how scarce resources may be.
5. Personality Clashes: all work environments are made up of differing personalities. Unless colleagues understand and accept each other's approach to work and problem-solving, conflict will occur.
6. Poor Performance: when one or more individuals within a work unit are not performing - not working up to potential – and this is not addressed, conflict is inevitable.

In the courses compared here, participants are encouraged to look at the specific contexts of violence, aggression and conflict and how these have been manifested in the experience of working in assigned job roles. It is possible to trace these elements from the divisions in society via explicit or implicit conflict or to the impact of patterns of migration and social and demographic change over recent years. For participants in these programs, it is possible to see and understand how conflict emerges from social structures, economic systems, land ownership, religious identities, discrimination, struggles for equity as well as more traditional forms of military conflict and warfare.

ISBN 978-963-89559-7-5

Many theories of the origin and nature of conflict exist. From Aristotle to Hobbes, people have tried to come to terms with how otherwise peaceable and cooperative people can become filled with hate, fear and bitter contempt for other groups and individuals. Groups can act out these feelings and attitudes in disturbing and dreadful ways. For those in employment, it is manifest both in internal relationships and/or divisions or more pressingly, in terms of relationships with external actors – be they stakeholders or customers. Learners therefore need to be encouraged to look at these factors, develop awareness and see for themselves if the principles of peaceful conflict transformation can be relevant and applied.

In all theories of conflict however there are some common themes. These themes, to a certain extent, all rest on a couple of issues.

1. *Portrayals of the Other*: negative, despising and contemptuous or laced with threat and fear;
2. *De-humanization*: the Other is attacked or liquidated because it is not seen as human;
3. *In-groups and out-groups*: loyalty only to those who resemble "us" – the Other is irrelevant;
4. *Fear and threat*: the Other is evil and malevolent and must be contained or eradicated.

These themes are persistent and powerful throughout history. They rely on a sense that the Other is a permanent threat, which is a very effective way to mobilize and control one's own side. These themes are very much universal and are also very destructive.

Apart from anything else, these issues mean that in a conflict situation it is very hard to really know anything about the Other. Many communities have adapted to this by simply living in a set of parallel worlds and separate viewpoints. Engagement may be minimal. While not ideal, it at least represents an absence of active violence. Nevertheless, in some shape or form, in all societies differences and diversity exist. Some mechanism has to be found to allow people to meet, interact and engage in positive and mutually rewarding ways. Negative portrayals of the Other lie at the root of much conflict and dispute. Negative approaches to the Other are one of the prime origins of conflict. These can be summarized as:

1. Prejudice;
2. Discrimination;
3. Stereotype;
4. Victimization.

Evolution of the UOC UNITAR training

The UOC (Open University of Catalonia) *Campus for Peace* has many years' experience in designing and delivering advanced courses and training in conflict resolution across the globe. It offers a range of online learning options, academically managed by the School for Cooperation. The School for Cooperation is the institution offering training on a wide range of critical learning themes and issues related to learning in critical fields such as humanitarian

ISBN 978-963-89559-7-5

action, dependency, conflict resolution, sustainability, international humanitarian law and the management of non-profit making organizations active in peace construction.

Its training and course offerings extend over a wide field of programs and include Masters, Postgraduate degrees and specializations from UOC's International Graduate Institute (IPP) and learning projects specific to the *Campus for Peace*, in collaboration with other institutions such as UNITAR (*United Nations Institute for Training and Research*). UNITAR is the United Nations' professional training and research institute. It has been meeting the training needs of its personnel in the areas of environment, peace, security, diplomacy and governance of all UN member states since 1965. The UNITAR peacekeeping training program has extensive experience in the design of e-learning courses aimed at civilian, military and police personnel serving on peace operations. The development of a significant new level of technological capacity and application with advanced ICT supported learning has enabled a significant expansion of scale in recent years for students across the world.

UNITAR was researching qualitative online programs to improve their staff skills on peace and conflict resolution missions. For this reason, UNITAR and UOC started building an agreement based on sharing programs and students. The *Campus for Peace* was the answer to UNITAR's training goals - both in contents and ICT-supported methodology. On the one hand, the School for Cooperation runs different programs on conflict resolution on line and in English. On the other, UOC's virtual campus was an efficient system for the UN staff taking this program online. The students could connect and would have a welcoming tutor to help them navigate through the campus. Once they were enrolled, a personal tutor would accompany them during their academic semesters at UOC.

The agreement between UNITAR and UOC was to set out a collaboration in delivery of the International *Master in Conflictology*, the *Postgraduate Certificate in Armed Conflicts and Crisis Management*, the Postgraduate in Societal and Business Conflicts, the *Specialization in Armed Conflicts,* the *Specialization in Crisis Management*, the *Specialization in Workplace and Commercial Conflicts*, and the *Specialization in Social and Family Conflicts*.

UOC recognizes five courses taught in UNITAR's *Peacekeeping Training Program* as three subjects in the *Master in Conflictology* in the following qualifications: "Master in Conflictology", "Postgraduate Certificate in Armed Conflict and Crisis Management", "Postgraduate in Societal and Business Conflicts", "Specialization in Armed Conflicts", "Specialization in Crisis Management", "Specialization in Workplace and Commercial Conflicts", and "Specialization in Social and Family Conflicts".

This is a two-way agreement that also benefits UOC students wishing to take any subjects in the UNITAR course catalogue, as their credits will be validated. Consequently, students taking the Understanding Conflicts and Conflict Analysis and Conflict Resolution courses on the *Peacekeeping Training Program* will automatically obtain recognition of the *Introduction to Conflictology* subject on the UOC's *Master in Conflictology*.

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Another of the possibilities offered by the agreement is the ability to undertake practical placements with UNITAR. UOC students who apply for it will be able to take part in the conflict resolution programs run by the United Nations and in peace operations and other post-conflict peacekeeping processes. Since then, the UOC School for Cooperation is providing conflict resolution training to UN workers sent on peace missions from October 2013.

UOC and UNITAR have established a convention based on sharing a program and students. UNITAR was seeking qualitative online programs to improve their staff competence on frontline missions. Building an online, recognized and official university is expensive and slow, so it made sense to join an already existing online university with an international campus and existing programs in. The present intake for the academic year 2013-14 is 87 students, selected by UNITAR – mostly soldiers on peace-keeping missions.

Change, conflict and combating racism in Veolia in Ireland

Enlargement of the European Union throughout the 1990s was accompanied by a profound demographic shift for most Member States. Buoyant economics and expansionary conditions associated with market liberalization meant that inward migration increased at significant rates. The EU now found itself at the centre of complex issues around migration, social complexity and ethnic diversity. The dramatic growth of racism in recent years now poses a real threat to communities and peace. Demographic transformation was profound and rapid in Ireland. The non-Irish population is now 10% of the population. Yet Ireland remains unique in Europe – it is the only country without an organized xenophobic, racist, anti-immigrant political movement.

Several issues have been identified in recent years regarding effective workplace diversity management. Issues around intolerance and individual racism have surfaced with regularity. National policy initiatives like the *Irish Human Rights Commission* have helped. But development of viable work-based anti-racism interventions that promote conflict resolution have been rare. A recent significant initiative was undertaken in 2013 to address ethnic conflict in a large national public transport provider, Veolia who operates the Dublin tram system (Luas). The company identified growing problems around aggressive and abusive customers, frequently based on racist attitudes or perceptions. More pressing was evidence of growing conflict between staff.

Universal Learning Systems was commissioned by Veolia in April 2013 to undertake the design and delivery of a diversity management and awareness-training program for staff. Several issues have been identified in recent years regarding effective diversity management in Veolia. These included *external* matters: interactions with the public (incidents, disruptive behaviour, hostility, aggression and insult – frequently based on racist attitudes and perceptions of ethnic origin). It also included *internal* issues; interactions between staff (including avoidance, poor communications or insensitivity around perceived difference). Management had also identified the effect of such attitudes and actions on staff and morale –

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leading to stress, absenteeism and underperformance based on negative experiences across a number of diversity categories.

ULS has designed, developed and delivered a dedicated program to address these issues and to develop the skills, knowledge and competences to deal effectively with conflict management in contexts of Irish workplace diversity. The program was entitled *Engaging with Difference: Diversity Management Best Practice.* The aim was to provide training in key themes and issues in diversity management to support personal and professional competence in dealing confidently with human and social difference in a commercial transport context. This engaged staff to facilitate interventions to overcome conflict and promote an environment of respect, tolerance and rights based practice. The program is based on research findings and extensive experience of employer-based diversity and equality training to create conditions where the transport company and its key personnel can maximize the opportunities presented by diversity while minimizing or containing conflict.

The aim is to provide training in diversity management to support personal and professional competence in conflict resolution based on racism in a commercial transport context. By the end of the training, participants are able to:

1. Define main elements of cultural difference in the commercial transport sector;
2. Address issues around bias, stereotype, prejudice and discrimination;
3. Use leadership and organizational culture to address equal opportunities and conflict management;
4. Use key skills in human rights, conflict transformation and legislation;
5. Develop sustainable work based solutions in conflict resolution and diversity management in operations, customer relations and company business model.

In general terms, participants felt that diversity had varying degrees of relevance in their lives and/or place of work. While many did accept that Ireland had changed dramatically, only some saw this as reflected in their own lives in a community context. Many felt that Veolia had become more segregated socially along ethnic lines, although few could pin this down to specific reasons or causes. Many felt that the initial camaraderie that had existed at the commencement of the company's activities (several staff had been working for the company from the beginning) had disappeared. All felt that tensions needed to be addressed by some kind of management initiative to stimulate team-building and enhanced interaction.

Conclusions

All felt strongly that diversity might be helpful in understanding and dealing with different cultures. But by the same token issues around conflict and abuse had less to do with diversity that with deeply ingrained anti-social attitudes and behaviours. In terms of positive learning outcomes from the diversity training the following learning points were made. Staff had developed a better and stronger awareness of others and now had insights into different

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cultures and traditions. There was a greater sensitivity to difference with achieved sense of curiosity around other cultures, traditions and customs. There was an improved understanding of communications between different groups. The comprehensive overview of the Irish legal and policy framework produced a basis for improved integration. The ICT dimensions meant that conflict could be discussed in a neutral framework. Most important was the evaluative finding around reporting of racist or discriminatory actions. Use of mobile phone technology meant this could be done on a rapid and user-friendly basis. Innovative access to critical diversity information was highly valued.

The challenges of population change, ethnic/cultural difference, migration and social exclusion have created concerns for Irish employers. Significant challenges exist in addressing issues and developing capacity around responses to ethnic conflict in Ireland. This program provides relevant, coherent and well-researched outcomes that address staff needs for methods and strategies in intercultural operations and conflict resolution. For both Veolia and UNITAR, partnership with external academic agencies provided a strong synergy of content and process in this critical learning field at a time of social transformation.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

IS THE OPENNESS A PROBLEM IN OPEN WORKPLACE-BASED TRAINING?

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Abstract

The issue of openness in prospective open courses, in workplace-based training, is investigated in this explorative study. Staff responsible for training at five companies was interviewed about open courses and MOOCs as possible for work based training. Both the both the interviewees themselves and the company they belong to is collaborating with scientists at higher education institutions (HEIs). The study raises the question whether they consider open courses and MOOCs might be a way to reinforce workplace-based training supported by ICT tools.

The companies displayed a positive attitude towards expanding the technology-enhanced learning and openness, and foresee few problems with the openness when they participate in teaching and other course activities. Nonetheless, the current use of ICT tools for communication and strategies to make use of technology-enhanced learning and open courses are surprisingly limited and vague although e-learning for well-defined routines is utilized. The size and business model of the companies are also factors that determine the potential interest for open courses.

Conclusively: the interest is obvious in order to succeed with technology-enhanced and open workplace-based training and the issue of openness seems not to be a major hindrance. There is a large potential in collaboration between companies and in collaboration between the scientists and industry.

Open education and open publishing are parts of the change that has been on-going for decades, and include the ideas of sharing open source and open content on internet, as well. Open education is believed to provide a great opportunity for more people to acquire access to higher education, and also to develop new business models. In this setting, the possibilities for new collaboration and partnerships should be intriguing for both HEIs and business (de Vries, 2013; Hamburg et al., 2014; Kim, Bonk & Teng, 2009). Ernst and Young (Bokor, 2012) points at different trends in an Australian setting in the report “University of the Future”. A clear trend is deepening cooperation between industry and universities, where they cooperate in both research and teaching. In the European setting is many initiative taken and the commission claims "the need to develop effectively and close co-operation between universities and industry". (Maassen & Stensaker, 2011, p.8)

While the number of open courses and MOOCs is increasing there exists an opportunity for business to benefit from these flexible online courses as work-based training. The providers are still trying to find suitable and sustainable operating models for this activity. Individual teachers, researchers, companies and university management have in most cases only a vague idea about appropriate operating and business model of open and online courses (Olsson, 2014).

MOOCs that are developed in the collaboration between the business sector and HEIs create opportunities to improve pedagogic quality. Collaboration can increase opportunities for students to use authentic data and case studies. Through researchers' collaboration in MOOCs, the conditions are enhanced to develop expertise among people already active in the business sector. One important result from collaboration between the academic and business sector is the improved ability to recruit qualified personnel as well as strengthen brands

In our view, the business sector is lagging behind the opportunity to enter this new arena. There are many motives and business models that can be developed. "Free" continuing professional training, training sales persons (world wide), and or customers in using the company's products and try to strengthen the brand.

It also raises questions concerning openness. Do the enterprises considered it risky to reveal business information from inside the companies when participating in an open course? Can business enter this market as co-supplier of a course or as active course participants without revealing secrets for their competitors? Does a case unveil weaknesses and strengths in the company that is not meant to reach the public? Are the course participants avoiding providing cases from their own company into open training depending on this or other risks? Is there any ambivalence to utilize 'the crowd' for generating new ideas and solutions in the MOOC setting? What evidence for and against open courses does staff responsible for workplace-based training have to consider? This study has a bearing upon this.

Procedure

Each company's contact person participated in an interview. The companies are Manufacturer of diesel engines, Consultancy company management development, Steel mill, Aerospace engineering company, Consultant company combining technology, environment and security and a Telecom company. The six semi-structured interviews conducted November 2013 – January 2014 at each respective company. The contact person representing the company were asked, based on an interview-guide, about their work-based training, the issue of openness in open courses and possibilities to us open courses in their work-based training. The interviews were conducted in Swedish, recorded and were carried out for on average 1 h 30 minutes. The statements were analysed, and particular quotations were selected to represent statements in the findings. The purpose was to obtain in-depth knowledge about the different ways the interviewed think and the way they represent the companies' strategy for training. Quantitative or any statistical analysis was not the purpose of the study. The interviewees are mostly termed "company" in the text. Be aware that the result despite this is based upon the individual interviewees' opinions.

Findings concerning openness into prospective technology-enhanced and open workplace-based training

Openness is considered by the companies to benefit businesses and the information included in open courses can be managed. The companies are accustomed to dealing to e.g. master students and external people access to important processes and data. In collaboration with other businesses, you do simply not bring up that which is secret. A company that collaborates very much in their own sector points out that you have written documents to regulate how and in what form cooperation takes place and how any secrets should be handled. The same company believes that "... if both [Company A] and [Company B] succeed, our casting plants will be even better, it's just benefits for all "and continues" ... we are not competitors, not casting plants between. Companies in between, yes, that's another thing." (Manufacturer of diesel engines)

One interviewee from an aerospace engineering company explains that several companies have comparable technology and the same challenges to solve. Since they did not compete with the same products they can cooperate both in training and development of new methods. A telling example is the turbines manufactured by the companies in question. One company manufactures turbines for the aerospace industry and the other company turbines for the hydropower industry. Everything is to be gained by jointly learn more about cutting techniques, etc. that benefit both businesses and the entire district.

Several companies questioned what really was secret. The interviewed person at the telecom company pointed out "people move around, change jobs between them [the companies] so how much secrecy is there in reality? I know very well what challenges [Company X] and [Company Y] are up to. We have people who came from there and vice versa. I think you can keep it at an appropriate level." (Telecom company) Some tasks would mean that they continually try to reuse what others have come up with before. System development is a typical area where a lot of the work is to re-use and build on source code developed elsewhere. One aspect that mentioned is that the most advanced research and development you have, the more secret it is. However even in research and development environments you have cooperation in clusters, and they must deal with what may be public information or not.

Common to all companies in the study is that the knowledge of generic level is no problem and already in practice. When you have started the process or operation, it also becomes normal general knowledge and the problem of what may be the secret of the process will be obsolete. An important aspect regarding education is that "if it is to be a secret, we have to hire people and then train them. It ought to be good if they learnt the stuff before they are hired with us." (Aerospace engineering company)

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Although the transparency is not an issue, the companies are pointing at some things that will be held from the courses. There are commercial secrets, innovations and specific inventions, which cannot be disclosed. Customer lists and similar information have to be secret. One company must also take safety aspects into account.

One interesting finding was when a couple of equal companies existed inside the same industrial group. A competitive situation existed because they did parallel things, where they do not want to let off their own development or their own innovations to the other companies, despite belonging to the same industrial group.

Conclusions and summing up the question of openness and collaboration with higher education institutions

Companies ‘approaches to collaboration with HEIs in the development and implementation of open workplace-based training relates to their core competence, strategies for their competence development and experience of participation in R & D projects involving HEIs and other companies. The interviewees were surprisingly positive about transparency and saw few problems with the openness in training even if it certainly are customer lists, business secrets and innovations that one must keep outside. However it is possible to find a balance. "You make more money if you are open than if you try to keep it a secret as it looks in society today." (Consultancy company combining technology, environment and security)

Among the companies interviewed are two large multinational companies based on high-tech products. These companies have partnerships with HEIs for both research and education. They have also developed strategies for employee skills that include collaboration with HEIs. This applies primarily to engineering but also other areas such as management and business development. Generally express these companies interest in open training as an additional basis for its competence. One also sees the value in contributing their knowledge to the course content. It is only a relatively small part of the company's knowledge that may not be disclosed by the company in a course.

The other companies in the study are focused on services or technology-based products. A few are relatively large with an international market. Even for those companies' informants express some interest in participating in the development and implementation of open technology-enhanced courses. Collaboration with HEIs appears not as a thought-out strategy for corporate succession planning. The possibility that through collaboration with HEIs strengthen university trained staff to better match the companies' own needs and increases the ability to recruit new employees seems not to have been a big issue for these companies. As the supply of skills at an advanced level may be more important for these companies may also their commitment to technology-enhanced and open training grow.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

VIRTUAL PRACTICAL TRAINING IN ENGINEERING FIELDS

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Introduction

Engineering education is a field of higher education that requires a broad range of practical skills to be offered to the students (Litzinger et al., 2011). The university curricula always involve some periods of work placements in companies, in order to allow students to get the real work experience in fields where they might practice after graduation. Many times, the physical realisation of such work placements is quite difficult due to different factors: mismatch between the schedule of the work placements in the university curricula and the companies' availability, lack of possibility to host many students (especially at the beginning of their student live – characterised by a lack of basic knowledge), lack of supervision personnel inside companies etc.

It is recognized both by the academics and the industry that there is often a disconnection between the theory learned in the university regarding the discipline area and the practical skills expected by companies at the start of an engineer's working career (Barber et al., 2013). Many times, companies have to invest in providing an extra training, immediately after hiring a young graduate.

It has been argued (Dalgarno et al., 2014) that the disconnection between the theory and the practical skills creates some fundamental difficulties: students have an incomplete knowledge of the practice context; in their university-based learning, students are asked to apply the theoretical ideas they studied to contrived or inauthentic problems; when students engage to professional practice, the messages provided by their supervisors may be different from those received from their university lecturers.

One possible solution to the raised problems is to involve students into university – enterprise cooperation (Ugwuanyi & Ezema, 2010), as soon as possible in their academic training, through different forms of work placements (Vriens et al., 2011), including blended and virtual ones. Usually, the term of virtual placement or virtual mobility is viewed as a form of learning which consists of virtual components facilitated through an ICT supported learning environment (Grove, 2008), where the three key stakeholders (students, universities and enterprises) interact with one another independent of time and space (Rintala & Schrader, 2010).

Background of the research

Politehnica University of Timisoara has a recognized history of cooperation with the economical area. This cooperation mainly embraces research and technological development, where students are many times actively involved together with the academics. The weak point is that this sort of cooperation mainly involves the top students, which will probably embrace a research or academic career after graduation. Still remains the problem of the average student, which will typically embrace an industry career – usually without a strong practical experience and without the practical skills expected by the employer.

On the other hand, the University has a strong expertise in providing blended and online learning and training, through its Center for eLearning, by using its own ICT platform. This centre also developed the university Virtual Campus, which can be used in order to facilitate online cooperation in training with industrial and academic partners from Romania and from abroad.

Based on those key factors, the university started a project for providing its students with practical training in real working conditions, in cooperation with the main economical actors in the region. The project has been implemented at national level, in order to test the possible cooperation between actors in different regions in the field of technological practical training and to see whether there are substantial cultural differences between those regions in the field of training and enterprise culture.

Research project's goals

Simulated enterprise for technical work in technology companies is a European Social Fund project implemented by the Ministry of Education, in partnership with Politehnica University of Bucharest, Politehnica University of Timisoara, Constantin Brancusi University of Targu-Jiu, conducted between 2011 and 2013. The project aimed mainly at increasing the employability of university graduates in terms of training and development of the engineering practical skills required by employers, by developing and implementing an integrated information platform that simulates the real working technology companies and hiring specialists from these companies for students' practical training and for developing supporting materials. These goals were accomplished by using an innovative tool for Romanian higher education: simulated enterprise.

To implement the simulated enterprises it was established one laboratory in each partner University and tutors from the private sector were used to prepare students for the labour market through training, simulations and applied exercises. Subsequently, 240 students with outstanding results from a total of 600 learners benefited of internships in companies that provided the initial tutors.

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The project aimed to recruit twenty-four tutors from the technology companies involved. The immediate benefits for the companies were:

- access to future graduates with specific training through customized applications,
- promoting the reputation of the company in the academic field,
- increase the degree of employee's satisfaction by harnessing their potential as tutors in the project,
- increasing the company's reputation.

Concerned by the formation of engineers that will demonstrate not only a solid base of knowledge but also real practical skills specific for any engineering graduate, Politehnica University of Timisoara had the role of regional partner representing the urban growth pole from the western area of Romania.

At the Politehnica University Timisoara, the project was coordinated and managed by the Center for eLearning, with the support of the Faculty of Automation and Computers and the Faculty of Electronics and Telecommunications and with the involvement of 8 specialists from companies attracted in this project. The training provided was designed for a total of 200 students from the faculties mentioned above and were mainly focused on:

- Practical activities of virtual project management;
- Software virtualization solutions;
- Simulation of the technological flow specific to the IT companies / telecom;
- Teamwork activities;
- Professional communication specific to engineering field (communication techniques, professional interaction).

The project was not designed just to meet a need felt by universities (a better insertion on the labour market for engineering graduates) or a need of senior students (to work immediately after graduating), but wanted to come half way to meet with current problems of recruiting young workforce, problems that technical companies are facing with.

From the employer's perspective, the project is an opportunity to:

- Influence, adapt and customize students' training content based on practical needs of the company, so that the graduates will be operational employees in a very short time and with minimum costs of initial training;
- Select and recruit students really passionate about the study, with outstanding academic achievement and training potential after graduating;
- Train the tutors, motivate and reward specialists from companies, people responsible with the initial training of the entry-level employees;
- Strengthen and make visible the reputation of every involved company and then the company's involvement in projects with direct social impact.

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Project implementation

Conducting simulated enterprise laboratory consisted in activities (including teaching – learning – assessment) supported by tutors recruited from the technology companies, to develop competencies among students that were following technical studies in four key areas of study: computer science, computer and information technology, electronic engineering and telecommunications, systems engineering.

The software component consisted in a number of IT solutions implemented in carrying out teaching – learning – assessment activities as:

- Portal information solution through which students, teachers and tutors communicated and collaborated during the simulated company laboratory and through which the project results and information were disseminated;
- Document Management Solution - to manage the necessary resources in teaching and learning;
- Students–teachers-tutors relationships management system;
- Computer system for simulation of case studies and practical simulations in virtual environment - students played different roles within this solution in business processes specific to technology companies;
- Assessment of acquired competences solution – was used mainly in assessing students' knowledge.

During the simulated enterprise laboratory organized at UPT numerous actions with advantages in training engineering students in line with the current needs of active employers in national and international labour market were facilitated.

The main activities were:

- Accurate simulation of real engineers working environment in a workspace where students were virtually exposed to various professional tasks and took appropriate professional behaviours, interacted easily with technical experts and teachers from partner companies and practice coordinators from the Politehnica University of Timisoara;
- Training a large number of students (200 students in Computer Science, Systems Engineering, Telecommunication Systems' Technology, Applied Electronics - second year of study) and the involvement as tutors of 8 technical experts from leading employers in the western area of Romania (OCE Canon, Continental Automotive Romania, HELLA, Flextronics Romania, ETA2U, Lasting Systems, Expert Consulting, MMD Design);
- Case studies and professional training courses provided by technical experts from partner companies, covering three important levels of engineering training (technical knowledge, business/entrepreneurial knowledge (project management, financial management etc.), professional communication skills (verbal and written interaction - company specific), in order to make students operational in a short time and without

ISBN 978-963-89559-7-5

extra charge for the employer (case studies examples: Redundant systems using virtualization technologies for infrastructure server (ETA2U), Server Monitoring on Mobile (OCE Canon), Internal audit management system in an organization from the automotive field (Continental), Tendering process / contract to carry out a Data Center (Lasting Systems));

- Sharing resources, information and professional experiences as well as their use in training future generations of students by the main actors involved in the practical training of students (partner universities, students, teachers, employers);
- Equipment and educational software developed and integrated in the online virtual environment.

The project has developed a methodology for conducting internship and student assessment that included instructional working methods, curricula for 90 hours, the assessment module and innovative use of ICT in the concept of virtual practice.

Practical placement is an academic compulsory activity that usually last 3 weeks in the summer, at the end of each academic year. This project extends this period over an academic semester, starting with February, with virtual activities, face-to-face meetings between students and their tutors from companies, constant communication and, at the end, a period of 1 week within the company.

Practical activity started with tutorials for tutors from the university, for students, tutors from companies on how to use the portal built for this purpose. The next step: students were distributed to companies, generally according to their options. Tutors from companies presented to students 2, 3, 5 or 8 themes, forming work teams associated with each theme.

The work methods, although the themes were different in type, have been somehow similar:

- Face to face presentations, explanations, questions;
- Homework, with results sent through the portal and discussed while direct meetings;
- Closure project, PowerPoint presentations and multiple choice test for evaluation;
- Visit and practice in enterprises close to the university and within the country.

A group of students with the best results followed a rigorous internship program in two representative companies that each partner involved in this project proposed: HELLA, Continental (Timisoara), Grimex, Inidan (Targu-Jiu), RoStar, AMRO Q Quadrant Beverages – Pepsico (Bucharest), and finally participated at the national seminar held at the Politehnica University of Bucharest, at the end of the entire process.

ISBN 978-963-89559-7-5

Project evaluation

The evaluation of the project *Simulated enterprise for work techniques in technology companies* has been done both from the point of view of students and of the companies.

Evaluation from the point of view of students

Tutors from the Politehnica University of Timisoara had discussions with the participating students, of which may be summarized as it follows:

- IS methodology was advantageous because it freed student summer holidays;
- Students' contact with people from companies created a clearer picture of how to work in a company;
- The suggested topics were related to real problems treated by employees of the company, so the information the students received came on the shortest path and it was very clear;
- Issues and documentation were clear and seriously presented, according to the standards of a company;
- All these issues have been a challenge for students and forced them to take the activity seriously;
- There have been students who have signed employment contracts for short and medium term with certain companies.

Evaluation from the point of view of companies

For companies, according to the tutors opinion the activity was a success for the following reasons:

- They had the opportunity to present the company to large groups of students (about 25 each);
- Strengthened cooperation with Politehnica University of Timisoara. All companies involved have a long history of cooperation with the University, and this activity came to support this collaboration;
- Students' problems became known and after participating at professional and organizational development it was possible to find the right students to employ.

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Focus group results

The results of the discussions in the focus group are summarized in Table 1.

Table 1 Focus groups results before 6 pts, after 3 pts, left aligned

Advantages	**Drawbacks**
Gaining confidence from the technological environment and from the economic environment in relation with universities / higher education	Highly professional trained tutors, but with minuses in transmitting information towards a group of students
The involvement of powerful multinational	
Teamwork – mix of students from different specializations, a plus for job interviews	Poor access to the platform
Encouraging the idea of "blended learning" – a mix between face to face meetings and remote access	
Extracurricular training	Improved Platform for specific applications
Employment opportunities – professional horizons were stretched	
Eliminate time spent/lost with public transportation towards the company, especially towards those located in the outskirts of the city	Infrastructure – computers, projector – purchased tardily
Using a qualified staff in companies while exposing technological processes	
Practice made during the semester in parallel with the actual teaching	Projects irrelevant to the company, in some cases
Determining priorities for professional development	
Information on internal procedures	

Testimonials from the companies

> *"The tasks and objectives have been met almost entirely with small exceptions regarding presentations and supporting them: Some pages were overloaded with text and others were too expedited. Presentation in front of an auditory revealed a certain timidity of some students and superficial trends for others."*

> *"Following the visit, the presentations from previous meetings and individual study found that most students were accustomed to the terminology and specific processes of production of electronic modules."*

> *"All participants have proven that they can perform tasks and can absorb in a short time the necessary knowledge. Attitude has been positive – being impressed with the way of working in a company/in a project – which is different than in college."*

ISBN 978-963-89559-7-5

Testimonials from the university tutors

> *"Students initially looked with disbelief at the simulated enterprise, but at the end of the activities they have perceived it as an effective activity that brought them a real gain both professionally and in terms of organizational, managerial, etc."*
>
> *"Students have taken seriously the themes offered by companies and have been seriously involved in solving them."*
>
> *"There was very good communication between the permanent tutors of the company and the University. There were no interruptions or incidents at any level."*
>
> *"Students have used the portal IS taking contact with such an application, necessary for some future activities."*

Conclusions

According to the project evaluation, done from the perspective of all involved actors (companies, university, students) the results proved to be positive. The companies were particularly happy that they were able to provide specific training for the students from the first year of study, and to accommodate students with the real working mentality about deadlines, internal communication, discipline, etc. The following year, many of the students participating in the project were accepted by the companies for internships and for taking part to joint project research. It is expected by the companies to cut-down the cost of training for their future young employees that should be better prepared for their working career. The university was happy to be able to provide a better practical training and to take advantage of the mentality change for some of the students that proved to become better motivated for studying and building their future careers.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

COMPARING LEARNERS' PERCEPTIONS AND EXPECTATIONS IN PROFESSIONAL TRAINING AND HIGHER EDUCATION: THE GERMAN PERSPECTIVE

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Introduction

Culture, particularly when related to basic values is often understood as a national phenomenon. Hofstede and Hofstede (2005, p.19) suggest that wherever and with whomever value-based culture is investigated within a nation, the results are fully transferable to any individual and social context within the same nation. In the 1970s, Hofstede (1980) investigated the working culture of IBM to determine how local work processes could be improved. For that purpose, he developed a standardized questionnaire, which he drove in national branches of IBM in 40 countries. For his sample, he eventually collected an impressive number of over 115.000 responses. He clustered the questions' results using *correlation* (Hofstede & Hofstede 2005, p.28) and found four dimensions, which he called '*Power Distance Index*' (idem, p.43), '*Individualism Index*' (idem, p.78), '*Masculinity Index*' (idem, p.120), and '*Uncertainty Avoidance Index*' (idem, p.168). For each dimension, he chose three to four questions with the highest level of correlation and transferred these results per country into national key scores per dimension. From these dimensional country-scores he deduced particular attitudes and perceptions of people in different social and thematic contexts (e.g., family, education, workplace, state). In a historical context, the taken approach was highly innovative, as comparative culture-analysis on national level was almost unknown. Sekaran (1983, p.69) wrote: '*Hofstede's research might be the beginnings of the foundation theories that could help scientific theory building in cross-cultural research. Hofstede's study encompassed 40 nations, had a big sample size, had longitudinal data, and used multivariate techniques to formulate some general theories regarding the ordering of nations across 4 dimensions.*' Because of its popularity (Jones, 2007), Hofstedes approach has been challenged unlike any other. Critique was expressed due many reasons, such as, the questionnaire design and the interpretation of results (32 questions led to 40 items) (Dorfman & Howell, 1988); the underlying concept of national culture in general (Ng et al., 2007); a massive simplification of the highly complex nature of culture (Groeschl & Doherty, 2000); methodological issues (Huo & Radall, 1991; Taras & Steel, 2009); the generalization of data that actually were collected in a very particular context (Javidan et al., 2006, p.898); the size of some national samples in general and the very selective choice of participants (McSweeney, 2002); the claim that the national scores will keep persistent over time (Fernandez et al., 1997; Spector et al., 2001); the reduction of culture to basic values (Tjafel & Turner, 1986), and a lacking selectivity between the dimensions (Cramer, 2007).

Some of the critiques that are related to Hofstede's model of cultural dimensions are quite fundamental and driven by emotions (Westwood & Everett, 1987). Most of the expressed critique against the national scores per dimension is reasonable and strongly encourages further investigations according to their general validity and scope. Additionally, the distance between the scale elements is not absolute but relative (Hofstede, 2011). We found that numerically equal distances (represented through the national scores) between national contexts cannot be assumed to represent comparative culture-related gaps (Richter et al., 2008). This issue, in particular, limits the opportunity to reasonably derive concrete conclusions for the design of culture-sensitive outputs, such as tangible products, computer applications and educational scenarios and material. Hofstede's cultural dimensions, in contrast, were confirmed (Søndergaard, 1994) in various other investigations, including the later found fifth dimension 'short and long-term orientation' (Hofstede & Hofstede, 2005, p.211). We think neither should Hofstede's cultural dimensions nor the related national scores be abandoned because they still have their value for academic purposes, but also in a practical sense. We experienced the national scores being very supportive as rough indicators (Williamson, 2002, p.1381) for an initial assessment of the need to drive further costly investigations: If two countries are indicated to being culturally very close to each other (according to a specifically relevant dimension), the risk for a clients' rejection of a product might be quite low if the product has already fully been accepted within one of both national contexts.

The discipline "Information Systems" (IS) is one of the core-disciplines contributing to the further development of Technology Enhanced Learning. As the bridging-discipline with a focus on people, technology and application systems, it mainly is responsible for the modelling of educational processes and the development of application systems, such as Learning Management Systems, groupware, authoring tools, etc. Myers and Tan (2002), Leidner and Kayworth (2006), and Ali et al. (2009) investigated IS literature according to determine the common practice of culture-related research in this field. Their analysis revealed that in more than 70% of all included papers, the authors adopted Hofstede's dimension model. Design decisions were taken from the related national scores without applying further detailed investigations. Above mentioned studies on IS literature were limited to studies that had been published in US journals. In order to find out if a similar trend and practice could be found within the German IS, we repeated the analysis for the two most popular IS Journals in the German speaking countries (Richter & Adelsberger, 2011). We particularly focused our investigation on the authors' argumentation regarding these particular research design decisions. In this context, we additionally considered the same papers that had been chosen by Myers and Tan (2002), Leidner and Kayworth (2006), and Ali et al. (2009). The only reasoning we found amongst all these papers came from Johnston and

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Wright (2004, p.234) who explained that '*There are other ways to operationalize culture, but we have chosen this one* [...] *it is the work usually selected by the researchers*'.

The author argues that one's culture, at least to some extent, always is related to particular (individual and collective) experiences. In terms of education, this means that a learner, who experienced particular services in his/her past, might perceive such services as usual (educational culture) and thus, expect them to be delivered in any kind of learning scenario. In German universities, education is meant to be a full-time job and usually is designed to provide a broad basis of theoretical and methodological knowledge. Achieving methodological competences is a core goal of German academic education: Once a student leaves the university, he/she is expected to decide about appropriate methods for any kind of problem (in the field of study and above) and how to modify the known methods in case of need. In contrast, in professional training, the learners have to study in extra-occupational situations (time is a serious issue) and might expect training that pointedly prepares them for very specific tasks. We assume that such a scenario has its own educational culture. Thus, when designing learning contents and learning scenarios for professional training, meeting the learners' expectations and contextual peculiarities might be essential for the learning success. For our investigation, we wanted to know, if expectations of learners and their perceptions regarding professional training actually differ between organizations.

Study setting

We adopted our standardized and already established questionnaire (Richter, 2011; Richter & Adelsberger, 2013) from our on-going survey "Learning Culture" that originally focuses on higher education. We slightly modified the questionnaire according to the targeted professional context ("professor" became "instructor") and used its paper form. On a 4-point Likert scale (ranging from fully agree – fully disagree), the respondents were asked to express their perceptions of education according to 100 culture-related statements in the following general categories:

- relationship between learners and instructors; perceptions towards laud and admonition; group building processes; communication style; behaviour in groups;
- time management;
- value of errors; the type of user activity; expectations towards personal coaching;
- demand to influence learning contents;
- how and when feedback is to be provided;
- gender-related issues.

For the questions, we considered issues that were reported to cause conflicts in education. We invited 30 traditional German stock-noted enterprises for participation. The implementation of the questionnaire proved elusive because none of the enterprises had an own interest in the results. Thus, they did not want to invest much working-time for their contribution. However, we were able to convince 7 DAX-noted enterprises from different sectors to support us with a

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defined number of participants. All seven enterprises agreed to randomly invite 25 employees. The agreed condition for participation was that each involved employee must have experiences with professional training (within the enterprise) and a position in which such training usually is provided. The non-response rate was quite high, so that in 5/7 enterprises four and less employees completed the questionnaire. In the remaining two enterprises, which were a telecommunication company (German Telecom) and an energy producing company (RWE), we received 7 and 14 responses (out of 25 invitees). Following the recommendation of Baur (2008) for ordinal-scaled data, we binarized the results into positive and negative outcomes and focused our analysis on the percentage of positive answers.

Findings

In the following, the findings of our survey are introduced and discussed. Since we consider the specific details for each of the investigated enterprises as less interesting for the community, we focus our discussion on the items that are most significant in regard to the original research question. The questionnaire with its 100 items will neither be introduced in detail. For recognition, the full questionnaire is publically available at:

http://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-34756/201402_Learning_Culture_Due_Publico_Version.pdf

The results from our study are displayed in net diagrams. The items in each of the net diagrams are clustered according different sections within the questionnaire. In this constellation, particular patterns get visible and comparable that otherwise (in tables or block diagrams) would be difficult to recognize. Each axis of a net diagram represents a single questionnaire item with regard to the percentage of positive answers. The spaces between the axes are undefined. On the scale, we understand responses between 40% and 60% as individual (normal distribution) and not as culturally biased. Results below 40% clearly show rejections and above 60%, agreement. In the following, we display both the average positive results from the investigated German enterprises (AE) and our corresponding results from the German higher education context (HE, 1817 respondents from three universities).

ISBN 978-963-89559-7-5

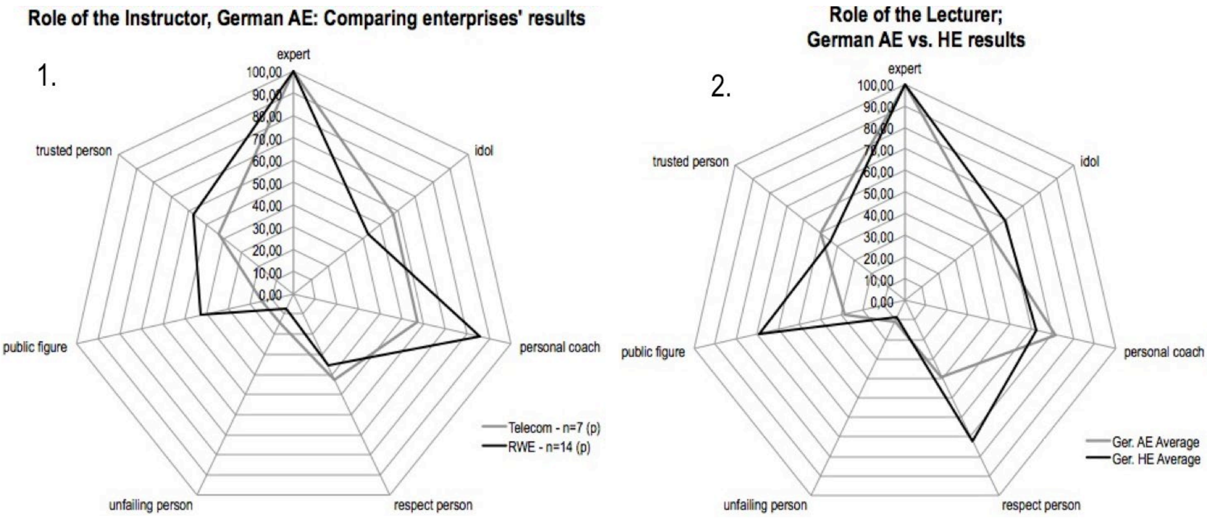

Figure 1. Role of the Lecturer: Results of enterprises (1) and comparing German AE with HE (2)

Figure 1 displays the learners' understanding of the role of the lecturer in their context of education. Comparing the both enterprises, RWE seems to have a higher developed tradition in personal coaching then the German Telecom. Contrasting the results from AE and HE, the work experience, professional standing and age of the participants seems to influence the results: While university students rather see a public figure and a respect person in their professors, the professionals do not recognize such an "imbalance of power" regarding their instructors.

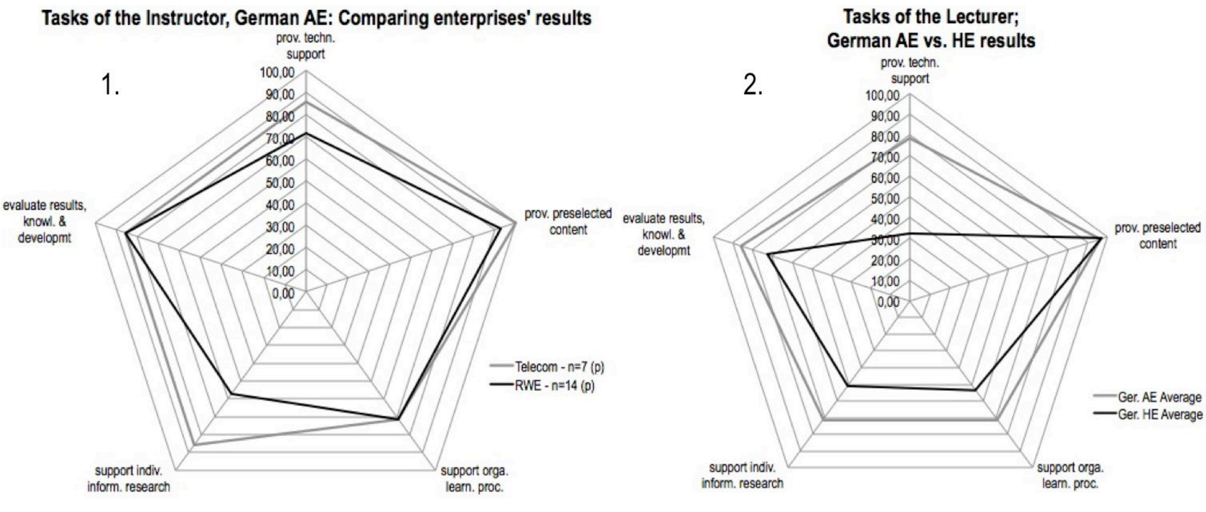

Figure 2. Tasks of the Lecturer: Results of enterprises (1) and comparing German AE with HE (2)

In Figure 2 particular services are focused, that the learners expect to receive from their professors/instructors. The learners in professional training generally express similar expectations. Smaller differences can be found according to the individual information research (Telecom: lecturer is expected to provide literature) and technological support (Telecom: the participants expect the lecturer to help if technological problems occur). Huge differences can be found between the AE and the HE contexts: In the German HE, beginner-classes in popular fields of study can reach a high number of students and thus, caring for

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individual needs is almost impossible. In all three items that are related to rather individual problems, the university students have little expectations. The professionals are much more demanding which is understandable given that they study besides their regular work.

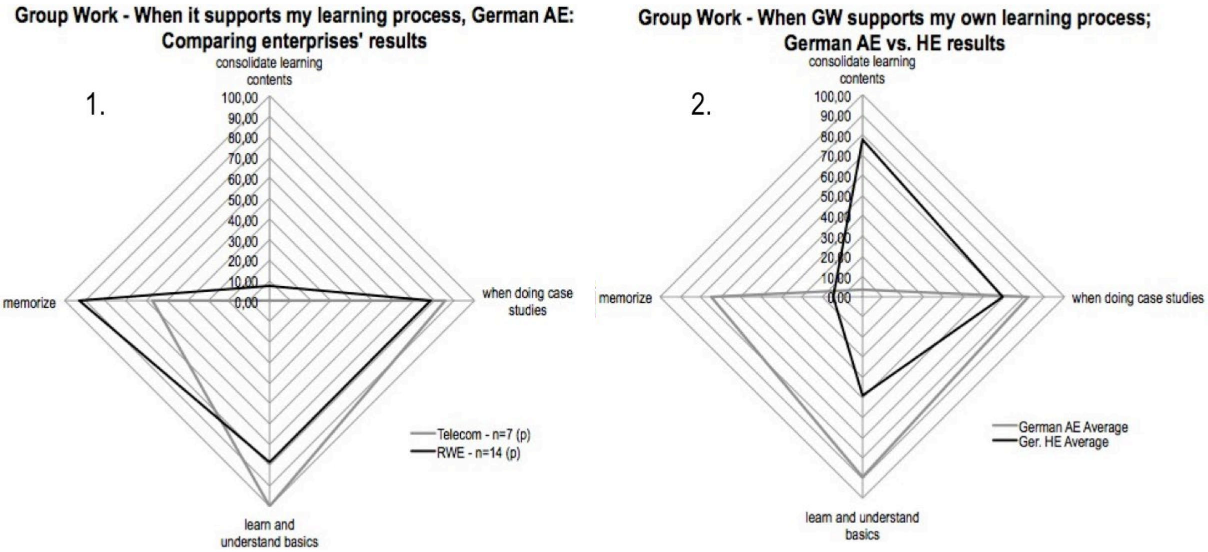

Figure 3. When group work supports my learning process: Results of enterprises (1) and comparing German AE with HE (2)

Figure 3 shows that for all employees, consolidation of learning contents (which actually is best to be done in a group) generally is irrelevant (provided learning entities are related to particular tasks). This is a big issue for the students who have to consolidate vast amounts of content and learned methodologies. Employees from both enterprises and students similarly report that doing case studies in the group is helpful. In contrast to the students, the employees of both enterprises perceive learning and understanding of basics in groups as feasible. Different to the employees who commonly study in a particular field, the students have a variety of elective courses (different learning groups would need to be organized). The employees from RWE, reported memorizing in groups being helpful. In case of Telecom the related answer is undecided (individual). This divergence could have its reason in the respective educational design of the organisations (behaviourist vs. cognitivist learning paradigm).

In Figure 4, the results according to our questions on time management are represented. For the employees' questionnaire, the original topic question was changed from "do your work" to "complete your learning tasks". In both enterprises the point of time when learning tasks are started and the adherence to schedules when it comes to completing learning tasks, appear to be individual issues as in both cases, the results show between 40% and 60% positive answers. Employees from Telecom are deeply involved in project work with fixed deadlines while the (herein involved) employees of RWE rather deal with continuous tasks. This might be an explanation for this divergence. Employees from both enterprises clearly report challenges in meeting related deadlines and that they tend to complete their learning tasks on the point. The university students rather tend to start their work early and particularly report always to meet

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their deadlines. In German universities, meeting submission deadlines is a crucial condition for passing the exams. Too late submitted work results often are not accepted anymore. Since for the students, studying is a fulltime job, they appear not to experience great challenges in meeting deadlines.

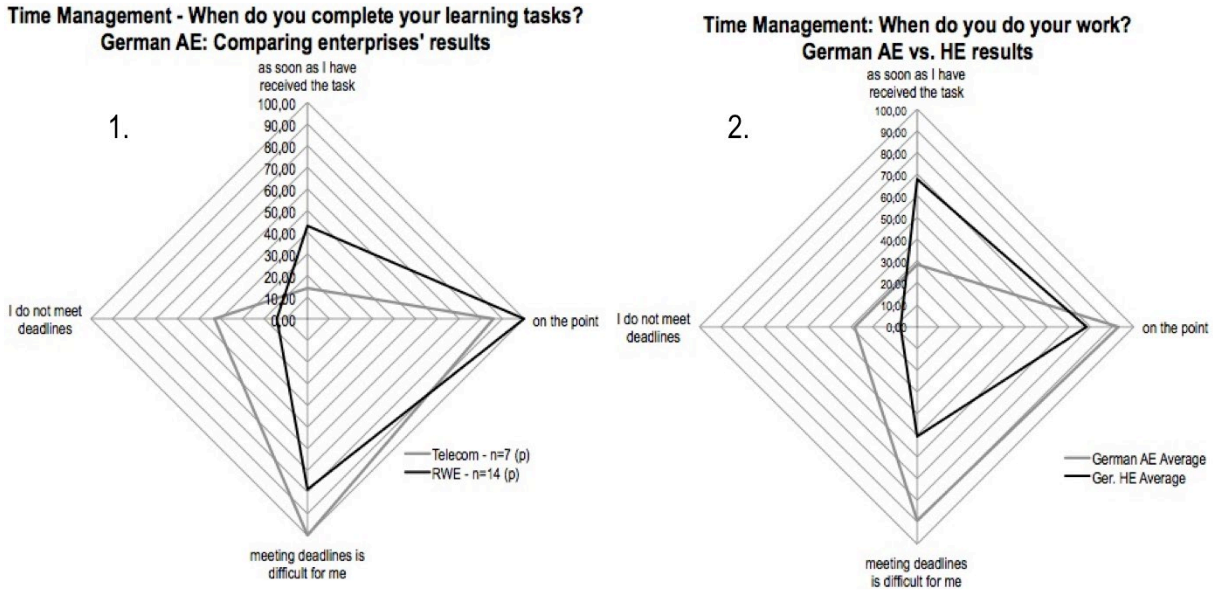

Figure 4. Time Management: Results of enterprises (1) and comparing German AE with HE (2)

Conclusion

We found several differences according to the learners' perceptions of and expectations towards education. Smaller differences were found between the two enterprises but those between the professional and the university context were most significant, reflecting the specific attributes of both scenarios of education. Even though the sample sizes of the enterprises were quite small, and thus, are not representative of these large concerns, the differences were explainable, particularly between the context of professional training and the university context. Learning scenarios that were produced for the context of higher education might need adaptation in order to meet the requirements of learners in the context of professional training. The found diversity in the answers from the two enterprises allows the conclusion that the organisational culture generally influences the enterprises' educational culture. As a general conclusion we can assume that generalizing research results that were solely achieved from national university students might lead to an inappropriate design of learning scenarios for particular professional contexts. Professional training for a particular enterprise should be developed according to its specific educational culture. The Learning Culture survey revealed as an appropriate tool for such investigations.

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Further steps

The Learning Culture Survey focuses on higher education but also offers enterprises the opportunity to analyse their own educational culture in order to produce (or order) best suitable and learner-centred professional training. Many open questions still remain and the survey is driven forward by chance. Its progress highly depends on (mainly) voluntary support through universities and enterprises. Currently, questionnaire versions are available in Bulgarian, English, French, German, Greek, Japanese, Korean, Portuguese, Russian, and Turkish. All language versions are (being) implemented in our online survey system and each study receives an individual instance of the questionnaire.

Due to data protection regulations, we cannot directly address the learners in universities and enterprises. Thus, in order to proceed, we would like to invite universities and enterprises from all over the world to support the Learning Culture Survey. Support can be granted through sending invitations for participation to their local learners (after making an arrangement with us) or through contributing further translations. Once, the data collection is completed, we are willing to share the results (reports) with the supporting institutions and organizations.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

IN SEARCH OF EMPIRICAL EVIDENCE FOR A GROWTH PATH TO CRITICAL REFLECTION

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Abstract

During their studies, pre-service teachers are continually asked to reflect. Hereby is mainly expected that they reach a level of critical reflection. Critical reflection is often described as a growth path in different phases, with critical reflection as endpoint. It is unclear whether empirical research confirms this growth path. To check whether a growth path with critical reflection as endpoint can be empirical confirmed, 596 reflections from four different empirical studies with pre-service teachers were taken in a secondary analysis. The results from this secondary analysis reveal that 1) participants score very low on critical reflection and 2) the idea of a growth path with critical reflection as endpoint, can not be confirmed. Focus shift is possibly a description that is closer to the empirical findings. Based on the results of this study, possible implications for the supervision of students are described.

Introduction

During their studies, pre-service teachers are continually asked to reflect (Calderhead & Gates, 1993; Korthagen & Vasalos, 2005). Although teachers-in-training are often asked to reflect, is there nevertheless still confusion about the concept of reflection (Henderson, Napan & Monteiro, 2004; Kinsella, 2007).

An important contribution in this debate is provided by Kelchtermans (2001). Kelchtermans (2001) distinguishes in-depth and in-breadth reflection. In-breadth reflection comprises the emotional, technical, moral and political dimensions. In-depth reflection refers to a personal interpretative framework and includes two domains: professional self-understanding and subjective educational theory.

According to Kelchtermans (2001, 2009), a reflection may be considered as a critical one when it includes moral and political agendas in the work context, and goes beyond the level of action to the level of underlying beliefs, ideas, knowledge and goals (personal interpretative framework). Without this deep and critical character, reflection may become nothing more than a procedure; “a method or coping strategy that confirms and continues the status quo” (Kelchtermans, 2009, p.269). In this paper we use the theoretical model of Kelchtermans to describe reflection.

Table 2: Theoretical model reflection*Critical reflection

Reflection					
In-breadth reflection				**In-depth reflection Personal interpretative framework**	
Emotional dimension	Technical dimension	Moral dimension	Political dimension	Domain subjective educational theory	Domain professional self-understanding
					Components - self-image - self-esteem - job motivation - future perspective - task perception
		Critical reflection			

Several theoretical models suggest that the notion of critical reflection assumes a growth path with different phases whereby the level critical reflection is an endpoint (e.g. Lee, 2005; van Manen, 1977).

In this study we investigate whether a grow path with different phases to the level of critical reflection can be confirmed through empirical research with pre-service teachers.

Design of the study

Participants

In total, 464 pre-service teachers participated in the different studies. 180 followed a pre-school, 183 primary school and 101 secondary school teacher training. 44 participants were in the third year of their training (see 1st study), 420 in the first year (see 2nd, 3rd and 4th study). In the first and third study, participants are pre-school and primary student-teachers. In the third study participants are secondary school student-teachers, and in the fourth study participants are primary school student-teachers (see Table 2).

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Table 2: Overview participants

Teacher training	Year of training	Participants
Pre-school	First	153
	Third	27
	Total	180
Primary school	First	166
	Third	17
	Total	183
Secondary school	First	101
	Total	101
		464

Methodology

A total of four studies were included in a secondary research. The choice for just these (and only these) four studies are related to the fact that in each study:

1. participants are pre-service teachers,
2. the theoretical model of Kelchtermans was used to describe the notion of reflection, and
3. the same method was used to determine the extent to which reflections reach a critical level.

In the first study, a field experiment with a within subjects design was used; in the second an online experiment with a pre-test post-tests control group design; in the third and fourth study respectively an experiment with a pre-test post-tests and a post-tests only control group design (Callens, 2012).

Like other approaches to measure the degree of critical reflection (Granberg, 2010; Carrington & Selva, 2010), in the four studies a framework was used. In each study this framework consisted of descriptions of different categories that are used to analyze the reflections (Callens, 2012). The categories used in the four studies were referring respectively to inbreadth-reflection and in-depth reflection, see theoretical model of Kelchtermans. As one element in a reflection of a participant refers to a category/indicator, an assessor gives the score one; when two elements refer to a category/indicator the score 2, and so on.

Results

The mean score on critical reflection is very low and a high SD is found (mean = 0.47, SD = 1.00). A one-way ANOVA with training year as independent variable and the degree of critical reflection as dependent variable, reveals a weak to moderate main effect ($F (1,594) = 23.28$, $p = 0.00$, $eta^2 = 0.03$). Third year students score higher on critical reflection (mean = 0.77, SD = 1.39) than freshmen (mean = 0.34, SD = 0.75). A descriptive analysis reveals that:

1. starting students pay special attention to technical aspects of teaching;

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2. third years focus less on technical aspects but more on: structural and organizational context of a school (cf. political dimension), an emotional dimension and components of professional self-understanding;
3. first year students score almost as high as third years on the domain educational subjective educational theory; and
4. the moral dimension scores extremely low in all studies.

Table 3: Overview scores dimensions /domains reflection

Reflection							
In-breadth reflection						**In-depth reflection Personal interpretative framework**	
		sum emotional dimension	sum technical dimension	sum moral dimension	sum political dimension	sum subjective educational theory	sum domain professional self-understanding
First study	Third year students	220	16	2	29	41	63
Second study	First year students	23	73	0	4	58	4
Third study	First year students	23	61	0	0	33	1
Fourth study	First year students	28	46	3	3	24	11
	Total	**294**	**196**	**5**	**36**	**156**	**79**
				Critical reflection			

Table 4: Score dimensions/domains reflection

Participants	**Dimensions/domains**	**Mean score**	**SD**	**N**
First years	emotional dimension	.18	.62	420
	technical dimension	.43	.84	420
	moral dimension	.01	.10	420
	political dimension	.02	.17	420
	subjective educational theory	.27	.69	420
	prof. self understanding	.04	.20	420
Third years	emotional dimension	1.25	1.12	176
	technical dimension	.09	.40	176
	moral dimension	.01	.10	176
	political dimension	.16	.63	176
	subjective educational theory	.23	.73	176
	prof. self understanding	.36	.80	176

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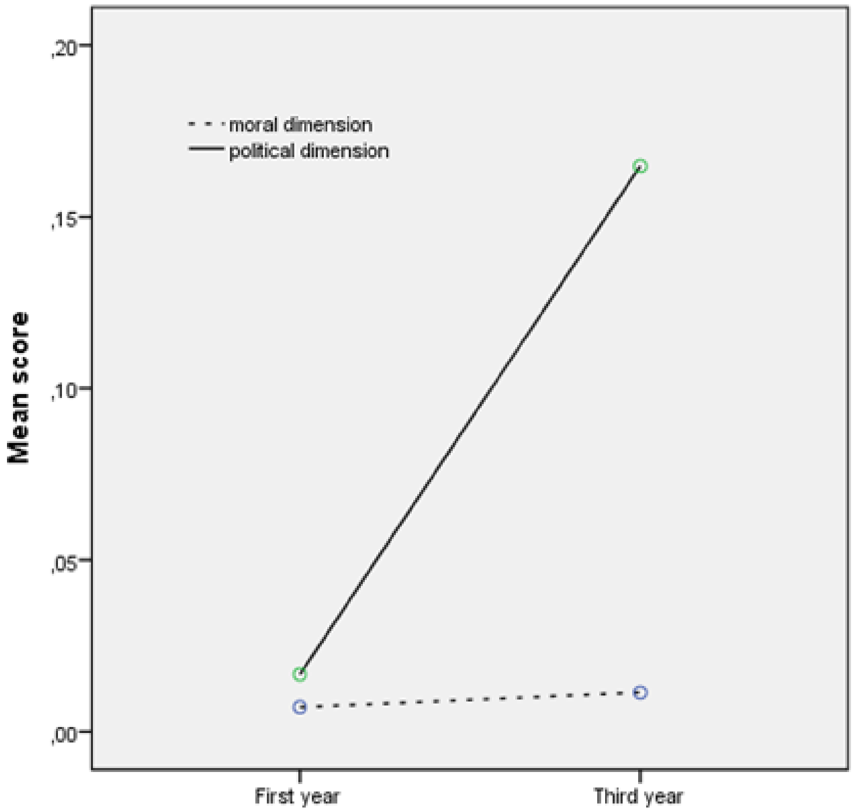

Figure 5. Profile plot*Politica land moral dimensions

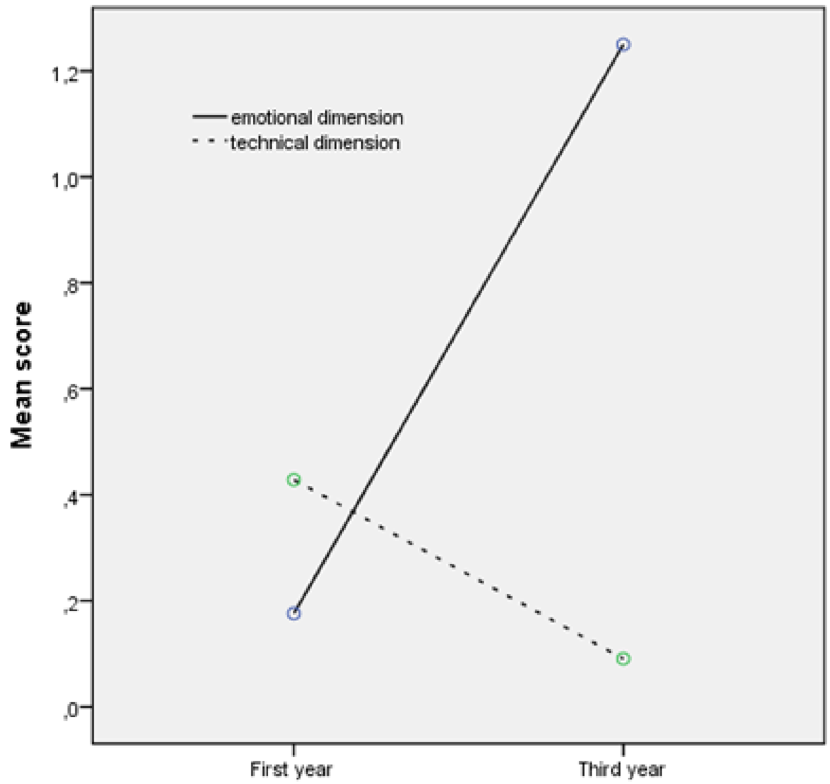

Figure 2. Profile plot*Technical and emotional dimensions

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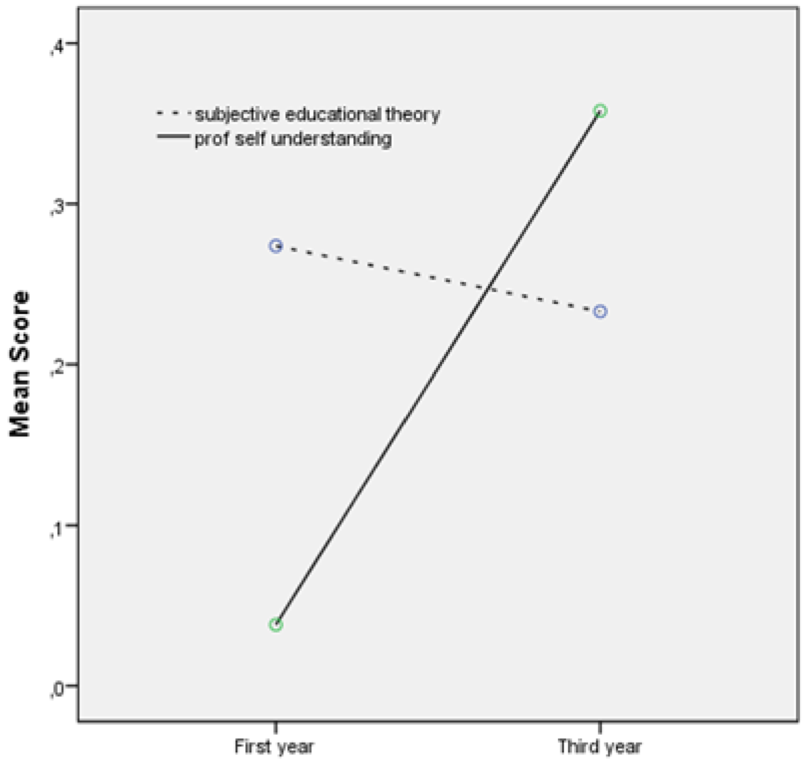

Figure 3. Profile plot*Domain subj educational theory and prof self understanding

Conclusions

Based on the results of this research, the idea of a growth path with different phases and with as endpoint the level of critical reflection, cannot be confirmed. Focus shift (with a varying attention of the students to certain aspects of a reflection process) is possibly a description that is closer to the empirical findings obtained with this conducted secondary analysis.

Implications of this study for an educational practice? Firstly, the focus shift in the reflections of pre-service teachers, may have impact on the guidance of a reflection process. When we take the perspective of the learner as starting point to determine the items where pre-service teachers could reflect on, it seems that the technical dimension and the domain subjective educational theory can stand at the heart of a start-up phase. If the student is more advanced in his/her teacher training, the emphasis may be on the domain professional self-understanding, the emotional and political dimension and finally on the moral dimension.

To conclude, following Carrington and Selva (2010), it seems interesting in future studies to determine whether the explicit incorporation of the emphasis on certain dimensions / domains actually helps students in their development to the level of critical reflection.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

INVESTIGATING RELATIONSHIP BETWEEN SELF- AND CO-REGULATORY LEARNING PROCESSES IN A WORKPLACE E-LEARNING SYSTEM

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Abstract

While supporting regulatory learning processes in work environments is increasingly becoming important, there is not a clear picture of the interaction between self- and co-regulatory processes performed by learners in workplace e-learning systems. In this paper, by following a design-based research methodology, we develop a theory-based framework to support the design of an e-learning system aiming at supporting learning regulatory processes in work environments. Then we evaluat the relationship between self- and co-regulatory processes conducted by 177 users in a prototype built upon this framework. The results suggest that there is a significant relationship between self- and co-regulatory learning processes.

Introduction

While learner-centric theories such as self-regulated learning (SRL) seem appropriate to inform the design of e-learning systems aiming at enhancing learner's control, there are deficiencies within SRL research when applied within workplace settings. Historically, SRL has been conceptualised and researched from an individual perspective within formal settings with disconnected individuals, emphasising cognitive and meta-cognitive aspects of learning processes. As asserted by Voelt, Vauras, and Salonen (2009), one deficiency of most SRL models is the reduction of the regulating process to the individuals "with little consideration of the vertical infiltrations from higher systemic levels (i.e., interpersonal interactions, relationships, social structures, socio-cultural structure" (p.6). According to Voelt, Vauras, and Salonen (2009), any reductionism to either the individual or the social levels can neglect important aspects of actual learning settings, including:

- the real time multimodal and multilevel learning processes,
- the context and its situational cues which trigger differential appraisals and regulatory patterns in persons with different response tendencies,

- the developmental history and individual psychological organization, and
- the development history of interpersonal organization.

Recently, there has been increasing attention given to the context in which the regulatory process takes place and the social and emotional processes which are components of it (Boekaerts, 1999). However, it is still unclear how the individual and social aspects of regulation processes interact and contribute to explain individual and group engagement in real-life learning situations (Grau & Whitebread, 2012; Voelt, Vauras, & Salonen, 2009).

The purpose of this paper is to propose a theory-based framework to design e-learning systems aiming at supporting learning regulatory processes in work environments and then to analyze the relationship between self- and co-regulatory processes performed by learners in a prototype built upon this framework. In the remaining sections of this paper by following a design-based research approach, first we identify a practical learning problem in a work environment and then develop a theory-based framework and solution to address the identified problem. Then, we describe the implementation of a prototype built upon this framework. Finally, we scrutinize the possible relationship between self- and co-regulatory processes accomplished by learners in this prototype.

Design-based research methodology

To design a technology-based aiming at supporting regulated learning processes and get insight into the interplay between these processes, we adopted a design-based research (DBR-) approach. Design-based research is a research methodology that focuses, simultaneously, on practice and theory through finding and solving practical problems and providing design principles. Design-based research is an iterative process comprised of four phases (Reeves et al., 2005):

1. identifying and analyzing a complex real world educational problem in the research context by researchers and practitioners in collaboration,
2. generating a solution based on reviewing existing theories and consulting with practitioners,
3. evaluating the solution by gathering empirical data, and
4. reflecting on the design experience to refine the solution and construct theoretical knowledge.

Analysis of a practical problem

The context of this research is the *customer contact center (CCC)* of Achmea insurance company in Netherlands. Communicating with customers to sell insurance products and providing accurate and quick answers to their requests and questions are the main activities of the CCC salespersons. The performance of salespersons in these activities has direct effects on selling products, satisfying customers' needs, and the company reputation and, therefore, can

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largely influence the organization's objectives and benefits. During the interviews with sales managers and salespersons it was realized that the salespersons' organizational awareness, or their update knowledge about occurred changes in relevant insurance information, can largely influence their performance. During the requirements' analysis phase several reasons have been revealed which could undermine these salespersons' awareness, including:

- rapid and frequent changes in the required information sources such as the national and international policies, rules, and legislations with direct impact on customers; new products, procedures and services within the organization; information about other competitors companies and their taken approaches,
- high working pressure and tight working structure resulted in the lack of adequate time for updating their knowledge, and
- lack of appropriate technology-based learning environment to support and facilitate self- and co-regulatory learning processes.

Development of a theory-informed solution

Any e-learning system aims to support and enhance the regulatory learning processes in workplace settings should address several requirements. First, it should conform to the principles of adult learning. Tynjälä and Häkkinen (2005) described the main elements of adult learning theories useful to inform the design of e-learning systems for work environments. According to them, learning in work environments should

- recognise the learner's experience,
- involve the learner in reflective process and social processes,
- follow a context-based and problem-oriented approach, and
- benefit both personal development and organizational learning processes.

Second, supportive social and emotional learning environment and interpersonal relationships are important elements to support and sustain self-regulated learning processes in work environments. Accordingly, one function of an e-learning system in work environments should be the development of a good emotional and motivational atmosphere in a working group through playful activities (Tynjälä & Häkkinen, 2005). One possible way to fulfil this functionality is to combine educational games with collaborative-based learning scenarios. This combination introduces a fun element to the learning environment and can stimulate competition-based learning and motivate learners to actively participate in the learning activities by promoting their desire to improve, interacting with information and tools as well as by collaborating with other learners within the game, and exciting awe and pleasure (Kim et al., 2009).

Third, during the past decade, interest in the flexible delivery and learning as a preferred training and learning method in workplace settings has increased (Smith, 2003). Flexible delivery is built upon a perception that training and learning methods need to be more responsive to changing requirements of the organizations and increase enterprise

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competitiveness (Stewart & Winter, 1995) through fulfilling diverse learning needs of employees and preparing them to be self-directed and autonomous learners. Accordingly, central feature of a learning environment built upon the flexible delivery approaches is to support learners control over what, where, when and how to learn (Smith, 2003).

Fourth, as explained by Zimmerman, Bonner and Kovach (1996), four factors are essential in carrying out individual regulatory learning processes being *learning schedules*, *materials*, *scenarios*, and *quality*. Learning schedules are required to help the learners make their own learning methodical. Also, the learners need qualitative learning materials as well as appropriate learning scenarios to assist them to get rid of challenging with the difficulties and complexities of accessing the learning materials or other sorts of distractions (Shih et al., 2010).

Equipped with these principles, a conceptual framework as shown in Figure 1, was developed to be used to support the design of an e-learning system to address the identified problem in this context. The rationale behind this framework states that organizing learning in flexible ways can support learners' autonomy and assist them to tailor the e-learning system to their learning requirements. Further, providing the learners with appropriate structure in terms of learning schedules, scenarios, and content can accelerate their knowledge updating process and support them to keep control over their learning process. Moreover, the principles of adult learning provide guidelines to design and implement context-based and authentic learning situations and meaningful content. Finally, employing social game-based learning strategies has the potential to trigger and sustain a shared regulation process through building and fostering learners' motivation.

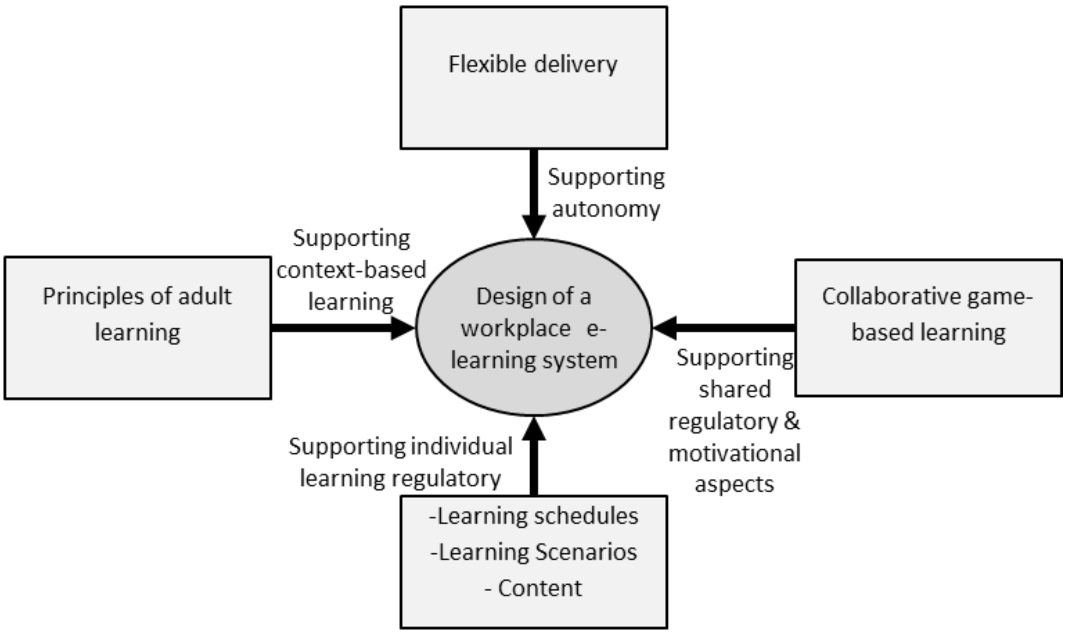

Figure 1. A framework to support the design of an e-learning system for work environments

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Implementation of a prototype

Figure 2 illustrates the architecture of a prototype, called as 'PowerApp', built upon the proposed framework. According to this architecture, each learner is provided with personalized learning content based on criteria such as the learner's previous activities in PowerApp and organizational parameters. The content-base provides the learners with a wealth of various learning content in terms of brain snack, brain breaker, and poll questions, where they can choose and learn according to their needs and preferences. To make learning meaningful and context-based, the content items are developed by an expert team according to the real situations, problems and practices of work environments. To support fast learning and comply with the limited learning time of employees, each content combines small amount of information in text or graphic formats to be read or answered in short time periods.

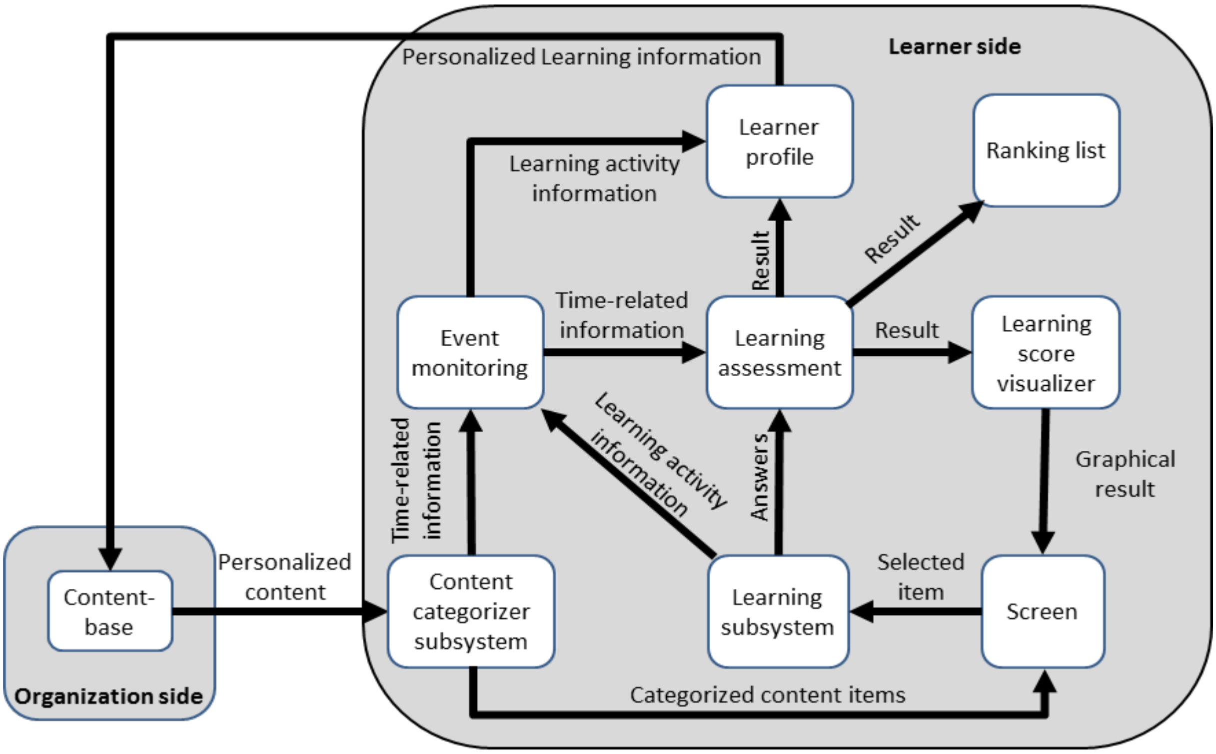

Figure 2. Architecture of the PowerApp prototype

The content categorizer subsystem categorizes content items and sends them to PowerApp's screen. To support this categorizing process, each content item has three features namely

- the type of the learning function,
- the type of the knowledge category and
- the time indicator.

Type of learning function

The type of learning function determines the way that the content item can be practiced and learned by the learner. There are four types of learning function supported by PowerApp: brain snack, brain breaker, poll question, and duel-learning game. Brain snacks (BS) are content items that provide kind of did-you-know information on a particular topic. Brain breakers (BB) are content items that go more in depth than BSs by providing some information in a particular topic to be read by learners, and then assessing and evaluating their understanding about the content through asking some questions. Poll questions are multiple-choice questions aiming at knowing the employees' opinions about a specific topic. With the Duel-learning game items the learner can select a peer to challenge each other knowledge in a specific topic by asking a series of multiple-choice questions that come from the content-base. To play a duel-learn game, first the challenger should invite an opponent peer to the duel-learning game and then to choose a knowledge category in which the questions would go. After accepting the invitation request by the opponent, the duel-game starts and the challenger and opponent both answer the same questions in a specific time sequence and get a score based on the number of right answers and the speed of their answering. After answering all questions the peers immediately will be informed about the result of the game. The final scores are shown in a public ranking list to be seen by other users. If one of peers does not answer her question within specified time duration the duel-learning game will be cancelled.

Type of knowledge category

To increase their awareness and support organizational objectives and requirements, the employees need to learn four types of information and knowledge: knowledge about insurance industry, financial and procedural knowledge, skills, and organizational culture. Each content item contains information pertain to one of these four categories.

Time indicator

Time management is a key element of self-regulated learning process. Due to the employees' high working pressure and limited learning time, developing effective time management skills and facilitating the use of short time periods between consecutive calls for learning purposes was one of the main functional requirements of PowerApp. Therefore, to develop the time management skills and encourage learners to access content items rapidly, as a part of learning schedule, a time-based scoring mechanism was implemented in PowerApp. Based on this mechanism, the event monitoring subsystem receives the time-related information about the learner's learning activities and sends them for the learning assessment subsystem. The learning assessment subsystem then calculates the learning scores of the learner based on her performance in learning subsystem and time variable. In other words, if an employee answers a content item correctly in the first week of releasing the content, she will receive more score

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than an employee who answers the same question correctly in the second week after releasing the content.

PowerApp provides each learner a personalized screen where the learner can manage and direct her learning activities. Figure 3 illustrates different parts of this screen. As shown in this figure, the screen consists of two main parts, including learning score visualizer (the top part) and a scrollable part to be used as an activity space to select, manage, and learn content items (the down part). Each puppet in the learning score visualizer part is assigned to a knowledge category and presents the learning score of that knowledge category earned by the learner through reading or answering related content items. By passing time, the filled level of each puppet diminishes slowly. By reading and answering content items or doing duel-learning games the puppets will be filled up based on the level earned learning score. This visualizing mechanism follows two purposes:

1. to encourage the learner to update her knowledge continuously, and
2. to build learner's internal motivation by satisfying her feeling of accomplishment and reputation.

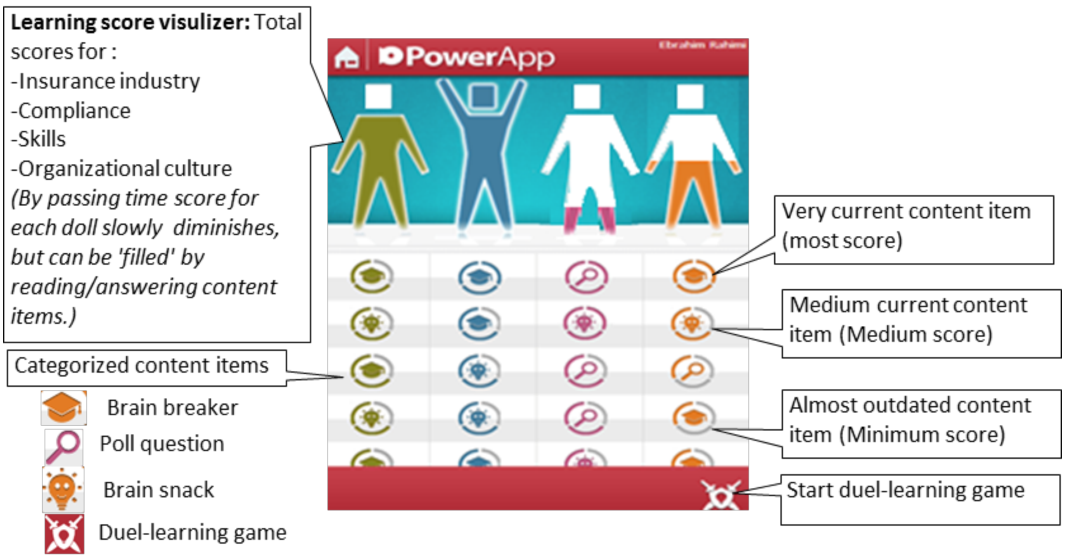

Figure 3. The personalized screen of the PowerApp prototype

Evaluation and testing of PowerApp

The objective of this research is to investigate the relationship between the self- and co-regulatory learning processes performed by learners using PowerApp. The following research question directed the data collection and analysis processes: Is there a relationship between individual-basis and social-basis regulatory behaviours of employees in PowerApp?

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Research setup and participants

To answer the posed question, an experiment was conducted with a pilot group consisting of 177 managers and employees from 21 teams belonging to 5 different subdivisions of the organization. The participating users consisted 59.32% of female (n=105) and 40.68% of male (n=72) participants. The users aged from 18 to 61, with a mean age of 36.98 years (S.D.=10.83). Before starting the evaluation process, the participating users were informed about the functionalities and objectives of PowerApp by their managers and through workshops. For users different accounts were created by which they could access PowerApp inside and outside of the company via Internet. The users were encouraged to access and use PowerApp at their free times especially between consecutive calls in order to reduce its influence on their job's productivity. There was a team of technical and content experts available to solve technical or content-related problems. At beginning, a limited number of content items were uploaded in PowerApp and every Monday a new batch of content items was uploaded to the system. The evaluation phase lasted 45 days.

Data collection and analysis process

To answer the posed research question, the actual data about all activities performed by the users stored in PowerApp data logs were retrieved and analyzed. To define metrics to measure self-regulated learning process, we used the constructed defined by the Online Self-Regulated Learning Questionnaire (OSLQ) (Barnard, Paton & Lan, 2008). The OSLQ defines six constructs to measure the individual-based regulatory process, including: goal setting, time management, task strategies, and self-evaluation. As self-regulated learning skills and strategies are "highly context dependent" (Schunk, 1989), we appropriated these constructs according to the architecture and functionalities of PowerApp by defining three metrics: Time index (time management), diversity of content (goal setting), and individual activeness (task strategies and self-evaluation):

- **Time index** – Refers to the number of days a user accessed the system to do individual-based learning activities. This metric was used to measure the time management aspect of the self-regulatory process followed by the user in using PowerApp.
- **Diversity of chosen content categories** – Refers to the number of different content categories a user read or answered during performing individual-based learning activities. This metric was used to measure the goal setting aspect of the self-regulatory process followed by the user in using PowerApp.
- **Individual activeness** – Refers to the number of individual learning activities accomplished by a user in PowerApp. The individual-based learning activities that the user performs consist of different learning functions (i.e. brain breaker, poll question, and brain snack) and assessing her knowledge by answering brain choices and brain selects. The former corresponds to the task strategies construct of OSLQ and the latter corresponds to the self-evaluation construct. Accordingly, the individual activeness

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metric was used to measure both the task strategy and self-evaluation aspects of the self-regulatory process followed by the user in using PowerApp.

- **Co-regulation metric** – PowerApp mainly has capitalized on duel-learning games to support and foster co-regulatory learning process among the users. In order to measure the level of co-regulation performed by a user in PowerApp, we first identified the number of duel-learning games initiated, accepted and continued by a user as an initial index. Then, as during each duel-learning game the user answers to five questions, we multiplied this index by five to calculate the co-regulation metric for the user.

We used several tools including Microsoft Access, Excel, and SPSS for facilitating the processes of retrieving, collecting, and analysing data and measuring these constructs for all the users participating in this pilot study. After measuring these constructs for each user, the Pearson's correlation analysis was used to determine the correlation between self- and co-regulatory learning processes.

Results

This section describes the statistical relationship between the defined constructs. Table 1 provides summary statistics for these constructs for the entire sample in the analysis. According to this table, the individual activeness ranges from 0 to 160 with a mean of 26.13 which shows a broad variety in the number of individual-based learning activities accomplished by the users in PowerApp. On average each user conducted 26.13 individual-based learning activities in PowerApp. The time management index varies from 1 day to 18 days with a mean of 4.7 access frequency to PowerApp. Diversity of chosen content ranges from 1 to 4 with a mean of 2.6, which indicates that the users, on average, have read or answered content items relating to more than 2 types of content categories. The co-regulation index ranges from 0 to 145 with a mean of 11.44 which indicates that while there are very active users in social learning (i.e. n=145 answered questions through duel-learning games), the majority part of the users only answered, on average, 11.44 questions through duel-learning games.

Table 1: Descriptive statistics (N=177)

Variables	Minimum	Maximum	Mean	Standard deviation
Time management index	1	18	4.70	1.68
Individual Activeness	0	160	26.13	35.32
Diversity of chosen content	1	4	2.63	1.19
Co-regulation index	0	145	11.44	22.45

Table 2 represents the results of Pearson's correlation analysis between the self-regulatory learning process factors. As illustrated in this table, there are significant relationships at 0.05 level between the time management index and individual activeness (correlation =0.503), the time management index and diversity of chosen content (correlation =0.341), and the individual activeness and diversity of chosen content (correlation =0.625).

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Table 2: Pearson's correlation table (N= 177)

Variables	**Time management**	**Individual Activeness**	**Diversity of chosen content**
Time management index	1.000		
Individual Activeness	0.503**	1.000	
Diversity of chosen content	0.341**	.625**	1.000

*. Pearson's correlation is significant at 0.1 level (2-tailed)
**. Pearson's correlation is significant at 0.05 level (2-tailed)

Next, we used regression analysis to investigate the impact of self-regulatory factors on the co-regulatory factor as the dependent variable. Linear regression estimates the coefficients of the linear equation by involving one or more independent variables that best predict the value of the dependent variable. We used a stepwise regression model to determine a significant model. Table 3 shows the results of ordinary least square regression provided by a stepwise regression model with the co-regulation index as the dependent variable and time management index, individual activeness, diversity of chosen content and working experience as the independent variables.

Table 3: Regression results

Variables	**Statistics**		
Time management index	10.542 (1.245)***	7.226 (1.517)***	6.857 (1.515)***
Individual Activeness		0.176 (0.049)***	0.129 (0.054)**
Diversity of chosen content			2.856 (1.413)**
Adjusted $\boldsymbol{R^2}$	0.285	0.331	0.343
Constant	-4.575*	-4.330*	-9.467**
F	36.067***	29.996***	22.920***
No of observations	177		

The dependent variable is Co-regulatory factor.
Standard errors are reported in parentheses.
*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

As represented in this table, the time management index, individual activeness, and diversity of chosen content can together interpret 34% of data which influence the co-regulatory factor. However these factors impose different influence on the co-regulatory so that the time management index has the largest share while the diversity of chosen content has the lowest share in the final model.

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Discussion and conclusions

The results shown above suggest that there is a significant relationship between self- and co-regulatory learning processes conducted by users of PowerApp. The nature of this relationship can be scrutinized from several perspectives. First, the correlation between the time index and co-regulation constructs suggests, that the more access to PowerApp for conducting individual learning activities, the more participation in co-regulating process, vice versa. To explain this relationship, one can argue that taking part in shared learning activities such as performing duel-learning games are time-consuming learning activities, which require time and effort by peers to proceed. Considering the time index as an indicator of the time management skill of the users, this relationship suggests that users with better time management skills participate more actively in shared learning processes. As remarked by Grau and Whitebread (2012) and Rahimi et al. (2013), in the context of collaborative learning, learners bring their own ideas, conceptions and self-regulatory abilities to the group work and all these personal characteristics will play a role in their engagement in the group activity. On the other hand, it can be argued that by active participation of users in co-regulatory process it is likely that they would increase their access frequency to PowerApp for performing individual learning activities. To explain this argument, we need to consider two mechanisms implemented in duel-learning games namely (i) answering, changing turn, and waiting for the peer's response, and (ii) time-based scoring. It can be argued that these mechanisms can cause frequent access of the peers to PowerApp for knowing their opponent reactions on the game. As a possible scenario, one can imagine a situation that a peer accesses PowerApp to know the state of the game and when she sees no change in the game's status she may perform some individual learning activities.

Second, the correlation between individual activeness and co-regulation suggests that the more activeness in performing and regulating individual-based learning activities, the more activeness in conducting co-regulatory learning processes. To scrutinize this relationship, we need to consider the elements of PowerApp that might create a learning space promoting users to perform individual-based learning activities and self-regulate their learning. These elements are: visualized scoring mechanism, motivational factors (i.e. sense of accomplishment, filled puppets), supporting users' personal choice in terms of content and learning function, facilitating self-evaluation of learning and providing immediate feedback. The combination of these elements plays a significant role to assist users in self-regulating their learning and taking control over their learning process. From this perspective, duel-learning games can be seen as a continuation of this learning space with similar elements including motivational aspects (i.e. winning a duel game, fun elements and competition-based learning), personal choice (i.e. freedom in choosing peers and content), self-evaluation of learning, and providing immediate feedback. Accordingly, one can argue that this similarity might encourage the active users in individual activities to take part in social activities as a means to support their personal development. In this regard, as asserted by Voelt, Vauras, and Salonen (2009), co-regulation is not directed at the achievement of explicit individual or collective goals but aimed at productive co-participation in a social activity, with impact on individual development in the broad sense such as identity development. Also, as asserted by Huang (2002), interactivity can be envisioned as an effective way to motivate and stimulate learners.

Third, the correlation between diversity of chosen content categories and co-regulation constructs suggests that the more content categories the user reads or answers, the more active she is in performing the co-regulation process, vice versa. To understand this relationship, one can claim that it is likely that users who have read or answered more content categories, have a broader range of learning goals and more curiosity to discover the learning functionalities of PowerApp and experience a challenge-based learning. One possible way to satisfy this curiosity is playing duel-learning games. On the other hand, it can be said that the competition-based nature of duel-learning games might lead and push the game's peers to prepare themselves before starting the game by reading and answering more content categories available in PowerApp. Also, playing duel-learning games can reveal the users' knowledge deficiency in a particular content category and provide them with insight into their lack of knowledge. This insight might encourage them to read and answer more content categories to diminish their knowledge lack. From this perspective, it can be argued that defining and pursuing learning objectives in workplace settings follows a non-linear process and the co-regulatory process can be envisioned as means for regulating personal learning objectives. In this regard, Littlejohn, Milligan and Margaryan (2012) asserted that the traditional SRL models presents a linear and sequential learning process consists of *forethought*, *performance*, and *self-reflection* phases which differs from adult learning in workplace where "adults acquire a significant part of their competencies through transformations with open objectives in which goals and motivations are continually reviewed".

These findings suggest the below list of improvements in the design of this e-learning system:

- Defining more social learning activities and scenarios to improve both individual- and co-regulatory learning process.
- Feeding both individual- and social-based learning activities with similar types of content in order to make a close link between these processes.
- Providing appropriate level of choices for learners and allowing them to pursue their preferred ways of learning as a means to increase their social activeness. To do so, it should be noticed that the employees with higher level of regulation need more choices than others.
- Allowing the learners to observe other learners' learning activities.
- Supporting motivational aspects of regulation process by introducing more extrinsic (gaming elements) and intrinsic elements (i.e. curiosity-based learning).
- Increasing the usability of e-learning system through generating context-based and relevant content.

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- Designing and implementing a learning analytic module to assist learners to get a clear picture of their learning process and pattern.
- Allowing more knowledgeable learners to participate in developing and evaluating content items.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

CASE STUDY OF IMPLEMENTING WORK BASED LEARNING IN THE IT SERVICE MANAGEMENT COURSE

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Abstract

Identification of various factors that can influence students' ability to gain or improve desired competences is a key element to build a successful learning process. Consequently, new learning methods are based on the premise of enabling competencies through performance. One of the innovative learning techniques becoming more popular in traditional education process is work-based learning (WBL), commonly described as a combination of self-knowledge, the expertise in practice, and a formal knowledge in solving the real-world problems. In this paper, we present the implementation of WBL in the undergraduate course IT service management. During the course, students were encouraged to "work" in virtual business companies to simulate process of developing, promoting and delivering an innovative and creative IT service. In order to validate introduced methods, students' perception of competences and skills that were gained or improved during the course was analyzed, as well as their estimation of course delivery.

Introduction

Emerging trends in ICT sector in the last decades have a great influence on the education of ICT professionals. For a success on the challenging labour market, higher education graduates are expected to show, not only the acquisition of formal competences, but also the adaptability to the working environment. In that context, changes in curriculum design and delivery in the education of ICT professionals have raised as an important issue (Lee et al., 1995; Koppi et al., 2009; Cheryl & Marilyn, 2002; Tatnall, 2010). Most of the authors stressed the need for the creation of curriculum that will help students to develop key competencies they will need one day in the working environment. Therefore, the collaboration with employers in both curriculum design and delivery is recognized as crucial factor for the successful education of future ICT professionals. The identified need for the connection with employers in the curriculum design and delivery has lead to the innovative teaching methods such as *work-ready learning activities* (Sixsmith & Litchfield, 2010; Costley et al., 2011; Costley & Dikerdem, 2012), *experience-based learning* (Matsuo et al., 2008), *practice-based learning* (Hynes et al., 2011) *cooperative education programs* (Coll et al., 2002) etc., that are increasingly finding their place in formal education.

Work based learning

There is no unique definition of work based learning (or practice-based learning, which is the synonym), but it can be described as the combination of self-knowledge, the expertise in practice and formal knowledge in solving the real-world problems (Flanagan, 2000). Generally, it is characterized by one of the following situations:

1. accreditation of certificated or experiential learning,
2. learning agreements including employers as well as learners,
3. location of learning in the workplace or `work' as the subject of learning, and
4. workplace or professional practice related 'applied' projects (Costly & Dikerdem, 2012).

It can be seen that work-based learning is not considered only as a work within an employers' organization, but can also be simulated in a formal academic traditional classroom-based settings through the active collaboration with employers, which is leading to the innovation and creativity in teaching process and improvement of students' employability skills. The positive effects of work-based related learning have been recognized for all of the stakeholders – students, employers, higher education institutions (HEI) and society in general, and discussed in the latest literature (Heyler, 2011; Skinner et al., 2011; Workman et al., 2011; Workman, 2011; Burrows & Wragg, 2013).

The overall objective of study presented in this paper was to obtain students' reflection on the implementation of WBL methods in the undergraduate IT service management course, and on the course content in general. The specific objective was to determine whether there is a difference in the students' reflection of different WBL methods regarding their initial interest for the course, which was characterize as small, medium and high.

Case study – course IT service management

This section presents a case study of WBL implementation in the undergraduate study course IT service management performed at the Faculty of Organization and Informatics in academic year 2013/2014. The course was organized in (1) lectures and (2) laboratory exercises, but this case study refers only to the laboratory exercises. The main goal in preparing new structure of laboratory exercises with the WBL elements was to motivate students to think and act as they were in real business surrounding. At the beginning of semester students were randomly divided into groups of four or five members. Each group was representing an IT company that is developing a new IT service. Firstly, students' companies were obligated to define their business scope and to decide about the new IT service they were introducing. When deciding about new service, students were invited to be innovative and creative. Exercises were performed in fourteen weeks, and each week students were introduced with specific topic through the presentation by lecturer and then given a task regarding the development of their new service. For solving assigned tasks, lecturers prepared various illustrations, guidelines, and recommended tools and techniques. The structure of exercises was organized in two phases. In the first phase of exercises, students' virtual companies were "working" to prepare

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themselves for business meeting with a potential new client, to whom they wish to sell their new service. Two lecturers were representing a potential client that is buying a new service from students' companies. During the preparation for first meeting with potential client, a visit to companies in Technology park (TPV) was organized, in order to introduce students with the real working environment. In seventh week, business meeting was performed between students' companies and a potential client, where they were negotiating about their future relationship. Client defined his requirements upon the service (or service packet) and students' companies were entitled to accept or decline those requirements. Each company had to invite potential client to meeting (using letter of invitation) and students were asked to "play" role of a person with a specific function within company. Students were encouraged to use all communication skills and techniques they have learned during their studies (regarding saluting, presenting, clothing or negotiating). After business meeting, in the second phase of exercises, students' companies were lead to prepare services that were agreed during the meeting and to deliver final service prototype. In the fourteenth week, second business meeting was organized, were students' companies were presenting a final work on their service.

Methodology

Measurement

In this research, the intention was on the students' satisfaction with the implementation of WBL methods in the course delivery and therefore, a questionnaire divided in three parts was prepared by the authors. The first part of questionnaire is related to some general respondents' characteristics, such as gender, initial course motivation and expected grade. The second part contains a list of generic competences, adopted from the one defined in Tuning project (Lokhoff et al., 2010). The purpose of this part was to obtain students' perception about the generic competences they have acquired or improved during this course. Third part of the questionnaire contains a semantic differential table with 8 pairs of opposing attributes. Students were asked to estimate five aspect of this course delivery using semantic differential table.

Respondents

Respondents were students at Faculty of Organization and Informatics who attended undergraduate course IT service management in the academic year 2013/2014. After the course completion, students were asked to fill the questionnaire prepared in the on-line form. Totally, 104 responses were obtained, out of 140 students attending the laboratory exercises, with the response rate of 76.4%. The core sample consists of 78 male (75%) and 26 female students (25%). The personal motivation for this course was marked as high by 19 students (18%), 73 students (70%) assessed their motivation as medium and 12 students (12%) considered themselves as low motivated.

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Results and discussion

The obtained results are shown below. Results were analyzed in general and according to the students' initial motivation for this course.

Results in general

Five course aspects that were assessed by students are the following:

1. the content of laboratory exercises,
2. teaching methods (team work – each team represents one virtual IT company, basic instructions for tasks, work in class with teacher guidance),
3. simulation of working environment (business meeting contracting and maintenance, assigning roles in the company, implementation of job vacancies within company),
4. collaboration with employers (visit to TPV, practical examples), and
5. career development aspect (insight into the labour market, meeting the standards of the profession – SFIA, preparation of motivation letter).

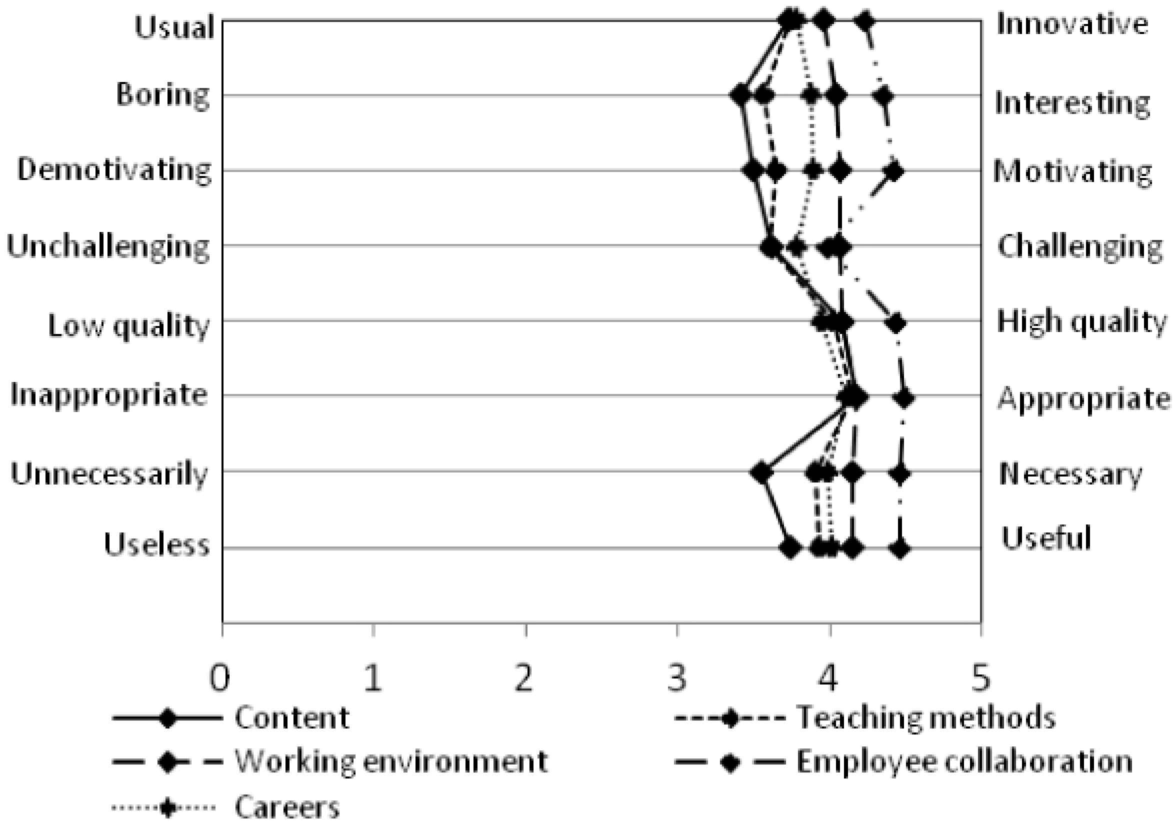

Figure 6. Students' assessment of five course aspects

Figure 1 shows students' general assessment of five mentioned course aspects. The general outcome for all respondents shows that their overall perception about the work-based learning implementation in this course is positive. It is interesting to notice that the collaboration with employers is perceived as most interesting and most useful (M=4.308,

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sd=0.258) aspect, although it is not perceived as much challenging. The following aspect is a simulation of working environment during the course delivery (M=4.081, sd=0.349). Preparation for the labour market through the career development activities (M=3.890, sd=0.311), teaching methods (M=3.770, sd=0.427) and the content of laboratory exercises (M=3.693, sd=0.459) were rated a bit lower, but still showing students' positive experience with those aspects.

Results regarding the initial interest for the course

Course content is an aspect that doesn't directly reflect the implementation of WBL methods, so the assessment of this one could not be directly related to the students' satisfaction with the work-based implementation in the course delivery.

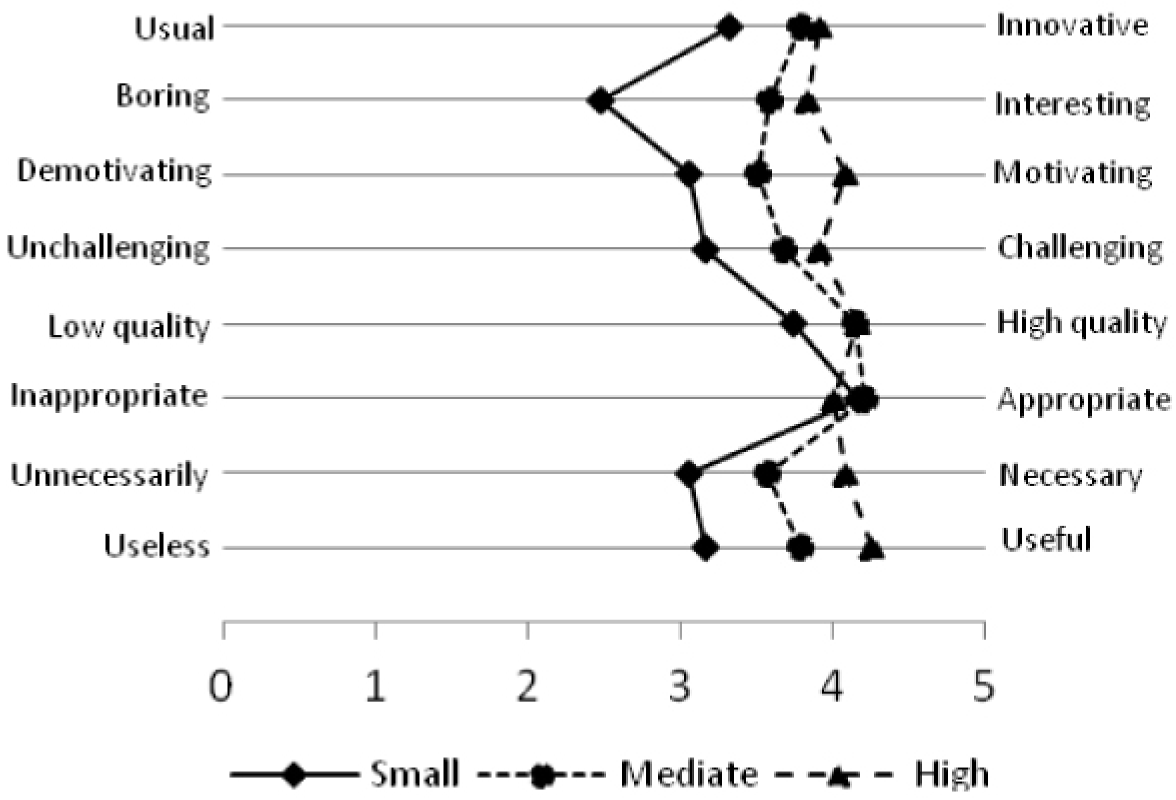

Figure 2. Assessment of laboratory exercises content according to the students' initial interest

However, it is interesting to perceive that content of laboratory exercises was highly rated, although the students' initial interest for the course was not very high. Analysis of variance was used to detect whether there is a statistically significant difference in students' perception of different aspects of course implementation regarding their initial interest for this course. The general outcome for all students shows a statistically significant difference between their assessment of laboratory exercises content regarding to the initial interest for course ($F\ [2.101] = 9.1807$, $p = 0.00022$) at the level of significance $p<0.05$. The adjective that deviates from the regularity (Figure 2.) indicates that students who initially had lower motivation for the course content find it more boring than the other two groups of students.

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Figure 3 shows students' assessment of teaching methods that were used during the course, which is as well statistically different according to their initial interest (F [2.101] = 7.9941, p = 0.00059) at the level of significance p<0.05. Similar to the course content, students generally perceive teaching methods as appropriate and useful, but a little bit less interesting or motivating.

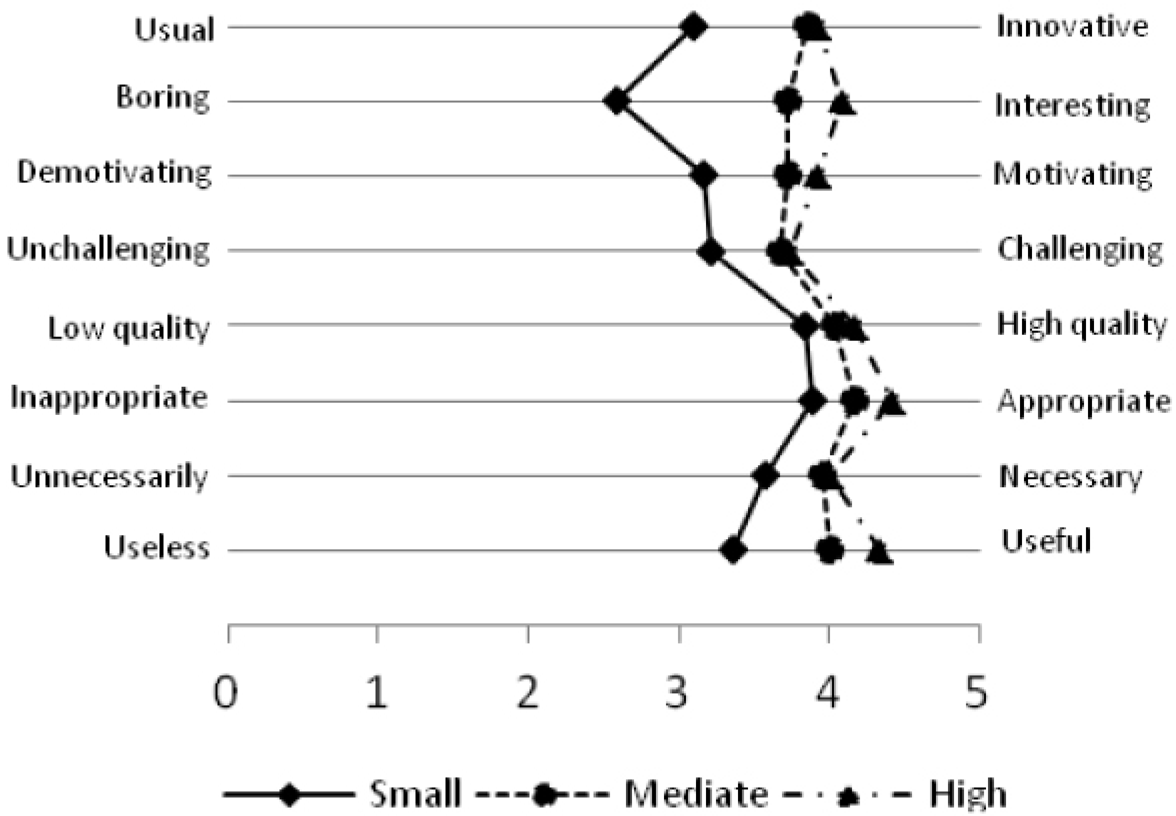

Figure 3. Assessment of teaching methods according to the students' initial interest

Simulation of working environment was realized mainly through the teamwork in randomly created teams of students. As described earlier, each team represented a small IT company with the task to create their own mission, vision, visual identity, scope of work, to assign roles in the company, to develop the prototype of their innovative IT service and to negotiate with the potential client in the form of business meeting. This kind of working environment in regular undergraduate course is perceived approximately with equal values for all the proposed attributes (Figure 4), but again with statistically significant difference according to the students' initial interest for the course (F [2.101] = 5.336, p = 0.00627) at the level of significance p<0.05.

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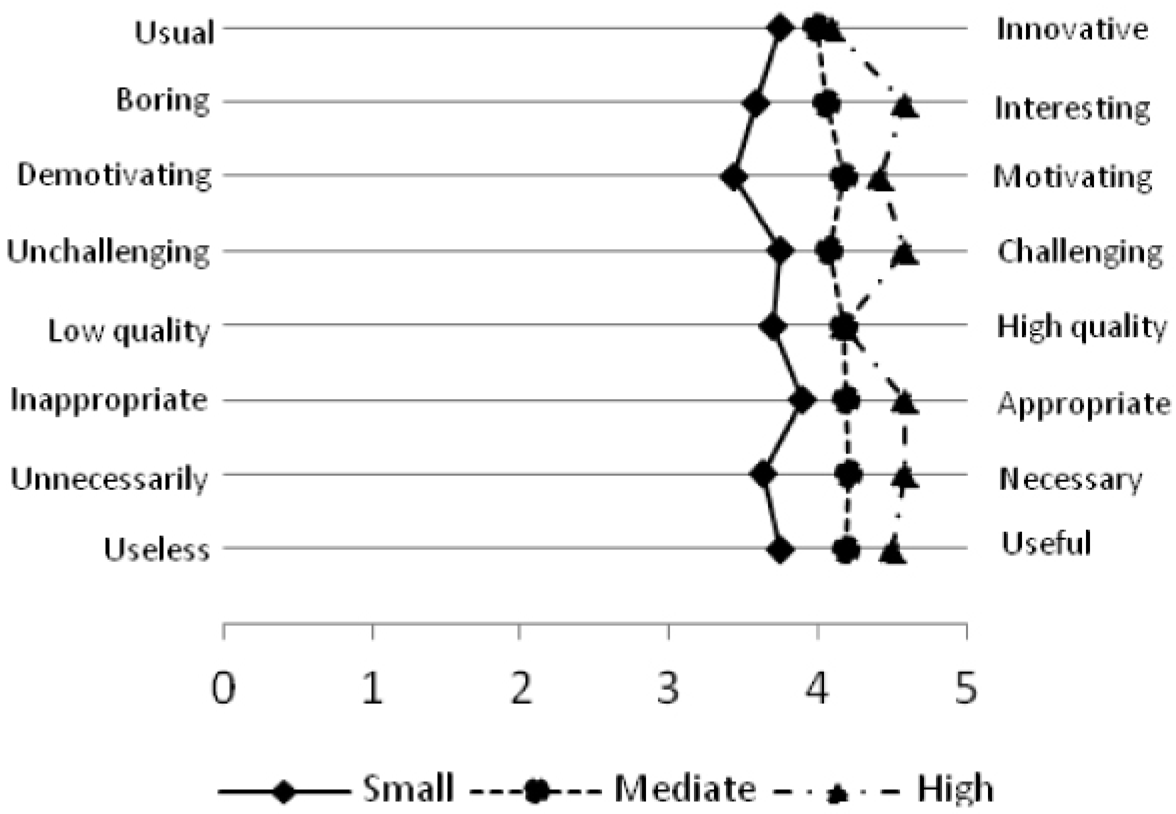

Figure 4. Assessment of working environment simulation according to the students' initial interest

Collaboration with employers was realized through the visit to TechPark Varaždin, which included the general presentation of the TPV activities and visit to one of the companies incubated in TPV. Students were introduced with the possibilities to get involved in some of the activities that TPV organizes for student population, they get the insight into the real working atmosphere in a small IT companies and had an opportunity to hear employers' expectations from graduates when entering their first job position. This component is the most evident form of work-based learning and it is interesting to notice that it has obtained the highest rates from students. Even more, there is no statistically significant difference in the perception of students with different interest for the course content ($F [2.101] = 1.726$, $p = 0.1832$) at the level of significance $p<0.05$, which lead to the conclusion that collaboration with employers in regular courses is very welcome by students. From the Figure 5, it can be perceived that one adjective deviates from regularity, showing that this aspect was not so much challenging for students. This can be explained by the fact that students' role was rather passive in this aspect, giving them insight in the real world of work, but not demanding their active engagement.

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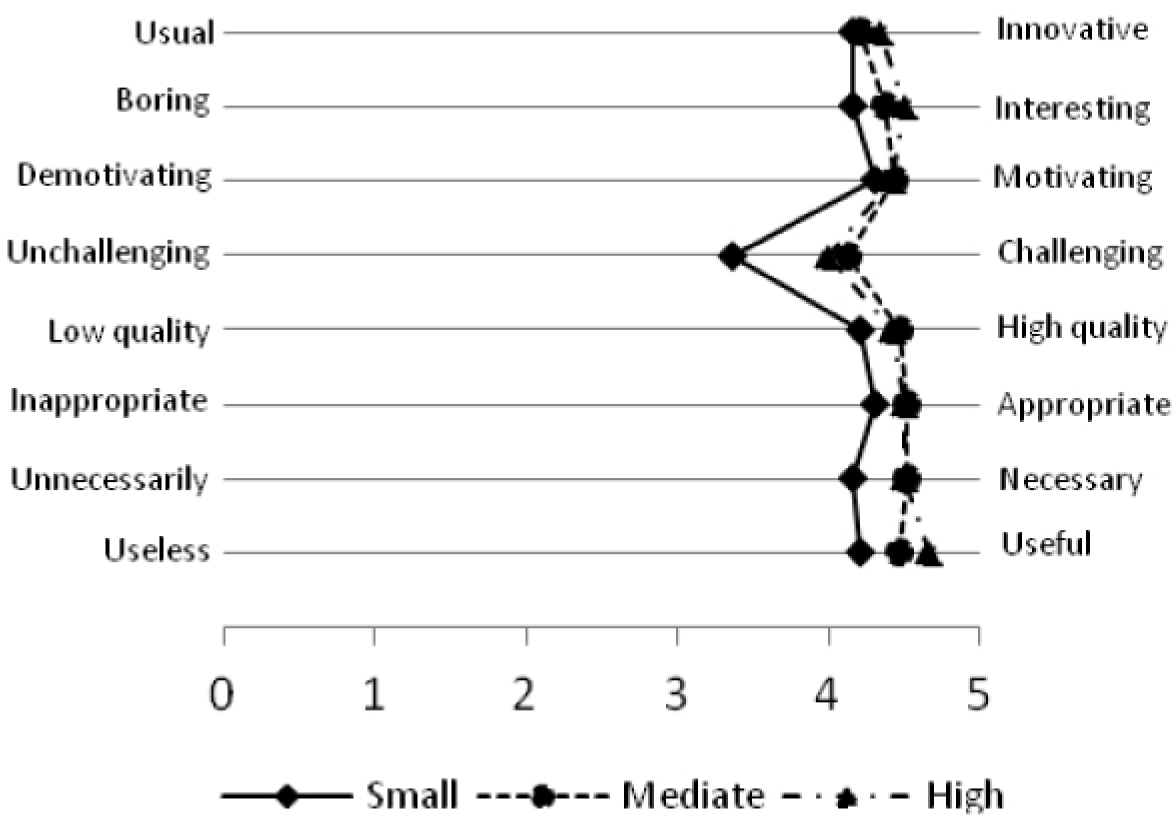

Figure 5. Assessment of collaboration with employers according to the students' initial interest

The last aspect of course that was assessed is the aspect of career development. This one was integrated in the simulation of working environment, requiring students to get the insight into the labour market, as well as the recruitment process from both employees' and employers' perspectives. On the one hand, each team had a task to prepare a job announcement according to the needs of their virtual company, which required the introduction with the real job announcements and professional standards. On the other hand, each student for itself was required to find a job announcement in accordance to its interest and to prepare the motivational letter for that job. Highly motivated students rated these activities with generally higher grades than students with middle and low motivation (Figure 6), and the difference in their perception is statistically significant ($F [2.101] = 4.988$, $p = 0.00859$) at the level of significance $p<0.05$.

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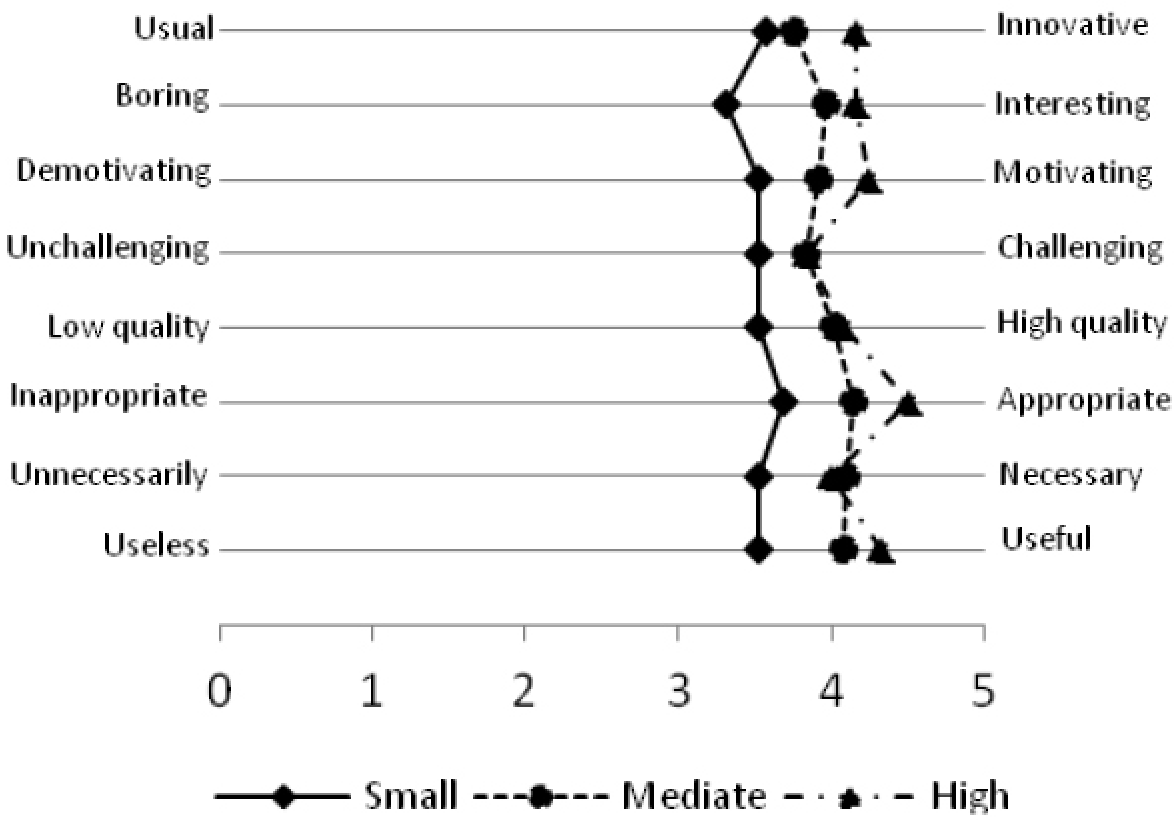

Figure 6. Assessment of career development aspect according to the students' initial interest

Conclusion

Although the educational institutions have the biggest influence on the competences acquisition of their students, future employers should be more involved in the whole educational process. Employers need to take part in students' professional development through the definition of outcomes and competencies needed from their future employees. In this way, they will help higher education institutions to align their curriculum with the needs of business. Results of presented study indicate that this synergy of traditional learning and simulation of real business surroundings within formal education is very welcomed by students.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

EVALUATING MOOCS – WHAT IS REALLY HAPPENING?

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Abstract

This paper describes the evaluation of two Massive Open Online Courses (MOOCs) run by the University of Leicester as part of the FutureLearn initiative. It will use a novel approach to the evaluation, using a new MOOC classification schema. The new MOOC classification schema has been developed because it is believed that the current discourse around the concept of xMOOCs (primarily based around interaction with content and essentially adopting a behaviourist learning approach), and cMOOCs (which focus on harnessing the power of social media and interaction with peers, adopting a connectivist learning approach), is an inadequate way of describing the variety of MOOCs and the ways in which learners engage with them. The paper will provide a brief history of the emergence of MOOCs and the key stakeholders. It will introduce an alternative means of categorising MOOCs, based on their key characteristics. The paper fits under the 'Quality aspects: assessment and evaluation, retention techniques, performance support' conference theme. It will argue that using the MOOC classification schema can be used as a strategy to better design MOOCs, as well as an evaluation framework for analysing participants' learning behaviours.

Introduction

Every few years a new disruptive technology emerges, i.e. something that fundamentally changes the way we do things (Christensen, 1997). The Internet, mobile devices and even Virtual Learning Environments are all examples. Mobile phones have made landlines virtually redundant; and the functionality of today's smart phones means that they are used for far, far more things than simply making a phone call. Virtual Learning Environments made institutions realise that technologies were an essential part of the service they offered students. They enabled teachers to upload content and provide mechanisms for students to communicate and collaborate via tools such as forums, blogs and wikis. The latest in the line of disruptive technologies is Massive Open Online Courses (MOOCs). Initiated by the *Connectivism and Connective Knowledge* course created by Siemen's et al. in 2008 (Wikipedia, 2012), the number of MOOCs have proliferated in recent years. Indeed there isn't a Vice Chancellor or Rector in the world who isn't considering what the impact of these free online courses might have on traditional educational offerings. Martin Bean (Vice Chancellor of the Open University, UK), talking about the announcement of FutureLearn[1], stated:

> *In 2012 that wave of disruption hit higher education. By the end of the year, 18 of the top 20 universities in North America were offering MOOCs – so that's the "great brands" box ticked (Bean, 2013).*

However, MOOCs have generated heated debate; opinions are divided about their value and importance. Some argue that they open up access to education and hence foster social inclusion, others cynically suggest that they are merely a marketing exercise – more about 'learning income than learning outcomes' and point to the phenomenally high dropout rates (typically between 95-98%[2]). This paper will summarise some of the key discourses around MOOCs. It will describe the way in which they are being characterised as either xMOOCs or cMOOCs, but will suggest that this distinction is too limiting. It will put forward a categorisation that can better describe the nuances of different types of MOOCs and will demonstrate how this framework) can be use to create more pedagogically effective MOOCs, which will enhance the learning experience and lead to quality enhancement of these types of courses (Conole, 2012; Conole, 2013). This section will begin by defining MOOCs and providing a brief description of their emergence. Key stakeholders will be described, along with the perceived benefits and challenges associated with MOOCs. The types of MOOCs will be discussed and a new classification framework for distinguishing different types of MOOCs will be introduced.

A brief history of MOOCs

MOOCs have been defined as:

> *A massive open online course (MOOC) is an online course aimed at large-scale interactive participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for the students, professors, and TAs (Teaching Assistants) (Wikipedia, 2012).The acronym highlights the key components; i.e. that they are online courses which harness the potential for learning in a large-scale, distributed community of peers, through open practices.*

Much has been written about the emergence of MOOCs as a phenomenon, these are not listed here, but for an up to date account of MOOC research, there are two recent special issues which point to much of the literature in the field[3], and at the time of writing there is a call out

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[1] https://www.futurelearn.com
[2] For a debate on the pros and cons see the video of ASCILITE's 'The great MOOC debate' http://alternative-educate.blogspot.co.uk/2012/12/audio-ascilite-2012-great-debate-moocs.html
[3] http://elearningyork.wordpress.com/2013/05/14/elearning-papers-special-moocs-and-beyond/ and http://ispr.info/2012/10/26/call-massive-open-online-courses-moocs-special-issue-of-journal-of-online-learning-and-teaching-jolt/ (due out late 2013).

ISBN 978-963-89559-7-5

for a special issue of Distance Education[4]. Siemens et al. created the first MOOC in 2008, called '*Connectivism and Connective Knowledge*'. The course was based on a connectivist pedagogy, which aimed to foster the affordances of social and participatory media. It relied on the benefits of scale though significant interaction with a distributed network of peers. Participants were encouraged to use a variety of technologies; to reflect on their learning and to interact with others. There was no 'right way' through the course; the emphasis was on personalised learning through a personal learning environment. Variants on this course emerged, collectively known as cMOOCs, examples included: David Wiley's course on '*Open Education*'[5], '*Personal Learning Environments and Networks (CCK11)*'[6], and '*Learning Analytics (LAK12)*'[7]. A second type of MOOC emerged in 2011, namely xMOOCs. These were primarily based on interactive media, such as lectures, videos and text. xMOOCs adopted a more behaviourist pedagogical approach, with the emphasis on individual learning, rather than learning through peers. As a result a number of companies emerged, such as: Udacity[8], EdX[9], and Coursera[10]. These courses tend to be offered by prestigious institutions, such as Harvard and Stanford, the emphasis is on delivery of content via professors from these institutions.

Nkuyubwatsi provides a useful overview of MOOCs, including a review of some of the key courses from 2008 to the present day (Nkuyubwatsi, 2013). He discusses the key controversy around MOOCs, stating that MOOCs are hailed for their fit within a knowledge society, providing each learner with opportunities to engage with material via formative assessments and the ability to personalise their learning environment. However, he goes on to state that they are criticised for the lack of constructive feedback and the lack of creative and original thinking, citing Bates (2012) and low completion rates, citing Daniel (2012).

Pedagogical approaches

Participation in MOOCs can range from informal non-accredited participation through to engagement as part of a formal course offering. In some instances, tuition-paying students taking courses for credit join the same class as non-tuition paying, non-credit learners. Many xMOOCs are primarily based on interactive material and videos plus multiple-choice quizzes. Udacity, Coursera and EdX courses consist mainly of lecture videos, course materials, quizzes and assignments. Some do contain wikis and discussion forums, although these are not extensively promoted or used. In some cases forum posts can be up- or down-voted by other participants; if a post is up-voted that participant receives a 'karma point'. For some Udacity courses, participants have organized their own meet-ups with others who are Geographically co-located. Udacity has set up a meet-up site to facilitate this.

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[4] http://www.tandf.co.uk/journals/cfp/cdiecfp.pdf
[5] https://learn.canvas.net/courses/4
[6] http://cck11.mooc.ca
[7] http://lak12.mooc.ca
[8] https://www.udacity.com
[9] https://www.edx.org
[10] https://www.coursera.org

ISBN 978-963-89559-7-5

Cormier, in a video describing the nature of Connectivist MOOCs[11], defines five steps to success: orient, declare, network, cluster and focus. He also argues that knowledge in a MOOC is emergent and dependent on the interaction with others. In his *PLENK2010* course he defines four types of activities: aggregate, remix, repurpose and feed forward. Therefore the intention of cMOOCs is to harness the power of social and participatory media to enable participants to communicate and collaborate through a variety of channels; for example Twitter, blogs, wikis, etc. and the use hashtags and curation tools (such as Pinterest or Scoop.it) to filter and aggregate. The focus is on personalisation, but also collective intelligence (Lévy, 1997). Each participate forges their own learning path through the materials; picking and mixing which content, activities and communications are meaningful for them. These types of course align well with Cormier's notion of Rhizomatic learning (Cormier, 2008; Cormier, 2011), i.e. networks are horizontal, dynamic and emergent, developing in different directions for different individuals. Barry provides a nice comparison of three different MOOCs in terms of workload, technology, content, pedagogy, assessment, etc. (Barry, 2013).

Assessment models for MOOCs vary, from simple Multiple Choice responses, through to peer-reviewed feedback and more formal, traditional modes of assessment. DS106[12], adopted an interesting approach to assessment, whereby course assignments were collectively created by participants and then posted to an assessment bank (EDUCAUSE, 2013). Participants could then choose which assignment they wanted to do which were rated on a difficulty of 1 – 5. In this model the assessment bank expanded for use by further participants. An interesting recent innovation in terms of assessment is the use of open badges. The concept is simple; learners can apply for badges demonstrating their completion of aspects of a MOOC. This may be as simple as completion of part of the course or evidence of particular aspects of learning. Badges have criteria associated with them; learners are expected to demonstrate how they have achieved these criteria and this is validated either by peers or tutors. The Mozilla's Open Badges[13], are perhaps the best known examples of badges. Their slogan is 'Get recognition for skills you learn anywhere'. There are three parts to the process: earn (earn badges for skills you learn online and off), issue (get recognition for things you teach) and display (show your badges on the places that matter). Therefore there are a variety of different pedagogical approaches being adopted in different MOOCs, some emphasising individual learning through interactive materials, others focusing more on social learning.

Stakeholders

The stakeholders for MOOCs are essentially learners (in terms of participating in the MOOCs, tutors (if there are any – in terms of facilitating the MOOCs), teachers (in terms of designing and assessing the MOOCs), institutional managers (in terms of considering their place alongside traditional educational offerings), policy makers (in terms of thinking of the longer

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[11] http://www.youtube.com/watch?v=eW3gMGqcZQc
[12] http://ds106.us
[13] dougbelshaw.com/blog/2012/07/19/informal-learning-gaming-and-openbadges-design/#.UAviyURJH40, http://openbadges.org

ISBN 978-963-89559-7-5

term implications for the educational landscape) and venture capitalists (looking to get a return on investment). Arguably the origin of MOOCs was bottom up; developed by individuals with a vision for promoting open educational practices[14] and fostering connectivist learning approaches through use of social and participatory media. However the recent emergence of start-ups, like Udacity, and initiatives like FutureLearn suggest a shift to a more top down structured approach. Coupled with this, there is evidence of an increase in the notion of open education at policy debate. For example, in December 2012, the Opening up Education through Technologies conference was held in Oslo. The conference was aimed at ministers of education across Europe, to inform them of current thinking on openness and the implications for policy. UNESCO has long being a promoted of Open Educational Resources, stating that:

> *UNESCO believes that universal access to high quality education is key to the building of peace, sustainable social and economic development, and intercultural dialogue. Open Educational Resources (OER) provide a strategic opportunity to improve the quality of education as well as facilitate policy dialogue, knowledge sharing and capacity building.*[15]

Whether there is a tension between the grass roots initiatives and the more structured approaches remains to be seen. The plethora of MOOCs now available, in a variety of languages (although the majority are still in English), is staggering. Recent examples include: the announcement in the UK of FutureLearn (with 21 UK institutions), Open2Study from the Open University of Australia and the EU-based OpenUpEd.

Terminology is always tricky when trying to describe a new disruptive technology. Even the term for the use of technology to support learning is contested and various terms have been used over the years: educational technology, learning technology, networked learning, Technology-Enhanced Learning, etc. (Conole & Oliver, 2007). MOOCs can be seen along a spectrum of adopting more open education practices; from the concept of Learning Objects (Littlejohn, 2003) and more recently Open Educational Resources (Glennie, Harley et al., 2012).

As mentioned earlier, to date, MOOCs have been classified as either xMOOCs or cMOOCs. I want to argue that such a classification is too simplistic and in this section put forward an alternative mechanism for describing the nature of MOOCs. Downes suggest four criteria: autonomy, diversity, openness, and interactivity (Downes, 2010). Clark (2013) recently provided the follow taxonomy of types of MOOCs: transferMOOCs – where existing courses are transferred to a MOOC, madeMOOCs – are more innovative, making effective use of

[14] Open Educational Practices (OEP) were first defined in relation to the creation, management and repurposes of Open Educational Resources (OER) as part of the OPAL initiative (http://www.oer-quality.org), i.e. a focus on how OER are being used rather than their production per se. The notion has seen been expanded to cover other facets of Open Education, including MOOCs. Therefore I would argue OEP relate to adopting more open practices in educational contexts.

[15] http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/

ISBN 978-963-89559-7-5

video and interactive material and are more quality driven, synchMOOCs – with a fixed start and end date, and asynchMOOCs – which don't have fixed start and end dates and have more flexible assignment deadlines, adaptiveMOOCs – which provide personalised learning experiences, based on dynamic assessment and data gathering on the course, groupMOOCs – where the focus is on collaboration in small groups, connectivistMOOCS – emphasis on connection across a network of peers, miniMOOCSs – which are much smaller than the traditional massive MOOC. Reich asked the question is a MOOC a textbook or a course (Reich, 2013)? He suggests that even the notion of a course is contentious, with parameters such as: start/end dates, self-paced or directed learning, skills or content based, the nature of interactions and whether or not certification is included. He suggests there are two analogies for MOOCs; as books or courses. I think these analogies are flawed. Learning occurs along a spectrum from informal to formal; from loosely based resource-based learning to a structured, time-defined course, which is accredited. MOOCs, in my view, can fit along any point of this spectrum; i.e. they can be used by individuals to support informal learning, where learners might not complete all of the MOOC, but instead dip into different aspects – through to receiving full accreditation and being part of an institutional provided formal course.

I want to suggest that a better classification of MOOCs is in terms of a set of twelve dimensions: three are related to the context of the MOOC (the degree of openness, the scale of participation (massification), the diversity of the participants) and nine are related to the learning (the amount of use of multimedia, the amount of communication, the extent to which collaboration is included, the type of learner pathway (from learner centred to teacher-centred and highly structured), the level of quality assurance, the extent to which reflection is encouraged, the level of assessment, how informal or formal it is, autonomy). This schema can be used to design, describe and evaluate MOOCs (Table 1).

Table 1: A new MOOC classification schema

Dimension	**Characteristic**
Context	
Open	The degree to which the MOOC is open
Massive	How large the MOOC is in terms of number of participants
Diversity	The diversity of the participants, in terms of discipline and cultural background
Learning Elements	
Use of multimedia	The extent to which rich multimedia and interaction are used
Degree of communication	The amount of communication
Degree of collaboration	The amount of collaboration
Amount of reflection	The ways in which reflection are encouraged
Learning pathway	The degree to which a guided and structure learning pathway is available
Quality Assurances	The types of Quality Assurance processes in place
Certification	Any mechanisms for certification and accreditation
Formal learning	Whether or not the MOOC feeds into any formal educational offerings
Autonomy	The degree of participant autonomy

ISBN 978-963-89559-7-5

Methodology

The evaluation will follow Patton's utilization focused evaluation approach (Patton, 2008). The aims of the evaluation are to: understand the patterns of learners' interactions in the MOOCs., gather perceptions of the MOOCs from the course designers, deliverers and learners, describe how participants (both course delivers and learners) interacted with the MOOC components and how much time they spent on the MOOC each week, describe how course delivers interacted with the MOOC components and how much time they spent on the MOOC each week, understand the reasons why the University of Leicester wanted to be involved in Futurelearn, understand why the course teams wanted to develop the MOOCs, gather evidence of learners' reasons for participating in the MOOCs, understand the reasons why learners dropped out of the MOOCs., and make recommendations on the design and delivery of future MOOCs. The courses are being developed by Archaeology (which ran from 25th November 2013 to 17th January 2014) and Criminology (which is starting on 31st March 2014), each lasts six weeks. The evaluation will include: Interviews with the course designers at the beginning, to find out why they wanted to develop the MOOC, the target audience(s), how they foster reflection, communication and collaboration, what assessment elements are included, and how they hope to ensure low dropout rates, interviews with those delivering the MOOCs and the nature of any problems, what the perceived benefits of the course were, what kinds of interactions and communications the participants engaged with, an interview with the Director of Distance Education, to gather information on: the context, why Leicester joined FutureLearn and how the courses were chosen, interviews with MOOC participants to gather data on their use and perception of the MOOC, a survey[16] of MOOC participants, analysis of the online courses, in terms of participant interactions and discourses, collection and tabulation of data on the number of registrants and participants of various types and their dropout rates over the six weeks and analysis of any learning analytics data that are available.

Conclusion

The paper has described a new classification schema that can be used to evaluation MOOCs. This is being used in the evaluation of two MOOCs being delivered by Leicester University. The conference presentation will report on the evaluation drawing on data collected through interviews and surveys with MOOC stakeholders. As stated at the beginning of this paper, there is a lot of interest around MOOCs at the moment. Many institutions are signing up with MOOC providers to see what the benefits and issues of developing and delivering MOOCs might be. However, there is little data to date on robust evaluation of these initiatives. We need to better understand the reasons why institutions and course designers are betting involved, as well as the perceptions and interactions of participants. The new MOOC classification schema described in this paper can be used to both design and evaluate MOOCs.

[16] This is an adaptation of the University of Edinburgh MOOC survey, available online at https://www.era.lib.ed.ac.uk/bitstream/1842/6683/1/Edinburgh%20MOOCs%20Report%202013%20%231.pdf

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

LET'S LOOK INTO THE FUTURE! E-LEARNING TRENDS AND HYPES IN ACADEMIC TEACHING

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Introduction

The integration of e-learning innovations is the current challenge for organisations in Higher Education in order to support learning, teaching and administrative processes. Due to changed student needs, increased competition between organisations, different political and economical conditions as well as new educational and technological approaches in Higher Education, institutions need to implement e-learning to generate additional educational and economical values (Seufert, 2008). But which e-learning formats can change academic teaching? Which formats dominate the current scientific discussions? Which approaches are close to a breakthrough? Which e-learning innovations have been or will be successful in Higher Education? These questions are focused by the present paper.

In the following, academic studies and reports will be introduced, in order to discuss future developments in the field of academic e-learning. In the next step, we will describe a theoretical approach to analyse and evaluate the life cycle of e-learning trends based on the degree of public discussions. Based on this, we will give insights into a study, which helped to identify and evaluate potential e-learning-trends in academic teaching in German institutions of Higher Education. But first of all we specify the technical term e-learning innovations.

E-learning is a concept that focuses on the use of digital technologies in education. The different educational formats at one hand and different internet-based application systems on the other hand lead in a variety of e-learning forms. Therefore we define *e-learning innovations as technological or methodological e-learning forms, which are perceived as new by potential users* (Fischer, 2013).

E-learning innovations in Higher Education

In order to identify and characterise technical innovations which will have impacts on academic teaching, the Horizon Report will be introduced in the following chapter. The Horizon Report, which is published annually, identifies and characterises technological trends that are expected to have a great importance for the various levels of education in the following years[1]. It focuses academic teaching and learning. With the Horizon Report experts in education and technology research evaluate the short (<1 year), medium (2-3 years) and long term (4-5 years) perspectives and effects of six technical innovations in the field of Higher Education (Bechmann, 2012).

In the recent Horizon Report (2014) Flipped Classroom, Learning Analytics, 3D Printing, Games & Gamification, Quantified Self and Virtual Assistants (see Figure 1) have been identified as trends in e-learning. However, a detailed insight into the last Horizon Reports demonstrates the difficulties of forecast. For example, in 2005 and 2006 as well as in 2011, 2012 and 2013 educational games were considered as a medium-term trend (two to three years). But for all that, the dissemination of game-based e-learning formats in academic teaching did not happen so far. As a short-term trend in 2009, 2010, 2011 and 2012 mobile applications (Mobile Apps) were considered. Also here the reality in institutions of Higher education shows another picture. However, other e-learning formats appear unexpectedly and diffuse rapidly in the field of academic teaching. Good examples for this are Massive Open Online Courses (MOOCs). For the first time MOOCs were recorded in the Horizon Report in 2013 and reached immediately number one of all e-learning trends. In fact, many MOOCs exist in Higher Education and the number of publications and scientific events about them grow rapidly (McAuley et al., 2013).

Time-to-Adoption Horizon	2014	2013	2012	2011	2010	2009	2008	2007
<1 year	Flipped Classroom	Massively Open Online Courses	Mobile Apps	Mobiles	Mobile Computing	Mobiles	Grassroots Video	User-Created Content
	Learning Analytics	Tablet Computing	Tablet Computing	Electronic Books	Open Content	Cloud Computing	Collaboration Webs	Social Networking
2-3 years	3D Printing	Games and Gamification	Game-Based Learning	Game-Based-Learning	Electronic Books	Geo-Everything	Mobile Broadband	Mobile Phones
	Games and Gamification	Learning Analytics	Learning Analytics	Augmented Reality	Simple Augmented Reality	The Personal Web	Data Mashups	Virtual Worlds
4-5 years	Quantified Self	3D Printing	Gesture-Based Computing	Gesture-Based Computing	Gesture-Based Learning	Sementic-Aware Applications	Collective Intelligence	The New Scholarship
	Vitual Assistant	Wearable Technology	Internet of Things	Learning Analytics	Visual Data Analysis	Smart Objects	Social Operating System	Multiplayer Education Gaming

Figure 1. Trends in e-learning based on the Horizon Reports (from 2007 to 2013)

As the Horizon Report shows, the life cycle of e-learning innovations isn't linear. Often new e-learning approaches appear suddenly on the agenda and dominate the scientific discussion at universities for a while. But they disappear abruptly from the agenda as fast as they appeared. That's why forecast is difficult. For the identification of trends and the assessment of future potentials, scientific instruments and methods are needed. One of these instruments is the Innovation Hype Cycle by Gartner Group[2].

[1] See in: http://www.nmc.org/ [31th January 2014].
[2] See in: http://www.gartner.com/technology/home.jsp [31th January 2014].

ISBN 978-963-89559-7-5

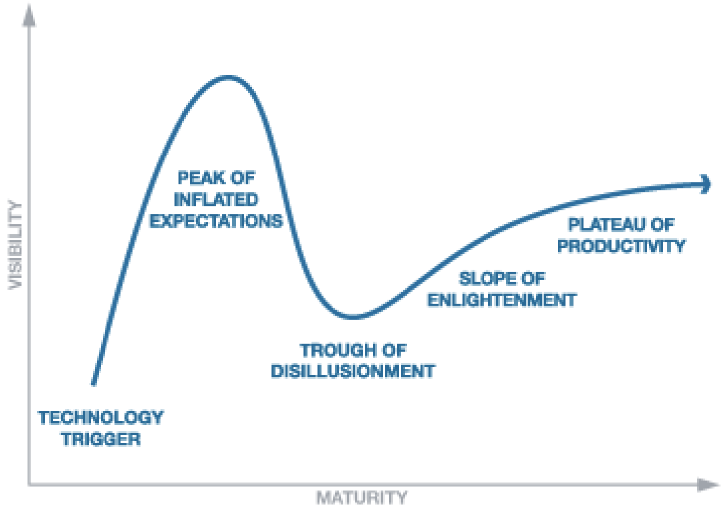

Figure 2. Gartner – Hype Cycle (Gartner, 2014)

The Hype Cycle is an analytic instrument developed and used by the IT research and advisory firm Gartner for representing the maturity, adoption and social application of emerging technologies (see Figure 2).The life cycle of technologies contains five phases. On the first phase (Technology Trigger) a technology breakthrough kicks off things. Based on early proof-of-concept stories the interest of publicity grows. On the second phase early publicity produces a number of success stories. Growing public interest is followed by the peak of inflated expectations. On the next step (Trough of Disillusionment) public interest wanes because of failed experiments and implementations as well as the emergence of negative effects of technology. The public interest grows again on the next phase. More examples of how organisations or users can benefit from the technology come to the fore, therefore the technology gets on the slope of Enlightenment. In the last phase, mainstream adoption starts and the Plateau of Productivity is reached. The technologies market applicability and relevance are clear and paying off. As the above description of the Innovation Hype Cycle shows, public attention or discussion is relevant for the evaluation of technology life stages.

Empirical study

Related to the general aim of this paper, we will now present an empirical study. The overall interest of the study was the analysis of life stages and future potentials of e-learning innovations. In order to make trends in e-learning in recent years at German universities visible, an investigation was carried out in 2014. The study should answer the following questions: Which e-learning formats dominate the current scientific discussions? Which approaches are close to a breakthrough? Which innovations of e-learning have been or will be successful in academic teaching?

To answer these questions, a trend study based on a content analysis was performed (Langer, 2000). We assumed that the intensity of discussion about e-learning innovations is related to their life stage – within the innovation process – and the degree of usage in academic teaching. This idea is based on the Innovation Hype Cycle, which had been described above. Therefore we analysed the content/topics of scientific contributions of leading, German speaking e-

ISBN 978-963-89559-7-5

learning conferences and publications: Gesellschaft für Medien in der Wissenschaft (GMW)[3] and E-Learning-Fachtagungen der Gesellschaft für Informatik e. V. (DeLFI)[4]. 427 scientific papers of both conferences resulted in the period from 2007 to 2013. Both conferences address scientists of German universities which apply e-learning in academic teaching. While the GMW has a strong focus on didactic innovations, e-learning applications tend to be discussed more from a technical perspective on the DeLFI. In combination both conferences demonstrate the technical and didactical potentials of e-learning innovations.

The trend study bases methodically on the approach of qualitative content analysis (Mayring, 2008). First of all the topics of the articles were identified and then combined to categories. So a system of categories was derived inductively, which covers the main topics of both conferences. All conference contributions of the GMW (n=234) and DeLFI (n=193) were sorted into the category system. For economical reasons, only the abstracts of the respective contributions (n=427) were used. The following categories of e-learning innovations were distinguished within the study: Social Software (systems or applications to support communication and co-operation), E-Assessment (handling online exams and test scenarios), E-Portfolio (systems for collecting and evaluation of digital artifacts), Mobile Learning (mobile applications for academic learning), Audio/Video (podcasts or videos in academic teaching), Virtual Worlds (artificial, virtual environments; e.g. Second Life), Learning Management Systems (central systems for providing and managing e-learning scenarios), Virtual Classroom (systems for synchronous cooperation of groups), Open Content (systems for the provision of open learning resources; e.g. OER) and MOOCs (Massive Open Online Courses).

The basic assumption of the study was that conclusions about the development potential of e-learning innovations in the German Higher Education can be drawn from the analysis of the scientific contributions within the two selected e-learning conferences. As the Innovation Hype Cycle suggests the degree of discussion delivers hints of the life stage of innovation. On that basis, we assume that frequently discussed innovations in these scientific conferences are supposed to have high potential for academic teaching.

Findings

Bellow-mentioned, the findings of the investigation are presented. Table 1 shows how many papers of GMW and DeLFI conferences report about the respective e-learning innovations. The following assumptions can be derived from the results:

- The cumulative frequencies (last column) make clear, which innovations dominated and shaped the scientific discussion during the investigation period (from 2007 to 2013).

[3] See in: http://www.gmw-online.de [31th January 2014]
[4] See in: http://fg-elearning.gi.de/fachgruppe-e-learning/delfi-tagung [31th January 2014]

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- The detailed analysis of the frequency distribution over the seven years shows trends in the investigation period. The increase of frequency goes along with an increase of importance for academic teaching.
- From the distribution of the frequencies within the two conferences, conclusions about the didactical or technical potentials of innovations can be drawn, because both conferences are different in terms of their objective. The GMW is more oriented towards didactical issues whereas/while the DeLFI targets increasingly technical topics.

Table 1: Findings of the study (numbers of articles about the innovation per year)

GMW (n=234) DeLFI (n=193)	2007	2008	2009	2010	2011	2012	2013	total
Learning Management	9	9	3	14	6	5	10	**56**
	10	10	8	6	7	5	9	**55**
Social Software	8	7	3	8	8	8	4	**46**
	3	4	6	1	5	2	6	**27**
E-Assessment	4	3	3	3	3	7	6	**29**
	3	3	6	5	5	3	7	**32**
Audio/ Video	5	2	4	2	3	6	3	**25**
	2	3	5	5	2	3	1	**21**
Virtual Worlds	4	2	2	1	0	2	2	**13**
	0	5	1	2	1	4	2	**15**
Virtual Classroom	1	1	1	1	1	1	3	**9**
	4	6	2	1	2	2	0	**17**
E-Portfolio	3	3	0	3	1	6	4	**20**
	0	1	0	0	0	0	0	**1**
Open Content	3	1	0	0	6	3	0	**13**
	1	0	0	1	2	0	1	**5**
Mobile Learning	0	0	0	0	0	4	8	**12**
	1	0	1	0	2	4	4	**12**
MOOCs	0	0	0	0	0	0	6	**6**
	0	0	0	0	0	0	2	**2**

In the following, the interpretation of the findings will be presented. To achieve the prognostic targets of a trend study, striking findings of the study will be formulated in the form of theses.

LMS – part of our routines!

Learning management systems (LMS) are the backbone of e-learning in Higher Education. Numerous articles about LMS have been presented continuously at both conferences. The decreasing scope of the scientific discussion should not be interpreted as a loss of importance, but rather for the productive usage of LMS in daily routines of academic teaching. LMS are an essential part of academic teaching.

Social Software – didactical potentials for academic teaching!

Considering the discussion about Social Software, it is striking that these is much more addressed within the didactic-pedagogical-oriented GMW – in quantitative terms – (46) than within the DeLFI (27). The DeLFI has a stronger focus on technical topics. It can be

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concluded that Social Software – and the associated learning activities like communication, co-operation and prosumption – is currently considered primary as didactic innovation.

Downfall of Virtual Worlds!

In 2007virtual worlds were identified as a medium-term e-learning trend in the Horizon Report, with an expected breakthrough time of 2-3 years. The euphoria was triggered by the public interests related to the application *Second Life*. But for all that, the scientific discussion of virtual worlds decreases continuously. This is confirmed by current Google statistics (Google trends), which capture and analyse general trends related to internet search queries (see Figure 3). Virtual learning environments could not prevail at universities and will probably disappear from the e-learning agenda in the medium-term.

Figure 3. Internet search queries in Google, analysed by www.google.de/trends (Keyword: "Virtuelle Welten"[5])

E-Portfolio – a didactic innovation close to a breakthrough!

E-portfolios have become established firmly in the academic discourse about e-learning. However the more surprising, therefore, is that e-portfolios have not been included in the international oriented Horizon Report. It cannot be determined whether e-portfolios are only/merely a phenomenon in the German-speaking area of Higher Education or not. In any case, the investigation showed that e-portfolios had been significantly more in focus on the GMW conference (20). Therefore they are probably more a didactical and organizational innovation in academic teaching than a technical challenge.

The long way of Mobile Learning!

From 2009 to 2012 mobile applications were number one of all e-learning trends in the Horizon Report. And what about the professional debate in the German Higher Education area? So far, mobile trends in e-learning were discussed rarely on the investigated conferences. Until 2010 there were only two articles about this topic (in both conferences). However, mobile learning has moved into the focus of the GMW and the DeLFI during the past three

[5] German translation of virtual world

ISBN 978-963-89559-7-5

years (12 papers in 2013) and now it seems to be established in the scientific discourse within German speaking universities.

What about MOOCs?

MOOCs have become unexpectedly number one among all e-learning trends in the Horizon Report 2013. Throughout the period since 2007, there were no hints for it. Neither the acronym MOOC nor the ideas behind it (open online teaching for large groups of learners) were identified as trends in the Horizon Reports. In 2013 the first articles about MOOCs have been published on the GMW (6) and Delphi (2) proceedings. That MOOCs belong to the e-learning trends with the largest development potential in academic teaching shows the university practice. Numerous MOOCs have been developed in the past few months[6] and the public debate about MOOCs is growing (see Figure 4). However, it is too early for assessing the true potential of MOOCs.

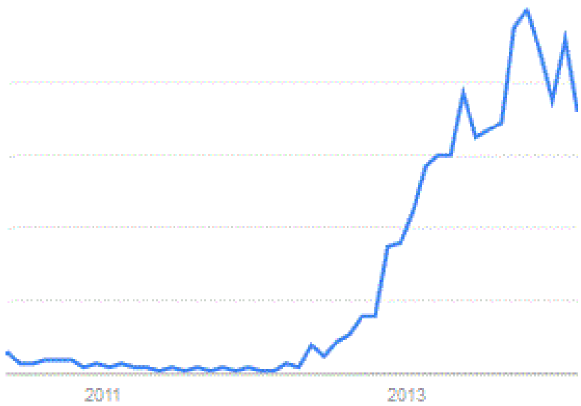

Figure 4. Internet search queries in Google, analysed by www.google.de/trends (Keyword: "MOOCs")

Limitations

The present findings are the result of an exploratory study. Anyhow the described research design can lead to distortions or errors, which can have impacts on the validity of the findings.

- Only abstracts of the contributions have been investigated. It is conceivable that in the complete articles topics have been addressed, which are not referenced in the abstract or that abstracts are enriched by modern (trend) terms to attract the attention of potential readers. In both cases, the assignment of the content into the categories has been incomplete or incorrect.
- For many e-learning innovations, there are no fixed technical terms in the scientific debate. The assignment of concepts to pre-defined categories is therefore difficult. Errors in the category allocation due to unclear terminology cannot be excluded.

[6] The European MOOCs Scoreboard, http://openeducationeuropa.eu/de/european_scoreboard_moocs [31th January 2014].

ISBN 978-963-89559-7-5

- We analysed the frequency of reports about e-learning innovations. The correlation between the frequency of reporting and the future potential of innovative e-learning applications has not been established empirically, but follows plausibility considerations (Rogers, 2003, Gartner, 2014).
- Organisers of the investigated conferences often define (main)topics. This influenced the spectrum of represented topics at all and the focus of individual contributions.

Résumé

These above-mentioned limitations could affect the scientific quality of the results. The data and findings therefore should not be over-interpreted. Despite all the potential limitations, the data provide on the one hand a differentiated picture of current debate focus of e-learning innovations in Higher Education. Some trends have become visible. On the other hand the study describes a methodical approach to characterise the life cycle of innovations by analysing scientific material.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

HOW CAN E-LEARNING AND MOOCS REVEAL AND EXPLOIT THE HIDDEN TREASURES OF OPEN RESEARCH AND OPEN EDUCATION?

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What is the Current Situation?

Open and Openness are becoming more and more in vogue: It is not a fashion but an increasing requirement due to dramatic changes in societies. Therefore open education is raising interest as well as gaining adaptation, implementations and success. In parallel open research is getting popular through the opportunities for researchers to share their results among themselves. While these developments are taking root, another phenomenon suddenly appeared and changed the public discussion on open courses: Massive Open Online Courses, called MOOCs. This article outlines the relation between these movements and the ("older") E-Learning.

What is E-Learning?

The term E-Learning is controversial and ambiguous from the beginning: Its introduction is often assigned to Jay Cross but it normally remains unclear for which abbreviation E-Learning stands for. Therefore the term Technology-Enhanced Learning (TEL) is more precise but could not become broadly accepted. E-Learning has existed and been promoted by many experts, professional providers and associations at national, European and international levels (such as BITKOM AK Learning Solutions in Germany, EDEN in Europe and ICDE worldwide) for more than 20 years, but has not achieved the awareness and attention of a broad audience and society as a whole. The huge promises from the internet hype at the beginning of this millennium were not fulfilled as predicted: despite the continuous and slowly increasing success and implementations of E-Learning in enterprises, it was not recognized as a driver and enabler for innovation across all educational sectors. Meanwhile E-Learning is normal practice in lager enterprises (95 % penetration in companies with more than 500 employees) but not yet widely accepted in other educational sectors.

What are MOOCs?

The new term MOOC (Massive Open Online Course) has immediately attracted the masses even though it is just another label for a diversity of different online learning scenarios and methodologies that were already developed and implemented many years before. MOOCs can be considered and defined as a special type of E-Learning, raising a new interest and offering opportunities to (again) reach learners that are attracted by E-Learning solutions due to many reasons. Thus, MOOCs can be the enablers for a renaissance of E-Learning even though their completion rates are very low and their general quality is questionable and currently under lively debate. Nowadays, different types of MOOCs (so called cMOOCs and xMOOCs) are discussed but the focus is still on the masses, technology and promised innovations that are not easily to discover: Most MOOCs are lacking continuous tutoring and support for all learners who are expected to teach themselves. Only this year 2014, the international EIF / LINQ Conference has raised the question of quality for opening up education with a special focus on MOOCs for the first time.

What is Open Research?

Open Research is (like E-Learning and Open Education) an umbrella term that evolved from several initiatives: First, open access, open licenses and open repositories were key questions (not only) for researchers confronted with changing legal and institutional changes. Due to the general shift from the traditional openness paradigm to copyright regulations and protections in the 60ies of the 19th century, open access and open licenses became an important issue for international agreement and standards. The establishment of open repositories and their federation and harvesting facilitated easier search and retrieval across institutional and global borders and enabled the growth of a global community and initiatives for openly linking and sharing research results. The term Open Research is covering this diversity and still lacks a commonly shared definition.

What is Open Education?

Open Education is as manifold as the term openness: It can be related to quite diverse approaches and understandings. Generally, open education is related to learning innovations and learning quality changing the educational environments and offering selections of methodologies, tasks and resources by the learners. Learning innovations and learning quality are important and reflected topics for a very long time from the beginning of discussions and theories about learning processes: In Europe, Plato's Allegory of the Cave is one of the earliest examples. Their debate continued during the introduction of the first universities in the Middle Age and of the school systems in the 18th century. During the last years and the upcoming so called "digital age", many discussions took place (also in the fields of school and higher education, learning for work and at workplaces as well as non-formal and informal learning) due to the two main changes covering all sectors, branches and levels of the society: first, globalisation and second, establishment of the worldwide internet. In our days, the

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European Commission has set a new milestone with its policy "Opening up Education" even though it focuses too much new technologies and Open Educational Resources (OERs) instead of new pedagogical methodologies and Open Educational Practices (OEPs).

The Hidden Treasures of Open Research and Open Education

Open Research and Open Education are two worlds which share the same vision, objectives and ideas, i.e. openness as the standard for the publication and (re-) usage of concepts and materials. But both worlds are not interconnected undertaking research, development and implementations in separate closed communities. Open Research focuses on the requirements for researchers to (peer-) review, publish and distribute their interim and final research results. This mainly leads to the upload and publication of the final results as scientific articles in the one's own repository or in journals and their repositories. Open Education addresses the need for the modernization of learning, education and training in general through the introduction of innovative methodologies and scenarios for opening up education and learning in all sectors. Both open worlds and their developments and results can be treated and described as hidden treasures because both worlds are not aware of each other and the (missed) opportunities which could result from their interconnection.

Why and How to Connect Open Research and Open Education?

Open Research and Open Education could and should be connected to mutually benefit from the potentials of the respective other world. Educators could benefit from all the research materials and resources that are normally published with open licenses as they can be adapted to their educational purposes and environments. Likewise, researchers could benefit from the broader (re-) usage of their research results, possible feedback and an improved reputation. For better awareness raising of these (not yet exploited) potentials and opportunities an international community was established in Rome on 15th of May 2013, the day before the international LINQ Conference (http://www.learning-innovations.eu). Experts and organizations from four continents assembled together to create ICORE, the International Community for Open Research and Open Education (http://www.ICORE-online.org). Consensus was achieved through open discussions, brainstorming, selecting and voting on ICORE objectives and statutes. Finally the following principles were defined and approved for fulfilling the ICORE objectives:

- ICORE aims to promote Open Research and Open Education as a fundamental social objective.
- ICORE aims to support the design and implementation of innovative strategies, instruments and services for facilitating Open Research and Open Education such as Open Access, Open Educational Practices and Resources.

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- ICORE aims to foster co-operation among all relevant stakeholders in Open Research and Open Education such as policy makers, researchers, educators, students, learners, non-profit and commercial providers and users.
- ICORE aims to facilitate the continuous and rapid transfer of results from Open Research and Open Education into the deployment for future research and education and for the benefits of the general public and global society.
- ICORE aims at fostering research and development that leads to innovation when that will benefit the objectives of the association.

Within one year ICORE was able to attract and welcome more than 200 members, joining forces with all interested existing organizations to promote and support the connection of Open Research and Open Education. Common events at international conferences and recognition by the European Commission and other public authorities and associations number among the first successes of ICORE.

Conclusion

In particular E-Learning and MOOCs can support the connection of Open Research and Open Education through their (natural) inclusion of digital resources and materials. Technology-enhanced learning and online courses are the ideal instruments and vehicles for the adaptation of research results and for their broadest societal impact through the uptake by interested and progressive pupils in schools, students in universities, employees at workplaces and adults in lifelong learning. E-Learning and MOOCs possess the potential to foster the break-through of Open Education in all educational sectors and to transfer the results from Open Research into learning opportunities. Most important is the focus on the (innovative) pedagogical methodologies and the quality of the Open Education as well as of the (adapted) Open Research results. Then both open worlds can truly benefit from the outcomes and advantages of the respective other world to enable a strong impact for the lifelong learning of all citizens and in the whole society.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
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ISBN 978-963-89559-7-5

OPEN LEARNING ARENAS WITH AN OPEN CULTURE OF SHARING – SUCCESS FACTORS

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Introduction

It is said that higher education is undergoing an era of disruptive development, and likewise as the music and film industry has done (Gaebel, 2013; EC, 2013). The development of open, free, and flexible education, with the use of OERs (Open Educational Resources) (Atkins et al., 2007), and MOOCs (Massive Open Online Courses) (Wikipedia, 2012) challenge higher education dramatically. However, unfortunately the way teaching and learning happens is undergoing infinitesimal shifts. Likewise, the way how quality and success factors are presented, and measured are still under the same umbrella, as in the so called traditional paradigm, e.g. linear offered, delivered, assessed, certified (Haggard et al., 2013).

Open learning cultures are significant quality issues in terms of globalization (Gaebel, 2013; EC, 2013; Haggard et al., 2013). Open education creates not only opportunities to participate in online courses from prestigious universities, but also allows for participation in global social online collaboration and interaction (Gaebel, 2013; Haggard et al., 2013; Ossiannilsson, 2012). Moreover, it is a democratic right. What is paid by taxpayers should go back to taxpayers. Free education for all is a social innovation, as well as the initiative with housing for all is. Both initiatives are inclusive and lead to better living conditions, a healthier population and possibilities for more active social citizenship (Ossiannilsson, 2012). Commissioner Vassiliou (EC, 2013) expresses it as:

> *The education landscape is changing dramatically, from school to university and beyond: open technology-based education will soon be a 'must have', not just a 'good-to-have', for all ages. We need to do more to ensure that young people especially are equipped with the digital skills they need for their future. It's not enough to understand how to use an app or program; we need youngsters who can create their own programs. Opening up Education is about opening minds to new learning methods so that our people are more employable, creative, innovative and entrepreneurial (EC, 2013).*

The development and introduction of MOOCs force quality enhancement of education, research, and collaboration with the surrounding society (EC, 2013; Haggard et al., 2013; Ossiannilsson, 2012). Additionally, MOOCs contributes to sustainable development. MOOCs are a revolutionary way of thinking about learning, social interactions, and quality (EC, 2013; Haggard et al., 2013; Ossiannilsson, 2012). MOOCs are already embracing the world and millions of people are enrolled, completely free, unrestricted, and at comfort in their own home. MOOCs requires rethinking and involves disruption of educational foundations (Wikipedia, 2012; Chok, 2014). MOOCs requires a shift in culture, power, and ownership; from stakeholder offers to learners' demands and promotes *choice based* learning. Choiced based learning is understood as that it is really the individual, the learner who makes the choices of his or hers own education, as the most of the prestige global educational offers are available almost for free here, now and from everywhere on Internet.

This paper focuses on how open education contributes to education for all on equal terms, free and inclusive, and with social interaction. The question is no longer how to work with digital media in education, but rather how to stimulate online learning as well as social interaction and participation in a digital world, and on a daily base, in schools and in working life. Higher education is one of the most powerful incentives to change the world. Democracy, richer and better living conditions may thus be encouraged. This does not happen by itself. It all starts with access, inclusiveness, interactiveness, and openness in education. If ancient models of education still are used, how can individuals, then be expected to successfully be active global citizens to be responsible and influence their own and others' situation in a modern and changing society. This paper also focuses on quality dimensions and ways on how to measure and how to work with quality enhancement in open learning arenas with an open culture of sharing.

Opening up education

Open and flexible learning are about fully exploring the potential of ICT to improve education and training systems, and aligning them with the current digital world (Downes, 2007; McAndrew, 2006). The EC stress with its initiative on opening up education, that ICT tools, OERs, and open practices allow for an increase in the effectiveness of education, allowing for more personalised learning, a better learning experience, and improved use of resources (EC, 2013). Such measures also promote equity by increasing the availability of knowledge. Furthermore, it is argued that ultimately, opening up education may lead to a situation where all individuals may learn anytime, anywhere, with the support of anyone, using any device.

To foster opening up education for collaboration and for competitiveness the European Commission launched the initiative Opening up education to boost innovation and digital skills in schools and universities (EC, 2013). Three main areas are emphasized:

- Creating opportunities for organisations, teachers and learners to innovate;
- Increased use of Open Educational Resources (OER), ensuring that educational materials produced with public funding are available to all
- Better ICT infrastructure and connectivity in schools

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More explicitly, and in detail the three areas are expressed in seven tasks for universities:

- review their organisational strategies
- exploit the potential of Massive Open Online Courses (MOOCs)
- stimulate innovative learning practices such as blended learning
- equip teachers with high digital competences
- equip learners with digital skills
- think about how to validate and recognise learner's achievements in online education
- make high quality Open Education Resources (OER) visible and accessible

Rethinking universities and teaching and learning

In the first bullet point above, it is set out that higher education needs to review their organisational strategies to meet the growing changing educational paradigm, where openness and learning is in focus. It is argued that since the MOOCs made its entry, nothing will be the same in and for higher education. Change is inevitable, with this follows that the way Gen Y needs to be engaged is also changing. Higher education needs to adopt new methods of the way to engage and interact with students, as well as how to interact with the global society of academics and educators. Boundless information awaits with just a mouse-click (wireless, of course) (Ossiannilsson, 2012). Chok (2014) stress that:

> *Today's young leaders need to be conversed with, and stimulated with more practical learning techniques that can translate into tangible skills and that can lead to real career opportunities. The truth is, students who are engaged in this way are excelling.*

She continues to say, that she:

> *…believe they are coming out ahead of students who are only exposed to, the more "traditional" instruction. Our job market … is becoming increasingly competitive. More and more institutions are making the shift to accommodate this new age of learners. Students who are immersed into real-world experiences earlier on in their education are more prepared, more confident, and frankly, it follows that they would be more employable.*

So the decisive quality questions are, if universities and educators offers, really prepare students in an adequate way for a mobile, flexible surrounding world at work and working places. Through case-based learning for example, students can work with real cases, and in addition with OERs, MOOCs in global networks through the Internet this can also reflect multi-cultural learning dimensions. Students require being active to solve real-life scenarios, and through self-directed learning students discuss, and learn analytical and practical knowledge. When students are discussing and solve real-life scenarios to acquire the analytical and practical knowledge needed for a given skill-set, they learn to be active participants in their own learning process and to orchestrate and take control themselves in their learning process and content due to learning aims or learning objects (Ossiannilsson, 2012). This

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framework requires students to be actively involved, and take part in self-directed learning. Essentially, it helps learners in a real-world setting, and not just by memorizing. Research from Stanford shows that;

> *…Students who students who learned in this way were more likely to become self-directed learners, because they had exercised metacognition to derive solutions. I can speak from experience that when a learner is actively solving a problem, they have to articulate and justify their logic and can't just follow a cookie-cutter approach to the problem. (Chok, 2014)*

Learning design

Several researchers as Conole (2013), Laurillard (2012), and Ehlers (2013), stress the needs and demands for a changed paradigm for learning design in open learning culture. With the use of web 2.0 tools (Mak et al., 2010), Figure 1, and even the upcoming 3.0 tools, learning design and learning analytics has to be rethought in many ways. In addition, personalized learning is stressed (Ossiannilsson, 2012). Opening up education with increased digitalization, OERs, MOOCs etc, will enable learning and personalized learning pathways (Downes, 2007; Mackness et al., 2010; Rodriguez, 2012; Pawlowski & Clements, 2013), and let the learner take control in the driving seat and orchaestra ones own learning (Ossiannilsson, 2012).

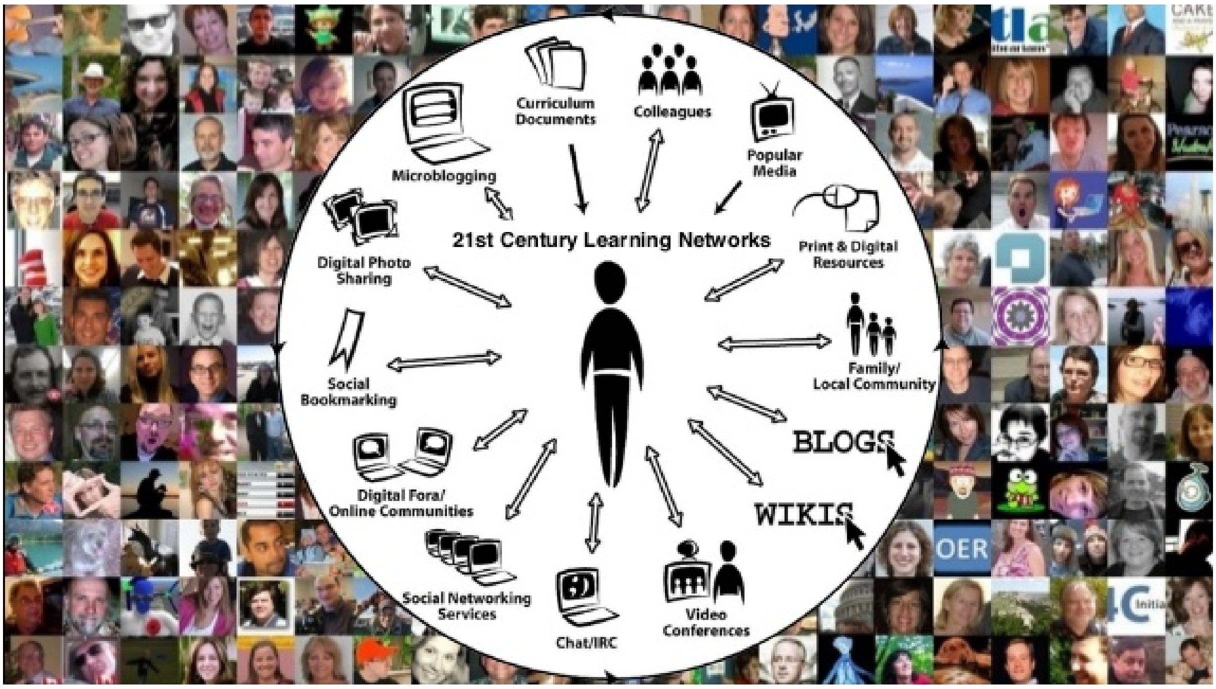

Figure 1. Learning design in an open learning context

Bloom's taxonomy is frequently used since long time in educational settings. By opening up education and digital learning and teaching, it has already been said that there are needs for rethinking in almost every educational area and settings towards the learners choices, and to personalize learning and education. Thus, this is true even for which learning taxonomy is in use. Through the latest years many taxonomy of digital learning for the 21st century, have

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come in use as for example the one which even is interactive, shown in Figure 2. Through its interactivity, learners and educators can get support for learning goals, activities, and for which tools to use.

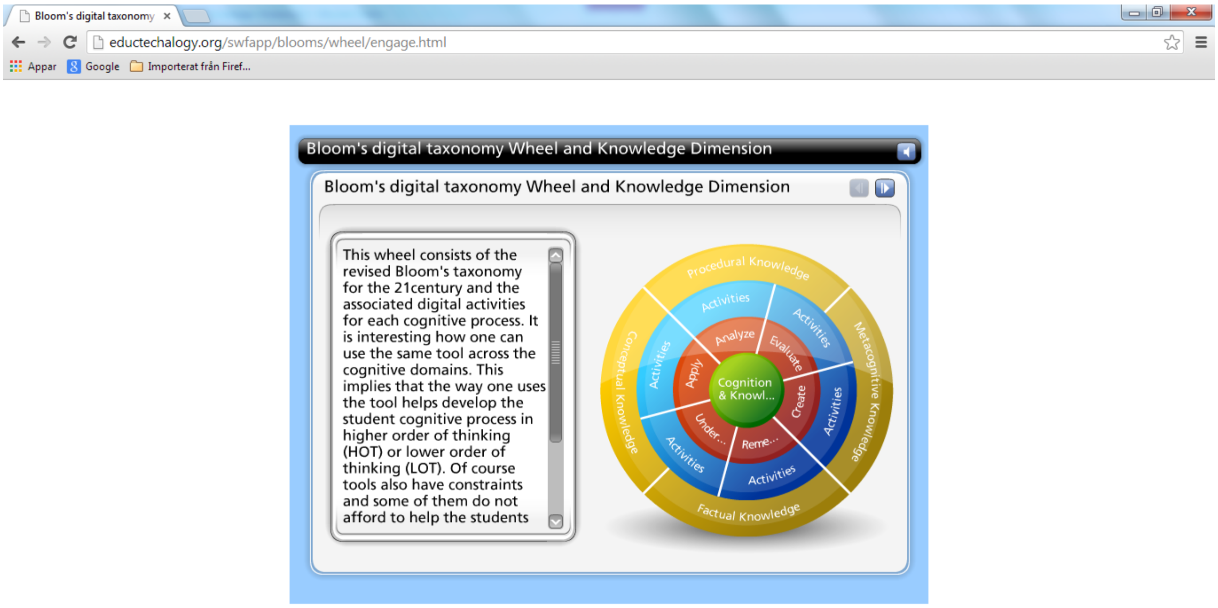

Figure 2. Blooms digital taxonomy Wheel and knowledge dimension

Quality and success dimensions

UNESCO (UNESCO, 2013, pp 8-27) has recently launched their policy guidelines for mobile learning in open education. Their focus is aligned with the EU's opening up education (EC, 2013), that mobile learning expands the rich and equity of education, facilitates personalized learning, enable the power of anytime, anywhere learning and provides the productive use of time spent in classrooms. Furthermore, UNESCOs guidelines emphasizes that mobile learning build new communities of learners, support seamless learning, bridge formal and informal learning, minimizes educational disruption in conflict and disaster areas, assist learners with disabilities, a maximize cost-efficiencies, and improve communication and administration.

Other success factors can be described in the areas of learning /institutional context, learning resources and learning processes. Success dimensions can also be outlined as referring to course design, learning design, media design, and content (Uvalic-Trumbic & Sir Daniel, 2013). Important is that a holistic approach has to be taken, looking to and reviewing quality in online, open learning contexts (Ossiannilsson, 2012).

It will be noted as well, the importance of whether quality is seen from a retrospective or prospective view (Ossiannilsson, 2012). In addition, the outcomes of a quality review differ if it is a question of quality enhancement (self-evaluation, benchmarking etc.) or if the quality review is an accreditation or certification (Ossiannilsson, 2012; Uvalic-Trumbic & Sir Daniel, 2013). Anyway, the quality is probably best and honestly measured as the expression; *quality is in the eyes of the belover.*

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Conclusions

The question is not any longer how we shall work with digital media and technology in education, but rather how we can work with learning in a digital community, not at least for work and in working places. It is also obvious that academics, and this is also true for managers and directors that the changing paradigm for collaborate work and to see learners as prosumers, academics has to go from sage on the stage…to guide on the side…to meddler in the middle. Likewise, learning situations, both formal and informal have to go from content to context, as content is available from everywhere, it is the context which matter, like the flipped classroom model. To adopt to open learning arenas with an open culture of sharing there are urgent demands for opening up education and to rethink linear learning and education and instead to offer rhizomatic (non linear, or like root threads) pathways for learning, this is true both for educational settings as for work and working life.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

BADGING AND EMPLOYABILITY AT THE OPEN UNIVERSITY

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Abstract

Awarding badges to recognise achievement is nothing new. Of late, badging has gone digital, offering new ways to recognise learning and motivate learners, providing evidence of skills and achievements both within and beyond formal learning contexts. Badging (or 'soft accreditation') has been piloted in various forms by the Open University (OU) in 2013, both in discrete projects and elsewhere on open courses and employer-led initiatives. This paper outlines what the OU has learned from its pilot projects and details how the University is subsequently developing a suite of badges for informal and formal students that align with employability and the OU's existing skills-related open educational resources (OER).

The OU's badging pilots are informed by recent research (Perryman, Law & Law, 2013; Law, Perryman & Law, 2013) into the motivations and demographic profile of learners using the free educational resources which the OU makes available through its OpenLearn and iTunes U platforms. The research findings had indicated that a substantial number of informal learners using the OU's free content do so for work and/or professional development and that learners are eager to have their informal learning achievements recognised in some way. The research also provided evidence that OpenLearn is providing a bridge to formal learning in several different respects, suggesting that the addition of badging could strengthen this bridge.

The evaluation of the 2013 pilots indicated that learners who achieved badges were highly motivated by the experience and that the badged courses attracted learners who were particularly inclined to become students. The evaluation has subsequently informed the development of a further project to deliver a suite of free, open courses of 24-hours learning, each of which are assessed through the deployment of a set of Moodle quizzes. To mitigate perceived risks to the sector and the University of providing a badged OU curriculum on a bite-sized scale, badges are limited to employability and skills development. The badged courses will be provided free of charge to the learner and those achieving badges will be encouraged to display them through their public-facing profile on the OpenLearn website. The badged content will be evaluated for its efficacy to motivate and develop informal learners and to provide employability skills for OU students. It is hoped that this paper will stimulate academic interest in the topic and will be of interest to Higher Education Institutions (HEIs) globally and open up the discussion around developing a known currency of non-accredited learning.

Introduction

Awarding badges to recognise achievement is nothing new. In the UK and internationally, Brownies, Guides and Scouts have long used badges to drive and acknowledge the skills development of young people, who collect fabric badges to sew on their uniforms. Of late, badging has spread to the world of adults and, as with many things, has gone digital. Digital badges offer new ways to recognise learning, providing evidence of skills and achievements both within and beyond formal learning contexts. As such, they can work both in motivating formal and informal learners, and in attracting new students to paid-for study. Mozilla's Carla Casilli and Erin Knight (2012) describe digital badges as "Digital tokens that appear as icons or logos on a web page or other online venue which are awarded by institutions, organizations, groups, or individuals, to signify accomplishments..." Hickey (2012) identifies three possible functions for digital badges:

1. **Summative functions**, which are often called **assessment OF learning**.
2. **Formative functions** for individuals, which are often called **assessment FOR learning**.
3. **Transformative functions** for systems, which a few are calling **assessment AS learning**.

The concept of badging (or 'soft accreditation') has been piloted in various forms by the OU in 2013. In support of the OU priority Journeys from Informal to Formal Learning (JIFL), recognition of informal learners' achievements on the OU's OpenLearn platform currently takes the form of a user profile and a 'Statement of Activity', detailing course excerpts that have been viewed online. To enhance learner confidence and progression badges, as a visual representation of achievement or participation, have been investigated and piloted in discrete projects at the OU and elsewhere on open courses and employer-led initiatives. As badges for free learning represent a challenge to the education sector overall, the OU's next steps beyond these first pilots must acknowledge the risk of this disruptive innovation, through a focused lens of activity.

The Mozilla Foundation, who has so far led the digital badge initiative in terms of technical infrastructure, invite learners to obtain a badge from various (mainly US) providers https://wiki.mozilla.org/Badges/Issuers. Organisations that issue badges come from a range of sectors including formal and informal educational institutions, multinational corporations, industry associations, non-profits and groups interested in professional development. Each badge displayed should link to a page that shows what the learner did to obtain the badge.

ISBN 978-963-89559-7-5

Background: free learning from the Open University

The OU makes its free educational resources available on various third party platforms (such as iTunes U, YouTube, Google Play and AudioBoo) and via its web-based free educational resources platform, OpenLearn (http://www.open.edu/openlearn). OpenLearn was launched in 2006 and hosts hundreds of online courses and videos, many of which are openly licensed, and is accessed by over 5 million users a year. It also serves as the medium through which the OU promotes its partnership with the BBC and the related broadcasting and free open access courses and content that is created as co-productions with them. Since its launch, OpenLearn has received 30 million unique visitors (internal OU data) and has developed from being a platform that hosts units from decommissioned undergraduate and postgraduate courses, to one which hosts commissioned interactive games, videos, blogs, podcasts and which offers users the opportunity to order free printed materials. Much of the course extract content is developed using structured authoring tools which is made available to users in multiple formats such as Microsoft Word and epub (that can be opened by ebook readers).

The development of OpenLearn was initially funded by the William and Flora Hewlett Foundation in 2006. With the end of the grant, OpenLearn became mainstream activities for the OU and now form part of JIFL priority as part of the OU's commitment to widening participation. The OU aims that 5% of each of its courses should be made available as OpenLearn content and for the period August to December 2013, the OU reports a 12.9% click-through from OpenLearn to the 'Study at the OU' webpage to learn more about becoming an OU student.

The Open University's informal learners

In 2013, the Open University's OER Research Hub and Open Media Unit collaborated in a large scale study profiling the demographics and motivations of its informal learners i.e. people using the OU's OpenLearn and iTunes U platforms (see Law, et al, 2013). This study has informed the development of the OU's badging provision, which is designed to serve the needs of the University's informal learners, especially those who are learning for employment-related reasons. The 2013 study informed the OU's badging pilot projects in three ways:

- By providing evidence about informal learners' motivations for using OpenLearn and iTunes U content;
- By leading to a greater understanding of the typical users of the two platforms (e.g. their age, qualifications, employment status and location);
- By giving a nuanced picture of the ways in which the OU's free educational content is providing a bridge between informal and formal learning.

Table 1 shows the balance between informal and formal learners, and educators in the OpenLearn and iTunes U survey sample. Table 2 gives a comparative summary of the findings regarding user demographics.

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Table 1: Informal learners, formal learners and educators using iTunes U and OpenLearn

	iTunes U	**OpenLearn**
Informal learners	42%	48%
Formal learners	38%	33%
Educators	20%	16%
Both learner and educator	18%	23%

Table 2: Comparing iTunes U and OpenLearn user demographics

	iTunes U	**OpenLearn**
What is your age?	**577** (27%) 0-24 yrs	**120** (14%) 0-24 yrs
	947 (44%) 25-44 yrs	**333** (38%) 25-44 yrs
	495 (23%) 45-64 yrs	**330** (38%) 45-64 yrs
	125 (6%) Over 65 yrs	**88** (10%) Over 65 yrs
What is your gender?	**1345** (62%) Male	**364** (41%) Male
	779 (36%) Female	**515** (58%) Female
	35 (2%) Other*	**2** (>1%) Other*
Where do you live?	**311** (14%) UK	**533** (61%) UK
	524 (24%) US	**27** (3%) US
	1324 (62%) RoW	**308** (35%) RoW
Is English your first spoken language?	**1138** (53%) Yes	**682** (77%) Yes
	1021 (47%) No	**207** (23%) No
What is your highest educational qualification?	**331** (15%) School	**139** (16%) School
	121 (6%) Vocational	**78** (9%) Vocational
	366 (17%) College	**199** (23%) College
	604 (28%) Undergrad	**227** (26%) Undergrad
	617 (28%) Postgrad	**178** (20%) Postgrad
	120 (6%) None	**52** (6%) None
What is your employment status? (Tick all that apply)	**1428** (66%) Employed	**504** (58%) Employed
	126 (6%) Voluntary	**40** (5%) Voluntary
	577 (27%) Student	**120** (14%) Student
	169 (8%) Unwaged	**135** (16%) Unwaged
	49 (2%) Disabled unwaged	**37** (4%) Disabled unwaged
	156 (7%) Retired	**127** (15%) Retired
Do you have a disability?	**281** (13%) Yes	**168** (19%) Yes
	1878 (87%) No	**741** (84%) No

* Other = 'transgender' and 'prefer not to say'.

One of the initial reasons for providing free content at the OU through the William and Flora Hewlett Foundation-funded OpenLearn project was about social mission. For many over the last decade this has evolved into developing business models for open content production that still serve social mission, but also support students and teachers and bring informal learners into the formal student experience. It has also provided new insights into informal learning, adding to established ideas around the provision and motivation for work-based learning to include new methods and sources of free content and social online interaction that meet the needs of both professional **and** personal development. (Law et al., 2013)

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Whilst the demographic analysis of the 2013 study shows that the OU, through OpenLearn and the OU's iTunes U channel, is serving a largely educated group who have a keen awareness of the range of free educational resources available online, it is clear that the OU is also reaching groups of users that fall into the widening participation agenda in equal or larger proportions than the population in general (demonstrable for the UK).

Table 3 shows the motivations of iTunes U and OpenLearn users as revealed in the 2013 survey results, which indicated that a substantial number of informal learners using the OU's free content do so for work and/or professional development reasons – a factor that has greatly influenced the employability-related aspects of the university's badging pilots.

Table 3: Motivations of iTunes U and OpenLearn users

	iTunes U	**OpenLearn**
Personal interest	81.58%	81.74%
My professional development	40.28%	39.73%
Relevant to my studies	27.86%	19.63%
Relevant to my work	22.47%	30.59%
For the purpose of sharing with others	12.88%	17.35%
For the purpose of teaching others	11.85%	14.61%
Family interest	5.95%	8.22%
Relevant to voluntary work	4.82%	10.05%
Commercial interest	4.05%	1.83%

The 2013 study (Perryman et al, 2013) showed that learners are eager to have their informal learning achievements recognised in some way and also provided evidence that OpenLearn is providing a bridge to formal learning in several respects:

- In leading informal learners to formal study with the OU and with other providers;
- In working as a showcase for the OU and increasing awareness of the learning opportunities and quality of provision offered by the university;
- In providing 'taster' materials that inform the paid-for module choice process;
- In allowing learners to test out university-level study prior to registering on a paid-for module;
- In broadening the range of subjects about which informal and formal learners are interested;
- In increasing users' study skills and confidence (thereby helping to increase existing OU students' performance and retention and potential students' readiness for study);
- In improving non-native English speaking students' language skills (and thereby helping with study preparation and retention).

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Why develop badges for OpenLearn?

Through the development of a curriculum of assessed, badged courses aimed at employability and skills, the OU will augment its employability offering for both informal and formal (OU) learners via the OpenLearn platform. Pilot projects around badging at the University undertaken in 2013 were developed using the Mozilla Open Badge Infrastructure (OBI) (see http://openbadges.org) and included recognition for learners' participation in a community activity, submission of a piece of work and completion of a particular task. In addition badges were awarded via three entry-level Openings courses on OpenLearn: *Learning to Learn and Succeed with Maths Parts 1 and 2*.

The evaluation of these pilots has informed the development of a further project to deliver a suite of free, open courses of 24-hours learning, each of which are assessed through the deployment of a set of Moodle quizzes. The project aligns with the University's priorities and core values in that it:

- Aligns with the Journeys from Informal to Formal Learning strategy.
- Helps to provide accessible routes into the University for students who might not otherwise have the opportunity to participate in HE.
- Supports The OU Charter: …to promote the educational well-being of the community generally.
- Aims to deliver a high quality student experience in relation to careers services and employability skills development.

The evaluation of these badged *Openings* courses was performed through online surveys to participants at the enrolment stage and at the end of each course. The evaluation results demonstrated that a) the IT infrastructure and the user experience of providing badges needs further development; b) learners who achieved badges were highly motivated by the experience; and c) the reworked *Openings* courses attracted learners who were more inclined to become students and were key to meeting the OU's widening participation agenda. Indeed, there were significant variations in relation to prior education, numbers of retired learners and numbers of learners reporting a disability compared to OpenLearn users overall:

- Only 36% of learners on the badged *Openings* courses already hold an undergraduate qualification or higher compared with 56% of the general OpenLearn learner population.
- 12% are retired compared with 20% of the general OpenLearn user population.
- 31% consider themselves to have a disability compared to 19% of the general OpenLearn learner population; 40% of *Learning to Learn* learners who completed the enrolment survey declared a disability.
- Of these learners, 38% report a mental health problem and 38% report an illness or chronic condition; 83% of *Learning to Learn* learners who say they have a disability, report a mental health problem.

ISBN 978-963-89559-7-5

What badges are being offered?

To mitigate perceived risks to the sector and the University of providing a badged OU curriculum on a bite-sized scale, badges are limited to employability and skills development. The following badges are proposed for development during 2014 using existing OU content and will be hosted on the OpenLearn platform:

1. First Steps in HE;
2. Succeed with Maths;
3. Succeed with Learning;
4. Succeed with English;
5. Skills for Work;
6. Career Development and Employability;
7. Digital Literacy;
8. Sport in Society.

A badge will be provided for successful completion of 24 hours of study (notionally eight weeks of learning at three hours per week, taken at the learner's' own pace. This fits with current, recognised open course design used by the OU as part of its programme of MOOC delivery for the FutureLearn platform and will allow portability between platforms should any content developed as part of this project be deemed feasible for release as a MOOC on FutureLearn, OpenLearn or as an iTunes U course.

Content identified for these badges is a mixture of:

- Open content that has already been reworked for soft accreditation/assessment;
- Open content that exists as standalone text on OpenLearn [this forms the majority of badged content];
- Module content currently available to OU students.

Technical infrastructure

The badged courses will be provided free of charge to the learner and as such, this 'class' of badge will remain free. Those achieving badges will be encouraged to display them through their public-facing profile on the OpenLearn website. In addition, registered students will be able to display both their informal learning and formal learning achievements together. To expand, learners who have logged into OpenLearn and have registered on a badged course will be able to earn badges by correctly completing a series of Moodle quizzes. The technical implementation proposed will allow users to display badges in the following ways:

- Their My OpenLearn profile, which will enable them to provide a public version via a shareable URL;
- By the end of 2014, their MyOU profile (the OU's personalised profile page for registered students);

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- Their Mozilla Backpack should they wish to link to set one up http://openbadges.org/display/;
- Any WordPress blog;
- Socially via their My OpenLearn profile which will allow them to automatically share their achievements on Facebook (as a status update on their timeline), Twitter (as a Tweet) and LinkedIn (as an update).

Measuring impact

In order to monitor impact, badged open content will be evaluated for its efficacy to motivate and develop informal learners and to provide employability skills for formal OU students. This will form part of a longer term impact study. Key elements to be evaluated include:

- Users' experience of the process;
- Users' motivation for pursuing a badge;
- Users' ongoing motivation for formal study, informal study and/or further soft accreditation;
- Users' demographic profile;
- Users' reasons for engaging with the material but not the badging elements of it;
- How users have used their badges (a longer term evaluation).

Conclusion

Evaluation of the OU's pilot badging projects suggests that badging offers a way of reconciling informal learning and the demands of employers, and that badging content for university students and informal learners alike may become a key widening participation activity for HEIs. It has also become clear that the provision of a public-facing profile that acknowledges both formal and informal learning and can be shared through social media networks, is both achievable and desirable. While machine-based assessment may be perceived as 'dumbing down' the achievement of gaining a badge, there is much to be developed and understood around peer assessment in the open and the use of graduate 'mentors' to help raise the bar. Further research in this area is needed and it is hoped that this paper will stimulate academic interest in the topic and will be of interest to HEIs globally, raising awareness of the opportunity to provide badges in HE and opening up the discussion around developing a known currency of non-accredited learning. In turn, it is hope that this will contribute to a broader ongoing collective assessment of the impact of MOOCs and soft certification internationally, for example the impact on students' confidence and success in employability. The subject of the session is innovative in that there is little published research on the impact of badging globally, and even less research on the impact of badges in UK higher education/informal learning contexts.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SUCCESS FACTORS FOR VIRTUAL MOBILITY EXCHANGE ON "OPEN EDUCATIONAL RESOURCES"

Airina Volungevičienė, Estela Daukšienė, Vytautas Magnus University, Lithuania, Elena Caldirola, University of Pavia, Italy, Ignacio J. Blanco, University of Granada, Spain

Introduction

The universities should keep abreast with the rapidly changing demands of the world of work and modern life in providing highly-advanced high-quality education and research of the highest international level of excellence and enable their students to acquire cutting-edge competences essential for the efficient work and life in the 21st century. "More traditional universities open their borders, collaborate supra/intra-institutionally and often (inter)nationally, and/or involve non-traditional students in their traditional learning environment. In this way every campus becomes a Virtual Campus, and all mobility has now some form of Virtual Mobility included" (Van Petegem, 2009, p.1) De Kraker and Corvers also claim that "in higher education, virtual mobility networks can provide effective learning environments for the development of the competences needed to participate effectively in such a process" (De Kraker & Cörvers, 2009, p.1).

Thus with the importance and need for HE institution modernisation and focus on student-centred-learning approach, as well as rapid technological developments, virtual mobility has become a way for international and intercultural collaboration of institutions, teachers and students, when the development of key competences and transversal skills are at focus. However, are the institutions aware of the successful ways of virtual mobility implementation?

The aim of this research is to identify success factors for virtual mobility implementation.

Context

10 international teachers and experts from 6 European countries (4 universities and 1 international association) designed curriculum for international student virtual mobility exchange. Curriculum was designed for a 3 ECTS course "Open Educational Resources" on the basis of the follow competences:

Having successfully completed the course, the participants will be able to:

- define OER, list their categories and compare types and models of OER,
- characterize the quality and explain the purpose of use of selected OER,
- analyse the issues of OER development and use in education,
- design use or reuse of OER and construct next steps in OER development.

The course was targeted at mixed target groups due to the topic of the course, and invitation was distributed for a closed group of people representing e-learning staff members, teachers and trainers at participating institutions, as well as students at different levels of study programs. The pilot of the course "Open Educational Resources" was implemented in the framework of Lifelong learning Erasmus program project "VMCOLAB – European Co-Laboratory for the Integration of Virtual Mobility in Higher Education Innovation and Modernisation Strategies" (project No. 527770-LLP-1-2012-1-BE-ERASMUS-ESMO). 18 students from 7 home universities participated in the pilot. Vytautas Magnus University coordinated virtual mobility course design and virtual mobility implementation. Other universities participated in curriculum design and were responsible for the topic learning organization (lecturing, student assignments and feedback), namely, University of Granada (Spain), European Foundation for Quality in eLearning, University of Pavia, and University of Jyvaskyla.

The course curriculum was designed using existing infrastructure for virtual mobility at partner institutions. Moodle virtual learning environment and Adobe Connect software were used for curriculum design and virtual mobility exchange organization. The curriculum was designed and agreed to be open under creative commons licence at virtual mobility platform at http://www.teacamp.eu/moodle2. The virtual mobility pilot lasted for 5 weeks, from November 6th until December 4th, 2013. There were 5 synchronous virtual meetings organized during the pilot. All teachers agreed to have the same time for synchronous meetings, i.e. Wednesday (each week) at 10:00 – 12:00 CET.

Each synchronous meeting was supposed to be composed of two parts, topic presentation and assignment presentation, as well as international student group home work presentation. All in all, international learner groups had to perform 3 assignments/ tasks working in international groups. All course participants were divided into international groups before the course started in order to ensure that each group is multi-cultural, multi-institutional, representing at least three different countries, in order to set equal challenges for each participant and group.

The pilot setting was multicultural indeed, counting on 10 teachers from 6 countries and 18 learners for 5 countries, representing different levels of study programs:

ISBN 978-963-89559-7-5

Table 3: Multicultural settings of participants in OER course.

Institution (country code)	**No. of teachers (country code)**	**No. of learners**	**Learners' country of origin**
Vytautas Magnus University (LT)	3 LT	6	4 (LT), 2 (ES) Erasmus students
University of Granada (ES)	3 (ES)	3	3 (ES)
EFQUEL (BE)	2 (DE, MT)	-	-
University of Jyvaskyla (FI)	1 (FI)	-	-
University of Pavia (IT)	1 (IT)	3	3 (IT)
University of Florence (IT)	-	2	2 (IT)
University of Porto (PT)	-	3	3 (PT)
University of Trento (IT)	-	1	1 (CN) PhD student
Total	**10 teachers**		**18 learners**

Learning in the intercultural settings and in a distance way

First, not only intercultural settings should be highlighted as of overall settings of the virtual mobility exchange, but curriculum designing solutions are also very important in further discussion of virtual mobility success factors and learner feedback collected. Teaching and learning in VM setting is different from traditional learning and distance learning context; thus, designing VM curriculum requires from higher education teachers to take into account different parameters. According to Casa Nova et al. (2011), teachers have "to think differently when facing paradigms such as (i) the development of a new teaching presence, (ii) the design of new curricula, (iii) the design of learning materials adapted to different learning environments, (iv) the application of different learning strategies and (v) the development of new assessment approaches, models and tools" (Casa Nova, Costa, Leal, & Oliveira, 2011, p.35).

During VM pilot, all participants met online for the first time and were introduced to each other as group members (as curriculum was opened as OER itself after the pilot, the records of the online meetings are available and can be reviewed at http://www.teacamp.eu/moodle2). Moreover, each week international student groups were assigned with the tasks that they had 1 week to implement, communicating using suggested online communication and collaboration tools, but also in their unique individual ways, using any resources they saw relevant for their successful group outcomes.

Each week international student groups implemented assignments as groups, and the following week, during a synchronous online meeting with the teachers they presented their artefacts online as a group. Interesting feedback was collected from the learners about how they succeeded collaborate online, what additional skills and competences they developed and how they felt about this way of learning and collaboration.

The whole curriculum solution was designed the following way (which might be useful for further references and use – as well as the use of OER course curriculum released under the Creative Commons Attribution-Noncommercial-Share Alike 2.0 Belgium License. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-sa/2.0/be/).

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Table 2: "Open Educational Resources" curriculum design

Learning outcome	**Responsible institution**	**Week**	**Synchronous activities and resources**	**Assignments and tasks**
1. introduction to the pilot and first topic date – November 6, 2013 Time – 10:00 – 12:00 CET Tools – video conferencing Curriculum for week 1				
Define OER, list their categories and compare types and models of OER	University of Granada	Week 1	Presentation on OER, their types, categories and models	Assignment 1. Identify OER repositories and prepare a group presentation on classification of repositories. Share experience and insights on OER identification (linguistic, cultural, subject and other issues). Present group work results in synchronous video conference on week 2.
2. Second synchronous meeting. Assignment presentations and topic/ teaching institution change Date – November 13, 2013 Time – 9:30 – 11:30 CET Tools – video conferencing Curriculum for week 2				
Characterise the quality and explain the purpose of the use of selected OER	EFQUEL	Week 2	Presentation on the quality and purpose of use of	Assignment 2. Each group should use OER repositories identified in assignment 1, describe the initiatives supporting the repositories and add them to the OEP best practice database. Discuss the quality of OER by going through the road map for learners, prepare a group presentation summarising the OEP roadmap and present your results during synchronous video conference on week 3.
3-4. Third and fourth synchronous meeting. Assignment presentations and topic/ teaching institution change Date – November 20, 27, 2013 Time – 10:00 – 12:00 CET Tools – video conferencing Curriculum for week 3 - 4				
Analyse issues of OER development and use in Education and categorise issues and challenges of OER development and use	Vytautas Magnus University University of Pavia University of Jyvaskyla	Weeks 3-4	Presentation on challenges on the use and development of OER	Assignment 3. International group members should organize focus groups or interview people at their home institutions (in Lithuania, Spain, Italy and Portugal, as well as China) to provide answers to the questions. Then summary of quantitative survey should be implemented and presented during the final synchronous online meeting.
5. Fifth synchronous meeting. Assignment presentations, reflections and feedback from the participants. Date – December 4, 2013 Time – 10:00 – 12:00 CET Tools – video conferencing				
Wrapping up: what have we learnt and are we ready to use and develop OER?	University of Pavia Vytautas Magnus University	Week 5	Wrapping up the session and presentations of participants – group work results and discussion on virtual mobility experience	Certification. Assessment and feedback.

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Learner feedback and lessons learnt

Besides constant online communication with the participants in the course, there were instruments ready made to collect learner feedback on virtual mobility. However, it was decided to use two types of questionnaires, pre-pilot and post-pilot one.

The aim of pre-pilot questionnaire was to identify the main reasons for participation in the virtual mobility course and their initial expectations. Most students indicated that their main interest was in the OER topic, but also virtual learning and working in intercultural teams. The main challenges expected by participants were working in international groups and the English language. Among other difficulties that were listed by respondents, challenging technological solutions was one of them, and the time.

The main benefits of virtual mobility course that learners were expecting were the following: new knowledge, experience and improvement of digital competence. The skills they wanted to improve were related to understanding OER, (re)using and sharing OER, group work and the English language. Most of the learners (92%) agreed that virtual mobility can represent a considerable alternative or a complementary element to physical mobility. The main ideas how virtual mobility can be spread between students were mentioned as raising awareness, promoting such kind of courses, integrating them into regular programs, and recognizing this kind of experience.

The aim of the post-pilot (feedback) questionnaire was to indicate how the participants liked the pilot, what was important, useful, clear and what was not, what they learnt and what difficulties and challenges were encountered. As all learners were divided into 4 international groups, course activities were designed to be international group activities. The cooperation among group members was rather successful (8 indicated as good, 1 as very good) and none of the students were working alone. Respondents indicated that the English language (n=7), lack of virtual skills (n=9) and intercultural communication difficulties (n=10) have not influenced the success of group cooperation.

Participants of the course had different feelings during the pilot, but most often they felt concentrated, happy/ optimistic, and curious/inquisitive. Also 9 out of 10 never were bored, 8 stressed never being frightened, and 7 contributed never being lonely nor angry; however 9 of them indicated that they felt worried, disappointed, or confused.

All survey respondents (n=10) confirmed that there were enough tools for communication and collaboration while preparing assignments and for presentation of assignment results. Most of them agreed that email (n=10), video conferencing tools (n=9) and reviewing lecture records (n=9) were important tools for communication and collaboration during the exchange. Among the most popular methods of learning organization during the pilot, information presentation, individual and group work, exploration, search for and analysis of new resources and discussions were indicated as important. Oral feedback during the final synchronous meeting, as well as post – pilot questionnaire responses indicated that some

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students wanted more feedback on their assignments. In general, the learning content was assessed as understandable, equally distributed during the course, and consistent.

Learners were also asked about their competence development in the survey. 7 out of 10 learners stated that the course learning outcomes were clearly stated and most of them (9 out of 10) improved competences related to learning outcomes strongly or adequately. Most of the indicated virtual mobility competences were also improved adequately:

- intercultural competence – minimally by 2, adequately by 8 and strongly by 1 learner;
- English language – minimally by 2, adequately by 6, and strongly by 2 learners;
- personal and social competences – minimally by 3, adequately by 5 and strongly by 2 learners;
- and digital was improved minimally by 1, adequately by 6, strongly by 2 learners and not improved by one.

Using the space in open question answers, respondents also indicated that they developed additional competences: OER related competences, personal and social competences, trust in other people and critical, reflection skills. After the course, most of the learners indicated that their attitude towards virtual mobility has changed and it is now positive (n=9). 1 learner stated that he/she sees more negative aspects of VM experience now. 9 out of 10 learners participating in the survey would like to participate in virtual mobility exchange in the future (see Figure 1 and 2):

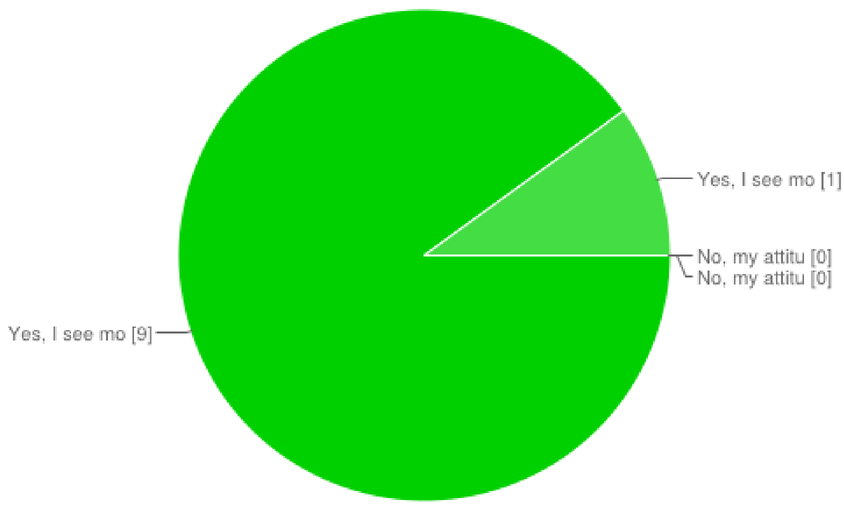

Figure 1. Has your participation in the course changed your attitude towards virtual mobility?

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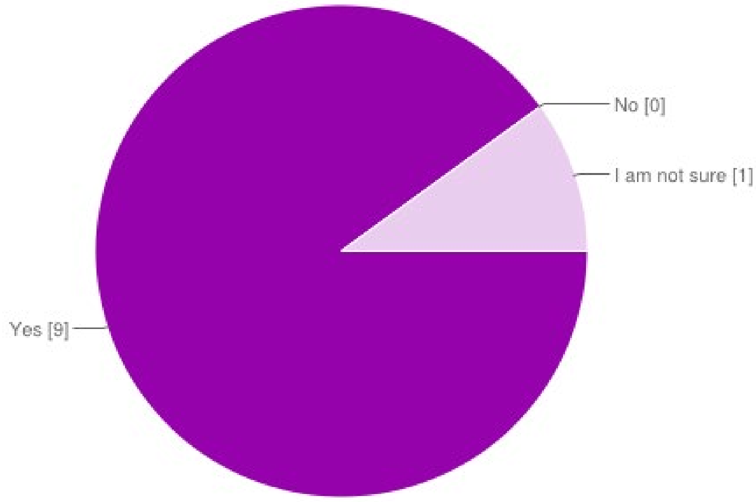

Figure 2. Would you agree to participate in virtual mobility sessions in the future if there is a possibility?

Main outputs and success factors

The pilot was successfully completed by the same number of participants – 18. No drop – outs were identified.

However, it was identified and noticed that not all participants contributed equally to group assignments and presentations. Therefore, all groups were addressed by the pilot organizers in order to differentiate certification according to contribution of each individual. The common decision was accepted and approved by all teachers and learners to differentiate the certificate on the basis of learning outcomes achieved and participation. Three participants received certificates for "participation", and the rest participants received certificates with the learning outcomes listed as achieved.

The course is accessible as OER itself. Besides these outcomes, the following experience can be described in terms of success factors influencing virtual mobility implementation.

Table 3

Factors that had influence on the pilot	**Possible solutions**
There was interest provided by 10 teachers, however not all of them were really active during 5-week course, and learners felt their lack of time/attention dedicated for the course, as well as feedback to their group work results. This was one of the most critical remark from the learners.	Discuss clear roles of participating teachers and reach either oral or written agreement on these roles If experts are invited (without asking them to tutor students), divide teachers into 2 groups, clarify their roles and present clear information on these roles to participants.
The duration of the pilot was rather short (intense) and the engaged learners wanted more topics and more practical tasks Time was also indicated as one of the challenges and there were less active participants in the last task than in the first one	It can be presumed that if the course is of longer duration, there might be more dropouts/passive students at the end, but also more experience and time for getting participants to know each other, improve intercultural competence, and strengthen their connections is necessary
International learner groups were planned to be composed of 5 students. However, immediate solutions were found during the very first online synchronous meeting, which required changes in group composition. As 2 students did not show up, one group composition was different, having only 3 members in the group.	Recommendation can be drawn not to compose smaller groups than having 4-5 members in the group, in order to maintain internationalization and intercultural communication characteristics.

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Conclusions and recommendations

Some of the success factors of virtual mobility implementation are summarized from the participants' comments, others are added by pilot organizers:

- There was a strong leadership and coordination that enabled the organization and successful finalization of the pilot (participants' point of view).
- Motivation of the participants: there were real challenges for student groups which had some passive students (*lurkers*), however groups managed to focus on the task, were highly motivated and dedicated (organizers' point of view).
- Thorough preparation, coordination and planning of the pilot, coherent information for the participants was prepared and distributed – all planned well in advance (from the teachers' point of view).
- Attractive topic was selected as most learners were interested in learning about OER (learners' point of view).
- Prior experience and dedicated collaborators who communicated, participated and supported the pilot from the very beginning till the end, our consortium partners and associated partners (organizers' point of view).

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Acknowledgement

This virtual mobility exchange and research was implemented only with the help of and in the framework of Lifelong learning Erasmus program project "VMCOLAB – European Co-Laboratory for the Integration of Virtual Mobility in Higher Education Innovation and Modernisation Strategies" (project No. 527770-LLP-1-2012-1-BE-ERASMUS-ESMO).

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

MOOC USING EXISTING OPEN EDUCATIONAL RESOURCES, SETTING UP IMPLEMENTATION AND REVIEW

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Summary

In France, DTU (Digital Thematic Universities) allow free access to thousands of OER (Open Educational resources). These resources are validated by the academic community. Some of these resources are used in distance learning by universities to deliver international co-diplomas mainly in French speaking countries. At the "Université de Lorrraine" we have already some experience with big groups through Paces (first common year of health studies) where traditional teaching has been replaced by blended learning relying on web lectures and pedagogical materials available via a learning platform. The MOOCs are a further step because there are free, fully online and for huge numbers of participants. This paper describes the setting up, the implementation and the first evaluation report of a transversal French MOOC in applied statistics called COURLIS. The contents of the MOOC are mainly OER coming from the DTU. Several universities are in the consortium designing COURLIS. The content's level is equivalent to a bachelor degree. A fee-paying certification is proposed and the final examination is not on line. The main objective is to give a common basis for each discipline (health, management, psychology, etc.) in applied statistic. The pedagogical methodologies rely on a connectivism part (cMOOC) and a transmissive part (xMOOC). Interactive self-assessments, collaborative wikis, personal blogs help followers in their learning. The personal work of the student is estimated to 100 hours during 4 months. There are 2 sessions per year.

Six months after the beginning of COURLIS 900 students are registered and no technical problem has occurred. The first examination is planned in February 2014 and at this day (end of January 2014), 2% of students are registered.

Introduction

In France, seven Digital Thematic Universities (DTU)[1] have created been ten years ago to pool Open Educational Resources (OER) labelled by the academic community. Access to OER via the DTU's portals is free, and do not require any password or registration. DTU resources are a basis for training. Universities can use them to develop training program, most of the time based on blended learning: part of the teaching is done online and another in face-to face. An example of this are the Interuniversity degrees devoted to the health of the mother and child[2], developed by the French Virtual Medical University (UMVF)[3] with the support of the French Ministry of Foreign Affairs. These have been implemented by several universities in West Africa. Alongside these institutional approaches, many authors have uploaded online educational resources freely available on YouTube, Dailymotion, and iTunes.

At the end of 2013, the landscape for French higher education can be summarized as following: repositories of Open Educational Resources (OER) labelled by academics, resources from everyone without *a priori* validation available via Internet, distance learning or mixed courses respecting the traditional academic patterns (registration fees and limited number participants, respecting academic rules for access to the course, specific training pedagogical models, validation certificate or diploma obtained by continuous monitoring and review or terminal examination). The concept of MOOC (Massive Open On line Courses) appeared with a few pioneers like ITYPA ("Internet Tout y Est Pour Apprendre", first French MOOC)[4] in October 2012 or "ABC de la gestion de projet" in March 2013[5]. MOOCs offer a totally distance learning for a large or very large number of participants from hundreds to hundreds of thousands of learners. Students learn by helping each other in combining affinity as in social networks. They share their problems and the solutions they have found themselves.

The teaching of applied statistics in the MOOC COURLIS[6] is common to many disciplines: health, economics and management, humanities and social sciences, technology. The subject is not mathematical statistics but the use of statistics. Potentially this transversal theme is relevant for many learners both for initial and continuing education. The program is often the same whatever the discipline: descriptive statistics and inferential statistical tests and regression analysis, this is particularly described in the texts of the common first year of health curricula (PACES)[7]. At the Université de Lorraine, for example, 2500 students already learn without traditional lectures which have been replaced by web lectures available on the digital learning environment. Then the idea to design a MOOC on applied statistics does not appear

[1] Ministère de l'enseignement supérieur et de la recherche. France. http://www.enseignementsup-recherche.gouv.fr/pid24640/universite-numerique.html
[2] Fond de solidarité prioritaire. Programme mère-enfant. http://eformation.mere-enfant.org
[3] Université des Sciences de la santé et du Sport. Médecine. UMVF. http://www.umvf.org
[4] ITyPA http://itypa.mooc.fr
[5] MOOC ABC de la gestion de projet. http://gestiondeprojet.pm/mooc-gestion-de-projet
[6] MOOC COURLIS http://courlis-pf.univ-lorraine.fr
[7] PACES http://www.enseignementsup-recherche.gouv.fr/cid53276/les-etudes-sante.html

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as a revolution but as an extra step. In this paper we will describe the approach to implement a MOOC which begun in September 2013 with the possibility to obtain a university diploma.

Digital thematic universities

Launched between 2004 and 2007, each Digital Thematic University (DTU) is in charge at the country level of a disciplinary field. It has to manage the coordinated development and the broad diffusion of thematic digital contents that are labelled by the UNT at a pedagogical, scientific and technical level. The seven thematic universities are the following:

- health and sport sciences (UNF3S), http://www.unf3s.org;
- engineer sciences (UNIT), http://www.unit.eu;
- law and political sciences (UNJF), http://www.unjf.org;
- economics and management (AUNEGE), http://www.aunege.org;
- humanities (UOH), http://www.uoh.fr;
- environment and sustainable development (UVED), http://www.uved.fr;
- sciences (UNISCIEL), http://www.unisciel.fr.

These seven DTU cover the whole spectrum of thematic fields that are taught in French universities. They offer several thousands of resources (more than 23,000 resources are available at the moment) with various granularity levels. The available pedagogical resources are of various nature (case study, lessons, exercises, simulation, virtual experimentation, additional materials to lessons, pedagogical kit, serious game, self-assessment, etc.) and various formats (pdf, audio, video, interactive document, virtual experiment, simulation, serious game, etc). They are designed either for teachers or for students and can be accessed from the DTU' portals. In order to make it easier for people to seek resources, a portal dedicated to digital university has been implemented. Majority of the videos are on Canal-U (www.canal-u.tv) the video library for French higher education. Canal-U hosts an outstanding collection of audio-visual resources produced by higher education institutions and validated by the DTU on their scientific and educational merits.

COURLIS design

Transversality, partners, objectives

The ambition to provide common training on applied statistics to the fields of health, management, human and technical sciences led us in December 2013 to seek French institutional partners in this area. Our contacts led to a consortium run by the University of Lorraine with associated universities of Nice Sophia Antipolis, Bordeaux Segalen, Paris Ouest Nanterre la Defense, HEC, and the National School for Statistics and Applied Economics of Alger.

The definition of course objectives has not been difficult. They represent a classic common base: instrumentation and measurement methods, concepts of censorship, principles of construction of a dictionary, a classification, a thesaurus, a classification, an ontology, data

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types (qualitative, ordinal, quantitative), construction of a questionnaire, descriptive statistics (tables, statistical parameters, including graphics cards controls, trend curves whose survival), basics of probability and the basic laws (binomial, Poisson, normal, Student, Chi2, Fischer), estimate or point value and interval properties of a diagnostic test, different types of studies (observational, analytical, experimental), the main statistical tests univariate and bivariate (comparison of percentages, Chi2, comparison of means, comparison of variances, correlation – regression, time series, one univariate and bivariate report statistical study).

These learning objectives content must allow learners to have the skills for the implementation of basic statistical techniques both individually in collective work to conduct a statistical study project.

Pedagogical principles

Face to the wealth of the OER in the DTU, teachers decided to create the least amount of resources but to use existing resources. However they have had to create pedagogical activities. It was decided that all practical applications would use Excel ® (Microsoft Office) spreadsheets conventional and Calc ® (Open Office). The program was spread over 12 weeks of work with a suggested schedule but leaving freedom to the student to work at their own pace. Registration is done online without selection criteria and is permanently open.

Each week is structured the same way: providing knowledge with mainly use of video courses (Figure 1). Examples of works to do with filmed tutorial (screen capture with audio comments), knowledge tests with self-assessments using QCM, short open-ended responses, association of elements and calculations of values. This part, representing a classical approach xMOOC is in the space "cours". This was supplemented by a "student "space like cMOOC (7) using wiki and blogs. This section should be completed by complex exercises that require peers assessment. Another space "enseignants" devoted to exchanges between teachers has been created. The interaction student – student and student – teachers are made using forums and email.

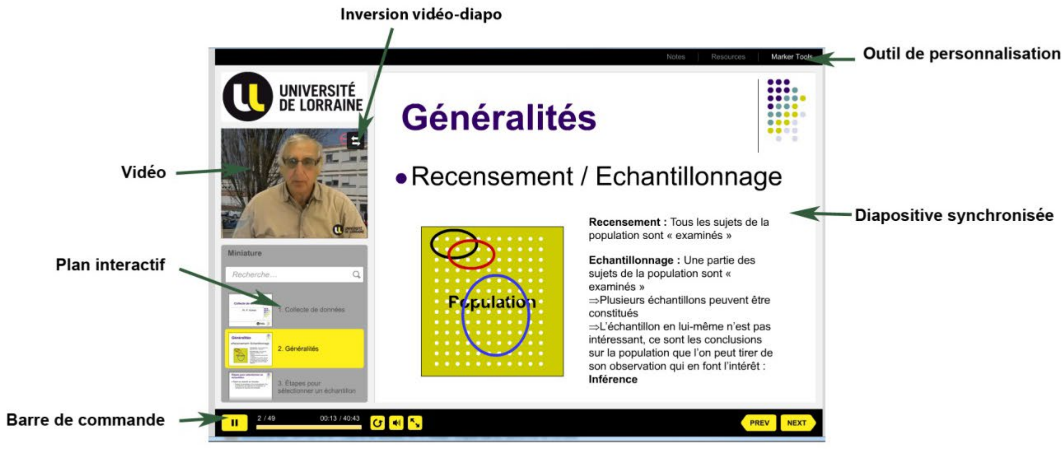

Figure 1. Video course example

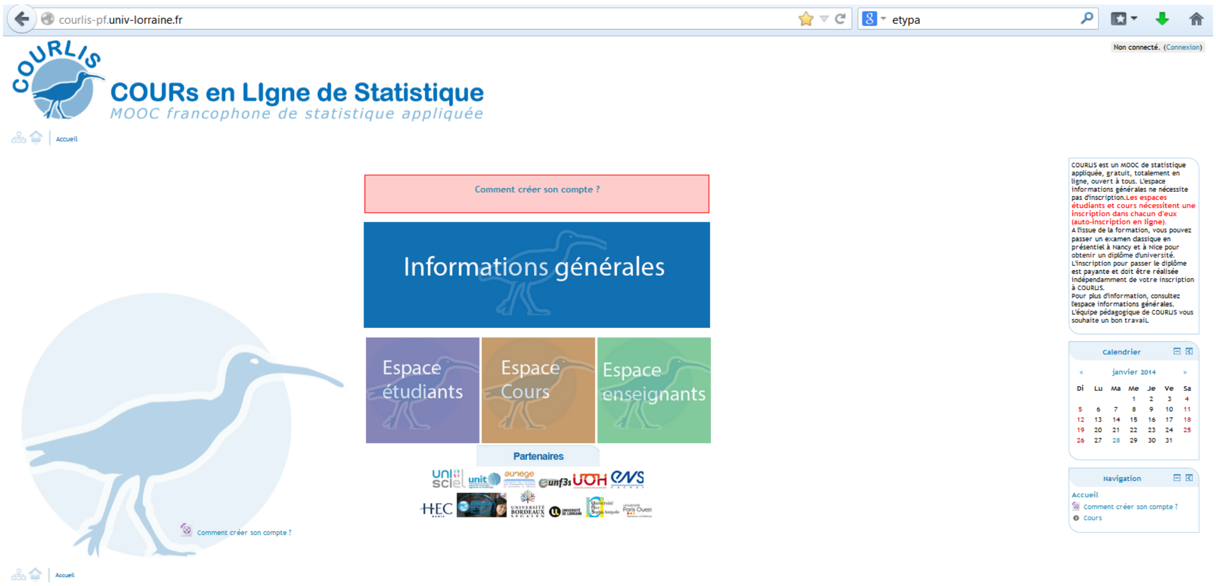

Figure 2. Home page of COURLIS

Final examination is organized 2 times per year by the universities of Lorraine and Nice Sophia Antipolis in face-to face after "classic" registration. The first session took place in February 2014.

Digital implementation

With the experience of the University of Lorraine in the use of Moodle[8] platform, free educational platform for all students of the university, the management team of ICT department was questioned and decided to use a Moodle platform for implementing COURLIS. This is complemented by a video-streaming server that displays video through a link from Moodle.

COURLIS governance

The steering committee is composed of 11 representatives of partner institutions and has the role to give strategic direction and to do monitoring. There is also a DTU committee composed of DTU representatives. Its role is to evaluate the use of the resources and propose modifications or the creation of new resources. The teaching staff is composed of teachers and researchers of the discipline belonging to the partner institutions. One or two teachers coordinate each week of the MOOC. The team's role is to select or create the resources and activities and to facilitate the MOOC.

[8] Moodle platform http://moodle.org

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The observatory

The observatory is led by the KIWI (Knowledge, Information and Web Intelligence) research team of the LORIA laboratory. Its role is to observe and to model the interactions with and within the MOOC COURLIS in their various aspects. The objectives are multiple: to design new indicators to assess the activities of learners (for themselves and for the tutors), to determine online communities of learners within the MOOC in order to recommend "pedagogical friends" to a specific learner, to model the learner's behaviour over time in terms of activities, etc. The approach that has been chosen relies on an analysis of the many traces let by learners and teachers when interacting with the MOOC. Traces, logs and other data have been collected during the first session of the MOOC in order to train the models that will be implementing on the platform for next sessions of the MOOC.

The timing of implementation

The idea of creating COURLIS is born in December 2012. The partners and the institutions involved in the steering committees and the teaching staff have been set up from January to March 2013. Requests for the creation of university degree at the University of Lorraine was made from March to June with several *back-and-forth* with different instances (components collegiums, board training, etc.) and permission was obtained in June 2013. At the Université de Nice-Sophia Antipolis, the process began in April and ended in August 2013. The implementation of the Moodle platform was conducted between April and June 2013. Since the beginning of July 2013, teachers had the opportunity to organize and feed the platform. October 1, 2013 COURLIS was online and open. Two sessions of the MOOC COURLIS are planned each year, one by semester.

First results after 6 months

At the beginning of February 2014, we enrolled a total of 922 people since October 2013, which come from different French speaking countries: France 721, Morocco 35, Algeria 29, Cote d'Ivoire 18, Burkina Faso 15, Benin 7, Canada 6, Cameroon 6, Tunisia 7, Democratic Republic of Congo 1, Haiti 6, Belgium 6, Guinea 4, Germany 2, Madagascar 2, Senegal 3, Other 28. A third of the first accesses took place between November 1 and end of January 2014. The use of the wiki is very low: only 3 contributions. Access to various resources and activities are highly variable, from almost all enrolled to only a few dozen people. Registration for the examination of university graduation is, so far, 9 people in Nancy, the figure is not known at Nice. No technical problems have occurred during the first session. Several participants asked to reduce the duration of the videos so we will cut them in smaller parts (about 5 to 10 minutes).

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Here are some messages from participants to the COURLIS MOOC:

> *"Bonjour,*
> *Tout d'abord merci pour vos cours qui sont d'une grande qualité. »*
> *First of all thank you for your course that is of high quality*
>
> *« Merci pour cette invitation hebdomadaire.*
> *Je vais essayer de consacrer plus de temps à ce MOOC dont les contenus sont de très bonne qualité en rattrapant petit à petit les semaines (j'en suis à la 4…). »*
> *Thank you for this weekly invitation. I will try to devote more time to follow this MOOC whose contents are of very good quality and catch up gradually my delay (I am following the fourth week).*

Discussion and conclusion

The implementation of the whole system lasted only nine months (all aspects included, from the administrative steps to the courses development). This is probably due to the experience of the different partners in online education and OER productions, but mainly it relies on the extensive use of existing pedagogical resources of the DTU. The re-use of resources allows reducing the time and efforts required to design online curses, but also the cost of the MOOC.

The "administrative" part was relatively long, due to the schedule of the various councils of the different institutions but also to the specific rules of a MOOC that are very different from usual curses. The principles change compared to the usual modes encountered in the university: the registration to the training is free of charge, only the exam registration fees are asked if the learner decides to have a diploma. The traditional administrative registration is off periods regular registration.

Fears of competition with existing qualifications are real. The use of DTU resources has simplified discussions on copyright. COURLIS is not just a series of tutorials selected and arranged to meet a need of knowledge, it offers a real pedagogical approach with self-assessment and may be validated by a university degree. In practice, the figures are similar to other MOOCs: a lot of registered people about 10% of registered have accessed to the resources until the end of the program following the proposed timetable and 2% want to pass the exam. We can consider not sufficient the figure of 922 registered people for a MOOC but it fits the figure of thousand we expected for the first session. Let us mention that no announcement of the MOOC COURLIS has been done before it is launched. It seems that discussions in social networks were an important mode of spread of the existence of COURLIS. COURLIS ended with 3 times more active learners than at the time it has been open.

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For the next sessions, we will upload the MOOC COURLIS on the FUN platform[9] (10), it is expected to significantly increase the visibility of COURLIS. If we except the creation of contents, economic balance should be achieved; the registered students pay a registration fee of 300 Euros which can cover the costs of organizing the MOOC at the University of Lorraine and the University of Nice as well as tutoring.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

WIDENING CREATION OF ACCESSIBLE DIGITAL EDUCATIONAL CONTENT: A COMBINED BLENDED LEARNING AND MASSIVE OPEN ONLINE APPROACH

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Introduction

Ensuring inclusive education systems at all levels and lifelong learning is a commitment shared by all the United Nations countries who in 2006 signed the Convention on the Rights of Persons with Disabilities (United Nations, 2008), by which each country should ensure that all citizens with disabilities or some special educational need have access to primary and secondary education, higher education, job training, adult education and lifelong learning, without discrimination and on an equal basis with others. This same principle should apply as well to their integration in the work environment.

To move towards an inclusive education, progressively and substantially increasing alternative education practices based on Information Technologies and Communications (ITC) are needed, through the implementation of accessible eLearning, understanding accessibility as the "extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use" (ISO 26800, 2011).

Extending this concept of accessibility to the virtual educational context (Teixeira et al., 2013), in which teachers use digital educational content, it should be ensured that the content is accessible, i.e., understandable, usable and perceivable by any student or lifelong learner who has the prior knowledge required to enrol in the training, and having any kind of disability is not a barrier to complete the training (García et al., 2012). This is even more important when we consider work based eLearning practices. In fact, in our contemporary work environments, digital skills are ever more critical for the workers to perform their tasks. In this special context accessibility cannot just be consider in relation to eLearning practices but in the framework of the work based learners relation to their work environment. Thus, when addressing e-accessibility we're not just considering how a given learner is able to access digital content, resources, support and assessment, but how he/she is able to perform as a worker in a digital environment. Widening the knowledge on how to create accessible digital content should therefore be a major goal today for training institutions.

WCAG (Web Content Accessibility Guidelines) (W3C, 2008) is a well-known recommendation that contains accessibility guidelines to create accessible web content, but there are also other methods and/or mechanisms to make accessible all digital content. For these reasons, a course has been created, in which are taught the main techniques that a teacher has to know for creating accessible digital educational content in the most commonly used formats in online training, such as text documents, slide presentations, PDF files, videos, audio books or web pages.

The course "Creating accessible digital educational content" is aimed at teachers conducting online training, and its objective is training for teachers to create digital educational content that any student can use, whether or not they have some kind of physical or sensory disabilities. The course is organized by participants in the cooperation project ESVI-AL, which aims to move towards a virtual inclusive Higher Education in Latin America. This course has two versions. One has the format of a workshop, with a online component and a face-to-face one. The second version uses the same resources but is organized as a MOOC (Massive Open Online Course).

This paper presents how the strategy for disseminating teacher training on creating accessible educational content has been designed in such a way to include both a blended learning approach and a massive open online one. In particular we describe how a course can be designed for a closed blended learning environment and can also be used in an open massive format. In sections Goals and Competences the objectives to be attained by the completion of the training and the competences to be achieved are presented, respectively. The next section shows the contents of the workshop and then the methodology of teaching and assessment set to pass the course. A section on the MOOC methodology to be used and finally, conclusions and future work are discussed.

Goals

The objective of the training courses (workshop and MOOC) is to train teachers so they can create digital educational content in a way that is accessible to any student, whether they have or not any physical or sensory disability. Thus, a teacher will be able to create accessible educational content in different formats after finishing the workshop.

The specific objectives are:

- Contribute to specific training of teachers, teaching them to create text documents, slide presentations, PDF documents, audiovisual content and accessible web pages.
- Raise awareness among participants about the problems that trainees with disabilities have while studying subjects virtually.
- Allow the participants to acquire skills in the use of tools for creating and reviewing accessible virtual educational content.

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- Empower teachers trained by these courses in order to make them multipliers, actively involved in the training of other teachers.

Competences

The main competences to be acquired in the courses (workshop and MOOC) are:

- Analyze and correct accessibility issues that a document created with a word processor such as Microsoft Word or OpenOffice Writer may have.
- Create accessible documents using word processors such as Microsoft Word or OpenOffice Writer.
- Analyze and correct accessibility issues that a slides presentation created with a presentation tool such as Microsoft Power Point or OpenOffice Impress may have.
- Analyze and correct accessibility issues that a PDF document may have.
- Create accessible PDF documents.
- Analyze and correct accessibility issues that a video may have, adding captions and audio-descriptions.
- Create audio books from accessible documents.
- Analyze accessibility issues that a web page may have, and how to solve them (W3C, 2008).

Content of the course (workshop and MOOC)

The course is composed of five mandatory teaching lessons. The main topics to be explained in each lesson are shown in Figure 1.

Figure 1. Syllabus of the workshop

Lesson 1 – How to create accessible text documents

- Guidelines for creating accessible content in Microsoft Word. Some guidelines are explained, such as “the content should be written in brief and simple language”, “indicate the language of the document”, “use a sans-serif font of at least 12 points”, etc.
- Accessibility evaluation tools. Some tools to evaluate accessibility in documents are showed, such as Microsoft Office and AccessODF.

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Lesson 2 – How to create accessible presentations

- Creating accessible Microsoft PowerPoint presentations. Good practices for designing and creating accessible presentations are explained, as well as some general tips for creating effective presentations and tips for presenting in an accessible way.
- Checking the accessibility of Microsoft PowerPoint presentations. In this section, trainees learn how to execute the accessibility checker and interpret the information about the issues found.

Lesson 3 – How to create accessible PDF documents

- Accessibility in PDF documents. Basics. In this section, it is explained what an accessible PDF is and how people with disabilities access to the content of a PDF. The characteristics of an accessible PDF, some WCAG principles applicable to PDF documents and tools for analysis and correction are also explained.
- Creating accessible PDF documents. This part explains how to create accessible PDF documents from other accessible documents already created. How to evaluate the accessibility of a PDF document is also explain, as well as how to make an initial checking for detecting issues that require to modify the source document, and how to correct accessibility issues directly in a PDF file.

Lesson 4 – How to create accessible audiovisual content

- Properties of an accessible video. It explains what an accessible video should contain (transcription in text format, captions, audio description, sign language interpretation) and some tools to create accessible audiovisual content.
- Creating accessible video tutorials. Best practices to create effective video tutorials are explained, as well as some techniques for creating and editing videos, and later upload them to YouTube.
- Accessible educational content with audio. This section explains how to create accessible audio books from Word documents and with tool Balabolka. It is also explained how to insert audio in PDF documents.
- Checking the accessibility in video and audio files. One checklist for accessibility in audio documents and another one for accessibility in videos are provided.

Lesson 5 – How to create accessible websites

- Developing an accessible website. Some guidelines to develop an accessible website are explained, such as identify the language, include the title of the page, do not use colour as the only visual means of conveying information, etc.
- Accessibility of the elements of a webpage. It explains how to make accessible the elements of a webpage, such as images, multimedia (audio, video, presentations), forms, tables, etc.
- Global evaluation of the accessibility of a web page. Some techniques to evaluate the accessibility of a web page are explained.

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Methodology

As stated above, the course has two versions: a workshop and a massive open course. The workshop is taught by a blended learning model, with online educational activities throughout its duration and classroom activities for a week. The workshop requires a commitment of 50 hours per trainee.

The expected duration is 6 weeks of online work for the mandatory part of the workshop, with a commitment of the learner between 5 and 6 hours weekly online, and 15 classroom hours. Another 5 hours may be considered to finish online some of the classroom tasks.

The open massive course uses the same online resources as the workshop and is organized in a fully open online format using the iMOOC methodological model (Teixeira & Mota, 2013). This model is the first institutional pedagogical model developed specifically for MOOCs and focus on four main features: learner-centeredness, flexibility, interaction and digital inclusion. It combines autonomous and self-directed learning with a strong social dimension and intends to articulate the flexibility that distance online learners need with the pacing necessary to help them get things done.

According to the iMOOC model, learning should be evidenced through the creation of artefacts freely accessible online, that demonstrate the learner's knowledge and competencies regarding the material studied. Learning support rests in the learning community, through collaboration, dialogue, peer feedback and active engagement from participants in the learning process. The course starts with a "boot camp" module, that lasts one additional, meant for participants to get acquainted with the spaces, tools and services, as well as with the processes of work and communication that will be used in the course.

According to the European Credit Transfer System (ECTS), the workshop has 2 credits in the mandatory part, since this system considers that 25 hours of student work equate to one ECTS credit.

Methodological strategies

The same methodology is applied in each lesson, which consists of performing the following teaching activities:

- Study educational content: Trainees must spend time reading and assimilating the contents of the lesson, which are presented in a sequence of interactive web pages. Trainees have the opportunity to download the contents of a lesson in one PDF or DOC file, if they want to read in this format. The educational contents of a lesson are available in the learning platform on the first day of the week assigned to that lesson in the calendar.
- Conducting self-assessments: in order that trainees check the proper assimilation of educational content, they can perform a self-assessment at any time during the study of a lesson and check their level of knowledge.

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- Participation in discussion forums: In each lesson, the tutor raises a discussion topic related to the content of the lesson, and the trainees discuss about it during the week assigned to the lesson.
- Sharing experiences with the community (MOOC version only): trainees are invited to publish comments and share resources using their own personal learning environments to manage their learning, publish their artefacts and engage in the conversation with other participants.
- Study of a case study solved: Trainees have at their disposal a practical case related to the theoretical content of the lesson, as well as the solution of that exercise, which allows learning how to solve similar cases.
- Viewing videos: In each lesson trainees are offered at least three short videos with captions, which can be played and viewed at any time. They are:
  - A presentation video of the lesson.
  - An explanation video of a topic of discussion in the forum.
  - An explanation video of a practical exercise solved.
- In the workshop version there's also the conducting of practical classroom activities: one additional week is dedicated to perform practical classroom activities, in 5 sessions of 3 hours each. In these sessions, the tutors-trainees interaction is powered, performing practical cases and discussing the results in common.

As a proof of completion of classroom activities, trainees must send to the tutors the work performed during the classroom sessions. They can do this at the end of the week or later, to have the opportunity to review it and, if necessary, improve it before sending it to the tutor.

Educational contents and resources

The main materials used in the course (workshop and MOOC) are:

- Online content: The online training content is designed as open educational resources (OER) and is offered in various formats: web, PDF, Word, PowerPoint and video.
- Resources for practical work: Trainees are offered the statements of the practical work to be performed in each lesson, and the software needed to solve it is indicated. The software is generally free to use, except in the case of the Microsoft Office 2007 or 2010 suite for lessons 1 and 2. If trainees do not have those programs, the corresponding exercise can be performed with a free editor similar, such as Libre Office, although the content is designed to Microsoft Office because it offers tools to evaluate automatically the accessibility of documents and presentations.
- Resources for classroom practices (workshop version only): In general, in classroom practices the same programs are used than in online practices. The classroom practices are conducted in a classroom equipped with a computer per student, with the necessary software already installed.

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Assessment

Different activities of trainees' assessment are carried out in order to check the acquisition of the competences provided in each lesson of the course, depending of the version (workshop or MOOC).

In what concerns the workshop, assessment activities have been planned for the online part and the classroom part. The total maximum grade that can be obtained in the workshop is 100%, considering the workshop passed with a grade of at least 60%.

The online part represents 60% and the classroom part represents 40% of total, according to the following distribution:

1. Online phase (60%): The study of the 5 lessons online represents 60% of the grade, according to the following breakdown:
   - Assessment test of theoretical knowledge of the lessons (20%): This is a questionnaire with a maximum score of 4% per lesson.
   - Participation in the discussion forum of the lessons (10%): The level of trainees' participation and discussion in the forum of each lesson is assessed, with a maximum score of 2% per lesson.
   - Online practical work of the lesson (30%): Students must send the resolution of a practical case raised in the lesson to the tutor. The maximum score of the practical work is 6% per lesson.
2. Classroom phase (40%): The work done by the student in classroom activities and the quality of the work that will be sent after the week are valued.
   - Assistance to classroom activities (10%).
   - Level of participation in classroom activities (10%).
   - Personal work sent to the tutor as evidence of the classroom activities performed (20%).

As for the MOOC version, graded assessments are included for participants who want to receive a certificate of completion of the course. At least two of the artefacts produced as evidence of learning by participants will be assessed and graded through a peer-review system – those who wish to participate in the peer-review assessment will grade the artefacts produced by 3 other participants and have their artefact graded by three other participants. The final grade will be the average obtained in the 3 grades given. Every assessment will be based on a detailed rubric provided by the professor or professors leading the course.

Conclusions and future work

The two-versions course created allows trainees who perform it to create accessible educational digital content. So far the workshop has been launched in different test groups in Latin America and the results have been positive. The results obtained in these pilot groups will be analyzed and studied shortly, and the results and the learned experience in these first workshops will be published.

We are currently developing the MOOC version so that it can reach a wider audience and the training can be completed entirely online. By that the classroom part of the workshop is not an obstacle for widening the impact of this specific training. We think in this way awareness about the importance of creating accessible educational digital content may be broader and may be widespread throughout the world.

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Acknowledgments

This work is funded by the ESVI-AL project (cooperation project funded by European Commission – ALFA III programme). Authors also want to acknowledge support from the University of Alcala, Helsinki Metropolia University & University of Lisbon.

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

A MOOC FOR ENTREPRENEURSHIP EDUCATION, ADOPTING A CRITICAL TECHNOLOGY. AN EXPERIENCE CARRIED OUT AT THE DHITECH TECHNOLOGICAL DISTRICT IN APULIA (ITALY)

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Abstract

Training a group of graduate students based in Apulia (Italy) is part of a wider project, the Activating VINCENTE: "Innovating engineers/ Entrepreneurs specialised in Technological Entrepreneurship Ecosystems", funded within the EU National Operational Plan, (PON02_00563_3470993). The main aim of the project is to create the specific profile of a high tech innovator and entrepreneur, specialised in defined areas of knowledge, endowed with skills and attitudes able to transform technology and/or research results in a new business model to create economic and social value (technological entrepreneurship)[1]. Within the above training course, LPS-Laboratory for Experimental Research (University Roma TRE) was in charge of teaching two modules, where the main task to be carried out by the in-training students was to devise an effective MOOC in Entrepreneurship education. The present contribution highlights the background at the basis of the specific training idea and describes the results of the inquiry carried out with the in-training graduate students, with the aim of reflecting in strengths and weaknesses of such innovative ways of carrying out open education.

Background and state of the art

The project idea complies with various EU policies, for instance HORIZON 2020 "Implementing the Small Business Act: to promote entrepreneurship, strengthen SMEs and increase the efficient use of human resources". In addition, this approach to innovation and entrepreneurship is in line with the view expressed in 'Innovation Tomorrow' by the European Commission and the "European Strategy for Smart, Sustainable, and Inclusive Growth". Promotion of a networking approach, involving various stakeholders, especially from the entrepreneurial world, in Higher Education teaching and learning processes, will improve the Quality of Higher Education Impact (see Poce, 2010).

[1] http://dhitech.it/downloads/PON02_00673/Prot.n.73del_8.2.2013_Bando61borse.pdf

In "Entrepreneurship education at school in Europe" (EACEA, 2012, p.7) the following concept is underlined: "a dynamic economy, which is innovative and able to create the jobs that are needed, will require a greater number of young people who are willing and able to become entrepreneurs – young people who will launch and successfully develop their own commercial or social ventures […] Entrepreneurship education is essential not only to shape the mind-sets of young people but also to provide the skills and knowledge that are central to developing an entrepreneurial culture".

The project in-training students will benefit from creating the so called "knowledge triangle" of education, research and innovation and start strong links among higher educational institutions, research centres and industry. This project is meant to support the solution of the crucial problem of employment and self-employment, which is of key importance for industrial society and economy, nowadays.

The objective is to satisfy the following stakeholders' needs:

- Universities needs to coordinate the efforts of the university sectors engaged in creation and exploitation of new opportunities derived from the partnership with enterprises. Bonn Declaration says: "HEIs – must build a university-enterprise cooperation strategy into their mission and institutional plan".
- Business needs to cooperate with universities to be competitive, gaining from knowledge transfer in developing and delivering innovative products, and in training of skilled human resource.
- Policy makers need to create partnership of universities and business to provide an innovation engine to boost competitiveness and to support the development of a knowledge-based economy.

These objectives will be prosecuted employing technologically advanced tools that will be devised for the project itself. Teaching and learning activity in fact will be carried out also in e-learning environments specifically "adapted", according to the aims of the project.

The project promotes the development and implementation of an interactive model for innovation where the starting schemes are supporting each other, and where fundamental research questions arise facing practical issues. Within this context, innovative processes are more and more characterised by interactive cycles, by circular sequences, where phases and components of different fields are involved at the same time. Disciplinary fields are characterised by an ever growing so called "cross-fertilization", researchers and enterprises tend to engage on complementary and integrated research paths. This new model for innovation implies a deep change in the actions and role of the subjects traditionally at the centre of innovative processes: the turning key to assure competitive growth in an economic system based on knowledge becomes the stable and deep interaction among enterprises, universities and governing institutions. The action of the three subjects involved is visualised as the "Triple Helix" one, where interactive relations among the spheres are constantly created, and act complementary and continuously, almost one playing the role of the other,

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without, anyway, putting out of sight their own specific "mission". Within the above scenario, one of the most important scholars of the topic, Henry Etzkowitz, speaks of "innovation in innovation", to describe how innovation is not only the development of new products, but should also qualify as the creation of new forms of relation among the three spheres composing the triple helix model. Now, Universities are more and more called to develop a new function, that of directly contributing to the economic and social development of society.

Universities, as well as the other subjects producing knowledge, are ever more seen as economic growth makers: universities are no more ivory towers and new entrepreneurial skills are going to characterise their nature.

In the above mentioned "Triple helix" model, more and more importance is given to university world ability of acting as an interlocutory subject with enterprises, together with the ability to guarantee a suitable valuing of research results, in terms of new patents and entrepreneurial initiatives.

Moreover, in the "Triple Helix" model, universities address a fundamental role, elevating their action to the one of the other spheres involved, thus matching their basic role of knowledge producers to that of a subject directly involved in the promotion of innovation. Last but not least also the State, and, more generally, all governing institutions are going to address a new a more up-to-date role.

In the "Triple Helix" model governing institutions being them central, local or regional, do not play anymore only the role of financially supporting other subjects' research activity, but are more and more subjects that draft the rules of the game and assure their respect, encouraging deep and systemic relations among enterprises and universities, aiming at realising the best context conditions needed to enhance innovation abilities of any country where the above actions are taking place. The cooperation to be created and made effective is not a closed circle, but it is openly connected to the outer realities and favours the contextual realisation of an effective open education.

Activating VINCENTE is a training project supported by DHitech, technological district, a consortium born within the scientific research framework programme agreement signed in 2005 by the Italian Ministry to the Treasury, the Ministry for Education and Research and the Region Apulia local authority. The DHitech is considered one of the most consolidated district in the field of Private-Public research, training and technological transfer, working in two main areas of action such as advanced materials and nano-technologies and e-business management. The above consortium is a non profit company and aims at building investment attractiveness in high tech fields, through scientific and technological excellence. Partners are public entities such as CNR (National Centre for Research and the University of Salento) and private ones, such as Engineering SpA Company and ST Microelectronics SrL.

ISBN 978-963-89559-7-5

The LPS – Laboratory for Experimental Pedagogy (University Roma TRE) – experience

Within the above Activating VINCENTE training project, researchers from LPS (Laboratory for Experimental Pedagogy – University Roma TRE) were in charge of teaching two modules to the graduate students participating in the initiative: Development of Online Cooperative Environments and Models, Processes and Systems For Online Learning Communities. Main learning objective of the modules was to acquire skills in the field of Internet entrepreneurship and, in particular, students were asked to devise an effective MOOC on the subject of Entrepreneurship education. The first sections of the modules were devoted to theoretical aspects regarding entrepreneurship education itself and how to build a successful MOOC, then, students were divided in groups and each group had to carry out, writing cooperatively online (Google Doc), one project work, taking into consideration the following points:

- Needs analysis;
- General and specific objectives of the MOOC to be devised;
- Specific learning objectives in the MOOC and Prerequisites;
- Description of the enrolling students profile;
- Methodology and tools;
- Activities – Educational sections;
- Time Schedule/ costs of the project;
- Promotion and marketing of the MOOC;
- Expected results and definition of the skills to be acquired at the end of the course.

The model adopted to make in training students work has been tested in other research activities (Poce et al., 2010; 2011; 2012) and it is based on the idea that, to be effective, educational technology must be thought and designed following well established schemes and structures, a part from being the result of experimentation and research of its impact on learning outcomes.

Among the various activities, in-training students were asked to answer to some questions about online education, with particular reference to cooperative learning. The questionnaire has been realised with Google Docs[2] and it included open ended and multiple choice questions. The results obtained enabled the research group to reflect on certain issues related to the design of online learning environments, such as MOOCS, in order to make them more and more effective and successful. Some results are given below.

First of all, the research group looked for information useful to describe the profile of the in-training students, who, as the graphics below describe, were all graduate, mostly male and aged between 26 and 32.

[2] Questionnaire is available at https://docs.google.com/forms/d/1S21apRlhPD5vcA3QGGLsEoo-lMAmsTkKay3qFiym5k0/

ISBN 978-963-89559-7-5

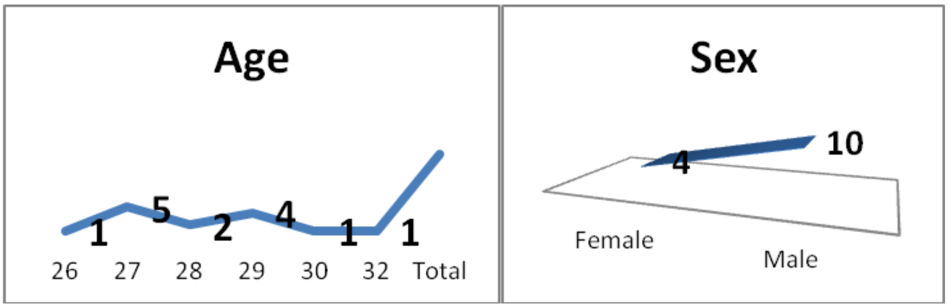


Figure 1-2. Age and sex (14 students)

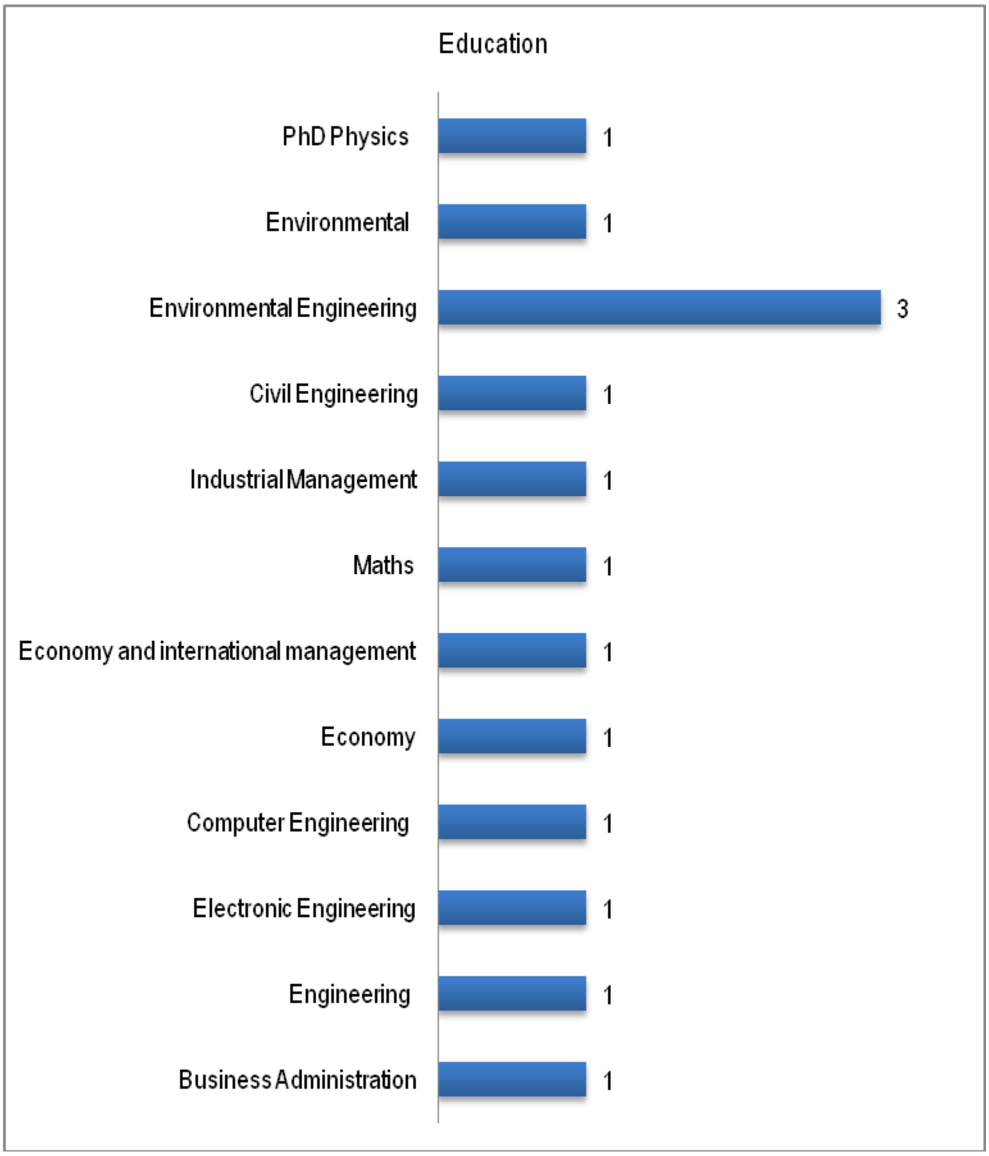


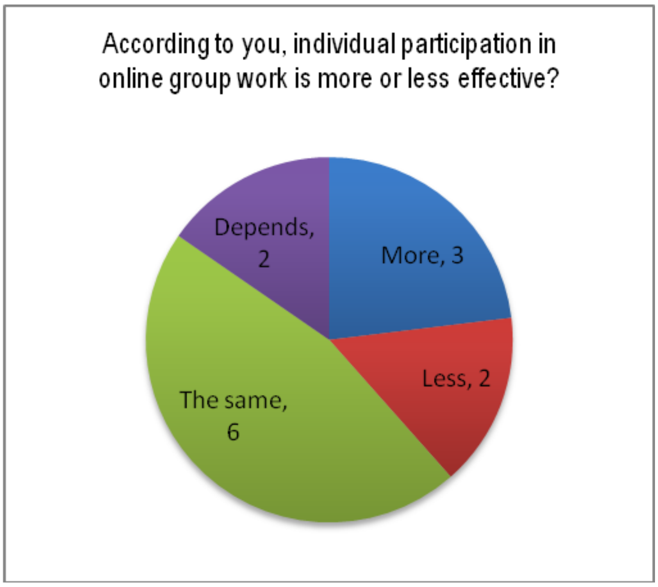
Figure 3. Education

As regards education, most of the in-training students are engineers with different areas of specialisation: from business administration to computer science.

The inquiry aim was essentially to understand what the interviewees thought about the differences between a face-to-face course and an online one. The results highlighted that they

ISBN 978-963-89559-7-5

do not consider the two learning situations so different in themselves, showing that attending an online course has become culturally accepted. The difference, if any, is noted when it comes to learning assessment and the data presented below demonstrate that online assessment is felt as more objective and less biased by physical presence, that would harm, according to the in-training students, the results in terms of validity and reliability.



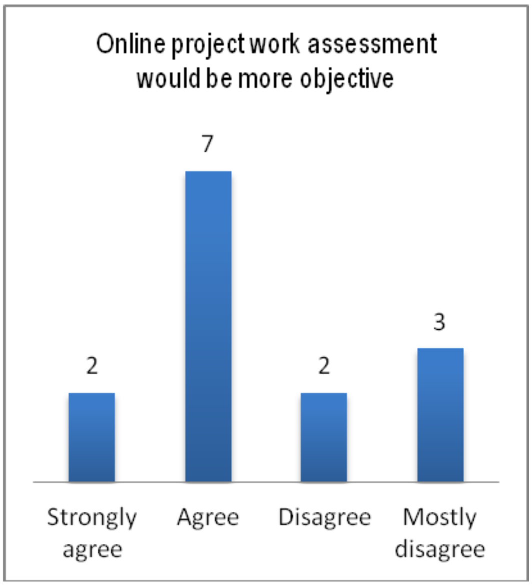


Figure 4-5. Self-evaluation of online project work

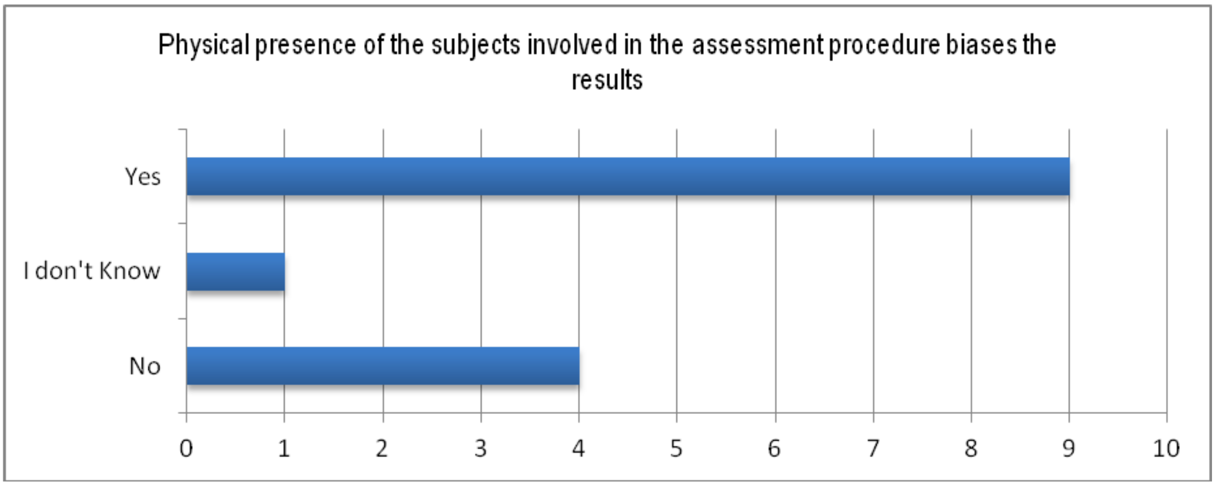


Figure 6. Physical presence of the subjects involved in the assessment procedure biases the results

Taking into consideration that online assessment is a key issue in teaching and learning online, such results give suggestions about the potential impact that online assessment could have on teaching and learning. Other results regarding students' project work on the design of MOOCs in entrepreneurship education will be presented later on.

ISBN 978-963-89559-7-5

Final remarks

Other analysis have been carried out during the modules, both as regards online cooperative writing carried out by the in-training students devising their MOOCs, and the level of critical thinking skills reached after their learning experience. The results of such analyses represent material for a wider study to be issued in the next future by LPS research group involved in the present research.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

OPEN BADGES FOR COMPETENCE RECOGNITION AND EMPLOYMENT APPLICATION: INSIGHT FROM THE GERMAN QUALIFICATION PROGRAM "CREDIT POINTS" FOR MIGRANT ACADEMICS

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Introduction

This paper describes current developments, practices and insights related the application, potentials and challenges of open badges for competence recognition and employment application in context of a blended learning qualification program for migrant academics in Germany. The program is called "Credit Points for migrant higher education graduates with engineering degrees (short: "Credit Points") and is the first supplementary qualification program for migrant academics in Germany applying open badges for competence recognition and employment application. The program "Credit Points" is anchored at Beuth University of Applied Sciences Berlin[1], at Gender and Technology Center[2] and is part of the German federal IQ Network[3]. The IQ Network focuses on promoting Integration through Qualification (IQ) and aims to achieve a sustainable improvement in the labour market integration of adults with migration background. Since the IQ Network has a federal structure with coordinated networks of projects in all federal states in Germany, the project "Credit Points" is part of to IQ Network Berlin[4], coordinated by the Senate Department for Labour, Integration and Women[5]. IQ Network including the project "Credit Points" is founded by the German Federal Ministry of Research and Education, the German Federal Ministry of Labour and Social Affairs and the German Federal Employment Agency.

The project "Credit Points" is an educational innovation program designed to complement academic and occupational qualifications of migrant academics with degrees in technical fields. The aim of the project is to help migrant academics supplement their existing qualifications based on individual academic backgrounds and career plans in order to facilitate the entry into the labour market in Germany. To reach this aim, "Credit Points" applies innovative pedagogical models, career counselling services and cutting-edge learning

[1] Beuth University of Applied Sciences Berlin: http://www.beuth-hochschule.de
[2] Gender and Technology Center at Beuth University: http://projekt.beuth-hochschule.de/gutz/
[3] Network "Integration through Qualification" (IQ Network): http://www.netzwerk-iq.de
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[5] Berlin Senate Department for Labour, Integration and Women: http://www.berlin.de/sen/aif

technologies to support migrant academics in developing, recognising, documenting and communicating skills for employment and employability. "Credit Points" builds on the principles of individualisation in adult education and uses a number of critical educational and counselling instruments including individual aptitude diagnosis, individual consultation and coaching as well as individual learning agreements and individual qualification plans. "Credit Points" combines eLearning modules delivered via Moodle, ePortfolio techniques supported by Mahara with face-to-face meetings, trainings, coachings and workshops to enhance flexible, modular learning individually combined to match personal goals, qualification needs and life circumstances. One of the key concepts in "Credit Points" is the use of open badges to supplement the formal "credit points" included in higher education certificates, i.e. course titles and the number of ECTS. As such the concept of open badges extends the traditional understanding of "credit points" and opens new pathways of conceptualising "credit points" in education.

Credit Points and Open Badges

Since its introduction in 1989, the European Credit Transfer and Accumulation System (ECTS[6]) has been successfully applied in higher education in EU member states. ECTS has been primarily used to enhance students mobility and comparison of courses and programs across the diversity of educational systems and institutions within and between countries in Europe, as envisaged by the Salamanca Convention in 2001 (EUA, 2002). Over the years, ECTS has effectively contributed to credit accumulation and academic recognition in Europe, playing a crucial role in consolidating the European Higher Education Area (EHEA[7]) as part of the Bologna Process.

While ECTS has enhanced comparability and mobility within higher education inside Europe, there is still a number unsolved problems related to the *recognition of competencies* and the contribution of ECTS to s*ustainable employability*, both being the cornerstones of the Bologna process (EUA, 2002). As far as problems with the recognition of competencies are concerned – the current practice in higher education is to describe competencies in terms of learning outcomes in module descriptions and to examine students at the end of the course. Competencies in module descriptions are often defined in terms of contents or topics to be mastered by the end of a course, frequently simply reformulating learning goals as learning outcomes. Also the question remains if the examinations really measure the competencies declared in module descriptions and allow inferences about student competencies that go beyond knowledge and knowledge application (Stratmann et al., 2009).

As far as problems with the contribution to sustainable employability are concerned - what is left to students after the examination, is the list of completed modules (topics), the ECTS points (workload) and the performance record (grades). This information serves primarily as

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[6] ECTS: http://eacea.ec.europa.eu/llp/support_measures_and_network/ects_dsl_en.php
[7] EHEA: http://www.ehea.info

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evidence of specialised knowledge in particular domains but gives little insight into individual competencies that are crucial to potential employers. For example it is hard, if not impossible, to recognise whether there is any evidence of graduates having demonstrated team competencies, strategic thinking or leadership skills during their study program. Competencies such as creating and conceptualising, interacting and presenting, leading and deciding or supporting and cooperating (Bartram, 2005), can be observed in project-based learning, group work or in interactions between students, but they are seldom taken into account, recorded and documented to serve as evidence of acquired competencies in terms of sets of traits, knowledge, skills and abilities (Boyatzis et al., 2002). Thus ECTS proves only limited value as a currency which can be traded between study and work. ECTS are also limited to certain populations of students, i.e. students from the EHEA and younger graduates who have been part of the ECTS system. Especially, graduates from outside of the EHEA cannot rely on ECTS and need other types of credit points providing evidence of their competencies and achievements to sustain their employability in Europe. This is where further ways of describing and capturing student competencies have to be explored in order to be able to communicate these sets of individual traits, knowledge, skills and abilities from the academic to the work-based context.

Open Badges is a promising concept and approach which may be used to capture, recognise and communicate employment-relevant competencies across contexts. Digital badges are symbolic representations of an accomplishment, skill, quality or interest that can be easily shared and communicated across contexts such as academic and work-related contexts (Knight & Casilli, 2012; Buchem & Pérez-Sanagustín, 2013). The Open Badges Initiative of Mozilla and MacArthur Foundation[8] have explored digital badges as elements of learning that can be used to set goals, stimulate motivation, recognise and represent achievements, supporting open credentialing and accreditation for formal and informal learning (Knight & Casilli, 2012). An important difference between digital badges and open badges is that open badges are designed to be autonomously collected by individual learners in the digital backpack and displayed by learners across different contexts and environments. In this way open badges have the potential to form living transcripts of individual competencies (Knight & Casilli, 2012). Open badges offer a flexible mechanism not only for motivating learners or goal setting but also for recognising personal competencies and achievements and communicating these between education and work. In this sense badges can be viewed as boundary objects, which can be used to cross boundaries between existing divisions such as formal and informal learning or academic and professional context (Buchem, et al., 2011).

With tools and infrastructures for badging constantly improving, there is much room to explore new approaches to using badges (Sharples et al., 2013). The next section describes the concept of open badges as individual "credit points" which capture and communicate individual competencies relevant for employment application as part of the research and

[8] Mozilla Open Badges: https://mozillalabs.com/en-US/open-badges

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development project "Credit Points" at Beuth University of Applied Sciences Berlin, Germany.

Using Open Badges as Credit Points

This section describes how open badges are conceptualised, designed and applied in the qualification program "Credit Points" at Beuth University of Applied Sciences Berlin. Following the background information related to the qualification model and qualification participants, this section dwells on recruitment considerations, pedagogical considerations, badges design and technical infrastructure, and application of open badges as credit points.

Qualification model and participants

The project "Credit Points" as part of the German federal program "Integration through Qualification" is concerned with devising innovative ways of providing migrant academics with supplementary higher education, capturing and communicating individual competencies as unique personal resources that are of value to potential employers. The participants in the qualification program "Credit Points" do not have to complete full study programs as they already have acquired HE degrees, but are given the possibility to choose single modules from different programs offered at Beuth University in order to supplement their existing qualifications. Participants may choose from a wide range of study programs, primarily blended learning modules from the Institute of Distance Studies at Beuth University (Fernstudieninstitut, FSI[9]), which offers full bachelor and master programs, including MBA in such fields as renewable energies, industrial engineering or clinical trial management. Participants may also choose other modules from the existing portfolio of Beuth University and participants in courses developed specifically for the qualification program "Credit Points". These modules are related to fostering generic competencies, including (a) German language skills, (b) digital literacy and identity, (c) academic/scientific skills, and (d) job application skills.

The choice of modules is based on intensive, *individual consultations,* during which each participant co-constructs an *Individual Qualification Plan (IQP)* under the guidance of the program advisor. The individual qualification plan is an outcome of a negotiation process between the participant and the advisor and results from the analysis of academic and professional track record, career goals and aspirations and current requirements and possibilities on the German labour market. Based on the results of the consulting process, a *Learning Agreement (LA)* is concluded between the participant and the program advisor, in which both the participant and the advisor commit to certain activities which best support the realisation of the individual qualification plan (IQP). For example, the participant and the advisor may agree that monthly or bi-monthly consultations are necessary to facilitate the individual learning and job application process.

[9] Institute of Distance Studies: http://www.beuth-hochschule.de/fsi

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The participants in "Credit Points" are graduates with degrees in technical fields including computational engineering, computer sciences, business informatics, construction engineering, chemical engineering, nutrition technology, environmental engineering and mechanical engineering. These graduates come from 11 different countries, i.e. Bolivia, Ivory Coast, Georgia, Iran, Cuba, Mali, Peru, Poland, Romania, Russia and Spain. Half of the participants already acquired the official recognition of their degree by an official German accreditation body. Despite the fact, that participants hold degrees in highly relevant fields and gained the official recognition of their degrees, about 70% the participants were unemployed at the beginning of the qualification program. Most of the employed participants where either employed in fields not relevant to their previous education or where employed in precarious positions not adequate to the level of their education and previous professional experience. This already points to the problem of many migrant academics in Germany: According to the German Federal Employment Agency (Bundesagentur fuer Arbeit, BA), about 20% of the domestic labour force potential in Germany is being currently wasted (BA, 2011). The program "Credit Points" addresses this problem.

Recruitment considerations

As the section above points out, migrant academics in Germany are faced with the challenge of entering and/or elevating on the labour market despite their academic degrees and in some cases even despite the official recognition of foreign degrees. From this perspective, a question emerges: How can individual strengths of migrant academics may be captured and communicated as valuable resources to potential employers?

The project "Credit Points" builds on the premise that online identity and online reputation are becoming more and more important for finding employment and that online recruiting have already become an important part of recruitment strategies of many organisations and enterprises around the world. As the research study "Recruiting Trends 2013" conducted with top 1000 enterprises in Germany and in cooperation with Monster Worldwide Deutschland indicates, recruiting and application processes are already digital, for example (a) nine out of ten job opening are published online, (b) approx. 75% of job applications are submitted online, and (c) about 12% of enterprises actively search for candidates in social media (e.g. LinkedIn, Facebook) and the share of both social media and mobile recruiting is estimated to grow in the next years (Weitzel et al., 2013).

The global trend towards digitalisation of job application and recruitment processes renders obvious that the use of digital representations of skills is becoming more and more important both for applicants and recruiters. Open badges as visual representations of individual skills and achievements have the potential of making this process more straightforward and efficient. Badges enable to capture and display fine-grained sets of individual competencies. The information conveyed by open badges includes:

- *Visual information* as a picture symbolically representing a skill or achievement,

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- *Textual information* as a description of the skill, awarding criteria and verifying evidence, and
- *Metadata information* as information related to the issuer, time and context of badge creation.

The combination of these different types of information and media formats makes open badges to data-rich digital tokens which may be used to enhance the transfer of competency-relevant information between education and workplace and vice versa. Additionally, the concept of open badges which is based on an open technical standard enabling any organization to create, issue and verify digital badges, as well as the possibility to collect badges from multiple sources into a single backpack, helps applicants to flexibly manage this transfer process according to individual preferences: Applicants can display the badges they received from various organisations as evidence of their skills and achievements on personal websites such as blogs, social networking profiles or job sites. In this way open badges may be used as validations of individual competencies, enhancing online reputation of applicants.

Pedagogical considerations

Open badges may be used as evidence-based digital representations of skills and achievements to highlight individual attributes alongside formal qualifications in this way providing recruiters with a more holistic view of an individual applicant (Hamilton, 2014). This calls for new forms of assessment and validation of personal attributes, going beyond the assessment of specialised knowledge and knowledge application, to a large extent the only and dominant practice in higher education. In view of the limitations of current forms of assessment, still largely based on summative assessment measuring content knowledge, as well as in view of problems with plagiarism, both alternative forms of assessment, including formative assessment, self-assessment and peer assessment (CERI, 2005), and alternative objects of assessment, including helping others, being cooperative and contributing to the public good (Downes, 2012) have been called for.

Using open badges in the project "Credit Points" aims at triggering alternative or new methods of assessment rather than enhancing summative forms of assessment targeted primarily towards measuring domain-specific content knowledge. The first and foremost aim of assessment for open badges is to elicit information about individual competencies, achievements and successes of each individual. The basis for the allocation of badges as credits points is not the workload or lists of predefined learning outcomes, which is already taken care of by ECTS, but capturing moments of student creativity, innovative thinking, peer support or self-initiative as evidence of competencies, emphasizing individual strengths. Following the principles of formative assessment, this evidence in program "Credit Points" is captured in the process of learning and interacting with other students in modules, workshops, meetings and consultations with the advisor as well as during in-company placements.

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Badges design and technical infrastructure

The design of open badges in the project "Credit Points" is based on the design framework of BeuthBadges[10]. BeuthBadges is a research and development project at Beuth University of Applied Sciences Berlin dedicated to the application of badges in different learning and teaching contexts, including higher education and work-based learning. The design framework of BeuthBadges combines a number of attributes to enhance the information-richness of open badges. BeuthBadges are designed as cubes with the following differentiating attributes (Figure 1):

- Logo – the logo is a variable element, providing information about the specific program or project, for example in the project "Credit Points", the logo of the program "Integration through Qualification (IQ)" is used to denote that the badges was acquired as part of this federal qualification program.
- Colour – the colour of the cube provides information about a specific domain, study program or element, for example in colours in the project "Credit Points" are related to different elements of the individual qualification plan such as modules from programs offered by the Institute of Distance Studies or modules related to generic competencies such as digital literacy or language competency.
- Title – the title of the badge is the concise description of the specific competence which the badge is representing, such as "Leader virtual team" to denote that the participant demonstrated leadership skills in an online environment while interacting with peers in a virtual team.
- Icon – the icon is a variable element and represents a category of skill or competency, such as "social skill", "language skill", "technical skill", "information skill" or "research skill". This symbol provides additional information about the nature of the competency represented by the badge.
- Text – the text provides the detailed description of what the badge represents including evaluation criteria that was used, the context in which the specific competency was observed and the description of the evidence.
- Metadata – the metadata provides the necessary information to verify the issuer and the date of issue.

[10] BeuthBadges: http://beuthbadges.wordpress.com

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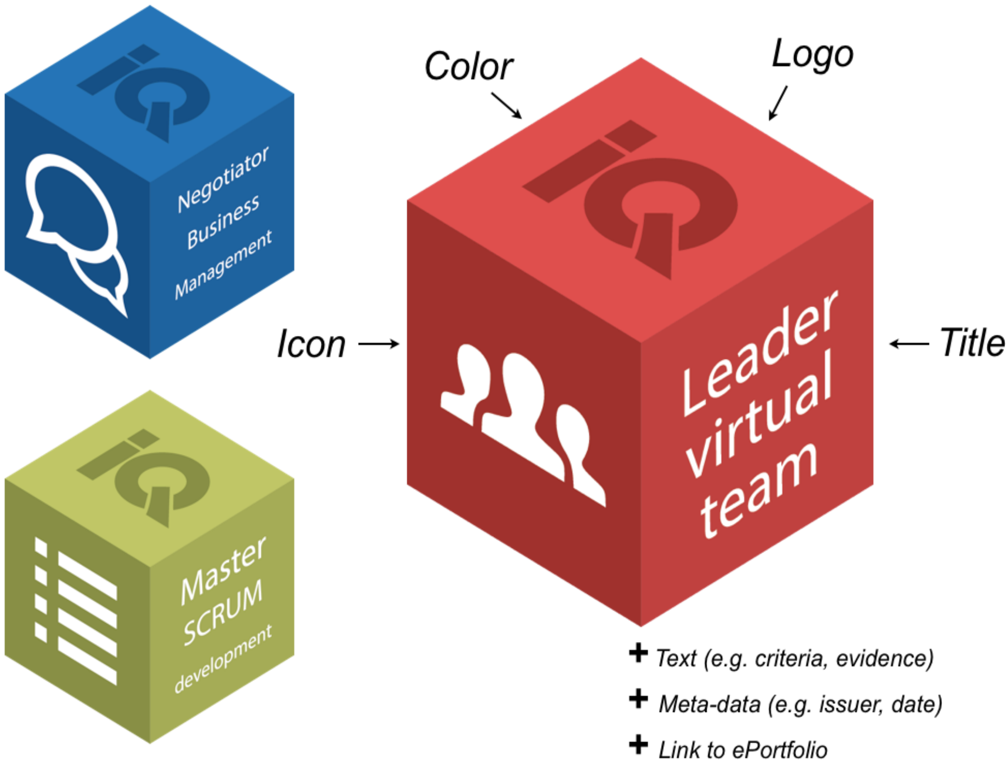

Figure 7. BeuthBadges – design of open badges and examples of badges

The technical infrastructure for issuing, awarding, collecting and displaying BeuthBadges is a combination of different systems, including:

- Adobe Illustrator – for graphical design of the badge png with templates to guide the design process
- Moodle – as badge issuer with integrated badge functionality in the 2.5 version.
- Mozilla backpack – as individual collector of badges which can be displayed in different sites
- Mahara – as ePortfolio system in which participants develop their digital job applications including the Europass CV and the directory of documents such as higher education diploma, certificates etc.
- WordPress – as project website in which individual participant profiles are displayed and as a tool in which students aggregate their digital traces to represent their online identity and reputation.

BeuthBadges are designed with Adobe Illustrator, are enriched with texts and metadata issued via Moodle, collected individually in Mozilla backpack or directly integrated into Mahara views by means of the Mahara badge widget. Currently, the concept of badges and the process of badge issuing and displaying is tested for German language skills based on the Common European Framework of References for Languages (CEFR).

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Application of open badges as credit points

Open badges designed in line with the BeuthBadges framework are applied as credit points in the qualification program "Credit Points" as evidence-based digital representations of skills and achievements highlighting individual strengths alongside formal qualifications. The badging process comprises of two phases.

In the first phase information to create badges is collected from all stakeholders involved in the program, including lecturers, advisors, project members, study program coordinators, peers and enterprise representatives who interact with participants during in-company placements. These stakeholders provide information about their own observations related to the demonstration of skills, competencies, achievements and positive developments of program participants. This information is based on real life observations, e.g. during team work or conversations. Based on this information badges are designed and issued to program participants, who collect badges in their backpacks.

In the second phase participants use badges collected in their backpacks to enhance their online identities and their digital applications based on artefacts collected in ePortfolios. Both online identities (e.g. profiles in LinkedIn or personal blogs) and digital applications (e.g. digital CV, work samples) are used as job application instruments. This process is based on individual decisions of program participants about which badges to display in which online environments and contexts. As in all other parts of the qualification program, participants are supported by the program advisor in this decision-making process, taking into consideration some of the key aspects, such as displaying a balanced selection of badges. As some field reports point out, providing too many badges may be counter-effective for the application process (Hamilton, 2014). In this way open badges complement the information included in certificates and ECTS, providing a more holistic view of the applicant.

Conclusions

This paper provides an insight into the concept of open badges for competence recognition and employment application as one of the cornerstones of the project "Credit Points" at Beuth University of Applied Sciences Berlin and part of the federal program "Integration through Qualification (IQ)" in Germany. Given the initial stage of the project, further insights and examples of badges will be provided in the second phase of the project, starting in April 2014. Some of the key challenges faced at the moment are (a) establishing awareness among lecturers and study coordinators as far as collection of information for issuing of badges is concerned, and (b) establishing trust in open badges among potential employers as far as application processes are concerned.

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Acknowledgement

The project "Credit Points for migrant higher education graduates with engineering degrees" as part of IQ Network Berlin is founded by the German Federal Ministry of Research and Education, the German Federal Ministry of Labour and Social Affairs and the German Federal Employment Agency.

ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

CMOOC IN E-LEARNING DESIGN FOR VET TEACHERS: MAPPING PROFESSIONAL COMPETENCES ONLINE

Agnieszka Chrząszcz, AGH-University of Science and Technology, Poland, Branka Vuk, Carnet, Croatia

Introduction

The article deals with the massive online course designed for VET teachers in e-learning pedagogies. The authors discuss the recommendations towards designing the cMOOC for VET practitioners and refer to the pilot cMOOC conducted in Croatia, Slovenia, Poland, Lithuania, Italy, Czech Republic, Spain and Norway from November 2013 till March 2014. More than 350 learners took part in the learning challenge, providing the authors with extensive feedback and evaluation of the content. The authors discuss the background for the designing of a particular course as well as initial results of the pilot MOOC realised in respective countries.

The transformation of VET across Europe is taking it momentum. In that context provision of open, massive educational offer for the professional trainers and teachers seemed a good direction. The partnership (http://evet2edu.eu) took the challenge to redesign the e-course towards VET-specific need, pilot it as cMOOC and transform it into an open course available for individuals and institutions.

Designing for VET e-learning: pedagogical framework

The course focuses on e-learning design and e-moderation on a basic level. It takes 3 months and app. 60 hours to complete, that is equivalent to 3 ECTS. The community and interactions between its members are the focal point of the social learning. As collaboration was indicated as pivotal for VET teachers (Sanchez Vera, 2013) it was also the driver for designing the course. The learners were to support each others as practitioners experienced in teaching. It was assumed that they would need support in re-directing this experience into e-learning practices and into mastering online moderation and collaboration.

There are 3 main pedagogical pillars of the course that is authentic learning (Herrington et al. 2002) and reflection (Moon, 1999) together with a portfolio-based competence development (Constantino et al. 2009)

Authentic learning is reflected on two levels:

- Meta-level of the course which becomes a learning environment and a reference point for evaluation. The experience of participation on e-learning course while learning about designing e-learning is a strong authentic factor.
- Activities that reflect actual, authentic situations that can be planned and can occur online and require adequate response from the course participants.

Due to the wide scope of the course that is on the verge of pedagogy and technology authors decided to embed reflective practice into the course to deepen learning and drive off from the technological component. As a reflection is always related to the real experiences, in combination with the authentic activities it enables the learner to experience real-life situations and draw conclusions for the future actions. Short but regular reflective tasks accompany the learners along the course together with a formative feedback from the moderators.

The authors defined 9 competences that need to be mapped with evidence during the course. The selection of evidence is autonomous and each participant can focus on different modules or activities according to their understanding and interpretation of the competences proposed.

1. To contextualize e-learning competences in VET;
2. Digital competence, using ICT tools for teaching and learning in VET context;
3. Work collaboratively online synchronously and asynchronously (sharing ideas, communicating...);
4. Analyse competences in general and participant's own competences;
5. Critically adopting general e-learning principles and particular solutions in their context;
6. Design engaging e-tivities for individual or group work in accordance with the learning outcomes;
7. Create and manage (publish, select, re-use, share, and evaluate) audio-visual teaching /learning materials in accordance with the learning outcomes;
8. Facilitate, inspire and motivate participants in an e-learning environment in order to achieve the learning outcomes;
9. Metacognition (awareness and critical reflection on own teaching and learning competences).

Designing cMOOC for VET teachers: background

Contemporary job profiles are too often rich in technologies that require advanced training. The employees need to be digitally literate so taking advantage of ICT in vocational trainings and education is necessary, especially in the perspective of lifelong learning. New media and e-learning correspond to enhancing creativity, innovation and entrepreneurship which are the priorities and recommendations for VET development in most countries (Digital Strategy, European Commission, 2013). ICT should be used to boost access to training and to stimulate active learning as well as to develop new skills, as we can see in different proposals from the European Union, such as the "action programme in the field of lifelong learning" (2006) and the report "investing in skills for better socio-economic outcomes" (2012).

Nevertheless, European Quality assurance in vocational education and training points out the lack of teacher training, administrative system and support tutorials for students, quality design of courses, methodology used and evaluation designs (EQAVET, 2013). Therefore the hype of MOOCs widespread offer does not include VET-specific courses in languages other than English.

Although the MOOC hype is on its ubiquity is rather ostensible, at least in Europe. The dominance of English as a main learning language makes the offer rather exclusive (Liyanagunawardena 2013) and courses in other languages are scarce (Scoreboard, 2014). The statistics show that the number of people taking up MOOCs is largely limited to the countries where English is either mother tongue or is perceived as second-language. Ability to learn in a foreign language is crucial and different then ability to read or communicate on the basic level which makes language a huge barrier in accessing MOOCs.

Provision of a cross-European MOOC for educators is a challenge. Differences in access to ICT, IT skills and online practices on vocational schools' level are significant and vary from country to country (Wastiau, P. 2013). In order to learn about specific challenges exploratory study was conducted with 31 practitioners from 7 countries interviewed (November – December 2012) along with a desk research on VET practices in e-learning and new media exploitation. As a result 6 areas of intervention were identified that are important for VET sector in relation to e-learning and require further development (Szymczyk et al, 2013, Sanchez-Vera et al, 2013):

1. access to up-to-date and digital educational materials for VET- specific subjects;
2. effective communication and collaboration online;
3. planning and assessing online activities, designing engaging online learning;
4. training practical VET skills for particular vocation;
5. critical thinking and working with information;
6. multimedia development (video, audio, animations).

The challenges were therefore tackled in the activities and materials of the course. Those areas where addressed directly in the e-course design as modules, resources, activities and reflective practice.

Content-design challenges

Although in general education content may no longer be the king, the lack of state-of-the-art textbooks and handbooks has been indicated as a real issue for VET teachers across Europe

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(Sanchez Vera, 2013). Access to up-to-date and digital educational materials for VET- specific subjects. Consequently e-books and electronic educational materials in local languages and specific for VET subjects are also a scarce resource. Teachers complained about outdated handbooks that are not following the recent developments in the industries but also noted on the lack of digital resources relevant to the profession. The relevance is absolutely necessary since learners are less motivated to learn if the content is not directly connected to their profession and in their own language. Policies regarding authorship and licensing and quality assurance of the content need to be adopted on the large scale. The flexibility and high quality of VET sector indicated in Bruges Communication (2010) depends, among other things, on the quality of the learning and teaching resources. That requires both improvement of teacher skills for design and development of the resources and providing support for selection, evaluation and maintenance of the resources and infrastructure. Since lack of resources is an obstacle for teachers, most of them create their own digital materials themselves, using whatever means available and being aware of the insufficient quality of the results.

Technology-related challenges

Multimedia development (video, audio, animations) (6) is a challenge related to content development however focuses rather on the media then a message. Teachers of vocational subjects are competent enough to create digital handbooks and resources themselves, and in fact they actually do: they search and evaluate websites, select materials, share links to prepare for their classes. As they work alone, usually without any support from neither colleagues nor students, it is also arduous and challenging. But the lack of resources can be actually a trigger for action.

Teachers are generally aware that inclusion of multimedia increases attractiveness and effectiveness of learning. Diverse content is always helpful for learners with different learning preferences. However many teachers are not aware of the opportunities of open/free software for content development, partly because of lack of information, examples and technical support. The latter is particularly important e.g. for organising online meetings, recording and publishing audio and video which should support achieving unique learning goals.

Web 2.0 applications can support sharing and re-using of VET resources since they enable easy creation and remix of content by all users. However, intellectual property rights have to be taken into account and use of open licences is suggested as the most flexible and appropriate for sharing educational content by educators.

Learning design challenges

The challenge of an effective communication and collaboration online involves encouraging collaboration between VET sector teachers and improving communication with students as well as establishing collaborative teaching tasks to enhance resource-based learning. EQAVET Work Programme (2013-2015) promotes cooperation as especially relevant for vocational education and our interviewees substantiate this policy – the majority preferred to learn and

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work in a collaborative way. Although their confidence and skills vary, they are generally positive about benefits of online cooperation with other teachers, educators and professionals as well as with their students. We learnt that it is necessary to provide the teachers with support for developing methodologies for collaborative learning and improved communication using ICT.

That component is inevitably connected to the planning and assessing of learning. VET teachers struggle to maximise the use of widespread e-learning platforms to go beyond publishing resources and apply more active online methods for blended learning mode. VLE access for 11 grade level: 61% EU, Norway 100%, Slovenia 87%, Spain 82% Czech 56%, Poland 44%, Italy 33%, Lithuania 29% (https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/KK-31-13-401-EN-N.pdf)That requires designing for authentic learning and ability to plan such online activities that would also enable assessment compliant with formal requirements of the specific VET curricula. That calls for the teachers' support in pedagogical design as enhancing theory-driven online course with interactive tasks increases effectiveness and motivation (Sanchez-Vera 2013). The variety of tools available (data bases, collaborative documents, easy broadcasts and videoconferencing) as well as the interconnection between them (collaboration tools) and the monitoring possibilities can help teachers with the hard task of planning and assessing online activities and make difficult assessment modalities more accessible for teachers – and students.

Active learning that engages the learner's attention is believed to be motivating and effective. E-learning can enhance the learning experience when it stimulates interactions and actual creation of knowledge by the learners. All cases where active participation of the learners is emphasised are worth noticing. When learners manage their own learning and set up their learning goals, they become more independent as well as more aware of their competences.

Development of critical thinking is a must when teaching is meant as support for finding the solution rather than providing the answers. Most teachers interviewed talked about their experiences and activities in which students have had to go further and use different skills. Learners need to work with information from different resources and develop, as a result, a product that is useful and necessary in their future work environments. Teachers talked about the importance of learning in VET sector that should be close to the reality. It is a necessity today to help students learn how to manage information, so teachers have to know how to promote and develop these strategies in their students. Each teacher is free to select his/her own methods. They can vary from those simple but effective e.g. learners creating and giving a presentation on a given subject, evaluate information, process it and build further on it (an example from a Croatian teacher), to the complex and multi-dimensional methods, such as that in a Spanish school where learners create professional websites for companies. The teacher explained that „the beginning is difficult, but students must work with information from different sources and that process is very rewarding. In the end students get a very useful product". Going online immediately immerses us in a flood of data. With the information so easily accessible the traditional transmissive model of teaching becomes redundant. However the issue of quality of information, as well as usability, needs to be explored by learners who

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need to know how to manoeuvre independently through online resources. One of the possibilities to practice critical thinking, evaluation and purposeful search for information is webquest.

Designing cMOOC for VET teachers: design and moderation

In order to verify the design of the cMOOC the piloting was conducted in 8 countries with overall 300 users registered from Norway, Spain, Poland, Croatia, Slovenia, Lithuania, Czech Republic and Italy. The openness of the course was temporary restricted for the piloting to the VET teachers of professional subjects.

The course consisted of 10 modules, each containing activities and localised resources. The driving concept was design of e-tivities (Salmon, 2008) for VET and its constant development with:

- content (OERs and licensing, evaluation of OERs, developing short educational videos and infographics, users generated content);
- pedagogy (activity-driven design, e-tivities, facilitation and scaffolding, moderation strategies, motivation and support for learners, online collaboration, using web-conferencing for competence development);
- technology (open source and free solutions, Moodle, collaboration tools, mobile devices for video making, web-conferencing).

The majority of the course structure and content was cross-national. However some localised features were also present: the local facilitation and feedback was given by the local facilitators and the certification was issued separately in each country for the piloting. Also the source materials, examples and case studies were localised to reflect the actual situation of the participant's country. Such an approach ensured more flexibility (one course, one handbook) but also make the product targeted (variety of examples).

There was also a debate about the course environment (Moodle enhanced with dispersed applications) and its impact on the collaboration and innovative learning design. The important issue to be discussed is whether the provision of a dispersed learning environment and social networking is a part and parcel of a collaborative learning. For this particular community social networking has often been an ethical dilemma whether engagement with students should or shouldn't take place (e.g. via popular social software). Security of data means not only system security but also creating a comfort zone for learning, exchanging opinions, taking challenges and making mistakes. Adding to the fact that the level of media competence was extremely diversified the decision about semi0centralised learning environment was justified.

The initial evaluation results show that the overall drop-out rate was around 1/3 which in fact reflects the general trend in that respect. Many claims that with the drop-outs rates high and the completion rate of the MOOC participants rather low (e.g. Brinton et al., 2013) the effectiveness of that open form of teaching is questionable. However for many VET teachers it

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is a great opportunity to become a part of a learning community online, as the course provided time and space for active engagement and practice. It is also the opportunity to become a lifelong learner in an authentic environment as a result applies the skills to the educational context of the school.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DESIGNING AUTHENTIC LEARNING ACTIVITIES AND ENVIRONMENTS: THEORY AND PRACTICE

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Adult learners returning to school, whether face-to-face or at a distance, are looking for educational experiences that not only cover the theory and background of a field, but also connect the program to the real world of work (Knowles, 1984). Whether they are looking for career change, advancement in their current organization, or personal growth opportunities, they are demanding that their educational experiences move them beyond the traditional decontextualized classroom model. These types of learning activities are embodied in the concept of "practice fields" wherein "the goal shifts from the teaching of concepts to engaging the learner in authentic tasks that are likely to require the use of those concepts or skills" (Barab & Duffy, p.34).

For those of us involved in distance education, this can provide unique opportunities to leverage educational technologies as our students are dispersed across a country or around the world. In this proposed presentation, we will discuss various instructional strategies used in courses offered by Penn State's fully online World Campus[1] toward the end of creating authentic learning activities and environments.

Practice Fields and Authentic Learning

The hallmark of a constructivist learning environment is that students are actively engaged in their learning rather than passive recipients of content (Jonassen, 1999). In authentic learning contexts, students are encouraged to engage in realistic, ill-structured problems that more closely resemble the real world scenarios they will encounter outside the structured class. Whenever possible, engagement with communities outside of the formal academic environment is even more effective (Barab & Duffy, 2012).

The authenticity of instructional experiences can vary from simulations, to immersive virtual experiences, to presentations to companies through technology or program internships. Barab and Duffy (2012) summarize the principles articulated over the years for designing "practice fields." Practice fields are environments characterized by the following:

[1] World Campus is the Pennsylvania State University's online campus, serving over 13,000 individual adult students at a distance. World Campus offers 90 distinct certificates, minors, bachelor's degrees, and master's degree programs online.

- "*Doing domain-related practices*. Learners must be actively doing domain-related practices, not listening to the experiences or findings of others as summarized in texts or by teachers."
- "*Ownership of the inquiry*. The students must be given and must assume ownership of the dilemma and the development of a resolution."
- "*Coaching and modelling of thinking skills*. The teacher's role is not solely that of a content expert, but rather as a learning and problem-solving expert."
- "*Opportunity for reflection*. Too often when we are engaged in work we simply do not have the opportunity to reflect on what we are doing, are going to do, or what we have done."
- "*Dilemmas are ill-structured.* The dilemmas in which learners are engaged must either be ill-defined or defined loosely enough so that students can impose their own problem frames (Roth, 1996; Savery & Duffy, 1996)."
- "*Support the learner rather than simplify the dilemma.* The dilemma the students encounter should reflect the complexity of the thinking and work they are expected to be able to do outside of the school context when this learning is completed."
- "*Work is collaborative and social.* Meaning is a process of continual negotiation. The quality and depth of this negotiation and understanding can only be determined in a social environment." (pp.36-37)

Over the years, Penn State's World Campus Learning Design unit has worked to incorporate the above design strategies targeting adult learners in a variety of ways. In what follows we will highlight and discuss four individual case examples in which we have designed practice fields into our online courses in order to provide students with authentic learning activities and environments. Our examples span the continuum from relatively low cost, low tech activities to highly immersive complex virtual environments.

Design Strategy Examples for Authentic Practice Fields

Case 1: Strategic Communication

The Strategic Communications program at Penn State is a program in which students, usually working adults, are trained to be better strategic communication practitioners. While it includes theoretical frameworks and a goal is to teach students to reflect more deeply on their field, much of the courses are designed to scaffold learners to be able to function as practitioners. Our students typically either hold or hope to attain positions like the following: public relations manager; marketing manager; media or communication worker; advertising or promotions manager; and broadcast journalist or news writer.

Many of the activities throughout the courses in the program – both in terms of content and assessment – are intended to represent authentic real-world scenarios practitioners would encounter in those positions. We will briefly discuss two course examples. In the first course, News Writing, students are expected to engage in their communities as a media professional, broadcast journalist, or news writer would. Students are required to identify a real

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organization with which they will work to write press releases and news stories about events actually occurring within that organization. The students engage in peer feedback activities where they pitch ideas, review drafts, and discuss ethical issues. These conversations are held in a social media platform.

In the second course, Research Methods for Strategic Communicators, the students work independently in their own communities to contribute to a shared dataset, using the tools and methods taught in the course, to test an actual hypothesis. The research concepts are presented in the context of a company that is promoting a fundraising event. The employee in charge of the event has to research why ticket sales are down and what he or she needs to do to increase sales. As the students are presented with the various research activities (interviewing, surveys, focus groups) in the course, they use those tools to build the shared dataset that is then evaluated to test the research hypothesis.

The practice fields designed in the Strategic Communications program are relatively low cost, low tech, and fairly straightforward in terms of design logistics. They require students to participate in domain-related practices, reflect on their work, confront ill-structured problems, and work in a collaborative and social environment (Barab & Duffy, 2012, pp.36-37).

Case 2: Instructional Design in Distance Education

Instructional Design in Distance Education is a course that not only introduces students to key design factors when developing curriculum for distance education, but also asks the students take these concepts and integrate them into prototypical distance education lessons. The students, as small teams, pick one of four real world examples and are tasked with defining the audience, determining existing knowledge, producing prototype budgets, a prototype lesson, and presenting the work as a report to what would be a committee that has put the project out to bid. Thus, the students need to bring all the elements of the course together to develop the final product not unlike what they will experience if working for a training company or bidding on an education contract.

This particular approach to an authentic learning experience is one that is not costly to implement, but one where the students have indicated that, while it has been one of the more challenging assignments in the program, it has made them stretch and tackle aspects of design they have not had to deal with previously (e.g. budgets). It has made them think more deeply about the audience they are addressing in their designs and how the technology choices may impact the learners in terms of costs and access. As most of the students in the course are not instructional designers or involved in distance education it allows them to build skills that they can integrate into their current careers or new careers as designers.

The following is the rubric used to analyze the final product and the next screen shot is from one of the team submissions. The actual team product will be demonstrated during the presentation.

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Prototype Unit or Lesson = 25 pts		Final Report = 25 pts		Peer Evaluation = 5 pts	
Well-Written Learning Objectives	4 pts	Well Written	3 pts	Peer Evaluation	5 pts
Assessment Strategy	4 pts	Well-Written Learning Objectives	3 pts		
Grading Outline	2 pts	Course Outline	3 pts		
Interaction Strategy	4 pts	Able to Defend Decisions	3 pts		
Content	4 pts	Correct Design for Audience	2 pts		
Multimedia (if appropriate)	3 pts	Project Follows QM Standards	1 pts		
Learning Activities (quizzes, group-work, etc.)	4 pts	Reasonable Timeframe for Review of Content & Completion of Activites	2 pts		
		Draft Proposal	4 pts		
		Draft Budget	4 pts		

Figure 8. Instructional Design Project - Grading Rubric

Figure 9. Instructional Design Project - Team Product Example

Case 3: Forensic Nursing Autopsy

The Forensic Evidence Collection and Preservation course examines the forensic nurse's role in recognizing injuries and patterns of injury. Evidence collection procedures are examined from collection to courtroom presentation. This course provides the students with the unique experience of watching videos of an actual autopsy being conducted on a cadaver. These videos were originally produced expressly for this course and our nursing students at a distance; however, because of the obstacles of viewing an autopsy in a synchronous, face-to-

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face course – timing, limited space in the morgue, and family consent – the instructor is going to use these videos in the resident instruction class as well.

Prior to viewing the autopsy, the students watch a video in which the instructor coaches them through the affective aspect of the autopsy. She describes what they may feel, how they may react, and reminds them to be aware of their emotional state during the viewing of the autopsy videos. She cautions them that a forensic nurse must remain unbiased in order to collect the evidence to help determine the cause of death.

After viewing the videos, the students engage with one another in a discussion of what they learned and how it will affect their behaviour. In future iterations, the instructor will videotape a live review session with actual students that discuss their experience and reactions to the autopsy videos.

This example of a live autopsy is definitely on the expensive and logistically complex side of the continuum. There were a number of practical, legal, and privacy matters pertaining to obtaining a cadaver and actually filming an autopsy that came into play in designing this practice field activity for the nursing course. The benefits of this approach centre on domain-related activities in the scientific observation of an actual autopsy and the authenticity of the learning experience itself. In addition to analyzing the cause of death from a scientific perspective, students also discussed their real emotions pertaining to the situation. Practicing these cognitive skills and experiencing and reflecting on their affective responses prepare them much more than a textbook overview to move into real forensic settings as nurse practitioners.

The following is a screen shot highlighting the video sections of the autopsy. Due to legal reasons, only registered students in the course and the course instructor can actually view clips from the autopsy. In the presentation, we will discuss the student and instructor experiences with this activity as well as the design factors that went into this production.

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Figure 10. Forensic Nursing Autopsy – Video Screen Shot

Case 4: Italian Language Learning

The Italian language learning environment has been designed intentionally to immerse students in real-world scenarios they are likely to encounter when travelling to Italy. Rather than students learning the language through artificially constructed textbook scenarios focused on the traditional-aged residential undergraduate student, they proceed through a story-driven, multimedia-rich course in which they are an active participant in their learning experience. Students virtually go to Italy as first time visitors and encounter and must navigate a number of scenarios adult travellers would face. Scenarios include negotiating transportation, attending cultural events, dining out, purchasing travel supplies, and meeting new people.

This example practice field was the most complex and expensive to develop as it involved a variety of design and production factors including language translation, the development of multiple authentic scenarios, hundreds of context-specific images captured in Italy, and multiple video recordings of different scene setters used throughout the course. The courses have not yet launched but based on two pilots with students are highly successful in terms of "the learning context [being] motivating" (Barab & Duffy, 2012, p.37).

ISBN 978-963-89559-7-5

The following are screen shots from the Italian language learning course.

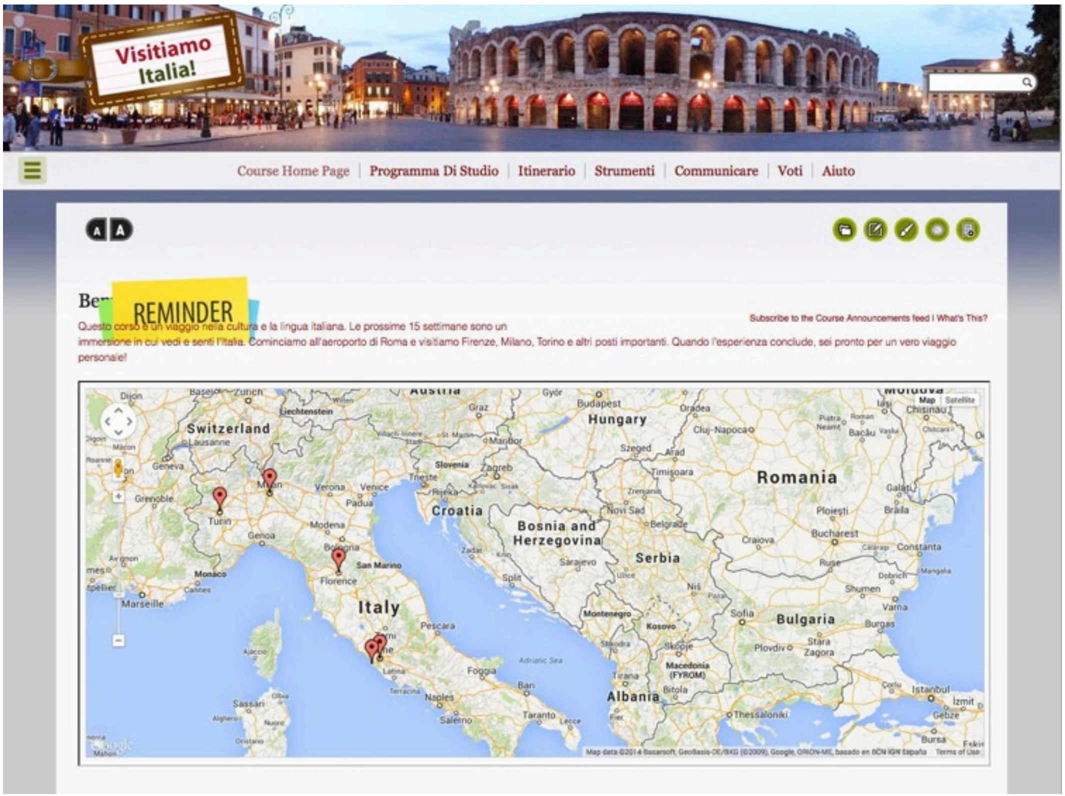

Figure 11. Italian Language Learning – Course Home Page Screen Shot

Figure 12. Italian Language Learning – Scene Setter Screen Shot

ISBN 978-963-89559-7-5

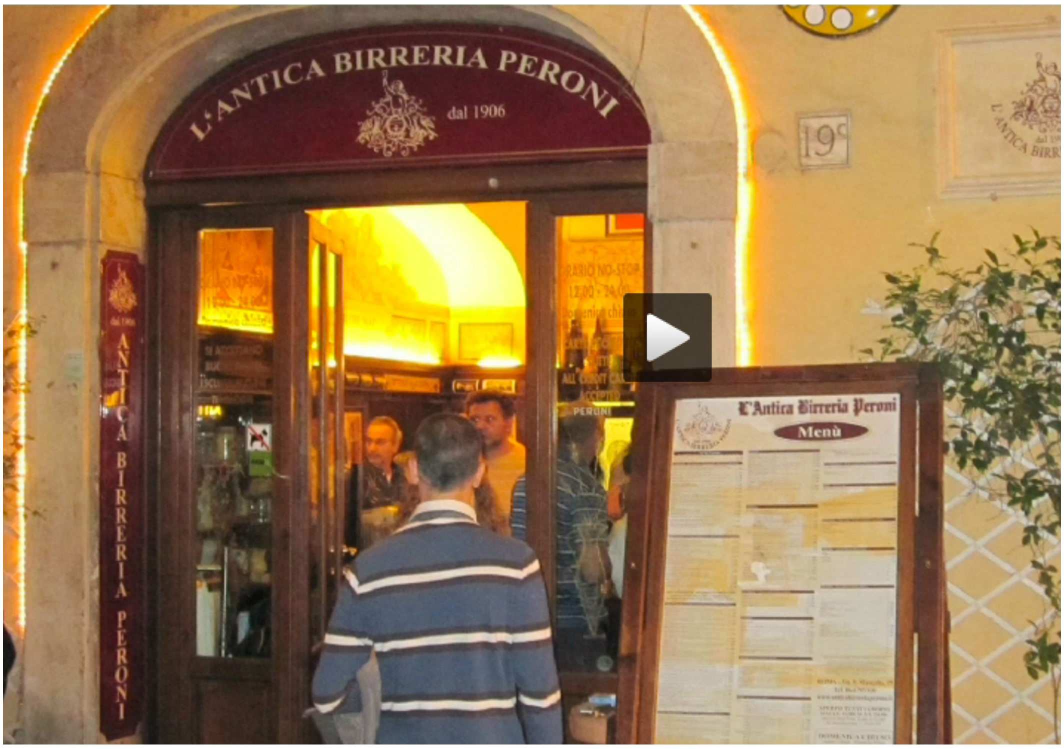

Figure 13. Italian Language Learning – Conversation Prompt Screen Shot

Discussion

The above examples all emphasize learning environments and activities in which students "practice the kinds of activities that they will encounter outside of school" (Barab & Duffy, 2012, p.34). Practice fields can vary in terms of cost, and overall complexity. Our examples range from low tech, low cost activities which ask students to engage directly in practices they will encounter in the workforce outside of the classroom to high tech, high cost learning environments meant to simulate or re-produce actual environments students will be immersed in the world outside of the classroom. Regardless of complexity and production cost, fundamental to the effective design and implementation of practice fields is a commitment to learning environments and activities that are authentic and treat the learner as an active participant in the learning process rather than a passive recipient of static knowledge.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

TOOL USE IN COMPUTER-BASED LEARNING ENVIRONMENTS: ADVICE AND COGNITIVE LOAD

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Abstract

Providing learners with control over tools in interactive learning environments (ILEs) is suggested to be effective in raising learners' motivation and learning outcomes. However, research indicates that learners do not always adequately use the tools they are given control over. In an attempt to tackle this issue, scholars suggested providing learners with advice in order to support the tool selection process. This study focuses on the effects of tool-related advice on perceived cognitive load, learning gains and motivation. In an ILE on gamification, participants were randomly assigned to two conditions: learner control over tools and learner control over tools with additional advice. Their main goal was to create a mindmap on gamification with the availability of seven tools. Results indicate that advice does not have an effect on experienced cognitive load, motivation and learning gains. These results are related to the content of the task and tool-related perceptions.

Introduction

Many theorists point out the steep rise of computers in education (Aleven et al., 2003). With this rise of technology in education, came the birth of Interactive Learning Environments (ILEs). Aleven and his colleagues (2003) define ILEs as "computer based instructional systems that offer a task environment and provide support to help novices learn skills or concepts involved in that task" (p.279). ILEs have two main features. First, ILEs use technology to support the learning process by providing tools and resources that enhance the construction of knowledge. Second, ILEs have the potential to shift control towards the learner (Scheiter & Gerjets, 2007).

Although providing learner control (LC) over these tools is thought to be beneficial for several reasons, research reveals mixed results (Lawless & Brown, 1997). Next to this, a main concern is that even though control over tools is often provided, tool use is often far from optimal (Aleven et al., 2003). Educational scientists have attempted to tackle this problem by providing advice for a learner on which tools to use. However, the added value of advice on either motivation or learning has not been clearly demonstrated yet (Vandewaetere, 2012).

The aim of this paper is to go deeper into the background of these mixed results, by bringing a cognitive load perspective into the equation. First, the notion of self-controlled tool use will be elaborated on. Second, the relationship between advice and tool use will be untangled. Further, the findings on advice and tool use will be translated into a cognitive load perspective, taking learners' perceptions into account.

Self-controlled tool use

Tools can be described as features or resources in an ILE which can help a learner to enhance their knowledge construction (Clarebout & Elen, 2006). This definition defines the concept of 'tool' broadly and suggests that tools can be divided in several categories. In order to make different types of tools more insightful, they created a classification system. The different types of tools are depicted in Table 1, accompanied with an example.

In this paper, the focus is on control over these tools. Several researchers have pointed out that tool use in ILEs often is suboptimal or even non-existing (Aleven et al., 2003; Elen & Clarebout, 2007). For learners to optimally use the tools they are provided control over, three conditions must be met (Perkins, 1985; Winne 2006).

First of all, these tools have to be perceived as functional by learners for the learning process at a given time in the ILE. While the tools have the potential to help structure the student's knowledge construction, the student might not realize this and hence does not perceive the tools as functional. Second, learners have to be motivated to spend time and effort in using the tools. In this case, tools might not be used because this will only result in having to spend more time to the experiment. Third, learners have to be instructionally knowledgeable. To tackle the issue of suboptimal tool use, researchers have brought a facilitator into the picture: advice.

Table 1: Types of Tools According to Clarebout and Elen (2006)

Tool type	**Tool goal**	**Example**
Information tools	Provide learners with information	Theory document
Cognitive tools	Assist learners in processing stimuli	Table of content
Knowledge modelling tools	Help learners to reflect on the learning process	Summary
Performance support tools	Assist learners in completing secondary tasks	Calculator
Information gathering tools	Help learners in searching for information	Google.com
Elaboration tools	Give access to additional exercises and practice	simulation tool
Conversation and collaboration tools	Provide learners with the opportunity to share knowledge	e-mail; chat

Advice and advice on tool use

To overcome the issue that learners do not adequately use the control they are given in ILEs, theorists have suggested bringing advisement into the picture (Kirschner et al., 2006). Advice

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can provide learners with more insights about the what-and-how of tools and can calibrate the learner's perceptions to the tool functionalities. The above mentioned frameworks of Perkins (1985) and Winne (2006) provide more insights to this reasoning. First of all, as an ILE advice is given to use certain tools, learners become aware that certain tools can be helpful for learning (condition 1). Gaining knowledge in the characteristics of the tools might lead to the fact that learners can more adequately see the benefits of a using a certain tool. Giving advice might thus enhance the perceived functionality of a certain tool. This in turn might lead to a higher motivation to spend time and effort in using the tools (condition 2). Finally, as learners gain knowledge about the intended use of tools, they might become more instructionally knowledgeable.

However, recent research reports mixed results on the effect of advice on self-controlled tool use (Clarebout & Elen, 2008). In a study conducted by Gräsel, Fischer and Mandl (2001), medical students had to solve a case on anaemia and could use a glossary tool, a data base tool and a tool that provided diagnostic help. The experimental group received additional advice by previously watching an experienced practitioner solve the case. The type of advice learners received in this study is identified by the authors as expert modelling. Analysis of the think aloud protocols revealed that advice on the tools let to a higher frequency of tool use. However, learners were not always able to adequately use or integrate the additional information in the problem solving process (Gräsel et al., 2001). It can be summarized that although theory predicts a beneficial role of advice, research does not show clear results. The next section might give us an insight into a possible explanation.

Advice, LC and Cognitive Load Theory

Providing control to learners in an ILE can impose an additional cognitive load on the working memory of the learners (Niederhauser et al., 2000) and can hamper learning (Scheiter & Gerjets, 2007). Learners' working memory has a limited capacity (Miller, 1956) and a vast body of research has shown that working memory capacity (WMC) differs between individuals (for a recent review see Unsworth & Engle, 2007). Recent studies have connected WMC with LC in ILEs. For example, in a study conducted by Vandewaetere and Clarebout (2011) university students took part in an online English course on grammar. The students were randomly assigned to a condition with no LC, LC as such and LC with instruction. The researchers found that WMC, as measured through the group administrable operation span task (GOSPAN; De Neys et al., 2002) was positively related to learning outcomes. They found this pattern regardless whether additional instruction was provided or not. This might indicate that learners with a higher WMC have more additional "free space" in their WM resulting in more efficient processing of information which in turn leads to higher learning outcomes.

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This study

This study focuses on the effect that additional advice on tool use has on learning outcomes, post-experimental motivation and experienced cognitive load. As additional advice might synchronize the perceptions' of learners about when to use a tool, the right information becomes accessible at the right time. Amongst others, Elaboration Theory of Instructions (Reigeluth & Stein, 1983) and the 4C/ID model (van Merriënboer et al., 2002) predict better learning and motivation in these circumstances. Consequently, it is hypothesized that additional advice enhances learning outcomes. In addition, as advice can calibrates learner's perceptions, cognitive load might be reduced. Therefore, it is hypothesized that advice is associated with a lower perceived cognitive load.

Method

Participants

Eighty-nine students took part in this study, they received extra credit in a course from the first bachelor year Educational Sciences. The age range was between 18 and 23 years, with M = 19 and SD = 1.12. Of the participants, 97% (n = 86) were female. One case was removed from the analysis due to missing data.

Procedure and Materials

Before the experiment took place, prior knowledge on gamification (5 open questions and 10 multiple choice questions), and learners' motivation (MSLQ); were measured through on-line questionnaires. Participants also filled out questions regarding their experience with the techniques of mindmapping. Afterwards, participants were invited to a computer classroom where they completed the course on gamification.

Before starting the actual course, oral instructions were given and WMC was measured (GOSPAN). The course was offered via Moodle, an online platform for e-learning. During the course, the main task was to create a paper-and-pencil mindmap on the topic of gamification. To fulfil this goal, participants had full control over seven different tools and a time limit of two hours. The available tools were a figure which depicted a mindmap with instructions on how to make a mindmap, a 25-minute video which contained a presentation on gamification, a PDF file which provided hints on gamification, a second PDF file which contained applications of gamification, a third PDF file with some principles on gamification in education, a fourth PDF file containing an overview of the advantages of serious games and finally the online search engine Google. All tools were offered in the ILE by hyperlinks. The two conditions in this design are: control over tools (C; n=48) and control over tools with additional advice (CA; n=41). In both conditions, participants received a sheet with explanation on the seven tools they could use. In the CA condition, participants received additional instructions on how and when to use specific tools.

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After creating the mindmap, participants were asked to complete the post-experimental questionnaires. These comprised a motivation questionnaire (IMI), a questionnaire on perceived cognitive load (NASA Task Load Index) and a test on gamification (identical as to the pre-test). Finally, questions about the mental effort required using certain tools, and the perceived functionality of tools had to be answered.

Tracking and logging data on learning behaviour (e.g. proportion of correct answers on knowledge tests, frequency of tool use) were also collected.

Results

Learning outcomes

To determine learning outcomes, two measures were used. A first measure was the score on the post-test. A second measure that was used to assess learning outcomes was the quality of the mindmaps (several aspects rated by three raters; interrater correlations between .67 and .77).

Since both measures (i.c., quality of the mindmaps and the score on the post-test) were not correlated, it was decided to request two separate ANCOVA's. In the first ANCOVA, condition was entered as factor, pre-experimental knowledge as a covariate and post-test score as the dependent variable. In the second ANCOVA, condition was also entered as a factor, but quality of the mindmaps was entered as the dependent variable, controlling for experience with mindmaps. Results show that, after controlling for pre-experimental knowledge and experience with mindmaps, there is no significant difference in learning outcomes between the conditions (post-test score, $F(1,86)=.02$, *ns*; quality of mindmap, $F(1,85)=.06$, *ns*).

Motivation

An ANOVA was requested with post-experimental motivation as dependent variable and condition as factor. The results showed that there was no significant difference between the C and the CA condition regarding post-experimental motivation ($F(1, 86)=.01$, *ns*).

Perceived cognitive load

A one-way ANCOVA was requested with C and CA as levels. WMC was entered as a covariate. Against expectations, there was no difference in experienced cognitive load between the conditions ($F(1, 86)=.00$, *ns*), after controlling for WMC.

Tool use behaviour

A total score per participant was calculated by adding up the use frequencies of the different tools. This score was entered in an ANOVA with condition as factor. The analysis revealed that there was no significant difference in tool use behaviour between the C and CA condition ($F(1, 84)=.85$, *ns*).

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Advice and tool related perceptions

To test whether the mental effort for each tool differed over the conditions, seven one-way ANOVAs were conducted. The results are listed in Table 2. For all tools, there was no significant difference between the two conditions.

Table 2: ANOVAs for mental effort ratings, based on the mental effort rating scale (Paas, 1992) (1=very, very low effort; 9=very, very high effort), for students who have used the specific tool.

Tool	Condition Control	Condition Control with Advice	Anova result
Mindmap (figure)	3.27	3.33	F(1,85)=.02, ns
Gamification (video)	5.21	5.45	F(1,81)=.74, ns
Hints (pdf)	4.23	4.03	F(1,85)=.40, ns
Applications (pdf)	4.00	3.82	F(1,82)=.29, ns
Principles (pdf)	4.47	4.13	F(1,85)=.27, ns
Advantages serious games (pdf)	4.30	4.13	F(1,83)=.24, ns
Google.com	2.91	3.00	F(1,50)=.03, ns*

*Note. Degrees of freedom associated with F differ per ANOVA as participants could indicate that they did not use a tool.

To test whether the perceived usefulness of tools and the perceived difficulty in using these tools differed amongst conditions, two times seven ANOVA's were requested. There was no significant difference for the tools in perceived difficulty between conditions. However, there was a significant difference between conditions in perceived usefulness for two tools. The gamification video tool was perceived as less useful in the CA condition ($F(1, 80)=5.97$, $p<.05$) and the pdf containing advantages of serious games was perceived as less useful in the C condition ($F(1, 79)=9.37$, $p<.01$)

Advice and tool use behaviour

Tool use behaviour was also registered during the learning phase. A total score per participant was calculated by adding up the use frequencies of the different tools. This score was entered in an ANOVA with condition as factor. The analysis revealed that there was no significant difference in tool use behaviour between the C and CA condition ($F(1, 84)=.85$, *ns*).

Discussion

The goal of this study was to investigate the effect of additional advice on tools that were under full control of learners on perceived cognitive load, post-experimental motivation and learning outcomes. In order examine this effect, two groups were compared. The first group had full control over the tools they could use to complete the task at the end of the ILE: creating a mindmap on the topic of gamification. The second group also had full control over tools, but received additional advice on which tools to use and when they could be used best.

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It was hypothesized that additional advice on tool use would enhance motivation and learning outcomes. Second, it was expected that advice lowered would lower the cognitive load of the task. In this study, providing additional advice over tool selection was not related to higher motivation and learning outcomes and to lower experienced cognitive load. Although these results might seem unsatisfactory, research on advice and self-controlled tool use benefits from these results. Hence, some elaboration is indispensable.

When inspecting the results of tool use behaviour and mental effort ratings per tool, we neither see an effect of advice. Despite that these findings do not allow to draw conclusions on the cognitive load this control over tools might generate, mental effort ratings also suggest that advice does not alter the mental effort that learners experience in using the tool. However, these mental effort ratings only give an idea of the mental effort of the use of different tools per se and not of the mental effort participants experienced in selecting or deciding what tool to use.

A possible clue for an explanation of why advice might not have lowered the perceived cognitive load of the task or the mental effort participants experienced in using a tool might be found in the qualitative analysis of the question why participants did not use certain tools. Some participants indicate that they first browsed through all tools to get an idea of all the information available and only after this they began drawing the mindmap. Also, inspection of the handed-in instruction bundles revealed that some participants took notes and created small schemes before they started completing the mindmap. These cues might indicate that the participants used their own tools and strategies to lower the cognitive load, as by using these tools and techniques it might become possible for the learner to act upon the limits of his or her own working memory. With respect to the experienced cognitive load of the task, it is possible that learners already equalled out a part of the experienced cognitive load, as it was reduced by their own scaffolds or self-regulation strategies.

Limitations and suggestions for future research

A first drawback of this study is that there was no condition included without LC. As research on the effect of LC over tools on motivation, learning and cognitive load stays inconclusive, the inclusion of a no LC condition would have allowed comparisons between the LC and no LC condition.

A second limitation of this study is the fact that learners' perceptions were measured after the experimental phase. This does not allow drawing conclusions about how these perceptions might mediate the relationship between advice, tool use and cognitive load. For future research it might be interesting to measure tool perceptions before or during the experimental phase.

Finally, a conceptual drawback should be mentioned. As tools are described as resources that can help a learner to construct knowledge, the reader of this paper could have noticed that learners did not have a full choice. As the learning content of the ILE was scattered across

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tools, learners actually had control over the pace of learning rather than the tools they could use. In fact, without the use of at least one tool, the learning effect of the ILE would be undefined, as there would have not been an interaction between the learner and the content.

In this study, providing additional advice over tool selection was not related to higher motivation and learning outcomes and to a decrease in experienced cognitive load. The results can be partly explained by the learners not following the advice. Learners reported that they had own strategies to deal with the tools (for example, going through all tools before starting the task) and that advice had not altered those. The results of this study suggest that advice for optimizing self-regulated learning strategies might be more beneficial than advice over tool-use.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

ACCEPTANCE OF DIGITAL LEARNING TOOLS IN THE CONTEXT OF NON-TRADITIONAL STUDENTS

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Adult students in higher education

The characteristics and needs of adult students are the vital starting point in the instructional design process (Morrison et al., 2011; Zumbach, 2010). In selecting appropriate media, the acceptance of e-learning tools and services by the student target population should be taken into account. Adult education requires different approaches compared to teaching children or undergraduate students. Adults accumulate knowledge and experience during their lifetime and due to the influence of experience, adult learning is more practical, life orientated and problem based (Wlodkowski, 2008). According to Ke (2010) high-quality online learning for adults is characterized by: "1) social interaction and collaboration with peers, 2) connecting new knowledge to past experience, 3) immediacy in application, 4) a climate of self-reflection, and 5) self-regulated learning" (p.808). Such an approach to adult learning is characterized by deep learning (Fink, 2003).

For the instructional design process for programs for adult learners, it is worth looking on the experiences made in the field of university programs, because the distinction between traditional, distance and so-called non-traditional students (NTS) is becoming blurred (Thompson, 1998; Teichler & Wolter, 2004; Kerres & Lahne, 2009). Although "non-traditional student" is now a frequently used term, a widely accepted definition does not exist. Ely described non-traditional students in just a few sentences: "I am your adult student, age 25 or older, who has returned to school either full-time or part-time. While attending school I also maintain additional adult life responsibilities such as employment, family, and financial commitments. […] I am your non-traditional student" (Ely, 1997, p.1). These are the basic characteristics typical for adult students. In order to address the needs of this student group – and NTS and adults are one rapidly growing group within university students – their distinctive characteristics need to be taken into account. Thompson (1998) records that demographic and situational variables like gender, age, location, life roles, ethnic background and disabilities emerged as key aspects in various studies. Research often focuses on some of these aspects and reveals these elements are linked to the concept of open and distance learning (Chao & Good, 2004), because open learning demands more intrinsically motivated students and removes barriers to learning opportunities for adults. But a specific digital learning offering will only be viewed as important if adults perceive a clear benefit in using these online learning tools (Kreidl, 2011). In the context of using e-learning tools, the question of acceptance has turned out to be essential (Küpper, 2005; Kreidl, 2011). Therefore this paper will have a look on the acceptance of e-learning tools by adult students.

Acceptance of eLearning formats for adult students

The major reason, why an online learning scenario is especial useful for adult students, is the argument of learning "anytime and anywhere". While this may indeed look like a very strong reason for the implementation of new media in learning contexts (cf. Horton, 2000), little is known whether students do understand or need the benefits of new media for time- and space-flexible learning. Various studies can be found regarding the media use of students in informal settings (cf. Kvavik & Caruso, 2005; Salaway et al., 2006; Brandtzaeg, 2010), but only one study (Johnson & Kulpa, 2007) especially analyzed students' use of new media for their studies. In order to reveal the acceptance of these tools, a theoretical framework is needed to analyze various aspects, which may seem important in judging a tool as relevant.

Küpper (2005) developed a model of acceptance based on an analysis of existing models regarding the use of e-learning offerings and programmes in business-related contexts. She confirms her empirical findings as follows: "In nearly all models, three groups of impact variables can be distinguished: individual-related, business-related and technical/innovation-related input variables" (Küpper, 2005, p.144). The model is particularly appropriate for investigating the use of electronic learning opportunities by students, because – understanding higher education institutions as businesses – Küpper's dimensions can be interpreted in the higher and adult education context as well as in the business context. The acceptance of digital learning formats is therefore significantly influenced by these three dimensions as shown in Figure 1.

ISBN 978-963-89559-7-5

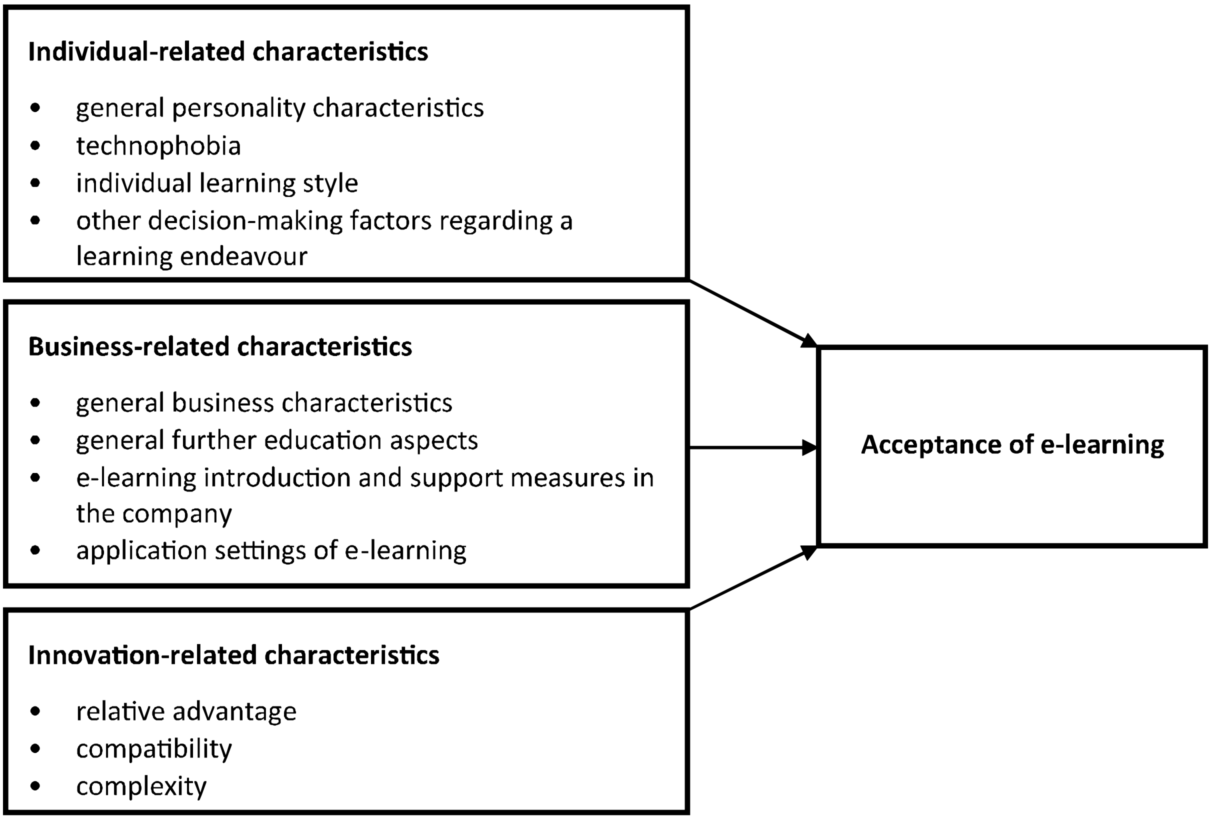

Figure 1. Küpper's acceptance model (Küpper, 2005)

Within these dimensions, Küpper outlines concrete sub-dimensions of superordinate impact variables (e.g. 'time saving' as a sub-dimension of the innovation-related impact variable 'relative advantage' (Küpper, 2005, p.150). Küpper's (2005) model was designed based on the premise of deriving concrete hypotheses which can then be analysed empirically. The presented study focused on all three dimensions of this model, in this paper only the last dimension – innovation-related characteristics – will be discussed on the premise of analyzing the perceived relevance of e-learning tools through students.

An important aspect with regard to Küpper's innovation-related characteristics (2005) is the relative advantage that the user sees in his or her use of digital learning formats. In the ongoing debate about the benefits of e-learning, the opportunity for learning independent of time and space is always emphasised (Horton, 2000; Dreer, 2008). This benefit makes it possible for students to individually regulate their learning time. For example, adult students who are under a lot of work or social time constraints (e.g. childcare), tend to value the use of digital learning formats as being important (Zawacki-Richter & Müskens, 2013). Two hypotheses were developed:

> *H1a: Students with family obligations (childcare, care of a relative) assess the use of digital learning formats as being more important than their fellow students do.*

Furthermore, one can expect that students who generally have a high desire for flexible learning opportunities that are more compatible with an individual life style (e.g. summer

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schools, tuition per module, unusual course times, longer self-study phases, more flexible exam system), value digital learning formats as being important:

> *H1b: Students with a need for flexible learning opportunities value the use of digital learning formats as being more important than their fellow students do.*

Results

The data for this paper was collected during a project (Stu+Be) funded by the German Federal Ministry of Education and Research (Kerres et al., 2012). A total of 3,801 students from three universities (Carl von Ossietzky University Oldenburg, University of Duisburg-Essen, Technical University of Dortmund) took part survey during the winter semester 2009/10. The students were asked during their lectures to fill in the survey. The sample consists of 3,687 undergraduate students and a small subgroup of 114 students enrolled in continuing education programmes. Participating students were enrolled in the departments of engineering (34.7%), economics (35.2%) and social science (30.1%); they completed a paper-pencil based questionnaire. The opening part of the questionnaire contained general study-related questions. The second part collected details about the students' professional experience and present occupational situation (including part-time jobs, etc.). In the next step, student expectations regarding the organisation of their study programme and the instructional design of learning environments were collected. This part included a list of different digital learning formats (see below). The next part of the questionnaire asked about study motivation and orientation patterns (practical and academic). The questionnaire concluded with questions to collect personal data.

The influence of innovation-based characteristics on the importance assessment of digital learning formats in higher education was tested. Referring to the theoretical background developed by Küpper (2005), particular predictors can be identified that focus on the aspect of personal, relative advantage through the use of digital learning formats.

A multivariate regression analysis provides a descriptive overview of (selected) possible factors that have an impact on the importance assessment of digital learning formats. Multivariate analysis can illustrate relationships in detail and minimise the distortion of possible overlapping effects between variables. As part of the multivariate regression analysis, predictors of the importance assessment of digital learning formats were identified (see Table 1). Table 1 presents the regression coefficients (b), the standard errors (SE) and the standardised regression coefficients (ß), allowing a comparison of the impact of the different predictors. The model explains 25% of the variance.

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Table 1: Determinants of the importance assessment of digital learning formats for the dimension Innovation-related characteristics

Importance assessment of the digital learning formats	**OLS-Regression**		
Innovation-related characteristics	**b**	**SE**	**ß**
Number of working hours (besides university) per week	0.00	(0.00)	0.00
Family commitments	0.10+	(0.06)	0.03
Summer schools	0.10**	(0.01)	0.15
Tuition fees per study-module	0.06**	(0.01)	0.10
Unusual course times	0.06**	(0.01)	0.08
Longer periods of self-study	0.11**	(0.01)	0.14
Flexible examination system	0.10**	(0.02)	0.10
N/ R2	2424/ 0.25		

**p<.01, *p<.05, +p<.10

Hypothesis 1a states that students who are under time constraints due to their employment, value digital learning formats as being beneficial and therefore more important. However, there is no evidence to confirm this hypothesis. There is a marginal effect for students with family obligations; thus hypothesis 1b can be partly confirmed. There is a tendency for students with family duties to value the flexibility regarding time and space as being beneficial and important; and such flexibility is supported by means of digital learning formats. However, this effect is vague and its significance is considerably weak. Hypothesis 1b can be confirmed: students expressing a need for innovative and flexible learning formats at university and rated digital learning formats higher. The effect is confirmed for all innovative and flexible learning formats covered in the questionnaire.

Considering the innovation-related characteristics, it can be seen that demands due to employment while studying do not increase the importance assessment of digital learning formats. Students with additional family commitments show a slight tendency towards a higher importance assessment; however the effect is only marginally significant ($p < .10$). Students with a stronger demand for various flexible and innovative ways to learn (summer schools, longer periods of self-study, etc.) assess the importance of digital learning formats consistently higher than students who have no need for flexible ways of learning.

Conclusion

With regard to innovation-based predictors, the results show that the impact of external criteria (number of working hours, family obligations) is smaller than expected and often discussed the theoretical articles regarding the needs of adult students for flexible learning opportunities. Students who are open-minded and have a high interest in innovative and flexible forms of teaching and learning, also value digital learning formats as being more important. A subsequent analysis would be required to examine which factors particularly increase the demand for flexible (and therefore also digital) learning formats. In further studies, it would be useful to examine to what extent certain study structures (e.g. mass lectures) in particular fields raise the importance assessment, or if personal preferences of certain student groups (e.g. positive attitude towards technology) play an important role.

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Most of the studies in the field of needs of adult students deal with the effectiveness of mobile-learning, e-learning or online-learning in contrast to classical synchronous learning situations in face-to-face classes (cf. Spencer & Hiltz, 2001) and don´t question the logic behind the argument of learning anytime and anywhere. Rao Hill and Troshani (2010) e.g. found in a quantitative study, that perceived enjoyment and usefulness were the most important factors in predicting the adoption of mobile learning tools among young Australians, flexibility was not. Regarding the often discussed, rarely proven potential of anytime/anywhere access, Vallance and Numata (2011) asked for explicit empirical evidence. Few authors even claim that users benefit from omnipresent, "anywhere anytime" access, is a myth (Friesen, 2008).

Access to education and flexible learning opportunities are the key to lifelong learning. Distance education and educational technologies provide powerful tools for fostering participation in formal, informal and non-formal educational settings. The traditional adult (distance) student who needs to juggle various jobs and family commitments is moving from "the back door" into the mainstream. Therefore it is a political goal to further increase participation of so-called non-traditional adult students in order to serve the needs of – in classical higher education – disadvantaged groups. This is a matter of social justice, equity and ethics. Committed to this goal, educational institutions must respond to the needs of an increasingly diverse student body. A prerequisite for being able to design appropriate student support systems is to be well informed about the multiple profiles, characteristics and needs of this diverse student body. Since the target groups will become more and more heterogeneous, a widespread research approach is needed to embrace their diverse needs. Especially the sometimes most obvious strengths of online learning tools, like flexibility in time and space, must be examined more closely to develop the right instructional design for a specific target group, not only for the right selection of media, but also to meet the expectations of adult learners. Finally it is not only about new student groups like the mentioned non-traditional students, but also about how to implement lifelong learning in higher education and society itself.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
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ISBN 978-963-89559-7-5

STUDENT AND STAFF PERCEPTIONS OF THE USE OF MULTIPLE CHOICE TESTING IN HIGHER EDUCATION ASSESSMENTS

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Introduction

During the last twenty years, participation in Higher Education has doubled and there has been more variation in student backgrounds and prior experiences (Biggs, 2003). Multiple choice questions (MCQs) are commonly used in higher education assessments, and their use has increased alongside the improved reliability and availability of information and computer technology (ICT). As an alternative to paper-based MCQs, the use of online MCQ testing is often considered as an option to help deal with increasing numbers of students on distance learning and workplace learning courses, reduced education resources, and they can also help to reduce the burden of marking that is associated with large cohorts of students (Bull & McKenna, 2004; Nicol, 2007). As well as their use in the traditional university setting, MCQs are commonly used to assess learning in workplace settings, for example, a study by Albino and colleagues (Albino et al., 2008) reported that 45% of academics surveyed used MCQs to assess learning in dental education based in the workplace.

Many studies have concluded that the use of MCQs promotes memorisation and factual recall and therefore do not encourage high-level cognitive processes (Airasian, 1994; Scouller, 1998). However, some researchers believe that they can be used to evaluate learning at higher cognitive levels if the tests are constructed to allow for this (Cox, 1976; Johnstone & Ambusaidi, 2000). By their nature, MCQs are not usually considered to encourage deep learning as the questions require the selection of a correct answer rather than the construction of a response. On the other hand, students who participate in online self-assessment have improved academic performance compared to those who have not, and even students with low motivation levels made use of an online MCQ tool (Ibabe & Jauregizar, 2010).

Seven principles of good feedback practice were identified to support the development of learner self-regulation and are listed in Figure 1 (Nicol & Macfarlane-Dick, 2006) and the ways in which MCQs can be used to support these points have been considered in detail using case studies (Nicol, 2006).

Good feedback practice:

1. Helps clarify what good performance is (goals, criteria, standards)
2. Facilitates the development of self-assessment and reflection in learning
3. Delivers high quality information to students about their learning
4. Encourages teacher and peer dialogue around learning
5. Encourages positive motivational beliefs and self-esteem
6. Provides opportunities to close the gap between current and desired performance
7. Provides information to teachers that can be used to help shape teaching

Figure 14. Seven principles of good feedback practice (Source: Nicol & McFarlane-Dick, 2006)

The aim of this paper is to present the perceptions of both lecturing staff and students on the use of MCQs in higher education and to summarise the viewpoints and opinions of their usefulness to give both formative and summative feedback. These findings will help to summarise current opinions on the use of MCQs in Higher education and will aid lecturers, programme leaders and work-based tutors to consider the appropriateness and acceptability of their implementation for distance or e-learning study.

Methods

All Business School students and teaching staff members at Edinburgh Napier University Business School were invited to participate in the online survey in May 2012. An email invitation was sent to all students and to all teaching staff within the faculty inviting them to participate in the respective survey questionnaires. The email invitation contained information about the research study and it was made clear to potential respondents that participation in the survey was on a voluntary basis. Ethical approval was sought from the Faculty Research Integrity Committee before embarking on the survey research. The email invitation also contained a hyperlink to the online survey which was developed within the online survey tool, SurveyMonkey.com. In order to try and boost response rates, email reminders were sent out to the staff and student cohorts three weeks after the first invitations, asking those who had not responded to take part in the surveys, and thanking those who had already responded. The survey contained mostly closed questions relating to experience and opinions on the use of MCQs in higher education assessment, but also included a couple of open questions to gain a more in-depth understanding of views on the use of MCQs.

Findings

Survey Findings

A total of 334 students responded by answering questions related to their experience or their opinion on the use of multiple choice questions in their university modules. Only 28 teaching staff, approximately one quarter of the total teaching staff members in the faculty, responded to the questionnaire survey.

The majority of students who participated in the survey were female (64.4%) and 80.2% of respondents were less than 30 years of age. Students were studying a range of different degree programmes within the Business School. Of the 334 students who responded to the survey, 282 (84.4%) were undergraduate students and 52 (15.6%) were postgraduate students. Of the undergraduate students, most were in years three and four of their studies (30.5% and 31.9% respectively), and fewer students were in year one (17.0%) and year two (20.2%). One student (0.4%) selected 'other' for year of study, indicating that this student is perhaps not studying towards a full degree but rather for a stand-alone module.

Of the 52 postgraduate students in the sample, the majority of 33 students (63.5%) were studying towards a taught MSc Programme, 10 (19.2%) were MBA students and the remaining 9 students (17.3%) said they were studying for an MSc by research.

Students were asked if they had taken an MCQ test at University in their current degree programme. A total of 63.1% of undergraduates answered 'yes' they had taken an MCQ test whereas only 48.1% of postgraduates said 'yes' to this question. This difference is statistically significant ($p = 0.045$) indicating that students were less likely to take an MCQ test at postgraduate level than they were at undergraduate level. Of those who had taken an MCQ test, 90.5% of postgraduates said they had taken a test as part of the formal module assessment and 9.5% of postgraduates said they had only been exposed to an MCQ test to inform them of their progress and no marks were awarded. Only 3.5% of all undergraduates who had taken an MCQ test, said the test was solely for the purpose of informing the students of their progress.

Table 1 shows the numbers and percentages of undergraduate and postgraduate students who agreed or strongly agreed with each of the statements. Chi-square tests of independence were carried out to test for associations between student degree level and agreement with each of the statements and p-vales are presented in the final column of the Table 1. The findings demonstrate that neither undergraduate nor postgraduate students have a favourable attitude towards MCQ testing, and postgraduate students are more negative towards this type of test than undergraduate students. Although differences in opinions have been observed in our student sample, these differences are not statistically significant except for the statement 'Students enjoy MCQs more than other types of assessment' where 53.4% of undergraduates are in agreement with this statement compared to only 22.5% of postgraduates ($p = 0.007$).

Students who had taken an MCQ test were also asked their opinions on the use of MCQ testing in their university modules. Fisher's exact tests were carried out to test for an

ISBN 978-963-89559-7-5

association between student degree level and their opinions on MCQ testing. Table 2 presents the percentages of undergraduates and postgraduates who believed that the MCQ tests were trying to assess each of the learning skills.

The majority of both undergraduates (83.1%) and postgraduates (76%) believe that MCQ tests are trying to assess knowledge; the difference in percentages between the two student groups is not statistically significant ($p = 0.403$). The majority of undergraduate students (72.5%) believe that MCQ tests can assess comprehension or understanding, whereas only 32.0% of postgraduates believe MCQ tests can be used for this purpose ($p < 0.001$). Fewer students, particularly postgraduates, believe that MCQ tests are useful for assessing application, and very few students in either group believe MCQ tests are useful for assessing oral skills and written skills.

Table 4: Student agreement with statements regarding attitudes towards MCQ testing

Statement	**Number of students (percentage)**		**p-value**
	UG	**PG**	
Adopting MCQ testing means 'dumbing down'	66 (28.1%)	15 (37.5%)	0.055
Students can guess their way to a Pass result in an MCQ test	109 (46.2%)	22 (55%)	0.762
The use of MCQ assessments encourages rote or surface learning	117 (50.0%)	21 (53.8%)	0.121
MCQs can test oral skills	33 (14.1%)	3 (7.5%)	0.212
MCQs can test written skills	47 (20.0%)	6 (15.0%)	0.323
MCQs could be used effectively to assess 50% or more of my module outcomes	86 (36.8%)	8 (20.0%)	0.124
MCQs do not allow student self-expression	148 (64.1%)	33 (82.5%)	0.089
MCQs should not be used for Masters level education	118 (50.9%)	26 (65.0%)	0.408
Students enjoy MCQs more than other types of assessment	125 (53.4%)	9 (22.5%)	**0.007**

Table 2: Percentages of students who believe MCQ tests are useful for assessing various types learning

Statement	**Number of students (percentage)**		**p-value (Fisher's Exact tests)**
	UG	**PG**	
Knowledge	83.1%	76%	0.403
Comprehension/ understanding	72.5%	32.0%	**<0.001**
Application	25.8%	8.0%	0.075
Oral skills	1.7%	4.0%	0.411
Written skills	2.2%	0.0%	1.000

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Students who had taken at least one MCQ test were asked how the tests were administrated and the findings are presented in Table 3. Most tests were administered online; 75.8% of undergraduates and 72.0% of postgraduates had taken an online MCQ test and very few students had received an MCQ test via an email attachment. Although 44.4% of undergraduates had taken a paper-based MCQ test, only 12.0% of postgraduates had done so; Fisher's exact test is highly significant (p = 0.002) demonstrating that postgraduate students are less likely to be asked to take an MCQ test on paper.

Table 3: Method of administering MCQ test

Method of Administering Test	Number of students (percentage)		p-value (Fisher's Exact tests)
	UG	PG	
Online	75.8%	72%	0.630
On paper	44.4%	12.0%	**0.002**
Via email attachment	1.7%	4.0%	0.411

Students were asked how their MCQ tests were usually marked. The majority of all students said 'Online' (45.0%) and 36.1% said 'by staff', 3.7% said by student peers and 2.1% said they marked their own. A total of 13.1% of students who had taken an MCQ test stated that they didn't know how they were marked.

When comparing student opinions with teaching staff opinions, there were some differences in views relating to the role of MCQs as summarised in Table 4. Chi-square tests for independence were carried out to compare the levels of agreement between students and staff; significance levels are also presented in Table 4.

Table 4: Student and staff agreement with statements regarding attitudes towards MCQ testing

Statement	Numbers agreeing (percentage)		p-value
	Students	Staff	
Adopting MCQ testing means 'dumbing down'	81 (29.5%)	9 (34.6%)	0.095
Students can guess their way to a Pass result in an MCQ test	131 (47.4%)	10 (40.0%)	0.556
The use of MCQ assessments encourages rote or surface learning	138 (50.6%)	10 (40.0%)	0.465
MCQs can test oral skills	36 (13.2%)	2 (7.7%)	0.288
MCQs can test written skills	53 (19.3%)	7 (28.0%)	0.467
MCQs could be used effectively to assess 50% or more of my module outcomes	94 (34.3%)	2 (7.7%)	**< 0.001**
MCQs do not allow student self-expression	181 (66.8%)	20 (76.9%)	0.797
MCQs should not be used for Masters level education	144 (52.9%)	15 (57.7%)	0.603
Students enjoy MCQs more than other types of assessment	134 (48.9%)	5 (19.2%)	**0.006**

For the majority of the comparisons presented in Table 4, there is no evidence of a difference in agreement between staff and students except that students are more likely to agree that

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MCQs could effectively assess more than half of their module outcomes (34.3%) compared to only 7.7% of staff who took part in the survey ($p < 0.001$). Also, 48.9% of students agreed that they enjoy MCQs more than other types of assessments whereas only 19.2% of staff thought this was true ($p = 0.006$). The survey respondents were also asked if they thought that MCQs alone could be used as the only type of assessment in a university module. Only one staff member said 'yes' (3.8%) whereas 46 students said 'yes' (16.4%); this comparison was not statistically significant ($p = 0.175$).

Thematic Analysis

A thematic analysis was carried out on the two open questions included in both the staff and student questionnaires which invited respondents to comment on whether they believed that MCQ testing could be used to assess a complete module/ course as well as inviting any additional comments or views on the use of MCQ tests in university education. Views are summarised into three main themes: Pedagogical tool to support student learning at HE; Questionable suitability at HE level; and Question construction.

On the whole, staff felt that MCQs were very useful in formative testing, but have limitations in testing higher level skills such as critical analysis, and are most useful in summative assessment when used alongside other more 'rigorous' assessment methods such as exams or essays. However, it was felt that the usefulness of MCQs is dependent on the quality of the question construction and that it is not good practice "to include obviously wrong answers."

While staff's views of the value of MCQs were on the whole critical, some positive factors were identified. For example, in the sub-theme 'supports formative assessment' some staff perceived it as a 'useful formative assessment tool' and it could help 'students with revision' and provide an 'opportunity for positive feedback' during the semester in ' some types of knowledge, understanding and application'. It was also highlighted under this theme that MCQs were particularly valuable when there was one definitive 'correct answer' and in two instances staff suggested it was even best suited to a 'non-scoring progress' test. Finally, it was noted that it was beneficial as part of a 'variety of assessment methods' that students could be exposed to, particularly in their early years of university study.

Despite some positives voices from staff, on the whole the feedback for the value of the use of MCQs was more negative. Several significant reservations were raised as to the value of MCQs in the classroom. The over-riding issue was MCQ's extremely limited use as a summative assessment tool. For example, several lecturers highlighted it could not assess higher order skills in their students thereby necessitating other pedagogical tools needing to be used. These higher order skills were identified as interpretation, critical evaluation, judgments, understanding of competing theories, writing skills, group working skills and reflective learning skills, alongside research and debating skills. There was also a sense that the use of MCQs could be perceived as sending the wrong message to students, particularly those engaged in postgraduate study. One staff member commented it's usage at that level 'sent a poor message about the rigour of any Masters' degree'. While another noted it became less

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useful the higher the level of education. The reasons given for this were that students do not find MCQs particularly challenging or sophisticated tools to support their learning. With the opportunity to guess, distractions needed to be credible so that students needed to think about the topic presented. One particularly challenging point to the value of MCQs, from a member of staff, was that students were unable, through MCQs, to demonstrate their learning and 'to create an output'. This goes against current social constructivist approaches in the classroom and, as noted by another member of staff, means that most likely the use of MCQs will just be testing rote learning and guess work.

When looking at the student responses, the majority of students held negative views on the use of MCQ testing that reflected the staff's viewpoints. In particular, there was a perceived 'unfairness' of the scoring of MCQs and their overall effect on students' skills development. Students also highlighted MCQ's limitation in allowing them to apply and demonstrate higher cognitive skills during the assessment. In terms of unfairness, students singled out several issues, namely that grading schemes can seem random, the wording of questions can be very challenging for foreign students, and guessing can mean that results obtained are an inaccurate reflection of a student's true abilities. In terms of skills-development, an over-reliance on MCQs can mean students don't get an opportunity to explore an issue in-depth during their assessments, encouraging a lazy attitude towards learning and failing to intellectually challenge the students. In addition, the use of MCQs was identified as stopping students demonstrating an innovative approach to work and utilising their higher order skills such as writing or logical analysis.

Despite this negativity, some students did highlight a few positives around the use of MCQs in the HE classroom. Again reflecting the opinions of staff expressed above, it can be used, for example, as a suitable adjunct to other coursework, because if the MCQs are well designed they are as difficult to answer as typical essay questions. Another student identified their suitability as part of a well-rounded assessment strategy experience. Finally, their role in self-evaluation and formative testing was highlighted, as one student noted that if the feedback is properly provided and additional reading is noted, MCQs can be a useful tool.

Conclusions

The statistical findings and the thematic analysis indicate that, on the whole, both academic staff and students tend to have a rather negative attitude towards the use of MCQs in higher education. The consensus was that MCQs may have a place in assessing knowledge, but are not useful in assessing higher level skills such as interpretation, critical evaluation and writing skills. However, staff felt that MCQs can be very useful as a formative assessment tool and a means of providing positive feedback to students. Students agreed that MCQs are useful for self-evaluation, and this is in line with other studies (Ibabe & Jauregizar, 2010; Desouza & Fleming, 2003) which concluded that students performed better in their final exams if they had access to online quizzes during their study, and students were also satisfied with the use of MCQs as a means of revision. However, students felt that MCQs, when used on their own, did

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not provide them with the opportunity to demonstrate their higher cognitive skills in an assessment setting.

When designing higher education courses, teaching staff should consider the use of well–designed MCQs as a tool for providing formative feedback to students, and the use of ICT in distance or work-based learning provides a means of access to a wide range of learners. However, adult learners in a workplace setting are often very motivated deep learners (Tan, 2206) hence the use of MCQs has its limitation in assessing higher level skills.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DESIGNING AND VALIDATING AN E-PORTFOLIO TOOL FOR TRACKING TEACHER COMPETENCIES AND DEVELOPMENT THROUGHOUT A CAREER ACCORDING TO EU PRINCIPLES

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Abstract

A policy describes and advocates an ePortfolio career-tracking system for European Union educators in order to strengthen professionalism and raise standards of teaching and learning. It argues for a need to include non-formal and informal evidence, as well as formal qualifications, in order to provide a more complete picture of an educator's knowledge and competence. Professional principles rather than arbitrary standards are suggested as being more enduring and meaningful in transnational contexts as the criteria for selecting appropriate evidence. These are defined for the beginning, middle and specialist stages of a career. The policy and ePortfolio tool were developed in the context of the PEEP project. This paper presents the methodology for designing the ePortfolio tool, as well as results from pilots taking place in Greece. Recommendations are made from stakeholders feedback regarding the development of the ePortfolio career record. It is suggested that this tool becomes a mandatory recording system of continual professional development for EU educators in order to assist and confirm professional status and provide a useful passport for mobility.

Introduction

Teaching is a complex profession, coping with increasing student diversity and struggling to raise educational standards for global competitiveness. The environment of an educator (teacher/trainer) at any level is immensely challenging and member states are reviewing how they prepare and support them for the vital tasks they perform on behalf of the European society. Educators play a core role in supporting the learning experiences of both child and adult learners. They influence the evolution of education systems and implement reforms which can make the European Union (EU) the highest performing knowledge/competence-driven economy in the world. They recognise that quality education provides learners with personal fulfilment and effective communication, enabling social competencies and greater employment opportunities. Their profession, inspired by values of inclusiveness and individual development, has a major influence on society by advancing human potential and shaping future generations. To achieve its objective, the EU views the role of educators and their career development as key priorities (COM, 2007).

The quality of teaching determines Europe's competitiveness in the world and is positively correlated with student achievement (Darling-Hammond, 2005). The European Commission Report (2004) on progress towards the Lisbon education and training objectives, as the route out of poverty and means of social inclusion, emphasises the development of key competences (2006). As well as imparting knowledge and understanding, educators must help students become autonomous learners by targeting transferable abilities rather than just memorising facts to pass tests. This calls for common European competencies and qualification principles for both teachers and trainers. Directive 2005/36/EC provides the legal framework for the professional mobility of teachers with common principles and recognised qualifications to support this.

European Principles for Teacher Competencies and Qualifications

The Principles have been devised in response to challenges laid down in the Joint Interim Report by the European Council and the European Commission on progress towards Education and Training 2010.

- **Well-qualified:** requiring extensive subject and pedagogic knowledge to guide students, understanding their physical, mental, emotional, social and cultural needs.
- **Life-long learners:** needing continual knowledge and skill updating to cope with a rapidly changing world.
- **Mobility:** working/studying in other European countries with mobility central to professional development in a global world with continual movements of populations
- **Partnership:** working collaboratively with all stakeholders for maximum results.

The PEEP Project

Europe comprises a rising number of diverse cultures and ethnic groups with values and attitudes exhibited in different conventions of thinking, communication and action. A more comprehensive, flexible mode of educating, training and assessing teachers meets these demands. A common EU ePortfolio of professional development encourages educators to plan and participate in life-long learning to validate this process. It addresses on-going monitoring of knowledge, attitudes and pedagogic competencies and their effectiveness in practice within a career dossier. This provides a coordinated, coherent, continuous, cooperative approach to personal-professional development, promoting a culture of reflective practice and research; supporting professionalism and assisting the status, recognition and mobility of educators.

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Portfolios are used in professions outside education such as architecture, journalism and medicine (GMC, 2003). They enable the inclusion of formal, non-formal and informal evidence for a richer, more complete picture of individual learning and experience (Council recommendation on validation of non-formal and informal learning, 2012).The European Centre for the Development of Vocational Training (CEDEFOP) has emphasised the importance of non-formal and informal evidence, which 'has a key role to play to increase the value of skills and competence developments for adults in the workplace' (2013). It is to finalize and disseminate results of a study on the validation of this new approach to gathering evidence.

- **Formal evidence** would include a relevant qualification, such as an under-graduate B.A. or B.Sc. degree or a post-graduate qualification like a Higher Education Certificate or Diploma, an M.A. or M.Sc and at a further level a M.Phil, subject Doctorate and ultimately a PhD. These can be measured against the European Qualifications Framework (2008).
- **Non-formal evidence** would be an organized activity, such as a teaching plan and implementation of this with personal analysis, reflection and review of what has been learnt.
- **Informal evidence** has many possibilities. It could record student, colleague or parent comments on something a professional has been involved in, such as a concert, field trip, community or other event with a response to this. Another possibility is a conference review, article or book with reflection on how knowledge and its application have been enhanced. It can also encompass skills acquired through life experience as in running a sports/drama club.

Choice of evidence reflects agreed principles, as described. At pre-qualification stage, this will be reviewed by a tutor with assessment in line with qualifications. In a post-qualification work-role, it will be the annual appraiser. How a portfolio is reviewed is a challenge requiring assessor training to ensure a consistent approach to its use.

Designing the PEEP ePortfolio Tool

The ePortfolio tool has been designed taking under consideration the following fields and employs a grid (Table 1) to plot the user's career stage against the four EU principles.

1. **The role of the creator:** This section contains a brief resume of the creator's present role, responsibilities and experiences, reviewing what has been gained from these and presenting a plan for future development in line with personal, professional and workplace goals.
2. **A grid defining principles at early, mid & specialist career levels:** This enables individuals to map their career stage to the four EU principles for evaluation of the formal, non-formal and informal evidence that has been selected.

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3. **Evidence of formal, non-formal & informal evidence:** Portfolios are representative not comprehensive, so evidence should reflect significant, relevant aspects of a professional and their teaching and so during a career new material will be included and older information archived. Firstly, focus is on goals and growth towards these and later achievements. Secondly, it is self and collaborative evaluation, meaningful for the teacher and others involved. Finally, it is dynamic assessment with items added or deleted to fit development. Four classes of evidence are chosen with the portfolio creator having ownership of all material and deciding who can have access, at what point and for what purpose.
   - **Documents**: such as a curriculum/lesson plan, reflective log, conference/journal review.
   - **Recordings**: visual/audio recording of a lesson, meeting, discussion with colleague.
   - **Testimonials**: evaluations from colleagues or letters from parents/students
   - **Information links**: statement of beliefs, goals, rationale and captions that enable the evidence to be cohered and developed as a narrative of an individual's personal and professional experience.
4. **Witness statements of evidence selected**: It is important for validity and reliability to have a witness statement for evidence selected for assessment or evaluation purposes.
5. **Previous learning and experience**: Those presenting portfolios for various purposes well into their career will select only what is relevant for current requirements but need to summarize and review previous learning and experience as a context for the present evidence.

The career phases do not signify levels of experience; rather they frame general and recognisable aspects of professional competence and achievement. In order to support teachers in the completion process, guidelines have been devised describing in detail the non-formal and informal types of evidence, since it has been that fed back to the PEEP partners that stakeholders are not particularly familiar with the terms.

Based on the principles grid, the ePortfolio tool has been designed and is available at http://peep.ea.gr. Interested stakeholders can register and choose their career level that can be changed later if they find their experience is across the prescribed stages. Based on the selection the respective indicators appear for completion. The indicators are categorised in six (6) tabs. Since, emphasis is placed on self-reflection; a tab entitled "*My Narrative*" has been added. Educators might start with this section, providing a generic outline and from there insert their appropriate evidence according to the purpose required. When providing evidence for their profile, educators can complete the Europass Curriculum Vitae form (2014). Users may either submit a file, URL or text note for submitting evidence (see Figure 1). Respecting requests for privacy, teachers can choose whether they would like to showcase their ePortfolios fully or partly by checking the box "*Make public*", existing under each indicator.

Moreover, by sharing the link *"View Portfolio"* they can share it with other stakeholders, peers or potential employers for assessment, evaluation, revalidation or exchange of practices.

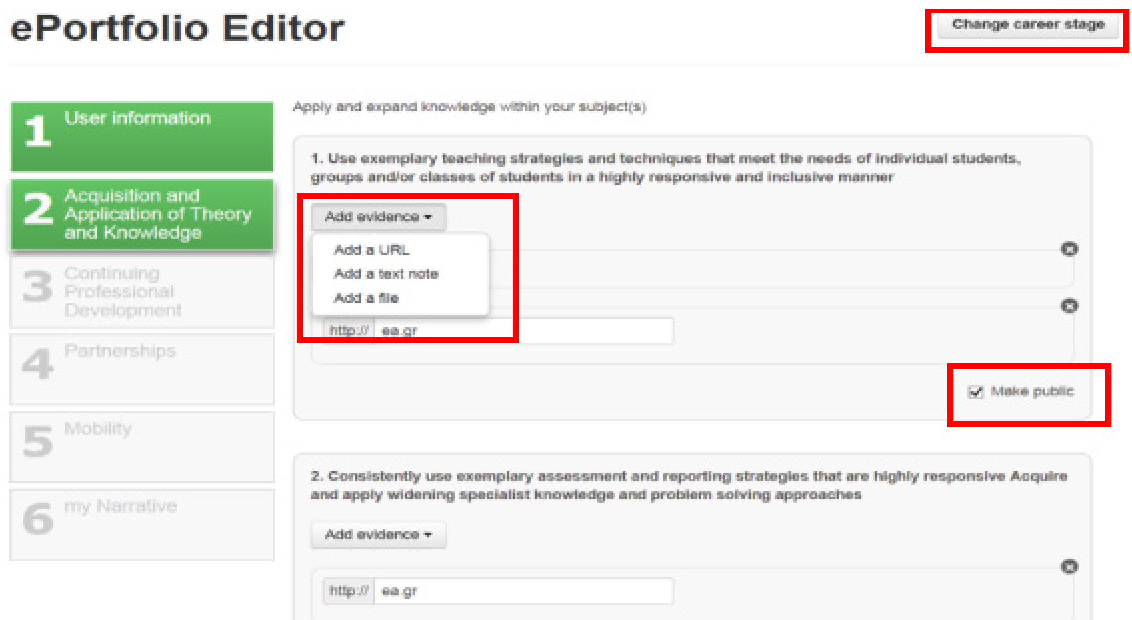

Figure 1. Providing Evidence

Also, web 2.0 functionalities have been added, using this tool to either share their ePortfolio through popular applications or to print it out in hard copy.

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Table 1: PEEP Grid defining principles at early, mid and specialist career levels/phases

EU Principles	Early Career Professional Development Phase *	Mid-Career Professional Development Phase *	Specialist Professional Phase * (specialism in subject and/or leadership expertise)
Acquisition and Application of Theory and Knowledge	**Apply knowledge within your subject(s)** Apply subject/s or phase-related knowledge to diverse audiences appropriate to your work role Cater for diverse student learning styles and needs through consistent application of a wide range of teaching strategies Engage students in purposeful and appropriate learning experiences Monitor, assess, record and report student learning outcomes Apply comprehensive systems of assessment and reporting in relation to student attainment of learning outcomes	**Apply and expand knowledge within your subject(s)** Use exemplary teaching strategies and techniques that meet the needs of individual students, groups and/or classes of students in a highly responsive and inclusive manner Acquire and apply widening specialist knowledge and problem solving approaches Develop new ideas and initiatives with learners and colleagues	**Take a leadership role in the expansion of knowledge within your domain(s)** Contribute to innovation development through action research leading to the emergence of new tools, methods, theories, models, etc. Provide support to the less experienced peers in your community of practice by teaching, training, mentoring and managing teams Demonstrate sustained commitment and contribution to the development of new ideas or processes at the forefront of work or study contexts, including research
Continuing Professional Development	**Take responsibility for your continuing professional development** Reflect critically upon professional experiences in order to enhance professional effectiveness Participate in curriculum policy and program teamwork Participate in CPD activities Contribute to the development of a learning community Get informed feedback from peers, students and colleagues Provide informed feedback to your colleagues on their own performance Plan further learning to support current activities and develop leadership capabilities in your subject matter(s)	**Take responsibility for your continuing professional development and that of others** Contribute actively in the review of the performance of individuals, groups and organisation. Engage in a variety of professional learning activities that promote the development of a learning community Promote positive and effective communication and relationships with all education stakeholders in a range of leadership roles, motivating them to cope with complex, on-going challenges	**Take a leadership role in the continuing professional development of a community** Take a leadership role in the review of the performance of individuals, groups and organisation. Lead in a variety of professional learning activities that promote the development of a learning community Provide leadership in the school by assuming a key role in school development processes including curriculum planning and policy formulation
Partnerships	**Establish partnerships** Establish partnerships with students, colleagues, parents, and other caregivers and agencies Work willingly with others Learn from working with others	**Lead work within partnerships** Support student learning through partnerships and teamwork with members of the school community Be committed to fostering team approaches that enhance roles, improve personal and academic performances Share expertise with colleagues in communities of practice	**Lead speciality work within partnerships** Be able to plan teams, create new strategies and initiatives which work effectively, ensuring equal opportunities for the development of colleagues in different roles both within and outside the work base, across national and international boundaries
Mobility	**Organise your own mobility** Contribute to establishing partnerships with external organisations and agencies in the perspective of mobility of learners across organisations, regions and countries Contribute to projects and initiatives leading to external mobility	**Organise your mobility and that of others** Establish partnerships with external organisations and agencies in the perspective of mobility of learners and staff across organisations, regions and countries Initiate projects and initiatives leading to external mobility	**Lead mobility** Develop initiatives across contexts and countries by establishing networks/leading initiatives to enable consistent standards of education across national boundaries

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Validation of PEEP outcomes

The PEEP ePortfolio tool has been piloted across the partnership (Greece, UK, Bulgaria, Latvia, Wales, and Poland) after a training session on its use that took place in Sofia, Bulgaria in April, 2013 with Master Teachers (see Figure 2). The evaluation of ePortfolio use for tracking careers took place with 258 respondents across Europe. Methods of analysis included face-to-face group and individual discussions with exposure to the e-portfolio tool. A ratings-style questionnaire, with supportive explanations requested, was completed after the master teacher training and from educators, via online questionnaires and dissemination events. Four key questions have been asked of educators:

- Q1. The usefulness of an ePortfolio to track a teacher's career.
- Q2. The use of principles rather than standards for classifying ePortfolio evidence.
- Q3. Whether formal plus non-formal & informal evidence provides a more complete view of an educator's knowledge and professional competence.
- Q4. The utility of ePortfolios for annual review, registration, job interview or sharing practice with colleagues to assist their development.

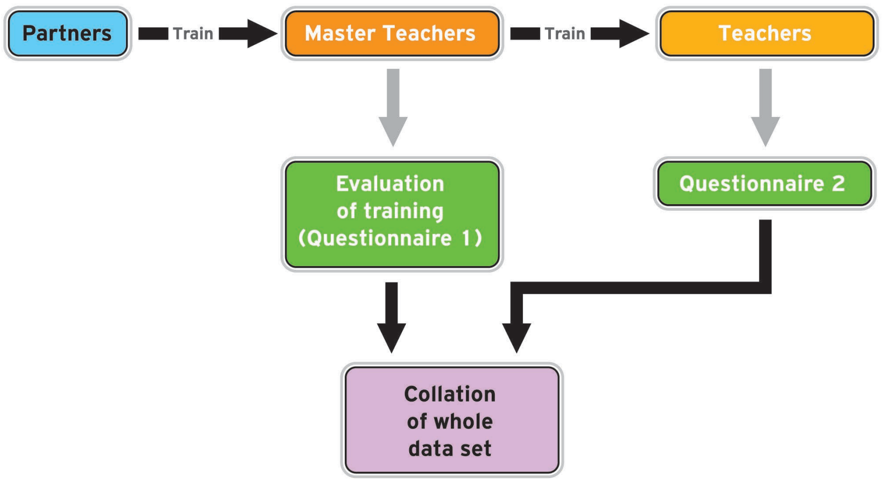

Figure 2. Model of training and data collection regarding the PEEP ePortfolio

Findings suggest that mixed quantitative and qualitative data, collected from questionnaires, capture a deeper understanding of respondent views, especially for triangulating evidence of question interpretation. Results of data analysis show that responses, from partner countries, are positive to the idea of ePortfolios. They offer insights into issues that may need resolution, such as a mandatory policy for career tracking and professional, technical support for the process.

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Results from Greece

Sixteen (16) education stakeholders from primary and secondary education, lifelong learning sector, higher education, as well as teaching counsellors have participated in the workshop "Recording Teachers Professional Development" conducted in the context of the 7th ICODL 2013 Conference, taking place on November 9th, 2013, in Athens.

Methodology / Workshop Structure

After an overall presentation of the PEEP project and its aims, participants were split in three (3) groups based on their experience and career stage. They were asked to work in groups and provide examples of formal, informal and non-formal evidence from their career span in order to validate the project methodology. The teachers worked collaboratively and drew mind maps to record their answers. Presentations from team leaders were then made to the whole group. After the collaborative work, participants were asked to login individually to the ePortfolio tool and record their evidence, choosing the appropriate career stage. A very positive response for the use of non-formal and informal evidence has been recorded, with some reservations regarding the use of *principles* as criteria because standards are the recognised criteria for evaluating teacher competencies in Greece. However, for mobility purposes, the use of *principles* may be more appropriate and standards can always be used within this framework. Participants found the ePortfolio tool user interface intuitive and user friendly which is a very important aspect in promoting the platform. Regarding the utility of an ePortfolio to track a teacher's career, some of the participants stated: *'The e-Portfolio is mobile, allows flexible arranging of the information; it is more ecological'*, and, *'I consider it necessary to write down and to present the good personal practices and new methods for improvement of the educational process'*.

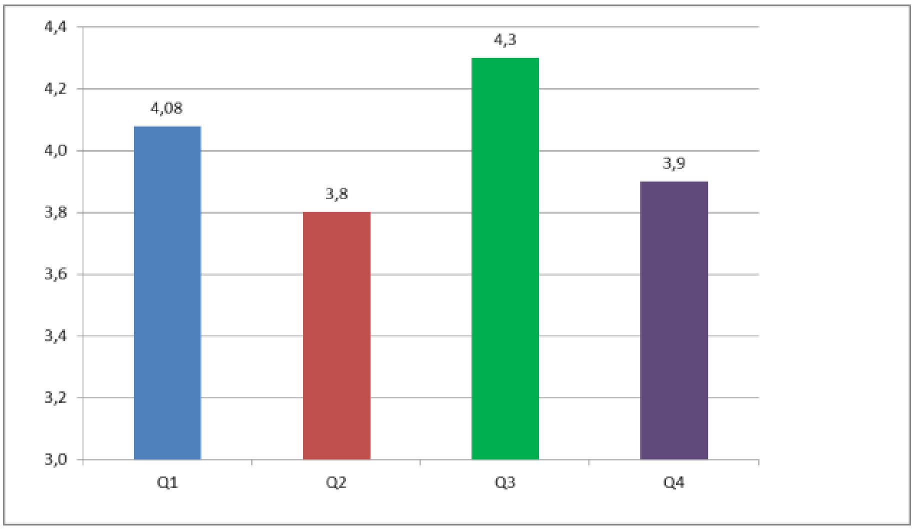

Figure 3. Collected input from Greek stakeholders

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Further work

Based on the four (4) principles, a respective ePortfolio tool could be developed for other sectors and professions, such as the health or the engineering sector. Moreover, an online community has been created on Open Discovery Space Project portal entitled *"Record your professional development!"* and will be updated based on the activities implemented. All interested stakeholders are invited to join.

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Acknowledgement

The Policy for Educator Evidence in Portfolios – PEEP project (521454-LLP-1-2011-1-UK-KA1-KA1ECETB) has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SEQUENT: SUPPORTING QUALITY IN E-LEARNING EUROPEAN NETWORKS

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Introduction

The Commission intends to launch its new strategy, focused on the use of ICT and open educational resources (OER) to enhance education and skills development, by mid-2013. We fully agree with Commissioner Vassiliou's statement: "The digital revolution must not stop at the classroom. The web, social networks and online open educational resources offer huge possibilities to modernise teaching and learning. These are areas where EU cooperation adds value and delivers results".

Already in the consultation round of "Opening up Education – it was stated that OER and ICT as means of modern learning can radically change teaching and assessment practices". The Commission rightly so recognises that Europe is and should be heading towards a more open and flexible education. Not only for students in the category of 25+, but certainly more and more for regular on-campus students as well.

E-learning has become mainstream provision in European higher education and is essential in supporting lifelong learning and internationalisation. By becoming integral part of higher education, e-learning should also be integral part of the QA systems, internal and external, with related innovative and appropriate criteria. In practice this is however not the case. In the E-learning Quality (ELQ) report (Report 2008:11R) the Swedish National Agency for Higher Education (NAHE) surveyed the work on quality assurance of e-learning in higher education on a European level in nine selected countries. One conclusion is that quality in e-learning is a non-issue for many. To this end, there is a need for methodological development within quality assurance agencies. At the same time, there is a need for increased cooperation between national agencies as e-learning enhances the development of borderless education.

The recommendations in this regard from the ENQA Sigtuna Seminar on QA in e-learning (Oct. 2009) were the following:

- Establish a solid quality assurance system in Europe;
- eLearning should not be evaluated separately;
- There is a need for a common definition and understanding on all aspects of eLearning;
- There is a need for a "common language" that would help higher education institutions and quality assurance agencies strive for the same goal;
- It is important to meet and discuss quality assurance at the European level and between different stakeholders in the educational sector;
- Provide adequate training for academic professionals, higher education providers and quality evaluation experts.

The current systems of QA in e-learning and open learning are offered by E-xcellence and UNIQUe support university changes and teacher education by quality benchmarking e-learning performance.

The SEQUENT project therefore in line with the EU actions and ENQA's recommendations supports the demand for quality in the use of ICT (e-learning) and OER by universities and quality agencies in HE.

With the SEQUENT project we want to reach out to a wider group of stakeholders European wide in a combined action of the E-xcellence and UNIQUe models for QA in e-learning and support universities in their ambition to a more open and flexible offering. Finding a common approach for the promotion of Quality Assurance in Europe will lead to much more effectiveness then stand-alone actions from the three respective partners.

The "SEQUENT" project aims to promote excellence in the use of ICT in higher education, with a clear goal to prepare European Universities in line with the European Modernization Agenda and to make higher education in Europe fit better to cross-border collaboration initiatives in the implementation of innovative and ICT enhanced partnerships.

Approach

The project will use models that have been developed by previous European funded projects and other internationally recognised models that enhance the quality of ICT uptake in Higher Education and have proven their effectiveness in Europe and elsewhere. Through the organisation of conferences, workshops and training events, excellence models and tools will be presented to delegates from HE institutions. Furthermore the partners of the consortium will use their extensive membership for targeted awareness raising campaigns and communication activities. This way, we aim to accelerate the uptake and create awareness in the European HE community on the importance of a mainstreamed ICT uptake.

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The specific objectives of this project will be to:

- Convince governments, universities and QA agencies of the necessity to have a QA approach for e-Learning provision;
- To raise awareness on Open and flexible learning among higher education institutions and networks in the form of lobby activities, profiling and conference presentations throughout the mainstream education channels;
- Further disseminate instruments for different applications of QA and a clear summary of the available method and to promote UNIQUe and E-xcellence as examples of these instruments, promoted towards the same or different stakeholders (sometimes overlap);
- To support universities in the adoption of a QA and e-Learning strategy, through dissemination and raining activities.

The project will reach out to national governments, QA-Agencies and universities in our message to include quality methods of ICT-base approaches. To increase impact we will approach associations of universities to bring the topic of open and flexible education and the quality aspect on the agenda and organise seminars and (on-line) Master classes with them.

The two main quality models, developed respectively by EFQUEL and EADTU and applying on the HE institution on strategic level; on degree and faculty level; and on course level, promoted by this project, will be the following:

- With **E-xcellence**, a benchmarking and assessment scheme for enhancing the quality of degrees and university programmes, EADTU is leading a European movement on QA in e-learning. More specifically, the building of an e-learning benchmarking community of Associates in Quality. The E-xcellence Associates label is a label for institutions/faculties using the E-xcellence instrument for self-assessment and take measures of improvement accordingly. E-xcellence therefore is an instrument for educational innovation towards improved e-learning performance. (http://e-xcellencelabel.eadtu.eu/)
- **UNIQUe** is a high quality institutional certification for outstanding use of ICT in learning and teaching in traditional HE institutions. It is an excellence award to universities or institutes, after a process of self- assessment and external peer review, for renewable periods of three years. The fundamental feature of the UNIQUe approach is to support institutions of higher education to measure how successful they are in technology-enhanced learning and to allow for continuous improvement. (http://unique.efquel.org/)
- **ECBCheck**, a result of collaboration between EFQUEL, GIZ and various international cooperation and capacity building institutions has produced a tool and certification scheme for e-Learning courses. (http://www.ecb-check.org/)
- **OpenupEd** is a benchmarking quality approach on MOOCs that aims to contribute to an opening up of education to the benefit of both of learners and of wider society while

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reflecting European values such as equity, quality and diversity. (http://www.openuped.eu/)

By this inclusive approach, we aim to respond to the specific needs and context of HE institutions that need support whether in a very specific field or in a more broad strategic effort.

Partnership

The European Association of Distance Teaching Universities (**EADTU**) is Europe's institutional network for open and online HE. Its mission is to support the members and HE systems by developing a shared vision and leadership for the role of open and flexible HE by student-centred teaching, flexible learning across institutional boundaries.

The European Foundation for Quality in E-learning (**EFQUEL**) is a membership organisation that aims to promote excellence and innovation in education in order to achieve qualitative learning opportunities in Europe and beyond.

The European Association for Quality Assurance in Higher Education (**ENQA**) promotes European co-operation in the field of quality assurance in HE and disseminates information and expertise among its members and towards stakeholders in order to develop and share good practice and to foster the European dimension of quality assurance.

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The SEQUENT project is carried out with the support of the European Commission, Dg EAC, under the Lifelong Learning Programme

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DEVELOPING A DIGITAL COMPETENCE SELF-ASSESSMENT TOOLKIT FOR NURSING STUDENTS

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Introduction

Digital skills are considered to be the most transferable generic skills as they are applicable to 90% of professions and highly valued in workplaces across the European Union (European Commission, 2011). Recent research reports 95% of all businesses had access to the Internet; 53% of the workforce was using a computer at work of which 44% used a computer connected to the Internet (Eurostat, 2013). Research into trends in future skills-demand shows that the requirement for digital competence is likely to increase in most sectors and professions (European Commission, 2009); indeed, the European Union established Digital Competence as one of the eight key-competences for continuous, life-long learning (European Commission, 2006). As digital skills become ever more ubiquitous the need to quantify the digital competences of technology users is becoming increasingly important. Measuring digital competency involves the establishment of appropriate indicators that can be used as metrics in a format that is generic enough to capture the diversity of capabilities needed when engaging with contemporary digital technologies. This paper sets out the results of the development and testing of a self-assessment toolkit, which measures the digital competence characteristics and attitudes of the participants, first year student nurses in a UK University (n=102).

Method

The toolkit survey follows the Janssen's and Stoyanov's study (2012), which focused on attitudes as well as participant knowledge of digital competence among experts in research, education, training and work. Their study, conducted as an iterative Delphi-type survey that recorded the views of a significant number of 95 experts. This work was part of the wider Digital Competence (DIGCOMP) project commissioned by the Information Society Unit at Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) on behalf of European Union Directorate-General for Education and Culture. As part of the DIGCOMP project an extensive literature review (Ala-Mutka, 2011) and work on the analysis and synthesis of existing digital competence frameworks (Ferrari, 2012) was carried out in order to establish a baseline of the prevailing digital competence and digital literacy theories. The Janssen and Stoyanov study was selected and adapted (as part of an investigation aimed at informing the revision of the nursing curriculum) to embed digital competencies. The attitudes of student nurses to new technologies are an integral part of the process. Attitudes are generic and allow the individual to reflect and express their own experiences of using digital technologies and, most important, in their own contexts. This approach permits the inclusion of diverse groups of users; reflecting the broad nursing intake.

Thus this study identifies twelve digital competencies and comprises of five statements per classification area. These statements have been selected from a wider variety expressed by the experts on the basis of the highest average scores on the validation stage. Since these statements define the digital competence areas of the framework, they have been used to devise a survey toolkit that requires the participants to self-assess their skills by agreeing or disagreeing with each statement on a six point scale with an additional option of not responding (see Figure 1). The six point scale was used to prevent participants from scoring towards the middle of the scale; this is an inherent tendency when scales of this type are used (Salkind, 2010). The 'acquiescence' effect (Lavrakas, 2008) was also recognised but this can be remedied by statistical data standardisation. The demographics section of the survey also included the investigation of potential trends of digital-competence characteristics of groups and individuals of similar demographical backgrounds.

***8. General knowledge and functional skills**

	Strongly agree	Agree	Agree somewhat	Disagree somewhat	Disagree	Strongly disagree	No response
I am able to use a digital device, which may be one of many types (e.g. Desktop PC, Laptop, Tablet, Smart phone).							
I possess general computer skills (typing, using computers, getting into a new programme).							
I understand the difference between hardware and software.							
I am familiar with the meaning of terms commonly used in user manuals for the operation of hardware and the installation and configuration of software.							
I know about the existence of various operating systems.							

Figure 1. General Knowledge

The toolkit survey was piloted by administering it to a group of 102 nursing participants in a UK University. Participant responses have been recorded via the use of 'Survey Monkey' online survey tool and analysed electronically through the use of 'Microsoft Excel 2010' spreadsheet software. Since the literature on parametric statistics cautions against analysis of ordinal data (McCrum-Gardner, 2007) such as those arising from Likert-type items and because the purpose of this paper is to present the process and the toolkit rather than the results of the surveyed group, such forms of statistical analyses have been omitted.

Results

To validate the usefulness of the toolkit, examples of the types of results extracted from the data are summarised below. The results are analysed so as to evaluate and 'map' the digital competence characteristics of individuals and groups at two levels. At the top level of the framework a summary of the individual or group performance can be extracted and visualised (see Figure 2).

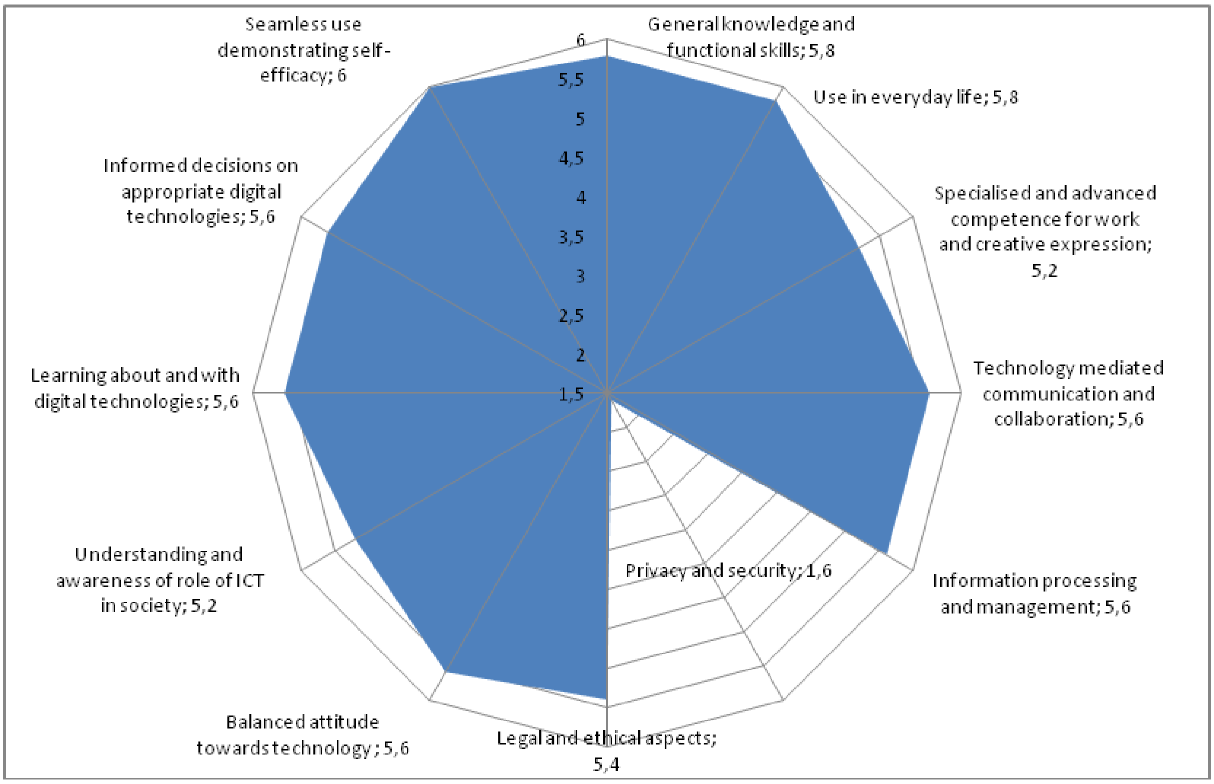

Figure 2. Digital Competence Characteristics Map of an Individual

In Figure 2 the digital competence characteristics of an individual have been mapped against the top level of the framework that included the twelve categories. This individual seems to have a fairly high level of competence in all areas, ranging from an average score of 5.2 up to 6.0, except for 'Privacy and security' - average score 1.6. In terms of the survey grading the results can be interpreted as follows. Taking the average result from the five sub-areas the participant seems to 'agree' and 'strongly agree' with the statements of all the high-level areas with the exception of 'Privacy and security' where, on average, they fall approximately in the middle of 'strongly disagreeing' and 'disagreeing'. Examining the results of the 'Privacy and security' high-level area in more detail the particular areas they feel they lack certain skills or understanding are highlighted (see Figure 3).

ISBN 978-963-89559-7-5

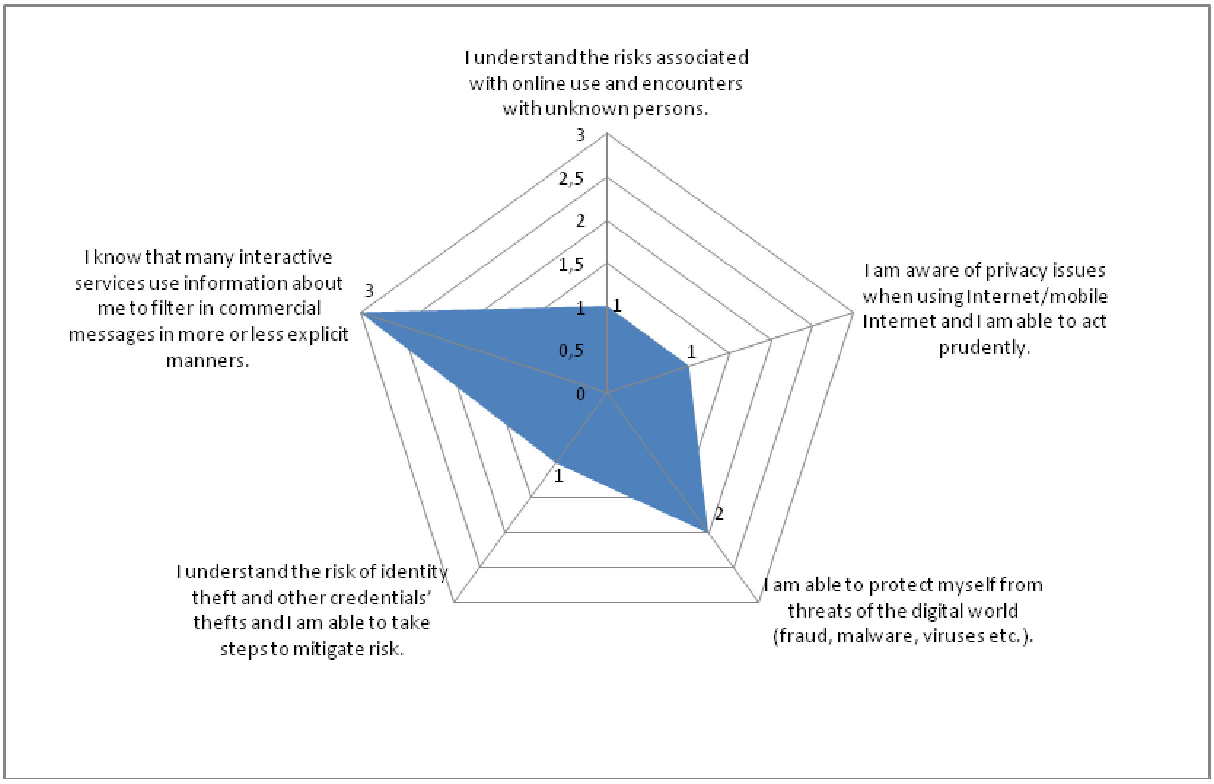

Figure 3. Privacy and Security Characteristics of an Individual

This individual 'strongly disagrees' (score of 1) with the three statements concerning: a) understanding the risks associated with online use and online encounters b) awareness of privacy issues when using the Internet and c) understanding the risks of identity theft and ability to take steps to mitigate risks. They also 'disagree' (score of 2) with the statement of being able to protect themselves from fraud, malware and viruses. They 'rather disagree' (score of 3) with the statement concerning awareness of online services and their monitoring culture for the purposes of targeting marketing messages for commercial gain.

A similar level of analysis is available for groups of participants at both, the top-level and the sub-areas of the framework. The score scalar used for groups is a weighted average according to the agreement/disagreement scale used. An example of what a group mapping looks like can be seen in Figure 4.

ISBN 978-963-89559-7-5

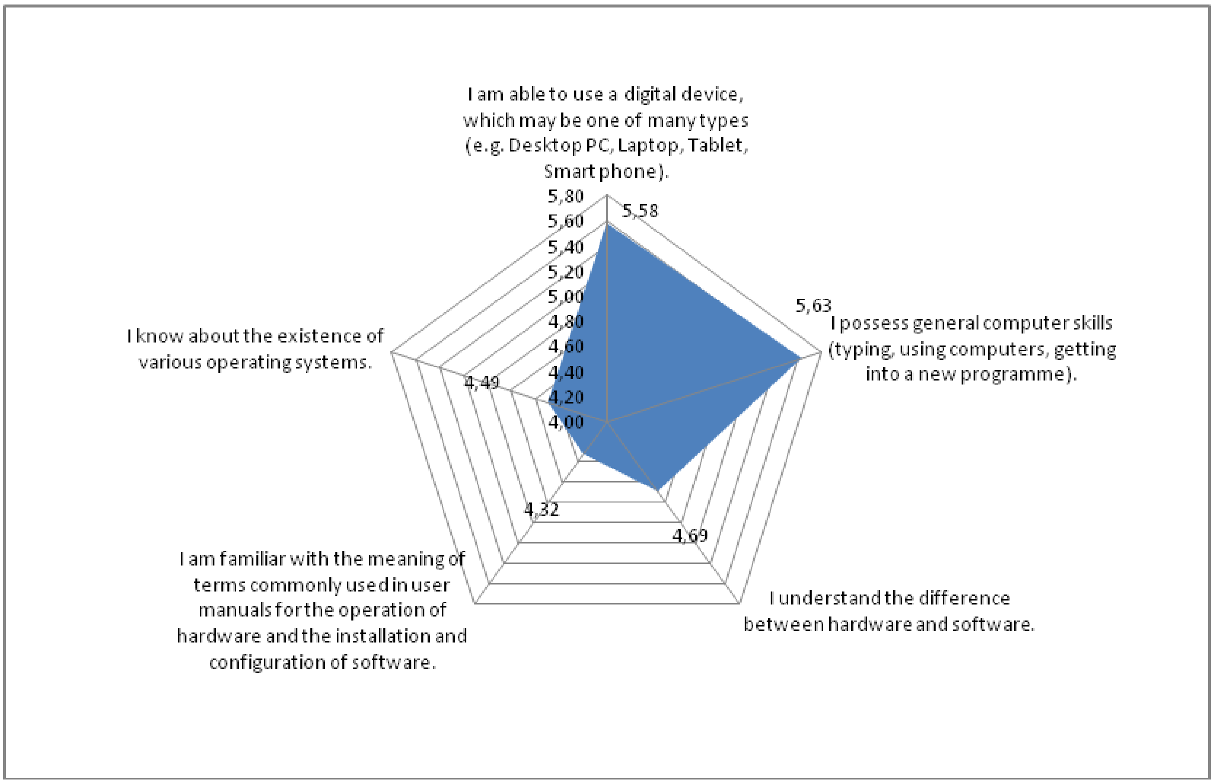

Figure 4. General Knowledge and Functional Skills Characteristics of a Group

The above figure maps the digital competence characteristics for the ‘General Knowledge and Functional Skills’ top-level area of the framework for the pilot group of 102 participants. The average rating of the answers of this group has been used to calculate the results. Following the same analysis protocol the results can be interpreted in a similar way. For this group of participants the strongest competence area is this of possessing general computing skills with an average rating of 5.63, which on the agreement scale falls between ‘agree’ and ‘strongly agree’; the weakest competence area is this of familiarity with terminology used in manuals for operation of hardware and configuration of software with an average rating of 4.32 which, on the agreement scale, falls between ‘rather agree’ and ‘agree’.

Discussion

Indicative results demonstrate the potentials and limits of the tool and its applicability, and are not intended to give an exhaustive view on the digital competence characteristics of the pilot group. For the purposes of this paper the evaluation of the toolkit is focused on its applicability; it takes into account the characteristics relating to the pilot user group and these intrinsic to the framework.

The pilot user group can be described to some extend as a homogeneous group although the individuality of the participants should not be completely discounted. Their homogeneity arose from the fact that they were all under-graduate students; therefore, they were all educated individuals but not in what could be traditionally described as a ‘high-tech’ discipline (Nursing). Competency or engagement with basic technologies was not a strict

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prerequisite but acknowledgement of the need to use some types of technology and a willingness to learn were implicitly assumed since the pilot group was in a higher educational setting. The intrinsic positive bias that exists in self-evaluations of this type, a fact previously identified by experts in the field (Beetham, 2013) was acknowledged; it was partly due to the users' over-confidence. It should be noted that amateur users of technology are not familiar with challenging scenarios because these surpass the limits of their competences and skills. The generic nature of the framework also encouraged the acquiescence of positive bias as the survey questions focused more at generic attitudes than at specific skills; thus it allowed for the assessment of a generic digital competence level that was based on the participant's experiences although not without certain drawbacks.

Limitations of the Study

Measurements of this type are not precise; therefore, they may not be repeatable because of the subjective nature of the described attitudes and the fuzziness introduced by the used agreement scale. The participants were asked to self-evaluate by recording their agreement with these generic statements that described attitudes towards technologies; this meant that the interpretation of the meaning of the statements was left to the individual. Therefore, it was heavily depended on the individual's experiences of technology. As a result the meaning of a certain statement and/or its interpretation may have been given according to the participant's own experiences and understanding. For these reasons the results cannot be contrasted and/or compared among individuals but they can be used as an estimate and rough guide of their general competence level.

Conclusions

Overall the toolkit offers quantitative insights into the previously uncharted territory of digital competence. By allowing individuals to express their attitudes towards technology in a loosely prescribed way that encourages them to reflect their own experiences and self-evaluate against a set of criteria that comprehensively describe digital competences; and this offers insights into the student expertise. This approach cannot be used to accurately measure the existence of digital skills nor should it be used as a comparison or grading tool; it can successfully be used, however, to quantitatively evaluate the general level of digital competence of individuals and groups and produce 'maps' of digital competence. At a group level this toolkit works satisfactorily as individual attitudes are brought together to give a holistic view of a group's digital competence characteristics. Such estimations are useful when identification and rough measurements of the digital competence potential are needed, for example when redesigning curricula for the needs of the 21st century nursing professional. Moving forward the project will be further expanded by combining the application of the toolkit with a specific digital skills test that will provide precise and repeatable results through which objectively and explicitly, the existence of specific skills and competencies on particular digital systems will be assessed.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE CHALLENGE OF THE TOTAL QUALITY MANAGEMENT APPROACH FOR THE DEVELOPMENT OF ONLINE AND DISTANCE EDUCATION

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Abstract

The organisations themselves have to "produce" quality systemically and not just the individual units, which are responsible for the study programs or contents. Therefore, a holistic approach of management in general and quality management in particular is required to cope with the challenges of online and distance education in the future. The integration of TQM and online and distance education management is based on the complex management approach for educational institutions. But, there are still a couple of dilemmas and issues. Therefore the universities have to develop general professional concepts and to transfer the standard procedures into special TQM processes for online and distance education. This development will be provided by discussing individual solutions and issues based on approved cases and best practices in the educational institutions.

Introduction

It's not about to philosophise, whether and how we will live in the future in a digital environment, but it's about recognising that we live in a digital world of knowledge. Now, it must be adapted to our advantage. The development of science, technology, and dependent ways of life has changed so dramatically fast and agile that the advance thinking and forward planning for individual elements of the entirety are becoming more difficult and more diffuse. The consequence is that it depends more and more on the definition of the right framework conditions and targets for complex systems and on the settings of self-regulating and self-evolving subsystems forming an optimal solution with high quality independently. Online, mobile, and computer-based distance education is a part of the subsystems of the digital knowledge society, digital worlds of knowledge and digital knowledge processes. Conditions and rules are set up for them that provide not only the optimization of individual components, but rather are directed to an absolute understanding of quality and thus securing the quality of the whole system. Total Quality Management (TQM) is geared to this permanent quality improvement. Its application to the knowledge and learning management with subsets of online and distance education helps to avoid particular and insular part optimisations in response to existing developments, but rather to focus on the pre-planned optimisation of the entire system. Each educational institution and each educational network should rise to this challenge.

Complex Management for online and distance education

The control of complex systems requires professional management. Management is the control and organization of something (Cambridge Dictionary Online: management). Thus, it is primarily an aspect of the management and control of processes in organisations. If management will be understood as a function, so it includes all the activities that are to be performed by managers in all areas of the organisation in fulfilling their management responsibilities. These include (Gabler Wirtschaftslexikon: management):

- The planning including problem and task definition, target setting, alternative planning and decision;
- The realisation concerning organisation, information, communication, motivation of employees and their coordination;
- The control with feedback as well as the nominal-actual comparison for the further planning and control.

Modern management approaches are focused to a multi-dimensional management model. For example, the kernel of the management practice is characterised by the dimensions of identity, synergy and development. The identity is influenced by the degree of the characteristic expression as well as according to their strength and sustainability. Synergy means true motivation of employees and their performed services. Development is based on the urge for growth as well as the willingness and the ability to redesign (Moll, 2009). The management in the field of online and distance education must take place in the context of the digital worlds of knowledge. These include the areas of knowledge generation (generation explicit from implicit knowledge), knowledge use (access to knowledge and new information services), the sharing of knowledge (design of online transfers and new synergy potentials), knowledge protection (organisation of entry paths and the data and information access), and knowledge preservation (avoidance of digital black-outs) (Kaiserswerth, 2010). The management can structurally be divided into management levels (strategic, administrative, operational) management tasks as well as methods and techniques. With regard to the variety and complexity of the tasks involved in performing organisations and processes in the field of online and distance education, numerous strategic administrative management tasks have to be considered and have to be treated integratively. (Figure 1)

ISBN 978-963-89559-7-5

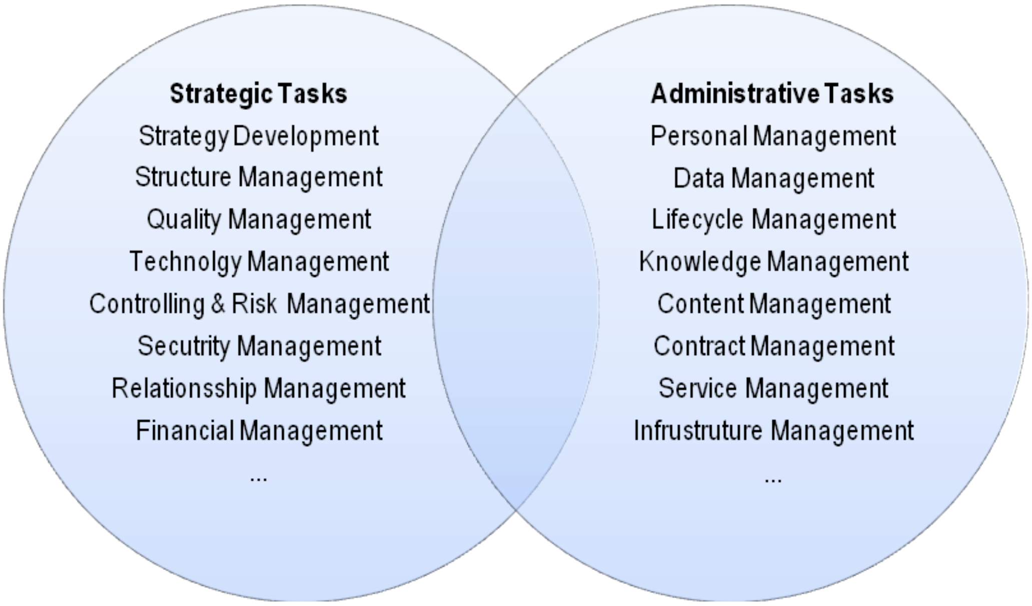

Figure 1. Complexity of Management Tasks for Online and Distance Education (source: Heinrich & Stelzer, 2011)

All disciplines and sub-tasks of the management shall be concentrated on the satisfaction of the demands of the interested partners. It is a question of the quality of provided performance and services on the basis of an overall-optimised approach. The optimal design of individual areas, processes, objects, products, et cetera is not sufficient in this sense, in order to achieve the satisfaction of the demands at the highest level in competition. Accordingly, all tasks and activities of the management shall be oriented to a high quality. Only in this way, the area of online and distance education can be optimally developed.

Dilemmas of the recent development

The current development of online teaching and distance education is dominated by the influence of the digitally-networked knowledge society. A clear differentiation between traditional distance education and online degree is not given anyway, because all areas of social life are determined and influenced by electronic media. A rapidly growing complexity and a complicatedness of systems with ever-increasing demands on the expertise result alone from this constellation. The approach is superimposed by extended demands on additional competences that developers, managers, teachers, coaches, consultants and practitioners must have, not only in terms of teaching and learning processes to be prepared in the course of knowledge transfer, but rather for the activities providing an integrated, digital learning in a complex economic, social and societal context. Planners and decision-makers, who are responsible for the development of online and distance education, often find themselves in situations in which they find multicriteria statuses with different options for the final solution. The key player is often clearly in a dilemma about/over how to tackle the problem. A dilemma is a situation in which a difficult choice has to be made between different things a person could do (Cambridge Dictionaries Online: dilemma). Dilemmas in the current development of online and distance education are manifested, among other things, in the following points.

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- The necessity to decide between technology-based forms of teaching and learning and the social demands of interpersonal relationships in the process of knowledge transfer;
- The requirements for strong expertise both in the field of education as well as in the domain of each field of special knowledge in accordance with professional capability and skills in management;
- The specifics and dialectics of regional, national and international learning and management cultures in the context of considerable differences of the regional, national and international forms of communication and patterns of behaviour;
- The mastering of the core processes of online and distance learning by sufficient core competencies within the organisation on condition of capacitive, human, financial, etc. constraints of the resources;
- The outsourcing of development and service processes in the framework of the international collaboration and knowledge transfer processes at the risk of generating dependency and loss of autonomy;
- The requirement of full satisfaction of the demands for a variety of education and diverse customer wishes in accordance with the quality objectives and the need for economical use of resources;
- The development of unique characteristics by specialization in relation to a broad, market-oriented range of study programs;
- The use of open online courses and content in a very individual, relatively uncommented way versus the development of joint, accompanied learning scenarios in learning groups in a social context with group dynamic development and motivation, etc.

The list could be continued. The mentioned examples attest that the planning and the control and thus the control of the complex systems of online and distance learning, which are more and more pronounced especially in the context of globalisation, cannot be realised by optimising and by quality-based design of the individual sub-processes or modules. The variety of decision situations is so high that the optimisation of individual elements and subsystems would take too much time and other resources to be able to manage the systems successfully in real time. Only a holistic approach of the development of online and distance learning, including a total quality understanding of the whole organisation or the entire network of cooperation, will put the actors in a position to lead and to control the permanent changes in online and distance education in the long term.

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TQM approach for online and distance education

The development of online and distance learning in a high quality can only be achieved through a holistic approach, a holistic model and a holistic philosophy encompassing the whole organisation. If the principle of constant change is recognized, then it will always be necessary for the organisation to pass through the following steps (Kotter, 1996):

- Establishing a sense of urgency;
- Creating the guiding coalition;
- Developing a vision and strategy;
- Communication the change vision;
- Empowering broad-based action;
- Generating short-term wins;
- Consolidating gains and producing more change;
- Anchoring new approaches in the culture.

A similar holistic approach is pursued in Total Quality Management (TQM). TQM is focused on the continuous quality improvement. The improvement process will be purposefully and manageable designed. It has a high affinity to the processes of learning, because it is primarily based on the needs of the people. Quality management and learning management in general as well as the management of systems of online and distance education in particular are always related to human activities, have a special relationship to social aspects, and are characterised individually and subjectively. This means in particular (Kaminske & Umbreit, 2008):

- The achievement of a high degree of satisfaction of customers;
- The focus on the employee orientation;
- The integration of all stakeholders;
- The claim to leadership and the leadership task for the management;
- The permanent change, improvement, and optimisation of processes;
- The motivation for the continuous generation of quality.

Thus, TQM involves the management and the control of all processes for optimising the quality of products and services in all functional areas of an organisation by the activities of all employees. An objectification of the quality planning and assurance is aimed by the systematisation and professionalization of the management. Quality and management tools as well as quality and management techniques are used. Quality will be effective in educational programs, particularly in the online and distance education in different contexts of meaning and roles. Quality can be referred to: the compliance with certain standards, the achieving of an error-free status or of a degree of usefulness or as an expression of a reasonable cost-benefit ratio. The roles are designed by the involved stakeholders as the teachers, tutors, students, administrators, managers, etc. The quality management will be concerned with the structural requirements of the educational process (input) as well as the planning and implementation aspects (process) and the results of educational processes (output). TQM in education means specifically: development of a quality management concept, quality assurance, quality

ISBN 978-963-89559-7-5

development, evaluation, accreditation and certification. A quality management system can be implemented in five steps (Zimmerer et al., 2004):

- The development a general understanding of quality with the focus on the learners;
- The generation of a quality management concept;
- The definition of quality standards for online and distance education;
- The planning of a cyclical and iterative process of quality development;
- The creation of a plan of actions for the competence development.

The principle of application orientation should be preferred instead of the focus on technology, the principle of learning orientation should be provided instead of the supply orientation, the principle of competence development should be pushed instead of the pure content production. In spite of the now quite complex approach, the success will only be achieved if TQM is seen as a complex management task. The organisation must continually produce quality by the staff not only in the core processes of management of online and distance education but also in all related management disciplines and educational processes.

Concept and best practice examples (CASES)

The philosophy of TQM was took up among others by the European Foundation for Quality Management (EFQM) and used in accordance with the following principles for the concept development:

- All stakeholders are involved in the continuous improvement of quality;
- The quality is controlled by purposeful action of the stakeholder as a results-oriented procedure;
- The improvement of the quality will be realized by defined learning, creative and innovation processes.

Fundamental criteria were fixed in order to determine the quality of an organisation. (Figure 2)

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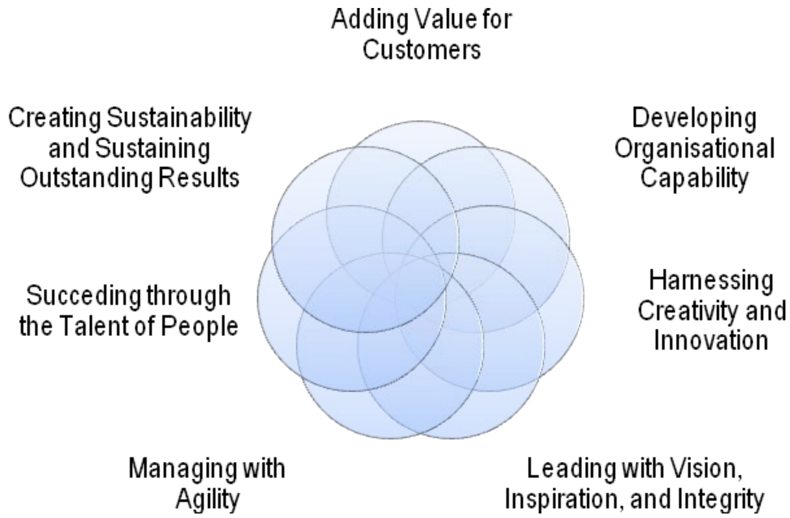

Figure 2: Criteria of excellence for an organisation [10]

If the general model of the development of a TQM concept for online and distance learning is used as a basis, the following guidelines for the preparation of a quality management concept can be derived (EFQM, 2012):

- The quality management is a useful and necessary procedure for quality assurance and development in online and distance education;
- The establishment of a quality management system should be based on minimum standards as well as existing and approved models;
- The development of a quality management system should take into account the characteristics of online and distance education;
- The customer orientation should be transferred to an orientation for stakeholders in the educational processes;
- It has to be take care of a balance of process-based quality management and content-related quality assurance;
- The knowledge-based structures and processes of administration and services should be addressed in the quality management concept;
- The systematic and regular evaluations should be part of the quality management concept and should take the characteristic features of the processes of online and distance education into account.

CASE 1

The comprehensive guidelines are supplemented in specific concepts by specific guidelines for evaluations, teaching, training, content development, platform use, etc. In addition, the TQM approach will only be successful if it is integrated into a general management plan of the organisation. Therefore, the concept of Balanced Scorecard (Kaplan & Norton, 1996), well-known from the strategic management, was applied to the planning of new services including

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the online and distance education. Four perspectives are defined, each of which has a direct relation to TQM (Figure 3) (Schumann et al., 2012).

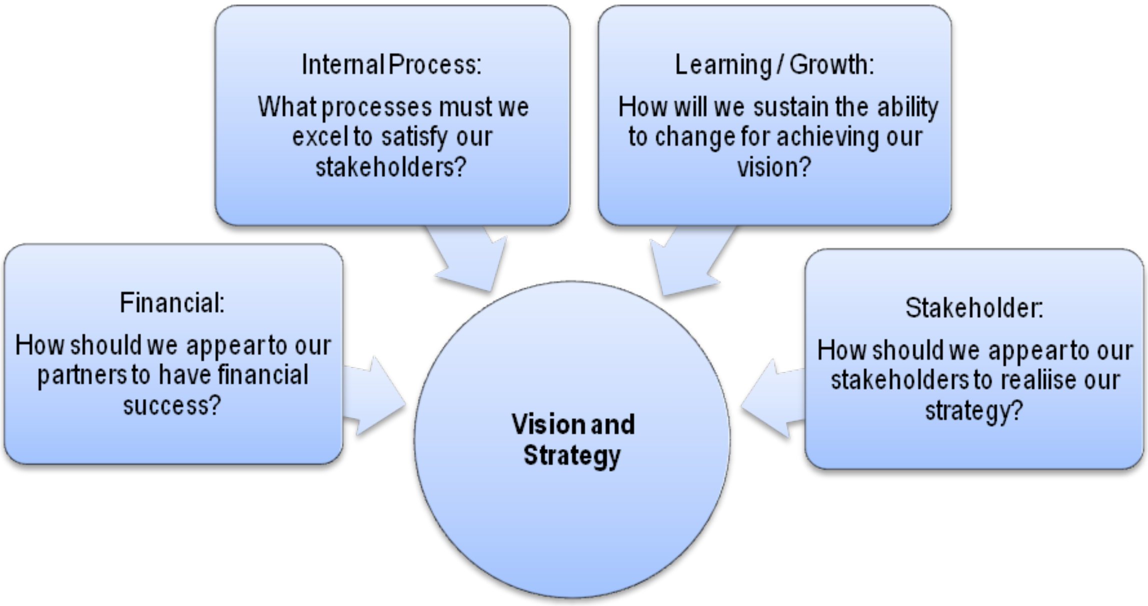

Figure 3: BSC applied for the development of study programs

CASE 2

The powerful concepts of the BSC and TQM, connected and adapted to the Online and Distance Education, form a bridge for the adequate access to other quality tools (histogram, error collection list, quality control chart, correlation diagram, Pareto chart, cause-and-effect diagram, brainstorming, etc.), management tools (relations diagram, portfolio, network plan, tree diagram, matrix diagram, affinity diagram, problem-decision-plan, etc.) and quality techniques (creativity technique, coaching technique, communications technique, information transparency, etc.). They are purposeful used in the planning of the study programs and the curricular development.

CASE 3

Perspectively, it will be possible to create new forms for connecting the management & quality development for the more quality-based design of online and distance learning. For example, in this sense, a fair educational value approach as a future demand quality in open and distance education should be created and applied for the specific conditions of international teaching and knowledge sharing collaborations (Rutsch et al., 2011).

CASE 4

The accreditation of study programs partially corresponds to a complex management approach and do not correlate with the sense of TQM. Therefore, educational institutions are able to perform a system accreditation, which is the holistic approach of TQM for all study and support processes according to the requirements of the European Association for Quality

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Assurance in Higher Education (ENQA) (2009). The entire organisation generates and constantly improves quality for open and distance education. Now, the next logical step is to embed the TQM approach for open and distance education in the overall landscape of the professional management.

Conclusions

Quality management and quality assurance are an essential part of the planning and design of programs and offers in open and distance education. The TQM approach will be increasingly established in this context. It's not just about the quality of individual subsystems or processes but rather that organisations are able to generate permanent quality by the whole system. If this approach is consistently pursued, so the next step should be the integration of TQM into an overall system professional of managing and leading of the educational institutions in particular into potential complex application fields of open and distance education.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

BUSINESS GAMES THE LEARNING BY DOING TOOL FOR BUSINESS MANAGEMENT

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Introduction

Our responsibility in business schools is to teach students what we do in business. That is, provide them the necessary knowledge for business management. This necessarily involves developing skills in the problem solving and decision-making involved in each stage of the business activity: analysis, planning, implementation and control (Figure 1). To do this, we have different teaching methods in business schools such as the lecture, concept applications, case method and simulations or business games (Figure 2). This article seeks to argue that business games are the most powerful method to achieve this learning objective. We analyzed the characteristics of each of the teaching methods and relate them to their potential for the development of skills in decision-making and problem solving.

Figure 1. Business cycle

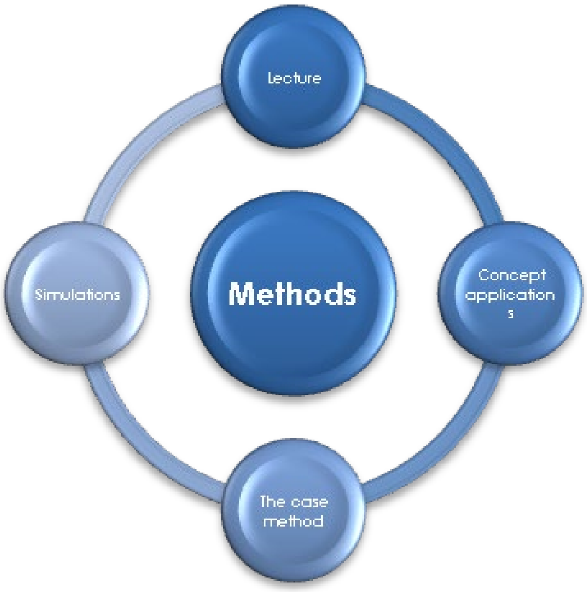

Figure 2. Methods

All companies go through the four phases of the business cycle: analysis, planning, implementation and control. We do it however at different time horizons. A newspaper, for example, goes every day through these four phases. A shipbuilding company, building oil tankers, goes through these phases over a period of several years. For training purposes this is irrelevant, as long as students pass during the training period through the four phases. Therefore, in business schools we have to use teaching methods that allow us to close the student learning cycle by going through the complete cycle. In fact, the analogy between the stages of the learning process, developed by the Experiential Learning Theory (Kolb, 1984) and the phases of business activity has been demonstrated (Blasco López, 2000). And the conclusion is that learning is effective to the extent that not only the process is complete, but repeated and as often as possible.

The Lecture

The classic approach of teaching is the lecture. It is an oral, via videoconference in the case of online learning, in which a speaker conveys his knowledge, almost exclusively uni-directionally to an audience. The teacher takes an active part in the communication process, while the audience is a passive recipient of information.

The analysis phase and the lecture

Can we teach analysis through a lecture? Our opinion is yes. We can, through a lecture, teach students the importance of analyzing the current performance of the company reflected in its mission, goals, objectives and strategies. We can show the process of evaluation of the resources and capabilities of an organization (internal analysis) and the importance of the evaluation of organizational resources, capabilities and core competencies. We can also through a lecture, teach the process of scanning and assessment of the external environment of the organization, to determine the opportunities and threats it faces (external analysis).

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In a lecture we can point to the focus of internal analysis, through an assessment of the structure, resources, processes, people and company culture that allows us to identify their strengths and weaknesses. Also through this method, we can teach how to conduct an external review of the organization, its specific environment (customers, competitors, suppliers and other competitive factors in the industry), and general environment (economic, demographic, socio-cultural, political-legal and technological factors).

The planning phase and the lecture

Can you teach planning through a lecture? Yes, through a lecture you can teach students the planning process:

1. performance analysis,
2. analysis of the environment,
3. analysis of the sector,
4. analysis of the company,
5. making a diagnosis of weaknesses, threats, strengths and opportunities,
6. measures to correct these weaknesses, address such threats, enhance those strengths and explore those opportunities,
7. formulation of objectives,
8. development of strategies (corporate and for each strategic business unit),
9. development of the plan and
10. control measures.

You can teach students the key questions to be answered by the planning process: Where are we now? Where should we go? How do we get there?

The implementation phase and the lecture

Can you teach implementation though a lecture? Our opinion is no. You cannot. Implementation necessarily means that a result is produced, an objective and measurable result. This is directly related to learning by doing and the method of "trial and error". Both principles are so universally accepted that we feel no need to show them here.

Implementation is as decision-making. You learn it by doing it. You can explain to students the main and most accepted theories of decision-making, but that will not make them learn how to do it. You learn to make decisions making them. You learn to implement management plans by implementing them. There is no other way. We will return to this later.

The control phase and the lecture

Yes we can teach to control through a lecture. We can teach students key financial ratios and accounting ratios (working capital management, asset management, debt, profit and equity management). We can teach the main tools of controlling marketing activities (indicators

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related to sales, costs, orders, delivery times, returns, profitability, etc.) And also with a more holistic view of the company, control business activities through a balanced scorecard.

The case method

The case method has its roots in law schools in the United States of America. The method, with over 70 years of history, was used for the training of future lawyers and then extended to business schools.

The majority, if not all, business schools in the world use the so-called case method. In fact, they use it extensively as the primary teaching method in training students in business management.

The analysis phase and the case method

Can we teach analysis through the case method? Yes, in fact, is the focus of attention of the method. Students are provided with the story of a real company with all the data that was available in the company at some point in its development (Christensen et al., 1991). Students analyze the case, in a first phase individually and then in small groups to exchange views that may allow improving the conclusions of each of them. These findings may require decisions on a complete or partial management plan, focusing on a single aspect of the business. In the last phase, all groups, therefore all students gather moderated by a teacher to explain their decisions individually and is not intended to reach a consensual solution.

The planning phase and the case method

We understand that yes, you can teach planning using the case method. As mentioned, the decision may require the development of a comprehensive or specific management plan of a particular business function. Therefore students can, through the case method, learn about the planning process.

The implementation phase and the case method

In the analysis of case studies, students will propose a solution to the case but never get to implement it. That is, students with its proposed plan never know if it was wrong or right, and even less to what extent. In fact, they may not even know if their proposal is better or worse than the one implemented in reality or that their peers developed. Lacking result you cannot talk about implementation. The execution, by definition, involves a reaction.

The control phase and the case method

Again, there are some cases especially focused on some problems arising in the control phase. Therefore, and to the extent that this is the case, the method can be used to learn some skills in this evaluation phase.

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Business simulations or business games

The antecedents of business simulators are found in the behaviour prediction tools, in some cases of market behaviour, and others, of more operational variables.

Business games, in the version we know today, are much more recent than the case method. In fact, the largest business game development has been accompanied by the consolidation of personal computers, which have enabled people with a basic computing knowledge use and manage complex programs.

In business games a manual is given to students describing the simulation environment and the rules that govern the simulation. The manual will specify with precision the decisions that students must make (which together are configured in a management plan). Information sources that are available and the number of decisions (plans) who will perform throughout the simulation are also specified. The fictitious time horizon may vary, be it a quarterly, semi-annual or annual management plans. And as it has already been mentioned, is irrelevant as long as they pass during training through the four phases of the business activity.

The analysis phase and business games

Can we teach to analyze through business games? Yes, definitely. In business games students have to analyze an initial environment that provides a basis for decision-making. In fact, in some simulators that initial environment is a case arising from a real business situation and provided the basis for the construction of the simulation model. So in a business game, the process we have described above leads to the conclusion that a SWOT diagnosis and a series of actions to act upon on it, is also carried out. Moreover, as one of the characteristics of business games are the changes in the environment caused by the decisions of the participants in the game, learning is enriched by the dynamism of the environment.

The planning phase and business games

In business games students have to make a plan for each simulated management period. Each company (teams of students) develops a management plan and the set of plans made by different teams is the input that is introduced into the simulator (computerized market model).

Therefore, one of the objectives of business games is to give students the opportunity to experience the formulation of management plans.

The implementation phase and business games

The simulation software emulates the market and becomes the model, using as inputs the set of plans, sheds some outputs, which are the results that each company has.

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Each company (team) has access to the result: sales, operations reports, profit and loss account, balance sheet, statements of cash flows, etc., and also information about new environmental conditions (market) after each decision.

It is clear then that in business games students experience implementation in a dynamic environment. Each plan (trial) corresponds to a result (error). Students have the opportunity to learn, through an objective and measurable criteria, the degree of error or achieved success and its evolution through different periods of decision.

The control phase and business games

As mentioned, students have the opportunity, through the analysis of the results (sales, operational reports and financial statements) to develop skills in the control phase. Through the implementation of control measures and the conclusions they reach as result of the evaluation, is that they may undertake again the analysis phase of the new competitive environment.

Implementation of business games in management training programs

At this point it should be apparent that business games are the most powerful methodology to develop the skills needed for business management: related to decision-making and problem solving skills and related to teamwork skills. To the above, we would add the skills related to negotiation.

Most, if not all, of the decisions made in companies have to be negotiated. That is, the plan implementation results in negotiations with customers, suppliers, employees, shareholders (represented by the CEO), etc. Therefore, an implementation of the business game even closer to reality includes the incorporation of a role-play in which, at least some of these facets of negotiation is simulated. In our case, we have seen how the incorporation of a role-play involving the justification of decisions and the presentation of future plans before a CEO (professor), makes the learning experience even more effective. We also simulate at the end of the business game, the presentation of a management audit to the shareholders of the company (other students). The result is a powerful learning process with a high level of involvement.

Conclusions

We have described the methods commonly used in business schools to teach business management, the lecture, the case method and business games or simulation method. We performed a critical analysis by noting whether each of the methods allows us to facilitate the development of skills and abilities in problem solving and decision-making associated with each phase of the business activity.

It is concluded that the lecture and case method allow teaching and to develop skills in the phases of analysis, planning and control, but not on the critical implementation phase. The

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only method that allows learning and developing skills in the implementation phase is the simulation or business game (Figure 3).

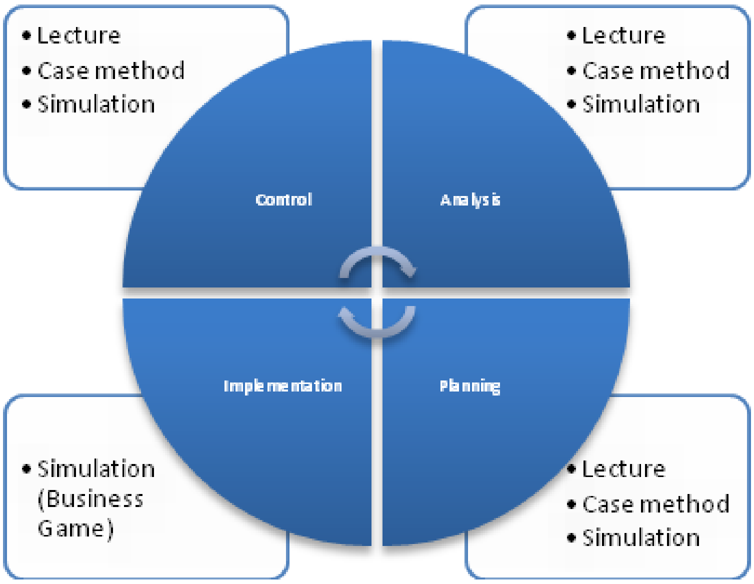

Figure 3.

On the other hand, it is concluded that business games provided that properly structured and also incorporating some role-play to contemplate negotiating skills may be the best method (without excluding others) for practical learning and developing skills in decision making and problem solving in all phases of the business activity.

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E-Learning at Work and the Workplace
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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

TRANSITION FROM EDUCATION TO EMPLOYMENT: CREATING MEANINGFUL MULTILINGUALISM IN THE EUROPEAN LABOUR MARKET WITH ADVANCED ICT

Hedva Vital, Ha'kibbutzim College, Israel, Alan Bruce, Universal Learning Systems, Ireland

Contexts

A key issue in the development of employment in Europe has been the creation of free movement of labour. This foundational principle of the European Union was initially designed to remove barriers as well as to increase labour mobility in contexts of progress and economic growth. The impact of the banking and fiscal crisis of 2008 has challenged this concept profoundly. Migration is now part of a wider global concern that has seen a dramatic redistribution of resources in terms of equality of access and the very structure of work itself. The underlying demographics of an ageing European workforce and escalating welfare demands of this population mean that labour market policy has been forced to locate its methodological analysis within the context of parallel European policies regarding diversity, migration and multiculturalism.

Parallel to this macro-economic context is the growing impact of the emerging digital world and the contours of employment it is shaping. This new and emerging digital world has created a range of new professions and skill sets which are literally and figuratively unprecedented. In other words, these new professions cannot be studied in advance and they represent a range of professional skills, behaviours and attitudes that professionals are obliged to learn in a hands on manner, in dynamic and evolving job configurations. This has been seen most acutely (as this paper will reference) in the field of digital writing.

Among other issues, this has also put a renewed light on the importance of multilingualism and development of skills and competences in learning materials' design and promotion of policies and technologies that enhance the acquisition, practice and development of additional languages for mobile workforces. Second languages are taught – or not taught – for a variety of reasons at national levels. European policy has been slowly evolving in this field. Apart from declarations of principle and promotion of best practice exemplars, the European Union still does not have executive authority over schools' teaching methodology, curriculum or policy. This is left, under the principle of subsidiarity, to Member States. This masks the fact that multiculturalism and the direct impact of significant levels of migration (both intra-European and from third countries) is increasing exponentially in the European Union.

Teaching a second language therefore becomes part of a wider agenda. Teaching a second language – or developing basic awareness and competence among learners around additional language skills - is educationally engaging but also part of a wider strategic orientation that reflects policy towards growing diversity in Europe. In turn this relates directly to the development of human capacity by creating ICT enhanced work-based learning strategies and techniques that meet the needs not only of learners but also employers, e-learning designers, employment policy makers and communities.

Shaping digital content to need

There is the need to ensure that the multilingual aspirations of an emerging European workforce are met. The Commission of the European Union has a Commissioner specifically responsible for multilingualism. While language policy is national, Article 22 of the Charter of Fundamental Rights of the European Union recognises the right to linguistic diversity. The official role of the European Union is to support and promote multilingualism – while responsibility for methods and implementation is left to Member States. The stated goal is that European citizens will speak two additional languages in addition to their mother tongue.

The role of advanced technological tools and e-learning has also become a key focus in the literature and research undertaken internationally. The use of advanced technologies can powerfully reinforce learning for adults and provide a rich resource in terms of techniques and methodologies for teaching staff and facilitators. Among the new professions that have emerged are digital content designers, digital writers, graphic artists, rich media experts and project managers for digital content.

The Centre for the Study of Learning and Performance (CSLP) in Concordia University, Canada undertook extensive research in this area for a special issue of its journal on technologies and higher education in 2013.

> *In light of the above studies, when it comes to implementing web 2.0 technologies such as blogs, wikis, podcasts, virtual environments, and social networks in higher education, university instructors need not reject their previous teaching approaches. instead, they could attempt to develop integrated pedagogical strategies that bridge the old-school instructivist lecturing and relatively newer constructivist styles. Several scholars have underscored the need to provide instructors with training on the best ways to integrate technology in their classrooms according to subject areas and teaching plans. (IJTHE, 10(3), p.11.)*

Bilingual and multilingual abilities are increasingly important for participation in contemporary society. Second language instruction is compulsory at all levels of the Canadian school system, and for many adults meeting personal and professional goals also requires learning additional languages. CSLP studies on how second languages are learned and used by

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adults has an underlying objective to identify best practices for enhancing second language proficiency. It develops supportive instructional and testing materials, and designs research tools for use in learning, workplace, and community centre contexts.

CSLP created *Team Alphie*, for example, as an innovative project to enhance such skills. *Team Alphie* is a computer programme designed to support small group tutoring for early literacy development. In teams of two to three students, this computer-based reading intervention programme supports struggling readers in grades 1–5. The reading intervention programme provided is based on instruction and practice in phonemic awareness, phonics, fluency, vocabulary, and comprehension. However, because this programme is targeted at struggling early readers, special emphasis is placed on developing their decoding and fluency skills.

The *Team Alphie* tutoring model enables one instructor to work with small teams, of two to three students, in a resource room. Following individual assessment, students are grouped based on their ability and practice needs. Once the teams are selected, the software creates an instructional plan based on assessment results. This plan consists of sequenced computer activities appropriate to each team's skill level. Learning styles have also changed with less face-to-face and more independent self-learning.

Each day, teams work on the interactive computer activities, designed to facilitate turn taking, resource negotiation and mutual support. *Team Alphie's* strength as a powerful reading software is also due to its support of teachers in assessing the students, grouping them into teams, developing instructional plans, and delivering effective, fun instruction. Tailored activities, frequent assessments and collaborative practices make *Team Alphie* a unique and effective tool in Early Literacy intervention in bilingual contexts.

Researchers agree that input plays a leading role in language acquisition, either in the form it takes and/or in the nature of the input content itself. In this sense, computer technology is being widely used as a medium of inferring instruction in all types of learning settings. Although there are many studies which support the application of new technologies, much research needs to be conducted in order to gain insights how computers can be introduced into workplace language learning effectively and how technology affects learning process and productive outcomes.

Developing human potential has been a persistent EU policy aim. It requires re-educating existing professions and featuring education as a major lever to achieve skilled competence development. With present economic trends and the shockwaves of financial crisis and public sector restrictions, key questions around growth and employability are highly important. One of the main problems that the EU has faced is that the traditional courses offered do not properly respond to the needs of employers and that most of the work continues to be learned in the workplace. Among the greatest needs in the world of education and training as applied to workplace development, is a huge and significant lack of trained digital content writers.

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Framing the needs

The key purpose of this investigation is to raise the question of how to train experienced writers from the world of print, so that they can adapt and learn how to become digital content writers. The knowledge of experienced writers and content specialists is valuable and it is important that individual learning skills are not lost. Besides being experts in their subject matter, digital writers are further expected to:

- Be able to deal with rich media (pictures, sound, video);
- Be able to tag rich media and attach it to the written activities;
- Know about judgmental scoring;
- Know about writing closed items, suitable for PC, tablets , mobiles;
- Understand and visualize what can be written for different sizes of screen;
- Write content in a way that will be clear to many people involved in the process: graphic artists, script writers, actors and production studios and integrators.

The ability to maintain all these dimensions and to keep all these balls in the air requires retraining of traditional writers and a smart management tool that allows all these different kinds of professions to "talk" to each other, understand and be well coordinated. In real terms it also means one language and one tool for all.

When considering the process of retraining writers to be digital content writers we need to take into the consideration the following points:

- A writing environment they are used to working with such as WORD;
- A structure and clarity of what the product is going to look like. Unlike print, they cannot visualize the product until it is on the screen;
- A system to help them relate to different screen sizes;
- A way to deal with rich media such as audio, video, and graphics;
- A simple tagging system of meta-data;
- A simple system to deal with ICT people that will convert the content to interactive activities.

The issue is how we solve these problems and begin to train an entirely new generation of digital writers in the shortest and most effective way possible. This requires thought on how we create vast amounts of quality content in a rapid way as well as how we deal with different language conversions and localization of digital content.

Over the past years, educational hypermedia applications, different from ordinary websites and multimedia software have appeared. These adaptive hypermedia systems, categorized by Brusilovsky, have all in common that users are guided towards paths considered optimal for learning. In cited cases, the possibilities of an adaptive navigation rely on the presentation of items according to the estimated level of learners' language and cognitive abilities. So, if learners respond correctly, the next task will convey a higher difficulty level, being presented as an easier question if the learner misses the item presented, selection which is done by the

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computer algorithm which adjusts the selection interactively to the successful (or failed) responses of the student. This approach stems from the realization that we learn little about an individual's ability if we persist in asking questions that are far too difficult or far too easy for that person. We learn the most about a learner's ability when we accurately direct our questions at the same level as the learner's ability.

Adaptive technology consequently enhances learner involvement in the learning process and develops autonomous access to learning material. In this sense, some other advantages of adaptive hypermedia could be based on:

- *Self-Pacing*: adaptive systems allow learners to work at their own pace acting as filter to affective connotation (learners are challenged but not discouraged by the presentation of items that are far above or below in front of the group). The speed responses could be used as additional information for research purposes.
- *Immediate Feedback*: the test can be scored immediately and provide instantaneous feedback for learners.
- *Multimedia Presentation*: tests can include text, graphics, photographs, and even full-motion video clips. The influence of multimedia formats on language learning can provide teachers with an important frame of research hypothesis.

Course books are considered a very important element in teaching languages. 'Using course books appropriately is an art which becomes clearer with experience' (Jeremy Harmer, How to Teach English, 1998). Course books play a major role in the classroom. They work as a learning resource as they are usually accompanied by cassettes, videos and teacher's guides. For new or inexperienced teachers, a course book works with the teacher's book as a "medium of initial teacher training". In terms of practicality, it saves time and effort for teachers when planning lessons. Additionally, it provides a focus for the teacher that allows her/him to follow and eventually achieve the aims and objectives of the syllabus. From the students' point of view, they present authentic language models to use in real life situations as well as provide more interesting and motivating materials for them to use and apply. They also give students a sense of progression in their learning as most course books are organized in units. In addition, course book restrictions can be dealt with by omitting, changing, replacing, re-writing and re-ordering.

The activities that are constructed and built in to language instruction also are very engaging and worthwhile - they have authentic language and experiences and encourage cooperative learning as stated in the programme philosophy. The nature of evaluation will help to reflect the concerns of the evaluator and assist in evaluating the course book more effectively and accurately. Authentic literature is also included which can provide 'real' language structure and vocabulary, in addition to building learners' knowledge of the world. Evaluating skills and their variation is practical in terms of deciding if we can use it to teach what is important while teaching language. The language content, however, needs to be well designed in the course book. Written evaluation makes the 'thinking' tangible and the decisions reviewable.

ISBN 978-963-89559-7-5

LANGO: project example and learning point

Language on the Go (LANGO) is an EU funded project developed to explore the opportunities offered by the new information and communication technologies to encourage learners to maintain and build upon their existing language skills. The project developed a multilingual language tool to apply interactive learning approaches and innovative e-learning platforms, which provide computer assisted and mobile assisted language learning within a framework of attractive and easy learning content. The LANGO innovative e-learning tool supports learners of Bulgarian, Maltese, Greek and Russian languages. Evidently, the methodology and technology can be adapted at later points to other languages.

The language tool aims to support language acquisition of adult learners who have a number of challenges including diverse educational backgrounds, literacy levels and migrant economic status. The LANGO tool integrates technology and uses innovative applications, which do not require advanced computer skills on the part of the learner. This allows for more individualized and independent learning in terms of pace, time and place (home, work, on the move). It provides benefits particularly for those with lower formal education levels - and supports improvement of their linguistic and digital competence at the same time.

The LANGO product offers users:

- introduction and practice of frequently used language patterns;
- initial development of communicative skills;
- easy language input through real life communicative situations;
- entertaining learning activities to practice language patterns;
- expanding intercultural awareness through language learning.

Apart from the purely linguistic knowledge, LANGO addresses levels of cultural awareness: this embeds cultural information about the countries where the target languages are spoken. LANGO language learning activities are delivered in a calendar format, aiming at the type of mastery which can be achieved in about sixty hours with only ten minutes per day during a year: an excellent return for a limited effort. The project is structured around delivery of mini-lessons, which require a little effort on the part of the learners and are easy to absorb. LANGO users learn the language literally on the go, at any time and place on flexible electronic platforms (web-based and iPhone). Moreover, part of the motivating learning activities is designed to be provided via widgets on Facebook. The content is delivered inside a specifically designed template. The program is designed to include different kinds of interactive activities and a game template. These include:

- Multiple choice;
- Multiple choice with media;
- Matching pairs (text or pictures);
- Ordering sequences;
- Media triggers;

ISBN 978-963-89559-7-5

- Categorizing different language areas;
- Listening to model, recording and hearing back one's voice;
- Listening to dialogue, choosing a role, record oneself and listening to own recording;
- Wordsearch games based on a sound trigger.

Translation of the introductory part of each lesson – as well as all learner instructions – aims to support learners and increase comprehension. The English language in the LANGO tool is used as a 'lingua franca' to reach out to a great number of learners who may be native speakers of various languages. However, the design of the tool allows for further transferability. In post project exploitation, translations into native languages can easily be integrated and replace the English translation (e.g. on a customer request: thus specific customer-tailored editions of the tool can be produced in the future).

Conclusions

Although free movement of labour in Europe is an economic, not a social concept, it creates many problems of a social nature: transfer of pensions and social benefits, entitlements of migrant workers to unemployment, social security and other benefits, family issues of education, housing, and so on. These social issues came to be dealt with not as independent social concerns, but under the rubric of economic free movement of labour. This created a tension in the balance between the economic and the social perceptions of free movement of workers. Policy initiatives, legislative provisions and court decisions were concerned with economic and not social consequences – that is, with possible restraints on free movement and not with the social implications of free movement of workers.

This has immediate implications for shared learning in an increasingly complex Europe and in the social context of effective language learning as shaping a new digital skills agenda. Developing digital content provides solutions that help and facilitate employment generation and the free movement of labour. At the same time developing digital content provides three important by-products:

1. Innovative training methodologies and pedagogy for self-learning users
2. Development of rapid authoring tools that can create quality content
3. A trained group of future digital writers.

Integration, free movement of labour, language learning and new future digital skills are thus cogently linked in new paradigms of innovative competence construction.

ISBN 978-963-89559-7-5

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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE CIRCUMSTANCES OF USING TECHNOLOGICAL APPLICATIONS INSIDE AND OUTSIDE OF THE FACULTY BY PHYSICIAN AND NURSE CANDIDATES

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Abstract

In this study the aim is to determine which technological applications are used by physician and nurse candidates; where, why and how they are used, based upon the technologic and educational context. This research is considered as a case study. The study group was determined by "easily accessible case sampling" and consisted of 78 freshman, sophomore and junior physician candidates from the Faculty of Medicine of Hacettepe University; 50 freshman, sophomore, junior and senior nurse candidates from the Nursing Program of the Faculty of Medical Sciences in Başkent University. A questionnaire and a semi-structured interview form created by the researchers were used in this study. The content analysis method was used in the data solution. Research participants stated that technological applications they used in daily life and for classes were different. This situation can be considered as an indication that we could not yet integrate technology into education. It was determined in the research that students used search engines and office programs the most. As a result of the research, results of the students who take distance learning courses was higher than those who formal learning. Moreover students presented positive attitudes towards distance learning.

In conclusion, the finding regarding students' willingness to take distance learning courses and use of social networks should be carefully dealt with. Especially considering the high numbers of students attending faculties that school health professionals, alternative teaching methods and procedures should be conceived. Student participation should be encouraged along with mixed learning platforms, and students who are crammed into the lecture halls should be supported in terms of education.

Introduction

Fast growing technological developments have significant effects in the educational context. In cases of providing students with opportunities that enable them to use information technologies efficiently and effectively, it is seen that their perceptions of information literacy and self-sufficiency regarding the fields that they study have improved (Usluel, 2007). Recently thanks to these technological applications used commonly for educational purposes, students can communicate with whomever they want to, share/receive files and correspond within a short span of time. These technologies include social networks and other electronic communication tools. All these technologies can be categorized under Web 2.0 (David, 2010). Web 2.0 technologies are determined to be used efficiently by especially university students (Pempek et al., 2009; Quan-Haase & Young, 2010; Toğay et al., 2013).

Informal learning is defined as the learning formed according to self-performances of an individual by interacting with other individuals on a social platform (McGivney, 1999). With the help of Web 2.0 technologies utilized frequently in educational environments in the recent period, students have been integrating into such environments and taking individual responsibility for learning (Milheim, 2007). However Web 2.0 platforms are used efficiently and effectively in the formal education environment as well as in the informal education environment. But if studies are conducted with the participation of students in terms of how to benefit from these technologies in both of these educational environments, opportunities can be created in efficient learning with a more realistic point of view (Solomon & Schrum, 2007; Atal & Koçak-Usluel, 2011).

There are several studies (Cotrell & Robison, 2003; Neumann & Hood, 2009; Fernandez, Simoa & Sallana, 2009; Johnson, 2002; Taradi et al., 2005) indicating the positive impact on students when technological applications and tools are used to assist face-to-face education. The important thing is to create awareness of these technologies' positive effects on students in the educational context. In this study the aim is to determine which technological applications are used by physician and nurse candidates; where, why and how they are used, based upon the technologic and educational context. In accordance with this primary aim, the answers to the three questions below are required:

1. Which technological applications do the physician and nurse candidates use in their daily lives and why?
2. Which technological applications do the physician and nurse candidates use in the educational context and why?
3. Out of the technological applications that the physician and nurse candidates use in their daily lives, which ones do they prefer to use in the educational context and why?

ISBN 978-963-89559-7-5

Method

Research design

This research is considered as a case study. Case studies are survey arrangements aiming to make judgments related to a specific section in population after analyzing it in detail (Hays, 2004; Karasar, 2005). There are no generalization purposes in these kinds of studies. The main purpose is to discover typical situations of each case (Yıldırım & Şimşek, 2008). As in the case studied in the scope of this research, not only physician and nurse candidates' use of technology both in their daily lives and academic purposes (in the educational context) and their reason for that but also their views in terms of their expectation in using technological application for their classes were analyzed individually and approached as a whole; multiple case design was used (Fraenkel & Wallen, 1996; Yin, 2003).

Participants

The study group was determined by "easily accessible case sampling" and consisted of 78 freshman, sophomore and junior physician candidates from the Faculty of Medicine of Hacettepe University; 50 freshman, sophomore, junior and senior nurse candidates from the Nursing Program of the Faculty of Medical Sciences in Başkent University.

Instruments and data collection

A questionnaire and a semi-structured interview form created by the researchers were used in this study. In the creation process of both the questionnaire and the form, expert opinions were requested and necessary corrections were made. In the final form of the questionnaire, open-ended questions regarding the students' circumstances and purposes for using technology in daily life and in classes were included. In addition, the semi-structured interview form was prepared in accordance with the questionnaire questions, and interviews with the participants were held to get more detailed information. The data collected after the interviews with students were coded by two scientists and then the credibility of data was calculated with the formula "Credibility=Consensus/Divergence+Consensus x 100" (Miles & Huberman, 1994). The coefficient of credibility is determined to be over acceptable limits (> 80%).

Data analysis

The content analysis method was used in the data solution. In this study, the researchers applied the coding using the "coding according to concepts in the data" method. The researchers and the two other scientists coded separately. Then themes were created; frequency and percentages were calculated.

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Findings

In this part of the research findings were included under separate topics in accordance with the research questions.

Which technologies do the physician and nurse candidates use in daily life? Why?

When the results obtained in accordance with this sub-question of the research were examined, it was determined that the physician and nurse candidates used the social networks the most (79.6%) in daily life. When other applications were examined in order, it is seen that they used office programs (69.8%), e-mail applications (57.1%), search engines (55.1%) and educational software (16.0%). Purposes for using these applications were introduced below:

Social networks

The students' answers to the question about the purpose of their social media use in daily life were placed under four categories. It was determined that students use social networks to communicate (69.5%), to make friends (52.3%), to satisfy their curiosity (34.8%) and to play games (24%). It was assessed in the focus group meetings that students use social networks to relieve the stress of life and to have a good time.

> *A.P.: Classes are intense and I follow social networks when I can spare myself some time from this intensity. I always stay in touch with my friends via constant notifications thanks to my smart phone.*
>
> *H.T.: I communicate with long-distance friends about classes and socially via social networks. Of course, if I can find some time outside of classes.*

Office programs

The students' answers to the question about the purpose of their office programs use in daily life were placed under three categories. It was determined that students use office programs to create class reports (83.8%), to keep the electronic records of hospital visits (52.6%) and to create academic study plans (29.7%). It was ascertained in the focus group meetings that students use office programs because they have to use them when writing class reports and they are unable to do any homework without a computer.

> *S.A.: We almost forgot how to write with a pen. Everything is performed with a keyboard. In the near future we will have electronic tests. It would not be wrong to say I can't manage anything without office programs.*
>
> *Y.T.: I use my computer just for writing in Word. Courses are so intense that office programs constitute a part of life.*

ISBN 978-963-89559-7-5

E-mail applications

The students' answers to the question about the purpose of their e-mail applications use in daily life were placed under two categories. It was determined that students use e-mail applications to communicate with friends and family (88.3%) and share files (74.5%). It was assessed in the focus group meetings that students use e-mail applications to communicate with friends and to send/receive files.

> *U.R.: I check my mail at least 10 times a day to see if there are any notifications from my family and friends. I don't use social media so I get the news via e-mail. But I can't be informed of lots of things just because I don't use social media.*

> *Y.T.: I use e-mail applications to video chat with my family. Other than that I'm not too involved in it.*

Which technologies do students use for classes? Why?

When the results obtained in accordance with this sub-question of the research were examined, it was determined that the physician and nurse candidates used search engines the most (83.9%). When other applications were examined in order, it is indicated that they use office programs (79.6%), e-mail applications (67.1%) and social networks (23.8%). Purposes for using these applications were introduced below.

Search engines

When responses of the students when asked why they used search engines were analyzed, it is seen that the students use search engines to do research for projects and classes (84.5%) and to get additional professional information (47.2%). It was assessed in the focus group meetings that students use search engines to frequently research about project subjects that they are given, and as assistance to class materials.

> *Y.R.: We are very busy with projects and homework. Now I can access everything thanks to the search engines considered as virtual libraries.*

> *Y.T.: I benefit from Internet for my professional development. Google opens every door.*

Office programs

It is ascertained that students use office programs to write assignments (69.2%) and summarize the book chapters before exams (36.4%). It was assessed in the focus group meetings that students use office programs to prepare assignments needed to be handed in and summarize foreign books electronically.

ISBN 978-963-89559-7-5

> *S.R.: Now as we have to prepare everything on computer, office programs are indispensable for me.*

> *Y.T.: We translate thick medical course books on computer by sharing among each friend, then we collect and use them in classes.*

E-mail Applications

The students' answers to the question about the purpose of their e-mail application use in daily life were placed under three categories. It is determined that the students use e-mail applications to share files (92.3%), to exchange opinions with friends (67.9%) and to communicate with instructors (44.5%). It was assessed in the focus group meetings that students use e-mail applications to share various documents with friends and to exchange information before exams.

> *S.R.: My friends and I share and archive the academic files we come across on the Internet via e-mail.*

> *Y.T.: We send potential exam questions to each other.*

Social Networks

The students' answers to the question about the purpose of their social network use in daily life were placed under two categories. It was determined that students use social network to share files (79.2%) and exchange opinions with friends (62.0%). It was assessed in the focus group meetings that students do not use social networks a lot. However the ones who do use them for exchanging files and chatting with friends especially about classes (especially before exams).

> *U.R.: I do not generally use social media for educational purposes. But when I do it is to discuss questions before exams.*

> *Y.T.: Social media is the best way to share files because all my friends have an account.*

Which technological applications do students use for classes? Why?

It is established that students use distance learning programs (88.5%) and social networks (76.6%) for classes. The reasons for their use of these two applications are stated below.

Distance learning programs

When responses of the students when asked why they used distance learning programs were analyzed, it is indicated that they use these for watching lectures later (86.2%), participating in some classes without going to school (58.3%) and following other instructors' lectures in another university (23.4%).

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Social networks

Students state that they need to use social networks at least to communicate for classes. This is especially true for physician candidates because there are so many students; they explain that they often get disconnected with each other and instructors. When their opinions were analyzed, it is seen that they use social networks for sharing information about class cancellation/class hour changes (88.3%) and for sharing files (66.7%).

It was assessed in the focus group meetings that students stated that they use distance learning programs for making up for classes, accessing course materials later and following some classes without going to school. They said they used social networks for file exchanges and to get information on cancelled classes and class hour changes.

> *U.R.: It makes great sense that some of the classes are provided with distance learning. We squeeze into lecture halls. Sometimes we can't find seats. It would be nice if there were a distance learning option for courses without going through that and then everyone would follow the lectures at home.*

> *Y.T.: They put up announcements on a board. But it would be nice to give up these kinds of traditional procedures in this electronic era. After all everyone has an e-mail or a social network account.*

Conclusion and discussion

Research participants stated that technological applications they used in daily life and for classes were different. This situation can be considered as an indication that we could not yet integrate technology into education. This case, which is described as digital inconsistency, unveils the need for recreation of teaching approaches in faculties (Clark et al., 2009; McLoughlin & Lee, 2007). Thus, the fact that almost every student has a social network or an e-mail account cannot be counted as a benefit in terms of education. The clearest indication for this is that according to the research results, even if all the students have a social network account they do not turn it into an academic advantage. It is no doubt that faculty administrations should consider this situation as a contributing factor for creating a positive learning platform with some arrangements.

It was determined in the research that students used search engines and office programs the most. When the related domain was examined, it was found that social networks could easily be used in educational context (Atal & Koçak-Usluel, 2011; Clark et al., 2009; Jones et al., 2010) and this would contribute to teaching, improving and sharing of class materials, and extracurricular group studies (Ajjan & Harsthone, 2008; Toğay et al., 2013; Yuen & Yuen, 2008). Similarly, Yuen and Yuen (2008) state that classes where undergraduate students are present have positive contributions on academic success, motivation and self-monitoring. According to the study conducted by Toğay et al. (2013), supporting social networks in the

ISBN 978-963-89559-7-5

educational processes has a positive impact on students' learning and facilitates and improves the learning processes.

In the study conducted by Özkul and Aydın (2012) with the participation of new undergraduate students, students' willingness to use distance learning was analyzed. As a result of the research, it is ascertained that students were willing to support their formal training with distance learning and they preferred distance learning to formal learning. In the research carried out by Suanpang, Petocz and Kalceff (2004) with the participation of undergraduate students, attitudes towards distance learning and academic success were examined. As a result of the research, results of the students who take distance learning courses was higher than those who formal learning. Moreover students presented positive attitudes towards distance learning.

In conclusion, the finding regarding students' willingness to take distance learning courses and use of social networks should be carefully dealt with. Especially considering the high numbers of students attending faculties that school health professionals, alternative teaching methods and procedures should be conceived. Student participation should be encouraged along with mixed learning platforms, and students who are crammed into the lecture halls should be supported in terms of education.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

ORBIS DICTUS – FROM LEXICAL STATISTICAL COMPUTATION TO NATURAL LANGUAGE PROCESSING AND SELF CUSTOMISATION

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Introduction

One of the main objectives of the Italian national funded project Adaptive Message Learning (am-Learning) is to produce a system capable of understanding the learner's lexical needs and providing him/her with the adapted study material that he/she will understand with the least help from a third party knowledge source (e.g. dictionaries, web, etc.). During the four years project, this result was obtained using lexical statistical computation techniques to measure relevant educational competences such as reading comprehension. This approach led us to manipulate the idea of "word frequency" as related to the difficulty of comprehension of a word in a certain document. In other words, the concept of frequency can be defined as how many times a word occurs in a huge collection of texts that fall under the same category (e.g. cardiology, physiotherapy, sociology, etc.) – called *corpus*. The higher the frequency the word holds, the higher the chance (probability) that the reader (student) already knows it (understanding its meaning in the document), and vice-versa.

One of the product of the am-Learning project is an advanced e-learning platform (or LMS – learning management system) called Orbis Dictus. It is already working and it implements the above approach to deliver an automatically adapted e-learning materials and tests based on lexical statistical algorithms. This innovative platform is formed by three distinct technological tools, each of them devote to provide different LMS functionalities: the *LexMeter* module outlines an initial user profile assessing the learner's characteristics in terms of his/her lexical competency; the *ProgressMeter* module creates short *cloze* tests to report and monitor the learner's gradual improvement through the learning path; using the results obtained by the other two, the third module, called *Adapter*, automatically adjusts the text document (e.g. manuals) in accordance to the follow hypothesis: introducing more detailed explanation of low-frequency (hard) words helps students better understand the given text material. In other words, starting from a fixed text inserted by the course tutor, the study material is automatically integrated with definitions and explanations in order to provide the student with an already tuned text, matching his/her reading skill.

Some enhancements were proposed to improve this approach taking advantage of the vast collection of words added daily to the web by its users, collecting new data with every second passing, in addition to building a system that will not need to be explicitly programmed every time new data is added, or every time the system makes a wrong judgement or a right one, but simply learns new knowledge from the newly collected data (Machine Learning).

One more addition deserves mentioning is the natural language processing, in this field some studies and algorithms were adopted in order to help the system consider the articles and books not as a collection of single words, but as a collection of phrases, paragraphs that cover a particular subject (Aboutness concept).

Web crawling

Using the XSL/XSLT language, a number of web crawlers has been developed, each of which visits a specified website, analyses it and stores all the links in the website, whether they point to an internal page in the same website or an external link, after analysing the first page, the crawler comes back with the information and the set of links found, copies itself as many times as the links found in the initial page, starts the same process with the links set one by one, finding new content, new links to follow and so on.

Web crawlers have been developed and spread over the web to find Italian language websites that contain articles, news or discussion spaces. As for now, 18 Italian language websites has been found, analysed and continuously monitored for updates. One example is http://it.docsity.com that has more than 11,000,000 question pages, each page contains one question made by a user (university student) and many answers with a voted best answer reply, In addition to 300,000 presentations and notes made on didactical materials used in Italian universities. This approach goes as long as there new content added to the crawled websites, in addition to the possibility to add new websites to analyse. The second step starts after the crawling process ends, cleaning the text and removing the noise that would only confuse the collected data (Latent Semantic Analysis).

Collecting the data from the web helps facing the challenge of updating the De Mauro's VDB, whether the update includes adding new common words, deleting old unused ones and updating the words ratings (words frequency/occurrence)[1]. And now with words being continuously retrieved, another approach is needed in order to understand the meaning behind not only the words, but of the sentence, context and the whole document.

Machine learning

Machine learning follows the same concepts of the human learning, but with a mathematical basis of a specific problem domain that are not seen as the way humans learn, but the outcome is the same however, a system developed and built following the machine concepts will improve the output quality with trial-and-error, training and the usage to previous data.

[1] Giuliani et al. (2005) demonstrated that only a small part of the third list of De Mauro's VDB (Alta disponibilità) is used these days.

ISBN 978-963-89559-7-5

Machine learning applications vary from building autopilots, handwriting recognition (optical character recognition), computer vision to database mining (which was adopted in order to categorise and arrange collected web data in our case) and natural language processing (NLP).

Latent semantic analysis (LSA)

Latent Semantic Indexing (also known as Latent Semantic Analysis) can be defined as a technique to discover the underlying meaning or concept (main idea) of a document. If every word held only one meaning, then LSA would have been easy to achieve (Figure 1).

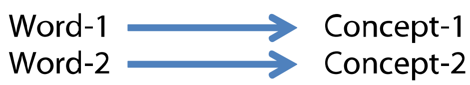

Figure 1.

Unfortunately, languages hold many synonyms, words with multiple meanings, and some obscurities that make it sometimes hard even for people to understand (Figure 2).

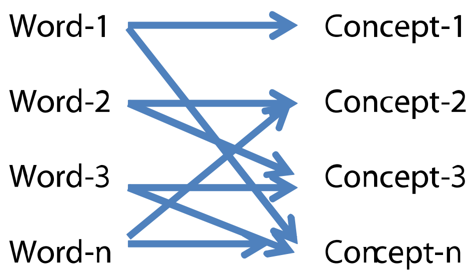

Figure 2.

One more problem should be addressed here, which is the fact that authors have a large choice of words for them to choose from, this makes it harder to analyse. This casual choice of words from authors leads to noise in the concept that describes the relationship between words and meanings. LSA proposes some simplifications in order to face and eventually solve this problem:

- Documents are considered as a "box of words" where the order of appearance is ignored.
- Concepts can be found usually from patterns of words that usually are together in a document (carta di credito, conto, bilancia, could possibly occur in a document about banking & finance).
- Words used in the same context usually hold the same meaning.

The LSA implementation has been made throughout the use of python programming language, using the python numerical library NumPy that will help with the creation of the count matrix, and python's scientific library SciPy that includes the Singular Value Decomposition (SVD).

Stop words (words that do not contribute to the meaning such as: e, il, la, in, per, a … etc.) and ignore characters sets (&, $, ", £, !, ", ;, etc...) should be considered before parsing a

ISBN 978-963-89559-7-5

document. The parser method splits the document into single words after removing/ignoring words and characters that match the characters and words inserted in the stop words and ignore characters lists.

After parsing all the documents, the words[2] (dictionary keys) that occur in more than one document are exported and arranged, and a matrix is built with rows representing the words, and columns representing the documents parsed, in the end, for each document and dictionary key (word) pair, the corresponding matrix cell is incremented.

Table 1: shows an example matrix

	Documents								
Words	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**Dn**
docimologia		1	1	1	3		1	1	
didattica	1				2	2	2		1
valutazione		1		1	1		4	1	
procedure	1	1	1	1	1	1	2	1	1
decisione					1			1	
votazione	1	1		1		4	2	1	1

In complex LSA/LSI systems, the previous matrix, which can also be referred to as raw matrix is often processed and modified in order to distinguish easy from hard words (common from specific / technical), in a simplified manner, a word that occurs in nearly all the documents should have lesser weight than the word that occurs in only one document, one well-known method is the term frequency – inverse term frequency, which can be achieved by applying the following formula to the previously calculated counts in the count matrix:

$TFx,y = (Nx,y / N^*,y) * Log(D / Dx)$[3]

After the TF formula has been applied to the matrix counts, an algorithm is adopted in order to examine and analyse the new count matrix called the Singular Value Decomposition algorithm (SVD). The motive it was considered as a useful addition to the whole approach is that it achieves the best possible reconstruction of the count matrix with the least possible information, it discards the noise, and emphasizes strong patterns and trends. The trick in using SVD is in figuring out how many dimensions or "concepts" to use when approximating the count matrix. Too few dimensions and important patterns are left out, too many and noise caused by random word choices will creep back in.

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[2] Words are defined as dictionary keys in the python program built, which are the words that are considered as dictionary entries, those entries have values assigned to them based on their occurrence in texts collected (word frequency).

[3] Nx,y = the number of times word x appears in document y (the original cell count).
N*,y = the number of total words in document y (just add the counts in column y).
D = the number of documents (the number of columns).
Dx = the number of documents in which word x appears (the number of non-zero columns in row x). In this formula, words that concentrate in certain documents are emphasized (by the Nx,y / N*,y ratio) and words that only appear in a few documents are also emphasized (by the Log(D / Dx) term).

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After the analysis is done, the system decides based on the correspondence and the amount of noise the webpage has in order to either include or exclude it in the final list of websites to retrieve data from continuously. So far, only 18 websites matched the criteria, which is not a small amount of initial data but rather a huge one (roughly 16,000 documents in addition to 900,000 discussions), and this is only one small advantage of using LSA techniques. The other and most fruitful advantage will be the update of De Mauro's VDB whenever a sufficient archive is created in order to reduce the error margin to a minimum (target is at least 25,000 documents)

The final objective was to have a system capable of profiling every student, holding vital information about the student that will help the system obtain a better understanding of that student. This does not only imply that the system will make decisions based on the data it has, but it will learn and deduce new knowledge about the user using the actual data in possession without being programmed explicitly, which is considered as the main concept behind Machine Learning and the reason why it was adopted.

Future developments

Having already implemented all that was mentioned and described beforehand, when trying to put everything together, a final step is yet to be made and developed, a user profile that holds not only basic information. Users and words should be considered as connected nodes, people with similar education and interests have highly similar lexicons, words should have some identifiable characteristics that can help connect similar words together (Bank, Account, Balance are connected to the finance domain), so, not only the word frequency should be considered, but a group of words frequencies should be considered as a set in order to find those connections. With this said, two new different approaches are needed: the former is a deeper semantic approach, in order to categorise and discover similarities between words; the latter is a new approach to define relations and similarities between users (students).

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DIGITAL COMPETENCIES – COLLABORATING, WORKING AND LEARNING ACROSS CAMPUSES

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Introduction

This paper presents Project *Digital Competencies for Collaboration – across Campuses* which is a design-based research project. The project shall illustrate how University College Zealand (UCZ) works with faculty's competencies developing new ways of using technology to empower faculty collaboration across campuses, to create new designs for teaching and to enable new methods of knowledge sharing. Faculty, in the case presented, is located on four different campuses and an increasingly use of technology can connect faculty members as well as link work and learning in new ways. The paper also shows how a design-based approach can improve educational practice.

The project is based on two former organizational initiatives. First, a project called *Learning at UCZ* has founded a strong ground for *Digital Competencies for Collaboration – across Campus. Learning at UCZ* lasted from 2010 to 2012 focusing on how to increase the use of technology to enhance students' efficient learning. All programs and many faculty members at UCZ were engaged in different ways. The project was evaluated, documented and disseminated 2013 http://www.scribd.com/fullscreen/130315494?access_key=key-qhg1yh16yyzru96x5hy. Managerially, the project was anchored in the board of directors. In the dissemination four vital conclusions have been drawn about organisational learning, technology and teaching:

- Knowledge must be shared
- Openness is required
- Balancing technology and face-to-face teaching
- Coherent learning activities – focusing a learning-centred approach (2013, p.80)

It has been four important pointers in the overall design of a new project *Digital Competencies for Collaboration – across Campus*, which is a project smaller in scale but closer to a specific Bachelor program and therefore closer to faculty and development of new competencies.

Secondly, the strategic goals at UCZ have been strong hallmarks in the organizational foundation of project *Digital Competencies for Collaboration – across Campus*, because the board of directors at UCZ has formulated six new strategic goals in 2012, and two of the strategic goals are "Digitalization" and "Blended Learning".

So, the board of directors has initiated, managed, documented and disseminated an important organizational project and simultaneously formulated a clear vision for the organizational priorities and initiatives. Therefore, *Learning at UCZ* as well as the strategic goals have been import drivers in the continued development of faculty's competencies in the new project, which is presented in this paper.

Digital Competencies for Collaboration – across Campus lasts for 18 month – from April 2013 to November 2014. In this paper, the focus is on project design, theoretical framework, results achieved after the first 10 months, and the perspectives for the final period of the project.

Leadership in Higher Education

According to Garrison and Vaughan (2008) it is essential that the management provides policy, visions, and principles, and sets goals, direction and allocates resources if the changes in higher education have to be implemented (p.164-165). However, it is also claimed that faculty needs more than visions to change practice because faculty is firm that the most effective and efficient teaching approaches have already been chosen to enhance students' learning (Collis & Moonen, 2001). Hence, for faculty, visions of a better future for society or for the institution are weak incentives for change:

> *Change for abstract reasons such as the future of the university does not weigh heavily enough to convince them to teach in what they feel will be an 'inappropriate way' for their course and habit (p.61).*

Latchem and Hanna (2001) state that innovation in a university setting depends on support, reasonable timelines and learning infrastructures specifically developed for its faculty. The complexity in the task is also emphasized by Laurillard (2001) when she claims that "the most extreme form of work-based professional updating" (p.226) is needed to enable faculty development at a university level. It is however an important task because it is essential that faculty is enabled to be "drivers of new knowledge about teaching and learning, able to critique and challenge the technology that is changing their profession" (Laurillard, 2012, p.7). It can only be realized, according to Laurillard, when faculty collaboratively reflects on, documents and shares their teaching designs. In the following part of the paper, it will be shown how these reflections have had an impact on the project design.

Social Education Program

In this paper, the specific case is based on the faculty of the Social Education Program (SEP) at UCZ. SEP is UCZ's largest program with eighty lecturers, four leaders, one program director, and two thousand four hundred students at four different campuses. More than 50 % of the students within the program live in rural setting, whereas the rest lives in urban settings. So, the students have different expectation to what a learning environment and learning activities should offer.

ISBN 978-963-89559-7-5

Nationally, SEP is provided as a Bachelor Program in which different disciplines cover all target groups: children 0-5 years, children 6-12; youth, adults, and people with special needs such as people with mental and physical disabilities and social problems. The program has been reformed in 1992 and in 2007. The historical roots of the program can be dated back to the end of the 19th century.

The most significant characteristic of the program is the practicum: All students are engaged in practical work-based activities for more than a year. 74 ECTS-points in the program, which covers 210 ECTS-points, are placed in an institution – a kindergarten, a school, an institution for mentally impaired people, an institution or a project designed for people with social problems .So, learning in practice is a very important part of SEP.

SEP is the largest national program within higher education in Denmark with more than five thousand students enrolled every year – and with twenty-seven campuses all over Denmark. One reason for the large scale of students is that 98% of all Danish children in the age of 3-6 visit kindergarten. In Denmark, the main part of the professionals in kindergarten has completed a BA as Social Educators. So, kindergarten is one of the largest institutions hiring the students from SEP, and the figures more than indicate how SEP has an important social impact on both the social part of Danish society and every child in Denmark.

Faculty Empowerment

In January 2013, the management of SEP at UCZ wanted to initiate a project with focus on development of competencies within faculty. Firstly, the ideas were presented to the Agency for Competence Development in the State Sector (CDSS) http://www.kompetenceudvikling.dk/node/477. The objectives of were formulated as the need to:

- increase faculty's digital competence
- enable new ways to collaborate across campuses
- link faculty work and faculty learning

The overall agenda was to enhance the development of a stronger academic environment.

Secondly, the ideas were discussed with the union representatives at SEP. For their part they agreed in the initiative but they also insisted that faculty participation should be open and based on entirely voluntary.

On this basis, the management design a project-description which the representatives actively supported and CDSS provided SEP with a grant of ½ Million Danish Kroner. In March 2013, all 80 teachers were invited to participate in the project. An application form was designed and 33 faculty members applied, and all of the applicants were enrolled in the project. The principles of openness, transparency, and voluntariness were in focus in the initial phase of the project.

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The design of the application-form forced faculty to motivate their participation, highlight their professional interests and key competencies in relation to three main disciplines in the program. On this basis, seven project groups were formed. The founding principles of the groups were professional preferences and self-assessment of professional skills and knowledge.

In both the design of the application-form and the formation of the groups, the management chose a competency-based approach instead of a technology-driven approach because it was important to emphasize that the project focuses on building new competencies in a collaborative work-based environment with new technologies as a mean rather than a goal. Furthermore, this approach is also grounded in Stacy's generic theory of complex responsive processes which emphasizes the paradox that "the individual and the group are paradoxically formed by and forming each other at the same time" (p.413).

In the application form, all lecturers were asked to express if they wanted to be part of the steering group. 25% of the applicants voiced the wish – and three lecturers with different profiles were chosen. The lecturers represented three different Campuses, different educational backgrounds, professional interests and teaching disciplines. Besides of the three lecturers the steering group composed of a coordinator, a program leader and the head of the program. So, the project was anchored in all levels of the program and representatives from all four Campuses were engaged in the steering group. Also, in this phase openness and transparency were essential in the project design.

User participation in the design and decision processes has been important for several reasons. Firstly, it can improve the knowledge upon which the digitalized collaboration is built and the digital methods chosen. Secondly, it can enable faculty and leaders to develop realistic expectations and therefore also reduces resistance to changes. Design is about changing structures, artefacts, processes, and practice. Finally, it enhances ownership and thereby workplace democracy which is of highly importance in a Danish academic context if sustainable changes are the objectives. According to Hofstede (2005), who has analysed cultures all over the world, the Danish society is characteristic by a low power distance which means that all members of Danish society expect power to be distributed rather equally and therefore lecturers have the right to ask their managers, leaders and even the Minister to explain certain decisions before they are accepted and implemented.

In-House and External Consultancy

The grant of ½ Million Danish Kroner was earmarked external experts facilitating new processes developing faculty's competencies. At the same time, the project was designed so that in-house units have tasks supporting the development of new competencies within SEP. Especially two units, Research and Innovation and Technology-Support were involved in the project with human and technological resources supporting the project groups when they ask for support and supporting the entire project. In the initial design phase, the units have supported the steering group with ideas as well as analysis. Whereas, the project-groups have been supported with concrete training, access to tools, ideas, and a knowledge-base.

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In relation to the external support, three consulting firms were asked to submit bids based on the project-description. Two of the three firms were asked to present their proposal to the steering group. Spark (http://www.sparkcph.dk) presented the most dynamic and innovative project- and facilitation plan with emphasis on visualization, training and collaboration. Spark was chosen as project facilitators because the steering group expected them to bring new ways of thinking and acting to faculty as well as to the steering group.

Face-to-Face-Activities

In 2013, two workshops and two conferences have been important face-to-face milestones in the project.

In the first workshop, it was firstly important to define a shared goal for each project group. Secondly, each project group shared knowledge about each member's technology profile. So, every group created an overview of the technology competencies. All overviews were shared face-to-face, photo documented and shared on the web based platform. In this way, faculty has shared their initial technology competencies across the project groups. First, it means that faculty sees their own competency profile clearly. Secondly, it gives the group access to knowledge about each other – and it opens up for new professional relations due to interest, strong competences or need for new competences. Finally, it also leads to strengthen the knowledge base of the steering group; having access to concrete visual documentation of existing competencies of the groups means that each faculty member as well as the steering group has a shared basis on which the need for new competencies within the groups and across the groups can been identified.

In the first workshop, faculty was introduced to a new learning platform: Podio, which offers a web-based platform for organizing communication, content and data in different workspaces. On the same day it was introduced all participants succeeded in uploading materials produced during the first part of the workshop. So, the platform showed to be as flexible and easy to use, as Spark has claimed. Within the steering group as well as in the group of faculty there was an initial resistance because UCZ already uses Fronter, which also is a web based LMS. Spark convinced the steering group – and the use of Podio on the first day convinced the main part of faculty. . So, it has proven to be a good decision to experiment with a platform familiar to the social media Facebook, which is easy to use and to customize with apps when it is needed – it has definitely resulted in new experience and competencies within faculty and management.

Until now, Podio has been used to share content – such as research overviews, articles, videos produced by the consultants, videos produced by faculty, project plans and minutes from the group meetings and the steering group. Podio is also used as the platform for asynchronous communication in the project groups and across all groups, consultants and steering group. Web based tools such as Google Docs and Doodle have been used for co-creation and group invitations.

ISBN 978-963-89559-7-5

In the second workshop, the project groups worked their project plans and goal with support from the external facilitators. Furthermore, three sub-workshops were conducted focusing on 1) design principles 2) social media 3) video documentation with presentations and support from both in-house and external consultants.

Between the workshops, the program director has visited two of the campuses to discuss the project, its design and outputs with faculty on location – in this way all groups have been represented in a dialogue with focus on the project and its processes as well as the challenge to share knowledge and experience with faculty members who are not part of the project.

It has also been on the agenda a several video meetings in the group of leaders, so that all leaders have been informed about the initiatives and processes in the project. On one hand, they have had the opportunity to comment on how the project impacts their part of faculty. On the other hand, they also have had the chance to influence the project and its processes.

In November 2013, all faculty members participated in a conference designed and conducted by Research and Innovation with focus on *Subjects and Professionalism within SEP*. Participants from *Digital Competencies for Collaboration – across Campus* were engaged as presenters as well as audience. In different workshops, knowledge and experience of digital projects carried out in collaboration with students, professionals, and researchers were presented and discussed. All projects have been published in a paper-back version as well as in a digital format http://ucsj.dk/fileadmin/user_upload/FU/Publikationer/Fag_og_faglighed_i_bevaegelse.pdf. 40% of the presenters also participate in *Digital Competencies for Collaboration – across Campus.* Although there has been an overlap between people in the two projects and the head of program explicit has required the researchers and the involved participants from faculty to focus on connecting the two projects, it has been a challenge to link them together and share mutual goals. It is an overall challenge to link different projects together even though participants, many objectives and activities are shared. In *Digital Competencies for Collaboration – across Campus* the steering group has from the beginning decided to work with this specific challenge. We have not succeed yet, but we still find it important to optimize processes and systematically connect participants and new knowledge so that projects not are seen and experienced as isolated islands but more as beads, on the same string. Here, digitalization adds new opportunities which we will integrate in n furtherance of designing the project.

Finally, head of program and one of the external consultants gave each a presentation at a conference for the entire faculty in December 2013. In this way, the most important processes and results have been shared with all 80 lecturers and all leaders at the same place and at the same time. So, during the first 6 month there have been different presentations, dialogues, feed-back and feed-forward-activities conducted face-to-face for the entire faculty, for all project-groups, for some project-groups and for faculty from two of the campuses. It has been a strategic choice to use a variation of presentation and dialogue formats because it also has an impact on the empowerment of faculty and the foundation for the steering group.

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On-line training

As an important part of the initial phase of the project, all project-groups have been systematically trained to use Adobe Connect for efficient meetings. Faculty at UCZ has had access to Adobe Connect for some years, many have been participants in sessions in Adobe Connect, and some have used it for meetings and teaching. However, the training in the project has already had an effect on faculty. Spark has delivered a very professional concept for on-line-training of on-line groups. In two hour sessions project-groups has been trained in the most important parts of how to design and conduct a virtual meeting. In seven qualitative interviews with representatives from each project-group, faculty has highlighted importance of participation in concrete training and reflections upon the experiences. For faculty it is important that these kinds of exercises are designed and conducted by an expert. A web based evaluation supports the qualitative results. The evaluation shows that more than 90% of faculty have developed knowledge as well as skills to use digital solutions to create efficient meetings.

The Project Groups and their Plans

All groups have defined projects with focus on using technology in their work. Some project groups want to design web pages for their students, other groups work with video documentation, digital portfolio and social web tools. The overall agenda in all groups is however, how faculty collaborates and learns in new ways with the use of digital tool. Nevertheless, it is a challenge for faculty to focus on their own competencies instead of solutions for their students.

The steering groups as well as the external consultants have worked systematically with different forms for time-outs and feedback to ensure that the student-oriented actions do not take all the time and all the resources. On one hand, it is important to disconnect some processes and actions to ensure that the focus stays on the development of faculty competencies. On the other hand, authentic and realistic projects are important drivers in faculty's work and development. Here they find motivation and engagement whereas their own skills and ability to collaborate and network across campuses intuitively have a lower priority.

A Design-Based Approach

A design-based approach has set the direction for the project design and evaluation. It provides a framework which makes critical multimodal evaluation, user-participation and researcher-involvement important parts of the educational research. Design-based research can be defined as "a systematic but flexible methodology aimed to improve educational analysis (Wang & Hannafin, 2005, p.6-7). In this case, the approach has been a guideline in the first period of the project. Right now, the project moves into a re-design based on the evaluations and analysis conducted until now. Some of the new initiatives decided in the steering group are:

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- Enhancing the virtual collaboration across the project-groups
- Integrating researchers into the work in the project-groups – face-to-face as well as virtual
- Linking the project more directly to other projects in SEP
- Enhancing the steering groups competencies to design and conduct efficient meetings in Adobe Connect

The steering group expects these changes to add further means to enhance the overall agenda of developing new competencies and collaboration across campuses. It is an important point of attention that the researcher in a design-based research due to the involvement is bias. Furthermore, in this case the researcher is biased in another way because head of program also has the role as the researcher. Ethical considerations and leadership blindness are part of the reflections of the researcher. Writing this paper is however one way to address these reflections. A presentation of the initial phase of the project gives faculty access to analysis and reflections of the researcher and therefore the paper provides opportunity to raise critical voices and other perspectives which also can improve the educational practice within SEP.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

ONLINE OR BLENDED – COMPARING ONLINE AND BLENDED COURSES

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Abstract

As broadband internet access and LMS technology are rapidly expanding, and ICT is becoming a part of the teacher education curriculum, online learning is growing in all parts of the world in order to open education to everyone. Online collaborative work can bring specialists to every class, connect between students in different countries and from different cultures and adapt learning to the flat world. This research compares blended and online models of teaching in two versions of the same course at a teacher college in Israel. Each learning activity in class in the blended model has become an online activity in the online course. What is the contribution of an online course to students as compared with the contribution of a blended version of the same course? An achievement test, questionnaires, course products, interviews and statistic tools assisted to measure, investigate and estimate the contribution of each model to the development of students' skills, and the advantages and disadvantages of each model. Results indicated that an online course, which uses state-of-the-art ICT and major pedagogical considerations in organizing its online learning activities, has the potential to create meaningful learning.

Introduction

As broadband Internet access and LMS (Learning Management Systems) technology are rapidly expanding, and ICT (Information and Communication Technologies) are becoming a part of the teacher education curriculum, online learning is growing in all parts of the world in order to open education to everyone. National programs are provided in the states and Europe (OECD, 2011) as well as in Israel. The rational is mainly the idea that integrating ICT into teaching and learning will prepare the students to the changing world (Resta & Carroll, 2010; UNESCO, 2009). Those programs promote the integration of technologies in schools on one hand and the training of teachers to integrate ICT in teaching on the other hand, preparing them to the 21st century. Teachers are required to adapt teaching to the changing world in relation to the pedagogical and technological aspects (Goldstein et al., 2012). As part of preparing teacher-students to 21st century skills, online courses are becoming part of the curriculums. This research examined an online learning course in a teacher education college in Israel and its contribution to the students, as compared with its blended course equivalent.

Literature Review

Transition from the traditional teaching to novel teaching methods requires deep learning in order to develop new knowledge. Mishra and Koehler (2006) defined it as an intersection of content, pedagogical and technological knowledge (the TPaCK model), meaning that educators should acquire not only technological skills but, more important, they need to be familiarized with or invent new teaching methods to implement teaching technologies in their specific subject matters.

The Israel Ministry of Education has been implementing computerized learning in schools since the early 1990s as part of the "Science and Technology" Curriculum. Schools received computers, and new books with learning software were produced. However, the OECD report on PISA scores has previously placed Israeli students under the average score in most ICT skills tests (OECD, 2011). In response to the relatively poor achievement of the students in national scores, the Ministry of Education launched a new program in the 2010-2011 school years to adapt the education system to the 21st century through the use of innovative pedagogy that integrates ICT. This ongoing program aims to equip pupils with the relevant skills for optimum functioning in the 21st century ("21st century skills"). Teaching is adapted to suit the diversity of the students, to break down barriers between the school and the outside world, and to make maximum yet enlightened use of technology to promote the teaching processes at the pedagogical and management levels (Israeli MOE, 2011). This initiative focuses on preparing tomorrow teachers to develop pedagogical innovations and teaching skills and empower them to lead school staff in the future in effective ICT integration in education (Israeli MOE, 2011; Melamed et al., 2010). In addition, student-teachers are required to be trained in online learning because of the need to online teaching in the education system (NACOL, 2007).

Teacher colleges that are preparing teachers for the 21st century should develop pedagogical perceptions, 21st century skills and ICT oriented teaching methods. Teachers who are modelling online teaching and providing learning experiences could influence students' perceptions and attitudes (Cochran-Smith, 2003). Practice in online environments could lead teachers to include pedagogies based on those environments. This is important because of the natural environment in which children are living in today and the image of schools as non-relevant for future life. Nevertheless, online learning is not enough to make the real change in school but it might lead schools to be more relevant for pupils' life (Rotem & Peled, 2010). Using online collaborative work could bring specialists to every class, connect between students in different countries and from different cultures (Shonfeld, Hoter & Ganayem, 2013; Resta & Shonfeld, 2013) and adapt learning to the flat world.

Bonk (2009) describes the availability of education from anywhere at any time with computers and Internet access. New technology-based teaching methods and processes have been

ISBN 978-963-89559-7-5

developed and incorporated in active learning processes. Researchers agree that students taking online courses are required to possess self-learning abilities, maturity and high self-discipline, high motivation, the capability of expression and communication in writing, time organization skills, as well as the ability to manage an online learning environment (Trentin, 2002). Furthermore, Cavanaughs et al. (2008) review of the literature pointed to greater improvement in critical thinking, researching, use of computers, independent learning, problem solving, creative thinking, decision-making, and time management skills of online students compared to their counterparts in traditional classroom settings. Unsurprisingly, the online learning environment poses some challenges to student learning as well as numerous benefits. The information revolution effected significant change in life. Broad accessibility increase the use of online learning in various education systems. Online learning is not limited in time and place, enables flexibility and personalization in learning. Nevertheless, it is not easy to integrate it in school and prepare teachers to use ICT in their teaching (Even & Selvi, 2010).

In the past, distance learning used to be through mail, radio and television where all learning activities were asynchronous. Therefore, online learning seems to be asynchronous taking place in LMS systems such as MOODLE. Those serve as a space for managing the materials, the activities and the communication between the teacher and the students asynchronously (Moore & Kearsley, 2012). However, the latest technologies, accessibility to Internet and the wide broadband promote synchronous learning, integrating text, audio and video in online environments such as Skype, Elluminate or Hangout (Roseth, Akcaoglu & Zellner, 2013).

Integration of the different environments enables to suit technology, pedagogy and content to students needs and to the requirements of the teaching and learning settings (Mishra & Koehler, 2006). However, at the design level of the online course it is important to get the right decisions about the structure of the course relating to the desired pedagogy. For example online collaborative pedagogy requires the use of WEB2 tools and etc.

Research done in the last 20 years show no significant difference in achievement tests comparing students grades in online courses and traditional courses. Nevertheless, it is important to distinguish between success of different learners in different teaching methods and in the different styles of teaching and learning. More research is needed to understand the efficacy of online environment to different students (Moore & Kearsley, 2012). Thus, research on online courses and blended courses could contribute to the knowledge of designing online courses, building it and integrating it in the educational system.

Study Context and Subjects

This study compares two models of teaching in two versions of the course "Teaching and Learning in Computerized Environments" in a college of education in Israel. Two groups of undergraduate students participated in the study. They randomly registered to one of the courses according to their study program. In one course (N=18), the model of teaching was online with only one face-to-face meeting, while the rest was online (20 assignments). In the

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second course (N=18), the model of teaching was blended, where most of the teaching took place in five face-to-face meetings accompanied with a course site (8 assignments). One of the researchers taught the courses and the other was a partner in planning the course and making decisions relating the strategy and assignments during the courses. Both versions of the course used The Moodle platform as the online environment. The online course was design while assuming a significant difference between the two models of teaching and learning. Each learning activity in the F2F class meeting of the blended model has become an online activity in the online course. For example, watching a movie in class and discussing it turned into an online assignment including online discussion. This strategy enabled the researchers to compare each learning activity that took place in class with its online equivalent.

Research Questions and Hypothesis

What is the contribution of the online course to education students versus the blended course?

Sub-questions:

1. What is the contribution of each model to the training of students to integrate ICT in teaching, as students and as teachers of the future?
2. What is the contribution of each model to the student's perception about the integration of ICT in teaching?
3. What is the contribution of each model to the achievements of the student?

The research hypothesis is that the online and blended models of teaching will have a different effect on the students regarding their achievements, attitudes, self-efficacy enhancement and overall learning experience. Therefore, it is interesting to compare the different models of teaching within the same population of students.

Study Type

This is a mixed-methods study. The research question was investigated using quantitative methods including questionnaires with closed and open questions and an achievement test. However, various qualitative research methods were also included to help understanding the differences between the students' learning models: interviews were conducted with five students from each course (each model). Preliminary findings helped to develop the interviews questionnaire. There was also a qualitative analysis of the products in the courses in order to estimate the contribution of each model to the development of students' skills, and the advantages and disadvantages of each model. Rights of the participants were ensured by anonymous questionnaires and interview data saving names. The data was collected at the end of the course and did not affect the assessment of students.

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Procedure

During the course, at the end of each of the five study units, there were two reflection assignments: reflections of what the students thought was the most important thing they learned in that unit, and reflections of their thoughts and feelings toward the course. At the end of the course, the students took the exam and filled two questionnaires: One was an adaptation of the MOFET research network questionnaire (Goldshtein et al, 2012). The other was the standard feedback questionnaire that Kibbutzim College randomly distributes at the end of courses, relating all aspects of the course and the lecturer. In addition, there were interviews with five students from each course.

Preliminary Results

Six variables were defined in the questionnaire and were checked for variability: Teaching process, Contribution of the course to teaching and learning, Contribution of online tools, Self-learning, Satisfaction, Accomplishing learning tasks and Use of technology for teaching and learning. The reliability (Cronbach's Alpha) of the different items in each category in the questionnaire was very high, as presented in Table 1.

Table 1: The reliability of the different items in each category of the questionnaire

Cronbach's Alpha	Number of items in category	The Questionnaire category
0.84	11	Teaching process
0.82	5	Contribution of the course to teaching and learning
0.69	9	Contribution of online tools
0.90	15	Self-learning
0.77	8	Satisfaction
0.72	10	Accomplishing learning tasks
0.75	6	Use of technology for teaching and learning

The college feedback questionnaire showed that the students appreciated both courses and the scores were high in the two models of teaching. In the blended course the overall score was 9.20 (10 was the Max) while in the online course the overall score was a little bit higher, 9.34. In the category of student's contribution to the course, the score of the blended course (9.04) was higher than the score of the online course (8.42) while in relation to their peers' contribution the online score (9.26) was higher than the blended course scores (8.82). The online course students ranked the course organization higher (9.30) as compared to the score in the blended course (9.04).

Analysing the course products and activities showed no differences in activities pattern in individual assignments, while in the collaborative assignments, especially those requiring discussion, there were differences. Only few students participated in class discussions, while in the online course most of the students participated.

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Students from the blended course emphasized the ICT tools they learned to use while students from the online course emphasized self-learning, peer teaching and various pedagogical strategies. As one of them wrote: "*It enabled me to take responsibility on learning, to get involved in learning and to put efforts in learning*".

Comparing the results of the seven variables Table 1 shows differences between the two groups. They were not significant, yet they were consistent. The online students scored higher in important parameters: (1) Contribution to learning including the knowledge to choose technology and use it in class for teaching and learning, and the ability to guide other teachers in integrating ICT in teaching. (2) Satisfaction from the methodology and communication in the course. (3) The overall process in the course including the online environment, the teaching method and the assignments in the course. Figure 1 presents the results:

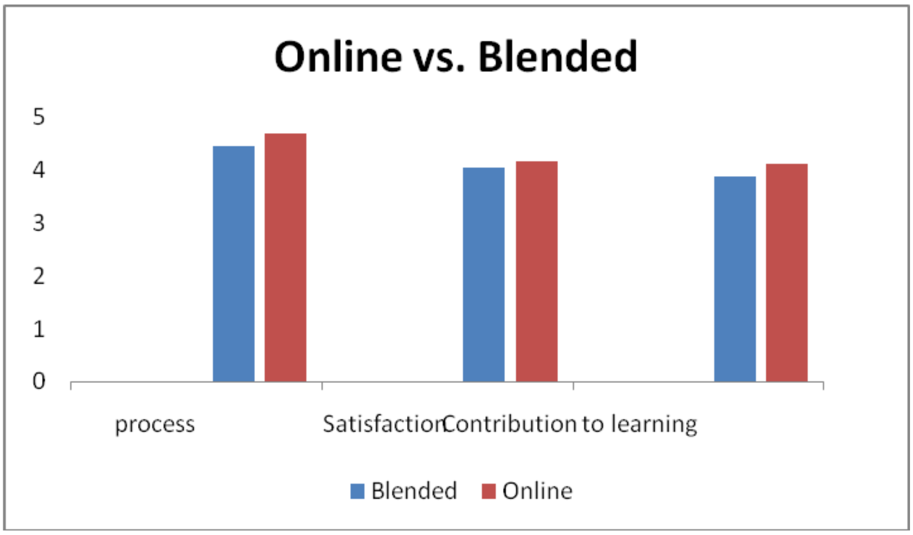

Figure 1. Differences between the scores of online and blended learners in evaluating the course

The open questions showed differences as well. Students from the online course emphasized the new ways to teach and learn. X. From the online course claimed: "*The course opens my mind to more ways to reach students*". *Y*. from the online course emphasized the self-learning skills and related them to his teaching experience: "*I think the course helped me by letting me experience self- learning in a way that I would like my students to experience too*". *V. continued to explain the relevance to his teaching by saying: "I think I got tools that will help me adjust my teaching to the students' different learning styles*".

Students from the blended course emphasized ICT and online tools: A. related to the tools and said: "*I was contributed by practical tools*". B. claimed that he changed his mind about e-learning as part of teaching but emphasized the tools as well: "*The course has contributed to my understanding that E-learning can and should be incorporated in teaching, and exposed me to online tools for such teaching*". C. explained to relevant to teaching but related as well to the different tools he would use, as he wrote: "*The use of computers (and smartphones) and whatever they offer have helped me and will help me teach in a more suitable way for youth, a way that will make them more involved in the process*". It seems that tools attracted the

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students in the blended course more while the online students put more emphasize on the methodology of learning.

Discussion

Differences in students' feedback to the course revealed the capability of online courses to demonstrate various methods of organizing course materials. There were differences in students' perceptions of their contribution to the course. The online students ranked higher the contribution of peer teaching to the course. Peer teaching is one of the recommended methods in training students and teachers in order to expose them to the 21st century skills. Peer review and peer teaching is the second step for collaborative learning (Salmons, 2011) However, it was surprising to find that online course students ranked lower their contribution to the course than the blended course students although the students of the online course dealt with more assignments and worked as self-learners. This is in spite of the assumption that students taking online course can appreciate their self-learning abilities (Leasure, Davis & Thievon, 2000).

Online courses can use unique online tools that have the potential to change pedagogy as was found while comparing each class learning activity to its online equivalent. In class discussions, only few students participated, and all could hear each answer and relate to it, thus students that did not read the discussed article participated in the discussion. Online QA forums (require submitting an answer in order to see and to participate in the discussion) guided each student to post an original answer without seeing any other answers. Only after publishing the post, the student could read others posts and reply some of them. This is possible only in online discussion and cannot happen in class discussion. After all students phrase their thoughts in a relatively short original answer, they compare it to the other opinions and study other points of view and ideas in the forum. This is where meaningful learning can begin. This pedagogical strategy was also achieved by using personal blogs, and after the students posted all personal posts, the blog was switched into common (collaborative) blog, which enable peer-to-peer comments and replies. In this research, the online discussions were wider, richer and more contributing according to students' opinions (and the researchers' indications) than class discussions. This is in light of the literature that describes online learning as catalysis for creative learning and critical thinking (Cavanaugh's et al., 2008). The use of different tools might result in pedagogical biases and those can be found in technologies such as online discussion platforms and other tools (Scardamalia & Bereiter, 2008).

The differences between the two groups were not significant, yet they were consistent. The online students scored higher in all important parameters. It seems that the differences between the groups were not significant for two reasons: one – the groups were small (N=18 each). The other – both groups had similar educational perceptions. This suggests further research with larger and more heterogeneous groups.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

ONLINE MODELS FOR PROFESSIONAL DEVELOPMENT OF A DISTRIBUTED TEAM USING VIRTUAL TOOLS – THE DYSLEXIA IN MODERN LANGUAGES PROJECT

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Introduction

This paper presents an online model of professional development for a distributed team of teachers of languages in a distance learning context. It presents a model that uses both synchronous and asynchronous tools, as used in previous projects by the project team and their colleagues as staff developers to bring together teachers, variously to develop online skills and practical knowledge to underpin the support of distance learners. This paper shows the model and its evolution in this particular project. With a focus on developing teachers' pedagogical expertise in the field of modern language teaching and specific learning differences, SpLD, and dyslexia in particular, it shows the use of a range of virtual tools to facilitate the shared gathering of information and the writing and reversioning of learning materials to support adult language learners with dyslexia in HE. This paper proposes to show the teachers' engagement with the shared gathering of knowledge and collaborative production of open educational resources, OER for supporting these students.

The study covers a staff development project which took place at the Department of Languages, Open University, UK, between December 2012 and July 2013. The project rationale was the identification by teachers and their academic managers that many language teachers in distance learning felt they could be better prepared to support adult language learners with dyslexia. These are very experienced teachers who have excellent practice in language teaching and in facilitating the development of learning strategies. Given that inclusive language teaching is regarded as an essential aspect of their professional practice, teachers welcomed the opportunity to develop expertise and good practice in that area.

The present paper will describe the design and different stages of the staff development project. It will discuss the affordances and shortcomings of the different virtual tools, and how combined they allowed the participating teachers to reflect on their practice and to create and reversion teaching resources in the light of their reflection.

Contexts

Established over forty years ago, the UK Open University attracts a wide variety of students who study part time for a comprehensive range of qualifications. They are typically older than traditional campus-based students and have a wide range of living situations and economic activity. Approximately 7.5% of the student body are registered as having additional requirements[1], which includes dyslexia.

Historically delivered by correspondence tuition, Open University courses now make extensive use of online tools. The model of print materials for home study, maybe with some televised lectures, supported by a teacher who, amongst various distance support practices, gives periodic face-to-face group tutorials, has been superseded by a blend including computer mediated learning. The evolving online practices have enabled new learning communities to build up. These can be for students, either as a designed part of the course or more casually occurring online mutual support. For the teachers, these can enable the shared development of knowledge and good practice, as in a project such as the one described in this paper.

Since 2009 Languages students at the Open University have been supported by blended learning (Nicolson et al., 2011). As part of the blend, teachers make use of synchronous and asynchronous online tools to support their student group and at times use them for extra sessions to reinforce and facilitate learning for individual students with special learning needs. Languages students are also encouraged to meet outside timetabled tutorials, to practice their speaking skills. The use of online tools promotes cultural understanding through more effective communication, enhancing employability and social mobility, as emphasized in the Common European Framework for Languages (CE, 2001, p.3).

Context of professional development for part time teachers at the Open University UK

The support and development of part time teachers at the Open University has long been the responsibility of their academic managers. The nature of this support has reflected the move to e-learning. At a time when the tutorial element of the students support was typically one face-to-face meeting a month, staff development was a once or twice-yearly event. With the progressive integration of online tools into student support, opportunities for guided reflection and skills development for teachers has mirrored this. As the tutorial support timetable for all languages students became a blend of online and face-to-face sessions, staff development reflected the increased variety of modes. This proliferation of techniques and resources that expands to reflect available media is a benefit of the digital age (Nicolson et al., 2011, p.233).

[1] Learning Accessibility Guide, Open University. http://www.open.ac.uk/inclusiveteaching

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The use of a dedicated Moodle website as a project core, with a forum for asynchronous communication and a synchronous space for organization and themed discussion is a model used successfully for development activities for between 10 and 20 participants. In 2008, for example, a jointly-run collaborative project organized by members of the department of Languages of the Open University UK and colleagues at the Universitat Oberta de Catalunya (Ernest et al., 2011) saw part time teachers further their skills with online tools, sharing their respective experience. Research into other learning projects on a virtual platform underlines the benefits of the structured, combined use of online tools with joint working to open up horizons, fostering co-operation and encouraging problem solving strategies (Pellas, 2014).

With the introduction of an online repository for sharing teaching materials LORO[2] further projects were undertaken to encourage its use. LORO was created in 2009 under a JISC funded project, using Eprints software (Comas-Quinn et al., 2011). It now contains three classes of language teaching materials for sharing. Firstly, there are the tutorial materials produced by the Open University Department of Languages. These are provided for the part time teachers to use in online tutorials, as resources they may choose from to support the students in their groups. Secondly, there are materials uploaded by the teachers themselves. Finally, there are materials uploaded by the wider language teaching community. Set up as a repository for sharing tutorial resources with staff who work in distributed teams to support distance learners, LORO also operates on an Open Educational Resource basis and makes materials available to any language teacher who registers on the site. LORO is open for browsing, inspiration and ideas sharing. Contributors must choose a Creative Commons category and they must confirm the material is theirs to publish, with acknowledgement of any previous versions or sources they have drawn on.

In 2011 the developers of LORO and three academic managers (Staff Tutors) came together to encourage the use of LORO with a scholarship project for a group of interested part time Open University language teachers. Building on the use of LORO as a repository for downloading materials created by others, the project aimed to enhance more active use, to include sharing and uploading. The teachers who elected to participate in the project were brought together online to write, comment on and reversion resources, with a view to giving them a firm grounding in open educational resources (OER) and through the project scaffolding their engagement with open educational practices (OEP) (Beaven, 2013; Duensing et al., 2013). The project structure promoted working together in virtual spaces of a distributed team with joint purposes, with the benefits of a community of practice and breaking the possibly isolation of the distance teacher.

This staff development model involves bringing together of a project team of teacher developers for project design, the seeking of expressions of interest from interested part time teachers, then a series of tasks, generally with guided forum activity interspersed with

[2] http://loro.open.ac.uk

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synchronous meetings. This model includes opportunities for reflection and discussion and is illustrated in the figure below:

Table 1: Generalised project schedule (adapted from Duensing et al., 2013)

Stage	Dateline	Action	Tools
Preparation	Over a 4-month-period prior to launch	Project team meetings to design and plan	Synchronous and asynchronous conferencing
Recruitment	Month 1 (1-hour-session)	Invitation Briefing meeting for all interested teachers	Advert ,email Online room
Training and discussion	Month 2 (2-hour-session)	Project Launch (participants and project team). Group formation and planning discussion	Online room
	Month 3 (2-hour-session)	Presentation and discussion of work	Online room
Group work	Month 2 to 4	Project activity	Synchronous and asynchronous conferencing. Email
Progress meeting	Month 4 (2-hour-session)	Presentation and discussion of resources	Online room
Completion	Month 4 to 5	Finalising and uploading of resources, peer commenting, final report, dissemination	Online repository

The Dyslexia and Modern Language Learning (DMLL) project

The staff development project on the theme of dyslexia and modern language learners in HE arose out of a number of part time teachers in the Department of Languages at the Open University UK seeking the guidance of their academic managers as to how best to support such students. The project was set up to strengthen the support and develop understanding, using the same tools that the teachers have available for use with their students. The virtual tools were used in new ways and a little used tool was added. The rationale was to provide a framework for the part time teachers to discuss their experiences, gather information, reflect, adapt their own teaching resources and share good practice.

The project ran from December 2012 to June 2013 and was managed by a Project Team consisting of four academic managers and staff developers (Staff Tutors), who worked with a cluster of twelve part time language teachers across a range of languages and levels, and a member of the University accessibility and disability team. The project is described below through a focus on the virtual tools and the uses to which they were put. The project sought to answer teachers' questions, "How can we make adjustments in our teaching to accommodate the individual learning needs of dyslexic learners?" and "How can we best support our dyslexic students?" As a first joint action, the participants worked with a shared purpose, to gather a literature of pedagogy and accounts of practice from a variety of contexts.

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The elements of the project workspace

The project, on a Moodle workspace, consisted of four top level links to different online tools. There was a project text-based forum for the project, a synchronous meeting room (Elluminate), a Moodle repository and a wiki. Each of the virtual tools had a particular purpose within the project, as described below.

The text-based forum

The Moodle forum was the spine of the project. It was used to set and maintain the direction of the project as well as a point of reference. The project team shared responsibility for moderating the forum, including welcome and information messages. The forum, then, is an asynchronous tool, which enabled participants to post when they had time available, one of its prime advantages. It gave structure to the project, with details of particular tasks posted for particular time windows, for example the gathering of information about supporting students with dyslexia from a variety of sources, and later the application of new strategies to teaching materials. There was a fluency to the interchange, with no postings remaining unacknowledged or unanswered for long. An organisational advantage of a Moodle forum is the threads that can be set up easily. Teachers were encouraged to set up threads for their project working groups of 3 to 4, split by areas of interest in a particular language or type of activity. As the various strands were not closed, all participants could read them and post comments. The forum aspect of the project worked well because all participants were familiar with the tool and respectful both of the strands as self-contained conversations and of each other as fellow professionals with valid opinions. The forum remained active and easy to navigate, and an area of relevant information exchange even after the formal end of the project.

The synchronous meeting room

Experience of online projects has shown the need to factor in training and development time (Ernest et al, 2011) in the use of new tools. An introduction to synchronous online conferencing is more significant than skill building for forum use. The participants in this project, however, were already skilled users of audio graphic web conferencing. Another salient factor for this tool is that synchronous meetings require particular times in common to be made available by the busy members of a distributed team. A timetable was issued at the outset of the Dyslexia and Modern Languages project and participants asked for their commitment to attend. In the synchronous meetings each phase of the project was explained and discussed. In an early meeting, participants exchanged experiences and information from the first task, the literature review. In a later one they discussed strategies to make materials accessible to dyslexic learners, and further on in the project presented their materials and gave peer evaluation, as shown below:

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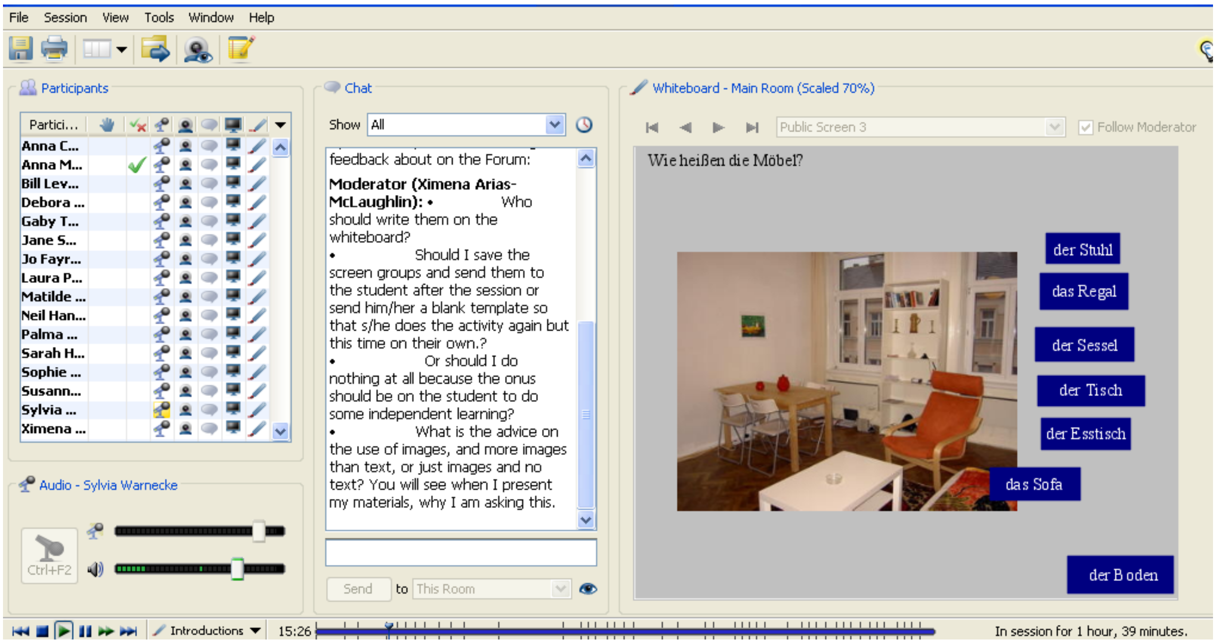

Figure 1. Elluminate meeting

Throughout the project the Elluminate room was available for small group meetings, for example to prepare presentations and later in the project some peer observation of online teaching with the newly created materials took place.

The repository

The Moodle repository was used for the collecting and sharing of references and scholarly publications of existing research on dyslexia and for the gathering of general support guidelines for students from the OU Disability and Accessibility experts. Some participants also uploaded information about other relevant experience. The Moodle repository was used at some points for sharing of materials and 'how to' guidelines. The collective literature review and sharing of expertise from other educational sectors and contexts was a distinctive element of the Dyslexia in Modern Languages in HE project. By its use the participants shared their variety of contexts, experiences and reading, and therefore built joint knowledge as a community, based very much on their diversity as teaching professionals.

The wiki

In the later stages of the project, participants collaborated to draw together their reflections and discoveries into a *Guide to Good Practice* for supporting Open University language students with dyslexia, for the use of other teachers. One project participant suggested the use of a wiki rather than the repository for this work. The wiki, a tool available in Moodle, has the advantage that changes by a number of contributors can be made to a single version of a document. The inclusion of a tool suggested by a participant was a positive feature, which helped progress the combined work on the *Guide*. Later feedback suggested it was the least popular of the tools, possibly due to lack of familiarity and insufficient planned strategy for its use.

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Open access "dyslexia-friendly" resources

The project participants assembled advice such as reducing cognitive overload by careful staging of the introduction of content. They learnt about and experimented with the use of colour, sequencing and style. They exchanged activities with word game structures and attractive visuals with a very clear purpose in the learning activities. As experienced Open University Languages teachers, they were all familiar with LORO as a location for finding materials, though not necessarily uploading their own. Previous staff development projects have encouraged the used of Open Educational Practices in LORO and the uptake of the underused comment function (Duensing et al., 2013). The DMLL project gave participants step-by-step guidance, both in a synchronous session and in the forum of how to upload their materials with a 'dyslexia friendly' free tag. In consequence, all 18 resources associated with the project can be retrieved with a single search.

The dyslexia friendly resources reflect the teaching interests of the participants, the shared interests, and their students' needs in spring 2013. For example, the Italian teachers created 'dyslexia friendly' resources on the use of Italian pronouns and pronunciation for beginner learners:

Figure 2. Italian direct pronouns activity for beginners (http://loro.open.ac.uk/3364/ and http://loro.open.ac.uk/3347/)

The levels of the resources span absolute beginners to Open University level 3 (CEF B2/C1). As well as Italian, there are resources for Spanish, French, German, Chinese and English for Academic purposes, several of which have explicit guidance in the teacher notes of how they might be further adapted across languages.

Conclusions

By the use of a number of virtual tools in a structured staff development project; the synchronous room, text-based forum, Moodle repository, and wiki, teachers were able to develop their knowledge and expertise for supporting students with SpLDs, in particular dyslexia. The tools enabled them to share good practice amongst themselves, gain confidence

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and experience, to produce a *Guide* for the use of other teachers and to upload 18 examples of 'dyslexia friendly' resources to LORO to be shared with colleagues and the wider language teaching community on an OER basis. As one participant commented:

> *Working with others has been very successful. Sharing ideas and expertise with colleagues meant that we complemented each other and learning took place through sharing.*

As part of the successful joint learning experience, firm insights were gained:

> *I thought that dyslexic students all had similar characteristics and faced the same difficulties. I now know that dyslexic students' characteristics and needs may vary and that they also have much strength which should be tapped*

Collectively, participants concluded that good practice for dyslexic students was generally good practice for all. By working together collaboratively online with a shared aim of learning how best to support dyslexic language learners, the part time teachers enlarged their professional skills. They did this within a project framework that was itself developed by the experience. This paper shares the project framework, discusses the detail of virtual tool design and use, and touches on the content, now available on an open educational resource basis.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

HYBRID LEARNING ENVIRONMENT IN HIGHER EDUCATION: CONCEPTUAL MODEL DIMENSIONS OF TEACHERS' COMPETENCE FOR E-LEARNING IMPLEMENTATION

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Introduction

In the past few years, under the influence of different trends, many higher education institutions have made great efforts to improve the process of adopting e-learning, as well as to enhance its quality. Hybrid learning environment is particularly significant e-learning model which is in this paper defined as systematically modelled educational environment. Based on the requirements and characteristics of the immediate learning environment (students and educational content) and wider learning environment (institutions), the hybrid environment is the origin of choosing and connecting the learning activities in traditional classroom (with or without the use of technology) with online learning activities in virtual learning environment (e-learning system), in addition to the mandatory interaction with the aim of successful realization of the educational goal. In practice, different hybrid forms can be created and, according to Allen et al. (2007), the ratio between two environments is around 30% to 70% with obligatory online discussion. It is important to point out that virtual learning environments are built in different e-learning systems (institutional or cloud) that represent one of the significant information subsystems of numerous higher education institutions aspiring to become virtual universities.

For quality application of any e-learning model, Marshall and Mitchell (2004) emphasize the importance of maturity for every educational component and this paper puts the main focus on personal competence of higher education teacher for e-learning implementation as one of the key participants in the creation and execution of the educational process. Ehlers and Pawlovski (2006) claim that teacher competence is one of the important categories of quality standards in e-learning.

The implementation of e-learning technology in academic practice is not a trivial matter since it includes wide range of knowledge, skills and competencies in different scientific areas (pedagogy, technology, sociology, psychology, etc.), especially while creating hybrid learning environments. It is important to point out that the usability of virtual learning environments can be considered from the pedagogical and technical aspect (see Zaharias & Koutsabasis, 2011). Defining the factors related to teacher competencies for e-learning implementation poses a great challenge for many experts, and it is crucial since the existing vocation of higher education teacher needs to be upgraded with certain qualifications from the field of e-learning. Furthermore, it is significant for *human resources management* in higher education institutions, i.e. for the development of new ways of *knowledge management*.

This paper will present a theoretical framework of literature research of factors concerning teachers' acceptance of technology and innovation in the field of e-learning and competencies for its application in higher education institutions. Based on the research findings, the dimensions have been singled out and described, as well as factors of conceptual model of teachers' competence for e-learning implementation in hybrid learning environment, as a foundation for future empirical studies and guidelines for teachers' professional growth. In the first part of the following chapter, a general notion of competency has been defined and characteristics of existing concepts and competence models have been pointed out. The chapter continues with the problem of defining the levels of competence for e-learning in hybrid learning environment. It all results in the definition of conceptual model dimensions of teacher competencies for e-learning implementation in hybrid learning environment, and key components and selected factors are specified within their framework.

Conceptual model dimensions of teachers' competence for e-learning implementation in hybrid learning environment

Competence models, concepts and frameworks

In general, according to *European Qualifications Framework* – EQF (see: http://ec.europa.eu/eqf) the term competence encompasses *the ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development*, while 2 attributes of personality are singled out: *autonomy* and *responsibility*.

Definitions of different competence models and concepts can be found in different areas, e.g. *Holistic model of professional competence* (Cheetham & Chivers, 1998), *general competence concept* (Weinert, 2001), in which the authors emphasize the importance of individual competence (e.g. *motivation*, *interest*, commitment *to work*) which makes a difference between individuals. The *Holistic model* (Cheetham & Chivers, 1998) stresses the importance of reflection which based on the self-perception or analysis of other participants in certain work environment can encourage the individual for professional advancement or career standstill. Therefore, according to the authors, the focus of analysis is on the implicit knowledge during the realization or after the realization of work. Weinert (2001) points out the importance of considering inner and outer motivation of the individual as an integral part of the competence model, while emphasizing the need to see the immediate *social context* (specific situation and task) and wider social context. According to the author, in the framework of wider social context, differences between certain *institutional models* come into focus during the *competence development*.

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In e-learning, based on the existing competence models, Schneckenberg (2007; Schneckenberg & Wildt, 2006) defined the *Model for eCompetence of Academic Staff*, giving special importance to *e-context*, and *individual* and *organisational eCompetence*, while Ehlers (2007) defined competence concept as *quality literacy* putting emphasis on *professionalism*.

While examining the required knowledge, skills and competencies of higher education teachers for e-learning, it is important to consider *Qualifications frameworks in the European Higher Education Area* (QF-EHEA; http://ec.europa.eu/eqf), as well as learning outcomes – the results of educational process (e.g. during the teachers' education and specialization), as well as standards for certain professions.

Numerous associations and institutions related to the development of education quality, teacher quality and lifelong education (or teachers' professional development), define the competencies for certain professions in the sphere of e-education. In this paper, based on the researched literature, the competencies for e-learning implementation in hybrid learning environment will be analysed in the framework of *pedagogical* and *technological* dimension from the following standards, frameworks and programmes:

- "*European Pedagogical ICT Licence –EPICT*" (2012; http://www.epict.org)
- "*Teacher ICT Competency Framework –eTQF*" (2010; http://etqfproject.ning.com)
- "*Guidelines for Professional Development of Online Teachers*" (*Southern Regional Education Board* –SREB, 2009; http://www.sreb.org)
- standard "*ISTE/NETS for Teachers*" (*International Society for Technology in Education* –ISTE, 2008; http://www.iste.org)
- "*The eLearning Competency Framework for Teachers and Trainer*" (EIfEL standard , 2006; http://www.eife-l.org)
- "*Common European Framework; uTeacher*" (2005; http://www.egger.ac/1docs/booklet2b.pdf)
- *"Blended Learning Certificate*" (*American Society for Training & Development –ASTD*; http://www.astd.org)
- "*Certificate in Blended Learning", "Certificate in e-Learning Facilitation" and "Certificate in e-Learning Design*" (*Training Accreditation Programme – TAP*; http://www.tap-training.com).

Problem – defining competence levels for e-learning implementation in hybrid learning environment

Generally, any form of learning process can be seen through a continuum, from *teacher-centred* education to *student-centred* education (Anderson, 2006).

In practice, *different models* of hybrid learning environment are found, where certain portion of differently structured VLEs are present. Even with slight rotation and shift of the components from the learning and teaching centre, VLE changes form and with it the role of key components: *higher education teacher*, *educational content* and *student*. However, this can

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be considered on the level of individual learning activities (see Graham, 2006) and in that case, in one learning scenario the roles of all components can be altered in different ways.

In this paper, the role of teacher is extremely important (illustrated in Figure 1) and can be transformed from *instructor* or encourager and *facilitator* to *mediator*, i.e. arbiter in the process of learning and teaching (according to Anderson, 2006; Mentis, 2008). Thus, with even the smallest shift in any segment, in student-centred hybrid learning environment, the required level of teacher competence for e-education is increasing. It can be concluded that the level of required competence for e-learning implementation in hybrid learning environment can be considered in the continuum from rather low to high level of required e-learning competency.

According to relevant literature (Anderson, 2006; Mentis, 2008), the above mentioned continuum highlights 3 levels of hybrid learning environment, i.e. the context of characteristic ability to use virtual learning environments where certain teacher roles come into focus:

- On the first level, higher education teacher creates VLE which has the sole purpose of conveying educational content, and practice shows that the content is most often delivered in the original form (Word document, PowerPoint presentation, PDF and similar) with communication via e-mail or general information forum at the institution's website or within the e-learning system.
- By increasing the quantity of online group interaction between teacher and student, and by creating the so-called *online learning community*, it is possible to define the second key level of e-learning technology implementation. The teacher, through certain discussions and using the organizational tools, encourages and helps the student in the process of learning the content delivered in VLE.
- Getting closer to the student-centred learning and teaching model, teachers gradually lose their original/traditional role of the instructor and arbitrate in the creation of new knowledge (by student/individual or group of students) when working on contextual tasks. With the increasing shift towards the final point of the third level, the VLEs become *personal learning environments* (PVLE). In such environments teachers need to have high level of e-learning competence (according to Mentis, 2008; O'Leary & Ramsden, 2002; Mason, 1998; Cook, 1999).

ISBN 978-963-89559-7-5

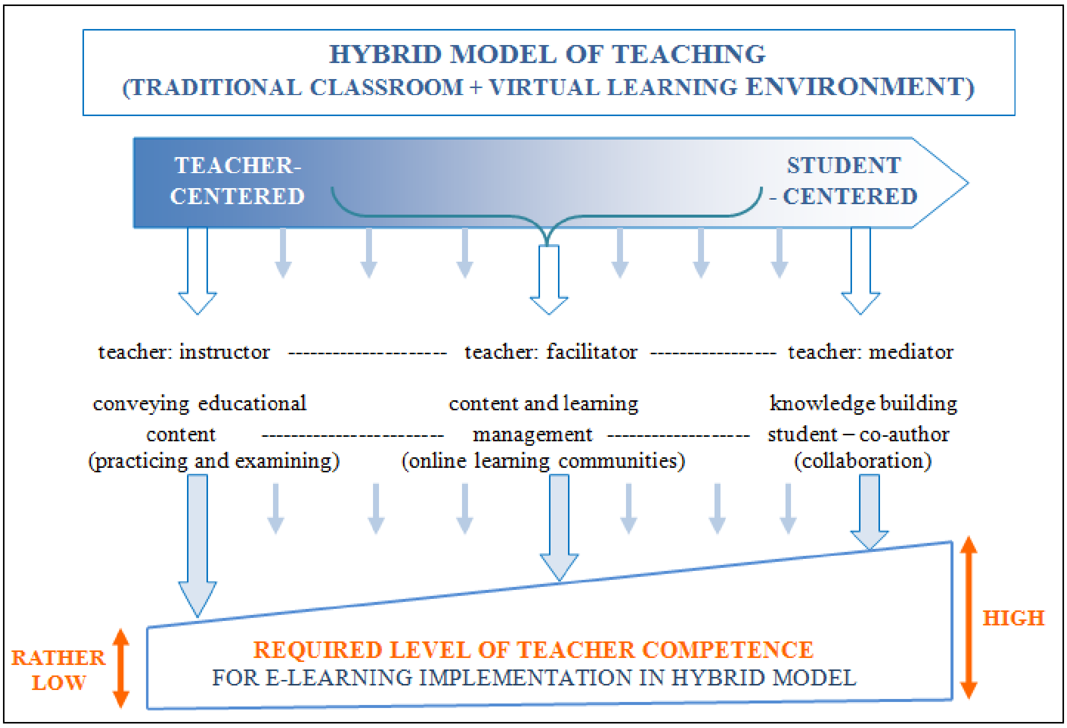

Figure 15. Levels of teacher competence for e-learning in hybrid learning environment

Conceptual competence model for e-learning implementation: dimensions, components and factors of e-learning adoption

It is evident from the analysis of existing competence theories and models that the key teacher competence for e-learning implementation, i.e. the so-called readiness to act (according to Weinert, 2001; Schneckenberg, 2007), includes *knowledge*, *skills* and certain *attitudes and values* connected with e-education. Furthermore, according to Ehlers (2007) among the main factors of teacher general competency for e-learning technology implementation are *responsibility* and *commitment to work quality*, related to the category of personal characteristics of higher education teacher.

According to the model by Cheetham and Chiversa (1998), higher education teacher develops the quality of professional work based on the *personal experience*, reflecting on effectiveness and teaching quality during the teaching process, as well as after. Therefore, great importance lies in the information gathered from other participants in the *educational environment* (students, colleagues within/outside the working place, management and others), as well as *self-perception*. Accordingly, the so-called *motivational factors* (*intrinsic* and *extrinsic*) are of crucial importance since they encourage the teacher to develop competence for e-learning implementation, i.e. for implementing the e-learning competence in hybrid environment.

In recent studies, and with the aim of better understanding of factors which influence the e-learning technology acceptance by higher education teachers, related to the e-learning implementation competence, various existing theories and models of technology and innovation acceptance have been used (e.g. *Unified theory of acceptance and use of technology*

ISBN 978-963-89559-7-5

– *UTAUT*, *Technology acceptance model – TAM*, I*nnovation diffusion theory* – IDT, *Theory of reasoned action* – TRA, *Theory of planned behaviour* – TPB, *Social cognitive theory* – SCT, etc.; see Venkatesh et al., 2003) which are grouped in different categories (e.g. *individual, organizational and situational factors, beliefs and attitudes, social influence, intrinsic* and *extrinsic factors and similar*).

The relevant literature authors have identified *institutional factors* related to learning adoption (e.g. *strategy*, *technical infrastructure, support, time, encouragements, promotion, education, organizational learning and others*), factors related to teacher *attitude and values* (attitude towards technology is more prominent than the attitude towards pedagogy), *computer literacy*, *teacher personality* (the most common factors are: *anxiety* and *self-efficacy*), *factors related to teacher education* (*formal and informal education, learning communities, etc.), demographic characteristics* (e.g. *gender, department, title, years of service*) and other (see Babić, 2012).

In this paper, based on the literature researched so far, competence for e-learning implementation in hybrid learning environment will be considered in the framework of the following *dimensions*: *knowledge, skills and competencies; values and attitude towards e-learning; values and attitude towards e-education adoption; higher education teachers' personal characteristics; situational factors (course characteristics; student characteristics); institutional factors and professional development.*

Table 1 shows conceptual model dimensions of teachers' competence for e-learning in hybrid learning environment. Within the framework of individual components the key components and selected factors are singled out which influence the e-learning adoption in higher education.

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Table 5: Conceptual model dimensions of teachers' competence for e-learning in hybrid learning environment

Dimension 1. Knowledge, skills and competencies:	
Description: key competence component for e-learning implementation in hybrid learning environment	
Components:	*Description:*
ICT knowledge and skills	knowledge and skills required for working with general functions of information and communication technology.
General pedagogical knowledge	knowledge about learning and teaching theories (behaviourism, cognitivism, constructivism and similar), learning strategies, techniques, learning and teaching styles and other (see: Referral centre, Methodology and communication of e-education, CARNet).
Pedagogical use of ICT	to understand and recognize pedagogical potential of ICT (EPICT, 2012).
Hybrid use of ICT	to understand and be able to create hybrid educational programme and related virtual learning environment; to analyse and choose educational methods, as well as appropriate ICT (according to the definition of hybrid environment).
Online mentoring and moderating	to understand and be able to assess the use of learning techniques for encouragement, guidelines and helping students in VLE using different ICT with the aim of achieving formal learning outcomes (Salmon, 2004; Anderson, 2006).
Assessing knowledge using ICT	to understand the possibilities of ICT in the knowledge assessment and be able to determine the use of appropriate learning techniques (see: Anderson, 2006).
Dimension 2. Values and attitude towards adopting e-education:	
Description: key competency component for e-learning implementation; encourages changes in learning process; it is necessary to understand which values create certain positive or negative attitudes. *Factors*: general attitude towards e-education, relevance for work, output quality, ease of use, educational value of hybrid learning implementation.	
Dimension 3. Higher education teachers' personal characteristics:	
Description: intrinsic motivational competency component which influences the acceptance of technology and innovation, as well as implementation and development of knowledge, skills and competencies in the educational context. *Factors*: computer anxiety, self-efficacy, innovation, teaching style, commitment to work quality, voluntary e-learning implementation, sociodemographic characteristics.	
Dimension 4 Situational factors (course characteristics; student characteristics):	
Description: extrinsic motivational competency component which teacher uses to choose the educational model in the hybrid learning environment (according to: ISO/IEC 19796-1:2005, 2005), as well as revision of the existing models. *Course characteristics*: compatibility of e-learning technology with the course culture. *Student characteristics*: student competencies for using e-learning technology, preferred learning style.	
Dimension 5. Institutional factors:	
Description: extrinsic motivational competency component which teacher uses to choose the educational model in the hybrid learning environment (according to: ISO/IEC 19796-1:2005, 2005), as well as revision of the existing models. *Factors*: e-education support (technical, pedagogical and organizational); institutional readiness for e-learning (ICT infrastructure, strategies and politics, culture).	
Dimension 6. Professional development:	
Description: lack of training in e-learning implementation is one of the crucial obstacles with higher education teachers adopting e-education (Hew & Brush, 2007). *Factors*: community of practice (within and outside the university), educational model of obtaining e-education qualifications.	

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Conclusion

Due to their organizational structure, numerous higher education institutions show special interest in implementation of hybrid learning environment in which teachers need to apply new knowledge, skills and competencies in e-education, while at the same time understand the way to integrate virtual learning environments into the traditional teaching approach.

The amount of the e-learning components present in the hybrid learning environment requires teachers to apply different levels of e-learning competencies which adds difficulty in defining the necessary qualifications and competencies of higher education teachers in the field of e-education (see Marshall & Mitchell, 2004; so-called problem of granularity).

E-learning is the innovation in higher education institutions and as such it comes across certain obstacles in the acceptance process by many partakers being influenced by numerous factors related to immediate educational context (personal characteristics) and wider educational context (e.g. institutional factors). In the literature it is possible to find great number of authors who, starting from different aspects, identified numerous factors that influence the adoption of e-learning, while using existing theories and models for accepting technology and innovation.

Based on the theoretical analysis, this paper singles out dimensions, components and factors of conceptual competency model for e-learning in hybrid learning environment. The model represents theoretical foundation for future empirical research.

Insufficient adoption of e-learning by higher education teacher is the potential problem of higher education institutions and educational systems on the whole. It is therefore reasonable to expect positive results of the proposed study for the following participants: *higher education institutions in the process of introducing and developing e-learning; institutions whose mission is to implement lifelong higher education programmes; teachers; institutions responsible for higher education quality; higher education teachers in their professional development; other organizations and individuals introducing new e-learning technologies to higher education institutions with the aim of improving the quality of e-education at higher education institutions, or in broader terms, with the aim of developing the knowledge society*.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE IMPORTANCE OF E-LEARNING IN TRANSFORMING ORGANISATIONAL STRATEGIES: A CASE STUDY

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Background

A number of organisations are introducing eLearning in training and teaching practices aimed at employees and/or customers. The adoption of eLearning methodologies and techniques often requires some level of adjustment by the adopting organisation and the participants. Bates suggests three reasons for introducing technology for learning in organisations: "the need to do more with less; the changing of learning needs in society; and the impact of new technologies on teaching and learning" (2000, p.8).

The reason why a change in an organisation, a plan or vision should be developed must be communicated to staff (Bates, 2000, p.48). The staff participation is crucial in change management and in the acceptance of change. In the context of integrating technology for learning in an organisation, some concepts assume a clear importance.

The notion of Open Educational Resources (OER) and its effect in learning facilitation assumes an important role in this research work. These are open materials, available online that can be used for learning, teaching and research (D'Antoni, 2007, p.1) and their use allow more flexibility throughout the learning process; OER can be used not only online, but also in classroom teaching. Notions such as the importance of experience in adult education (Knowles, 1980) and the establishment of links between what the learner already knows and what he is about to learn, covered in the definition of Meaningful Learning (Ausubel & Fitzgerald, 1961, p.501), assume considerable importance, particularly when it comes to their potential in Work-based Learning (WBL) systems.

WBL is the "multiplicity of approaches by which one can learn through work" (Lemanski et al., 2011, p.2). WBL is "where students are full-time employees whose programmes of study is embedded in the workplace and is designed to meet the learning needs of the employees and the aims of the organisation" (Sodiechowska & Maisch, 2006, cit. Lemanski et al., 2011, p.5). According to Usher (2000, p.230), WBL values the learner and the organisation. Currently, organisations have a much more complex reality and have to be successful and more competitive. There is a demand for qualifications as the proof of competencies or salaries based on performance (Mumford et al., 2010, p.18). In the scope of this transformation, it is becoming more normal that workers are life-long learners (Margaryan, 2008). Research shows that WBL can be formal, informal, structured and unstructured.

According to the 70:20:10 model, 70% of what people know is learned informally (Jennings & Wargnier, 2011, p.14). This model tells us that 70% of what we learn is learnt through tasks, 20% through people and 10% through courses or readings (Jennings & Wargnier, 2011, p.14). Therefore, learning is not a formal isolated task.

In the scope of WBL and learning through experience and social interaction, for this work we also based our attention on the Five Principles of Instruction of Merrill (2002, pp.44-45):

1. Learners are engaged in solving real-world problems;
2. Existing knowledge is activated as a foundation for new knowledge;
3. New knowledge is demonstrated to the learner;
4. New knowledge is applied;
5. New knowledge is integrated into learners' new world.

Therefore, for this research, we also considered the idea of a Learning Organisation, proposed by Peter Senge (1990). A Learning Organisation is an organisation that constantly adapts itself and evolves to remain competitive. For Senge, learning is part of a bigger system than the learner himself. Learning goes beyond the individual plan; learning is social. Kerka (1995, cit. Smith, 2001, 2007), suggests that Learning Organisations offer learning opportunities and use learning to reach their goals; these organisations relate individual performance to the organisation's performance. In situations of extreme change, only the fastest ones, the ones that show flexibility and productivity can be successful (Senge, 1990, p.4).

Project and organisation's description

This research project aims to determine whether, and how, the introduction of eLearning practices in a training organisation, or an organisation with a strong training component, represents a disruptive process and whether it leads, or empowers, the transformation of the organisation's strategies. The research takes, as a case study, the RIPE NCC, and is composed by two complementary parts. The first part focuses on the analysis of the introduction of eLearning in the organisation, with all the contextual aspects inherent to such a process. The second has its focus on studying the impact of eLearning in changing organisational strategies.

The RIPE NCC is a not-for-profit membership based organisation, founded in Amsterdam, The Netherlands, in 1992 and it is one of the five Regional Internet Registries (RIRs). Its main goal is to guarantee the fair distribution and management of Internet Number Resources (IP addresses – IPv4 and IPv6 – and Autonomous System Numbers – ASNs) in its service region, which covers Europe, the Middle East and Central Asia. The RIPE NCC distributes Internet Number Resources to its members, called Local Internet Registries (LIRs). These are mainly Internet Service Providers, domain and hosting companies or telecommunication companies in its service region.

ISBN 978-963-89559-7-5

As part of its Internet coordination activities, the RIPE NCC also provides training courses to the members. The trainers travel throughout the service region to deliver onsite training courses on Internet related topics. The target audience for training courses consists of network operators, network administrators or managers that need to deal with the RIPE NCC and that are located in the organisation's service region. The Training Department delivers an average of 86 courses per year, covering about 52 countries. Although a big part of region is covered, there are still a number of countries where it is not possible to travel to, given their unstable political situation.

Classroom training is a major investment of the RIPE NCC. Given the limitations of onsite training courses, organisations should adopt training methodologies that are more consistent with the technological evolution and its integration in the learning process. This raises the question of how to introduce eLearning practices at the RIPE NCC and how to verify if, and in what ways this change can transform the organisational strategies.

Therefore, we proceeded with the gradual implementation of an eLearning system and, afterwards, developed two surveys: one was meant for the RIPE NCC Management Team and Executive Board; and the other one, for the members who participated in Webinars.

Research methods

In this work we combined two research methods: case study, as we focus on a specific organisation, and Design-Based Research (DBR). The choice of DBR is due to the fact that it is an emergent research method for learning environments, in which the researcher can also be designer. This allows for more flexibility during the research period, given the fact that the researcher can change and adjust the teaching and learning process design during the research and, "in some cases, a new framework may emerge" (Wang & Hannafin, 2005, p.10).

The case study Development

The introduction of eLearning practices at the RIPE NCC was gradual and we split it into four stages.

Stage 1: Improving the quality of the OER

In this stage we wanted to improve the quality of the videos, which the organisation was already producing, and make them more meaningful for the learners. We started developing videos according to the following criteria: centred on real life tasks/problems; consider different learning styles; use of plain English; short and specific videos (one topic at a time); use of a persona or cartoon that could add some humour to the learning process. In the videos related to the RIPE Database, we developed a character named Debbie who is representing the RIPE Database robot. Debbie's role is to explain concepts to the learners.

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Stage 2: Implementing the Webinars

Due to the unstable political situation in some countries of the RIPE NCC's service region and the fact that developing videos for all the content one needs to learn about the RIPE NCC is very time consuming, we developed Webinars to help those members who cannot attend the local training courses. In order to verify if there was any interest in Webinars, we used a survey for needs' analysis, which helped us making decisions about the integration of Webinars with the regular training activities. We added a few questions about Webinars to a survey we send at the end of every year to all the onsite training course participants of that year. The goal of this survey is, generally, to verify if the knowledge they acquired in the courses was useful for their jobs. This survey was sent in January 2012 to all the participants of 2011. The interactive Webinars, with the duration of one hour, were implemented and launched as a new service in March 2012, being very well accepted by the RIPE NCC's membership.

Stage 3: RIPE NCC Academy implementation proposal

Given the success of the Webinars, we started considering adding a new eLearning service that would fit the members' learning needs. One of the main features of this model is the certification of the LIRs' knowledge; since currently, in the onsite training courses, the LIRs receive a certificate of participation and many demonstrate the interest in seeing their knowledge certified. The RIPE NCC Academy is an eLearning service, using a Virtual Learning Environment (VLE). The learning process will be organised through formal online courses, available 24/7 and that will lead to a certificate of knowledge. The content and the course activities will follow a problem-based learning approach. This project aims to provide more learning opportunities for the members, to include more members and members outside the places of the onsite training courses, to offer a virtual environment that aggregates all content that is useful for the members to perform better at their jobs, to certify knowledge and skills and to increase the recognition of the RIPE NCC services. The RIPE NCC Academy is now being implemented and its launch is planned to quarter 2 of 2014.

Stage 4: The impact of eLearning in the RIPE NCC's strategies

In the literature, we found several definitions of organisational strategies, and in this work we chose to define them as the bridge between the objectives, the goals and the actions to reach those goals: "corporate strategy is what makes the corporate whole add up to more than the sum of its business unit parts" (Porter, cit. Meyer & Volberda, 1997, p.25). As for the RIPE NCC's organisation strategies, in this work we considered the strategic pillars of the organisation: Strong Registry; Trusted source of data; and Strong and stable Community. In order to answer the research questions, we used two surveys to verify the impact of eLearning in changing the RIPE NCC's strategies. One of the surveys was sent to Senior Management, Middle management and the Executive Board of the RIPE NCC, as they are more aware of the strategies of the organisation than any other employee. This survey was sent to 22 individuals:

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7 Senior Managers, 10 Middle Managers and 5 Executive Board members. We obtained 17 answers.

The other survey was sent to the participants of the Webinars since 2012, to verify the impact that using eLearning has in the way they perceive the RIPE NCC. This survey was sent to 1510 individuals and we obtained a total of 65 answers. The sample is not entirely representative of the Webinar participants as a whole, but we consider that these are the people that were more motivated to help us carry on our research. It's also important to notice that not all the 1510 individuals actually participated in the Webinars. Not everyone who registers to a Webinar participates in it. As the login is anonymous, we cannot control who registers and attends and who doesn't. Therefore, and bearing this in mind, it was decided to send the survey to all the members who registered in the Webinars.

Results and general discussion

We used the technique of content analysis to treat the qualitative data. As the goal of this research is to verify if, and in what ways, the introduction of eLearning can be disruptive and lead to the change of organisational strategies, based on the answers to the open questions of both surveys, we created a grid to help us present the data obtained. The RIPE NCC's strategies were used as categories and, according to the answers, we described the subcategories. After that, we proceeded to the presentation and the discussion of the results based on the predetermined categories and subcategories.

Table 6: Content analysis grid

Categories	**Subcategories**
A – Strong Registry	A1 – Services' quality improvement
	A2 – Services' value
	A3 – eLearning implementation
	A4 – RIR quality
	A5 – Knowledge certification
	A6 – Publicity
	A7 – Perception
	A8 – Commodity and costs' reduction
B – Trusted source of data	B1 – Learning opportunities
	B2 – Content and format
C – Strong and stable Community	C1 – Physical borders absence
	C2 – Support
	C3 – RIPE Community integration
	C4 – Communication and interaction

With regard to the investment made, both members and the managers of the organisation are satisfied and, in their opinion, we should continue working to offer more and better eLearning

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practices at the RIPE NCC. The members of the RIPE NCC and the Management Team (MT) and the Executive Board (EB) believe that the eLearning improves the quality of the educational services offered, making them more prominent and relevant. Most of the MT believes that the RIPE NCC members became closer to the RIPE NCC with the provision of this service. In turn, the members consider that eLearning is an important service that helped them to understand better the reality of the RIPE NCC and it has increased their interest in wanting to know more about the quality of eLearning, covering more content and using different presentation formats.

According to the MT and EB, eLearning has a higher positive impact on the communication and interaction between the RIPE NCC and the members, than the members themselves think it has.

Regarding the effect of eLearning in changing the way the members perceive the RIPE NCC, both MT and EB, and the members agree that this service has a positive effect on how the members and the RIPE community see the RIPE NCC. According to the value of the membership, both groups consider that eLearning has made the members feel more valued. The question that arises is if and how these advantages of introducing eLearning practices affect the transformation of organisational strategies. Furthermore, if the introduction of eLearning practices does not lead to any change in the organisational strategies, can they function as a vehicle or a tool to achieve the vision and strategies of the RIPE NCC? Throughout this research, we asked these two questions, which we examined through data analysis. For that reason, we organise the discussion of the results according to the strategic pillars. Based on the data retrieved from the answers of the MT / EB and the members, how does the introduction of eLearning practices transform each of the strategic pillars of the RIPE NCC?

A – Being a strong Regional Internet Registry

Regarding this pillar, eLearning has had a positive impact on the quality of the training services, in general. It is also important that eLearning addresses other issues, related to the activities of other departments, so that there is greater cohesion in services. The improvement in the services' quality makes the RIPE NCC be seen as a stronger organisation. There is also the feeling that the introduction of eLearning values, not only services for members, but also the very fact of being a member of the RIPE NCC. All these variables affect the perception that, not only the members, but the community in general, have of the RIPE NCC as an organisation. With the introduction of eLearning practices, throughout the RIPE NCC service region, the members have equal learning opportunities. They can learn in the workplace or at home, after the working hours, and at no additional cost. According to the members, this helps establishing the RIPE NCC as an RIR with a stronger position in the Internet industry. Thus, the introduction of eLearning practices carries out what the RIPE NCC intends to achieve with their strategies.

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In general, both members and the MT/EB are satisfied with the implementation of eLearning. For some managers this was a rather late implementation, but still necessary. As for the members, they are receptive to more learning opportunities of this type, and they also claim that their perception of the RIPE NCC was improved after using this service. The great advantage of eLearning is that the members can view short videos, or participate in a one hour long Webinar from their workplace, or even from home. The way eLearning at the RIPE NCC is organised allows for the clarification of small doubts by the members.

There are issues, though, that must be dealt with. For example the need for more advertising of eLearning so that more people get to learn about this service and can get to use it; the future possibility of certifying knowledge; and continuing to implement eLearning practices in a structured way. These issues, once solved, will further strengthen the position of the RIPE NCC.

B – Being a trusted source of data

The primary function of the RIPE NCC is to be a registry (Regional Internet Registry), hence the need for the existence of validity and reliability of the data provided. The introduction of eLearning practices can affect this pillar, by providing the same learning opportunities for all members. If the members know about the RIPE NCC and its services, about the RIPE Community and about how the process of developing Internet policies works, then that is basis for the participation in the RIPE community discussions. In addition, eLearning allows the individuals to learn how to correct the data in the RIPE Database, related to their own organisation, so that this data can be as accurate as possible. Thus, eLearning does not just help the RIPE NCC to reach its goals and vision, but it also leads the members to become active participants in adjusting and transforming the organisational strategies. This is done through the availability of more learning opportunities.

C – Keep a strong and stable RIPE Community

The support given to both members and the community (since the availability of the OER is addressed to all); the education of more members, eliminating the limitations of physical boundaries; the fact that there are more/alternative channels of communication that make the interaction and the communication between the RIPE NCC and the members easier, and offers more ways to receive feedback on the RIPE NCC services, make the RIPE community more cohesive and stronger. There are more opportunities and more ways and tools to learn. As noted previously, this can lead to greater participation in the community, not only regarding the influence one can have on the direction taken by the RIPE NCC, but also the possibility that one can have of interaction with the rest of the community. In addition to helping strengthen the community, eLearning can also help rejuvenating it (and this is a goal of the RIPE NCC).

After analysing the data in the light of each pillar, we can conclude that the introduction of eLearning practices in the RIPE NCC can help reach the strategies. However, it is by providing

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more learning opportunities and to more people, that the members and the community can perceive the RIPE NCC more positively. This can lead to the RIPE NCC becoming a stronger RIR. Through the availability of more learning opportunities, the members can have a higher chance for more participation in the community discussions. The involvement of all participants in this discussion process, may affect the strength of the community. Since the RIPE NCC members can decide what direction the organisation should take, the more knowledge they acquire about the organisation, the faster they can influence the decision making process. It is precisely in the development of more learning opportunities, and the inclusion of more people, located in all the countries of the RIPE NCC service region, that eLearning can lead to changes in the organisational strategies. Therefore, we can conclude that the introduction of eLearning acts in the transformation of the RIPE NCC's strategies, not only by improving the communication between the members and the organisation, but also by improving the impact and perception of the RIPE NCC and, specifically, the RIPE NCC's training services.

Conclusions

Based on the indicators shown in this research, we can conclude that the introduction of eLearning practices represents a disruptive process, which can lead to the transformation of the organisational strategies. Taking into account the temporality of this process, the results indicate that a change may happen. However, in this research we did not have enough time for a short or long-term verification. Regarding the advantages of this study, we highlight not only the advantages listed by the members, which result from the usage of the eLearning practices, but we also highlight the advantages that this research can bring to other organisations. As the RIPE NCC is one of five RIRs, the success of the practices developed in this study, may lead to their adoption (or the adoption of similar practices) by the remaining RIRs. As for clues to future studies, the grid developed for the content analysis, in order to verify the impact of the eLearning strategies in the transformation of the organisation's strategies, may be used in similar studies, expanded or adapted. The choice for the development of this research is also due to the fact that there were not, in the current literature, many examples of introducing eLearning practices in similar contexts. Also the regional scope and cultural diversity make this an interesting study from the standpoint of practical implementation of eLearning in an organisation, and from the point of view of educational research, since this study has practical implications in individuals from 76 different countries, located on different continents. Regarding the introduction of eLearning practices, this research, may also be an example, for corporate and/or not-for-profit organisations. One limitation of this research is its contextual specificity. The RIPE NCC is very particular organisation, with specific and complex ways of working, which makes it difficult to generalise the results to other institutions that do not have the same or similar characteristics. Another limitation is that, for our needs analysis for the implementation of the Webinars, we have only considered the participants of the onsite training courses. This is considered a limitation, due to the fact that the trainers cannot travel everywhere in the region because of the political situation in some of the countries. But the people from those countries

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are also part of the target audience of the eLearning. The fact that these countries did not hold any onsite course, excluded them from the needs analysis. Issues such as the time difference between countries in the service region are taken into account. However, the praying times were not considered. The difficulty of integration of the eLearning practices in some of the cultures in the RIPE NCC service region can also be seen as a limitation of this study, such as the fact that, to date, the eLearning service offer is only available in English. As this research took place in a very particular organisation, despite the limitations noted, we expect that it will contribute, positively, to the research and the development of eLearning in organisations with similar characteristics to the organisation object of this case study, and to workplace learning and eLearning practices, in general.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

IS THERE A CORRELATION BETWEEN ICT INTEGRATION LEVELS AND LEARNING ORGANISATION MATURITY?

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Abstract

The use of technology by academics in teaching learning and assessing in higher education has become increasingly important in the early part of the 21st century. In this study 10 institutes of technology in higher education in Ireland are examined to investigate whether learning organisation maturity may be interpreted as a predictor of ICT integration levels. Two tools where used for this study. These tools are the learning organisation profile (LOP) tool adapted from Marquardt (2002) and the teaching learning and assessing tool (TLA) developed for this study. Some positive correlation between LOP & TLA where established for the institutes as a group and at individual institute level.

Introduction

> *"Everything has changed but our ways of thinking, and if these do not change we drift toward unparalleled catastrophe." Albert Einstein*

Information and Communications Technology (ICT) is now a mainstream component of how higher education institutes conduct their business in Western Europe. The interest in investigating this topic arises from such work as that described by Goldstein (2007) where respondents listed ICT as a top three change driver in higher education. This makes ICT the third most significant change driver in higher education presently.

Many major studies, such as those by Collis and van der Wende (2002) and The Seusiss Report (2003) in Europe, Hawkins et al. (2005) in the US and Kearns (2002), which has a global perspective, have examined the effectiveness of the integration of ICT into higher education organizational processes in detail. Overall these analyses provide a mixed picture of the effects on educational outcomes of the integration of ICT into teaching, learning and assessing (TLA). Many of these reports point to the requirement for continued research into this area. Researchers such as Collis and van der Wende (2002) found a disjoint between perceptions of policy and strategy makers and those employing ICT in delivery of higher education at the chalk face. The perception from students particularly from Collis and van der Wende (2002) was that there was little or no ICT skills development in their programs of study.

In the literature there are some radical approaches mentioned in relation to the integration of ICT into TLA. Scott (2000) for example, describes the scenario from Carnegie Mellon University were it was suggested that the traditional academic would be replaced by electronic tutors in the future. However, most reports agree that in the main a blended approach to the use of ICT in TLA will prevail. In the exploration of the integration of ICT into TLA, evidence of best practice will be sought both from the policy / strategy and the levels of integration perspectives. First, the paper will give a brief outline as to the development of the institute of technology (IOT) sector and where it sits within the higher education landscape of Ireland currently, in order to set the context for this study.

Irish Context

The higher education sector in Ireland is made up of in the main two types of higher education institutes i.e. universities and IOTs. In more recent times some private third level institutes have emerged mainly in the Dublin region. The Higher Education Authority (HEA) has traditionally been the funding body for universities and recently has become the funding body for the IOTs. This study is focused on the IOT sector. However it is important as a preamble to explore some of the current thinking into what the writer understands an IOT to be in the context of this study. Fundamentally the IOTs are coming from a base where Oswald (2002) would describe them as teaching institutes i.e. institutes where the primary role is teaching where little or no research activity existed in the early days of their existence. In recent years there has been a greater emphasis on applied research in the IOTs.

Ireland has a binary higher education system, which developed over time to meet the needs of the various academic attainments of those student cohorts completing second level education and to serve the needs of the economy transforming from a mainly agricultural to a more industrialized base. Within the sector universities are mainly concerned with undergraduate and postgraduate programs to PhD level and beyond together with basic and applied research. The IOTs are mainly concerned with undergraduate programs, together with some post-graduate programs. IOTs are mainly involved with applied research and have strong regional links with industry in their locales. The IOTs were founded in the early nineteen seventies, whereas the university sector in Ireland has been in existence for a number of centuries.

IOTs were initially called Regional Technical Colleges. They were ten such colleges established at first in the early nineteen seventies. This number has increased to thirteen IOTs recently, with a number of new institutes opening in the Dublin metropolitan area towards the end of the twentieth century. The IOTs vary in size from 1,000 to 8,000 students. These are strategically located geographically throughout the country.

This study is set in an era when higher education institutions, similar to private business organisations are required to adapt and change at an increasingly frenetic rate to ever more intrusive environmental stimuli which require rapid cultural shifts. These adaptations are being driven by factors such as globalization, increasing competition, ubiquitous technology and communications and the emergence of the post-industrial society where the expected

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graduate is a knowledge worker (Drucker, 2002) required for the knowledge economy (Kok, 2004). This is particularly true of Ireland a small open economy on the periphery of Europe which is currently haemorrhaging its traditional manufacturing base to less costly eastern European and Asian states. The current mantra of the Irish Government and all its agencies is to transform Ireland to a leading knowledge economy (Forfás, 2004) as soon as possible.

Higher Education Institutions as Learning Organisations

Therefore, the question is what type of higher education institution is required to produce new knowledge workers and / or transform traditional workers to knowledge workers? The answer suggests a higher education institution which, somehow itself operates similarly to what is expected of any new knowledge economy entity. Marquardt (2002), Senge (1990) and others advise that knowledge economy entities are ones that embrace the learning organisation phenomenon. While the learning organisation phenomenon is supported by many in the literature the writer acknowledges that it has its detractors also such as, for example, (Brown & Keep, 1999). There is a lack of empirical evidence of successful deployments of the learning organisation concept in many studies. This fact must also contribute to the view that the phenomenon, like many other yet to be proven management theories, will inevitably be embraced with a certain amount of scepticism. Sennett (1998) suggests that the learning organization approach ought not to be adopted in higher education as it is too close to management theories pertaining to private sector for profit organisations. The writer would disagree with these views however from both a theory and a praxis dimension. From the theory perspective the writer believes that the learning organisation approach is suitable as a model for the higher education setting as supported in literature such as Hyland (2004) and Friedman et al. (2005). The study described in this article is an example of investigation of learning organization theory in a higher education setting.

Higher education institutions are required to respond in ever shorter life cycles in adapting to new pedagogical cultures, driven by environmental change. In this climate there is a need to at least investigate business frameworks such as those espoused in learning organisation theory. Examples such as the COVARM project (2011) in the UK represent efforts to streamline and normalize the course validation process using business models and software engineering tools. It is salutary in exploratory research in this area to look at a model like the learning organisation in that a limited amount of research exits in a higher education setting using such a model and thus further investigation is opportune at this juncture.

In essence a brief exploratory study undertaken by the writer fits into this drive towards the knowledge economy currently the strategic focus of Ireland Inc., in that it examines in a small way two important building blocks of the knowledge economy i.e. learning organisation maturity and efficacy in ICT deployment in organizations specifically in a higher education setting here. In a wider context, this study can also be viewed as contributing to the European Union objectives around the development of knowledge economies in its setting of agendas in areas such as life-long learning and e-learning. These aims originated from Lisbon in 2000 when the EU declared that it wished to become "*the most competitive and dynamic knowledge-*

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based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion".

While a lot has been written about learning organisations and organisational learning (Senge, 1990; Brown & Keep, 1999; Marquardt & Schwandt, 2000) in the literature, there appears to be a dearth of work which links the theory to the application or practice.

Methodology & Literature Review

The study set out initially to identify strategies and / or strategic frameworks around the integration of ICT into TLA in higher education. During the examination of the literature a lack of specific frameworks became evident. Various assessment tools have been developed for measuring learning organization capability. In the main these tools adopt a normative perspective based on learning organization attributes arising from the literature. This study will adopt a similar approach in line with its coherence to social research in this domain. To the fore in these normative approaches is the self-assessment Likert type scale method such as those developed by Watkins and Marsick (1997), Pedler et al. (1997), Richards and Goh (1995) and Marquardt (2002).

Watkins and Marsick (1997) developed a self assessment Likert based tool. In the case of Pedler et al. (1997) they developed Likert type questionnaires concerned with measuring areas such as the quality of the learning environment and the organization toxicity index (OTI). These measures allow an estimate of how amenable organizations are to allow their employees opportunities to learn. In the case of Richards and Goh (1995) they developed a Likert type tool called the learning organization survey which consisted of 21 questions comprising five sections covering areas such as clarity of mission and vision, leadership commitment and empowerment, experimentation and rewards, effective transfer of knowledge and teamwork and group problem solving. Richards and Goh (1995) developed this tool in order to measure an organization's learning capability. This tool has been used in many case study analyses e.g. Goh (2003) and was adapted for a study in higher education by Neefe (2001) in a paper on organizational learning maturity in higher education institutes.

However, despite the limited amount of frameworks, the writer was still determined to somehow examine institutes organisational strategic awareness. In this study the writer endeavoured to identify if there was any correlation between the level of integration of ICT into TLA and the level of learning organisation maturity in the IOTs.

Learning Organisation Maturity

Learning organisation maturity for an entity may be viewed, analogously, as continuous professional development or lifelong learning for an individual. The learning organisation approach seemed to fit well with what the writer sought as a framework for strategic thinking, given its currency. The next hurdle to be crossed was to ascertain, whether it was possible to establish a measure of this 'learning organisation maturity' in relation to higher education

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institutes under examination. This led the writer to the work of Marquardt (2002) who along with others such as Marquardt & Schwandt (2000) had explored and applied in practice learning organisation maturity theories in many case studies. The tool developed by Marquardt (2002) for this purpose was called the learning organisation profile (LOP). The LOP tool made up of five subsystems namely, learning dynamics, organisational transformation, people empowerment, knowledge management and technology application. These subsystems seemed to have the elements required for the idea of a measure of learning organisation maturity, which was necessary to address the strategic focus of the study. The tool in praxis had been applied in over 500 case studies consisting mostly of business type organisations. The writer, by employing this tool, was if you like continuing the practice (Meek, 2003) of applying strategic methodologies first used in business organisations subsequently in a higher education setting. A number of small adjustments were made to the LOP tool in order to adapt it for this study within a higher education setting. Firstly some of the statements were slightly amended to allow a better fit to a higher education environment. Next some of the all positive statements in the questionnaire were changed to negative statements in order to mitigate against bias in the data (Messick, 1962; Friedman, 1988).

Having found and adapted the tool to address the strategic focus of the study, the writer next sought a tool that might assist in establishing the level of integration of ICT into TLA in the subject higher education institutions. Again during the literature review tools developed around this theme such as Rogers (1995) 'diffusion of innovations' and Davis et al. (1989) 'technology acceptance model' (TAM) were examined. While acknowledging that the ideal way to make a measure of ICT integration is to monitor behaviours of use over time, this is not always feasible. So, given the cross-sectional nature of the study and having anchored the strategic focus in a well tried tool, the writer decided to develop a new tool to measure ICT integration levels. In order to mitigate in some way the risks presented by the new tool called TLA, (teaching learning and assessing), the tool was developed in a similar fashion to the already well accepted LOP tool, in that it used a Likert type questionnaire, a well established methodology in social research. The TLA tool consisted of three subsystems with Likert type questions around the use of |ICT in lecture preparation, delivery and assessment. The tool was devised to provide a snapshot of ICT integration into TLA in the subject higher education institutions. The TLA tool, having been modelled on the LOP tool, could also follow the argument around aggregation of data (Beal & Dawson, 2007) from individual to organisational level, which was necessary for this study. The TLA tool was tested statistically for validity and reliability, similarly to the LOP tool, and proved well within the norms required for social research.

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Study Question

The main question posed by this study was:

> *Is it possible to correlate, the identification of learning organization' maturity, with the level of integration of ICT into TLA in the Institute of Technology sector in Ireland?*

First off it was imperative for the writer to identify a suitable means for gathering data given the limited resources available. Having looked at various options such as mailing surveys and online surveys, the online route was chosen because of administrative efficiency. Within the online area the next decision to take was whether the writer would outsource or manage himself the technical aspects of the survey. The latter was chosen, as the writer felt confident enough technically to do so. The main benefit, here, was the cost-neutral aspect of this approach. Having examined many open source survey tools PHPSurveyor was chosen as it showed best fit for what was required by the study. The adapted LOP and TLA tools were loaded onto the online PHPSurveyor tool. This tool is open source and uses the PHP scripting language and has the MYSQL database system as a back end. It catered for all the types of survey questions required in this study. Another useful feature of PHPSurveyor was that survey data could be easily extracted from it into an excel or CSV spread sheet format. This would greatly help in preparing data for analysis. The writer downloaded this open source product from www.phpsurveyor.org and installed it on a LINUX web server based within Athlone Institute of Technology. To summarize, the reasons an online publishing method was chosen were the following:

- Fast delivery of survey to targeted cohorts;
- Easier administration of gathered data;
- The predication of limited time and resource of the writer;
- It was felt that participants would be more predisposed to completing a survey about ICT in Teaching Learning and Assessment in this fashion.

Findings

The survey was launched and data was gathered between June and July 2007. There were thirteen subject higher education institutions targeted and data from both tools was successfully gathered from ten of them. When the survey was closed the data was exported from PHPSurveyor and imported into SPSS for codification and analysis. Tables 1 to 5 give a summation of the preliminary findings.

The two tests chosen for this analysis were correlation of LOP subsystems with TLA subsystem results and multivariate analysis between LOP subsystems as independent variables and TLA subsystems results as dependent variables. Table 1 applies a correlation analysis of LOP subsystems against TLA subsystems to ascertain trends here around the research question against the subject higher education institutions as a group. Table 1 shows significance in all cross-tabulations with, in general, a positive weak to moderate correlative

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effect between subsystems. In Table 1 the most significant correlations returned from cross tabulation are in the people empowerment subsystem, first and technology application subsystem, secondly. The other subsystems of learning, organisation and knowledge showed no significant correlations from cross tabulation.

The analysis in Table 2 tells us that the independent variables of people and technology can reliably predict the dependent variable preparation. This again underpins findings in Table 1. Table 2 indicates that for every unit increase in the independent variable, the dependent variable preparation is increased / decreased. For example with the people on its own in the model every unit increase in the independent variable people there is a predicted .21 increase in dependent variable preparation.

The analysis in Table 3 tells us that the independent variable of people can reliably predict the dependent variable delivery. This again underpins findings in Table 1. Table 3 indicates that for every unit increase in the independent variable, the dependent variable delivery is increased / decreased. For example with the people on its own in the model every unit increase in the independent variable people there is a predicted .20 increase in dependent variable delivery.

Table 1: Correlation of LOP subsystems all institutes

Correlations				
All Institutes		**Preparation**	**Delivery**	**Assessment**
Learning	Pearson Correlation	0.186	0.240	0.211
	Sig. (2-tailed)	0.000	0.000	0.000
Organisation	Pearson Correlation	0.227	0.267	0.268
	Sig. (2-tailed)	0.000	0.000	0.000
People	Pearson Correlation	0.275	0.289	0.221
	Sig. (2-tailed)	0.000	0.000	0.000
Knowledge	Pearson Correlation	0.222	0.231	0.235
	Sig. (2-tailed)	0.000	0.000	0.000
Technology	Pearson Correlation	0.253	0.256	0.258
	Sig. (2-tailed)	0.000	0.000	0.000
	N	366	366	366

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Table 2: People V Preparation independent – dependent variable comparison

Coefficients(a)						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**	**B**	**Std. Error**
1.00	(Constant)	19.94	0.96		20.66	0.00
	People	0.21	0.04	0.27	5.45	0.00
2.00	(Constant)	18.87	1.10		17.22	0.00
	People	0.15	0.05	0.19	2.93	0.00
	Technology	0.10	0.05	0.13	2.04	0.04
a	Dependent Variable: Preparation					

Table 3: People V Delivery independent – dependent variable comparison

Coefficients(a)						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**	**B**	**Std. Error**
1.00	(Constant)	17.37	0.84		20.57	0.00
	People	0.20	0.03	0.29	5.77	0.00
a	Dependent Variable: Delivery					

Table 4: People V Assessment independent – dependent variable comparison

Coefficients(a)						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**	**B**	**Std. Error**
1.00	(Constant)	15.42	1.03		15.03	0.00
	Organisation	0.22	0.04	0.27	5.31	0.00
2.00	(Constant)	13.72	1.25		10.97	0.00
	Organisation	0.15	0.05	0.18	2.76	0.01
	Technology	0.14	0.06	0.15	2.35	0.02
a	Dependent Variable: Assessment					

ISBN 978-963-89559-7-5

Table 5: People V TLA independent – dependent variable comparison

Coefficients(a)						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**	**B**	**Std. Error**
1.00	(Constant)	53.17	2.38		22.38	0.00
	People	0.61	0.10	0.32	6.36	0.00
2.00	(Constant)	49.35	2.68		18.41	0.00
	People	0.38	0.12	0.20	3.08	0.00
	Technology	0.36	0.12	0.19	2.97	0.00
a	Dependent Variable: TLA					

The analysis in Table 4 tells us that the independent variables of organisation and technology can reliably predict the dependent variable assessment. This again underpins findings in Table 1. Table 4 indicates that for every unit increase in the independent variable, the dependent variable assessment is increased / decreased. For example with the organisation on its own in the model every unit increase in the independent variable organisation there is a predicted .22 increase in dependent variable assessment.

The analysis in Table 5 tells us that the independent variables of people and technology can reliably predict the dependent variable TLA. This again underpins findings in Table 1. Table 5 indicates that for every unit increase in the independent variable, the dependent variable TLA is increased / decreased. For example with the people on its own in the model every unit increase in the independent variable people there is a predicted .61 increase in dependent variable TLA.

Conclusions

While this study employed a learning organisation maturity model, adapted from Marquardt (2002), as a strategic framework measure for comparison with ICT integration in higher education institutions, the writer acknowledges that the learning organisation discourse is large and complex and requires further exploration to decide whether it may be a suitable strategic framework for higher education institutions. However, given the need for speed required by higher education institutions in adoption new strategies for transformation where the idea that competition in the space is emerging in Ireland in the early part of the 21st century, against a backdrop of scarcer resources, an approach such as that of the learning organization framework, which embraces a holistic view of organisational health in that it attempts to marry the desires of the individual and the organisation while acknowledging the tensions between culture and structure, may prove worthwhile. Preliminary findings here would indicate that in this study, a learning organization maturity model may be interpreted as being useful as a predictor of ICT integration levels in higher education institutions.

ISBN 978-963-89559-7-5

A discussion around the reason why the people empowerment subsystem emerged as the lead predictor raised the conundrum of a possible symbiotic relationship between learning organization maturity and ICT integration levels in the IOT sector in Ireland. To adjudicate more clinically on this symbiotic relationship a follow up longitudinal study might well prove worthwhile. In the context of a transformative environment in which the IOT sector in higher education in Ireland finds itself the engagement with strategic frameworks such as the learning organization model may benefit the embedding of the idea of continuous change and adaptation into the mindsets and theories in use of the protagonist stakeholders for the benefit of both themselves and their institutes into the future.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

COLLABORATIVE LEARNING AND KNOWLEDGE MANAGEMENT

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Introduction

Education and knowledge management within a company are the most important activities to foster employees' qualifications and to encourage them in their individual professional development. By utilizing specific processes it is possible to mentor their progress and to promote them to a position in which they can use their abilities to their full extent. Overall, this leads to a more efficient working environment, which paves the way for further improvements in regard to the working process as well as to the workers themselves. When it comes to learning, finding the most efficient way to learn for each individual is the key. In in most cases this is informal learning as that is the way people learn the most (Weber et al., 2008). In consequence, enterprises should envision an educational roadmap that incorporates informal learning for their employees not only on an individual level but also as a social activity throughout the entire structure of the enterprise.

To succeed in such a paradigm shift, several actions have to be taken. It is imperative to create and maintain structures and processes that enable HR managers to mentor and steer the overall development within the entire company. This can be realized via a reasonable mix of several e-learning and knowledge management ideas and theories. By choosing suitable concepts and link them with an efficient management, it is possible to create a collaborative learning and knowledge management system. In return, this environment facilitates middle- and long-term improvements of the entire company. Two conceptual ideas suitable for such an endeavour are self-learning organisational management on the one hand and Management of Collaboration on the other hand.

Knowledge management and the different types of learning

Knowledge management is concerned with the efficient preservation and distribution of knowledge within a company. Its main goal is the cultivation and exploitation of knowledge (Handzic, 2005). It deals with how to improve performance and enables innovation as well as sharing experiences. This leads, among other things, to shorter innovation cycles and allows employees to grasp the wider picture of their work. This, in turn, enables the workforce to work more efficiently and to adopt new skills and knowledge quickly, which can grant a competitive advantage.

There are three different **types of learning**: i) formal learning, ii) non-formal learning, and iii) informal learning (Merriam et al., 2012; Colardyn & Bjornavold, 2004). Formal learning is organised and has the intention of passing on knowledge in a pre-defined context. Non-formal learning is perceived as learning by the learner but is actually part of other activities. Informal learning is the by-product of everyday activities. It does not take place in any formal educational environment and therefore it does not follow an agenda and has no planned pedagogical content. Examples for informal learning are spontaneous knowledge transfers like instant messaging and other interactions on the Internet as well as phone calls or chance meetings.

The biggest part of what somebody learns happens through informal learning (Colardyn & Bjornavold, 2004). This means that an employee does not learn what he/she really needs in some kind of formal educational program or courses a company may offer but through interaction with his/her colleagues. A presentation can teach the formal basics of something an employee has to know but it is slow, unnecessarily time-consuming and therefore ineffective. However, if an employee is working and encounters a problem and he/she can contact one of his/her experienced peers immediately, he/she is not only able to solve the problem quickly but also learns how to deal with it in the future and gains knowledge connected with that problem. Due to that everybody involved would benefit from the constant possibility of instant interaction and communication.

Initial situation

This section deals with some current trends and technologies to deal with education within the boundaries of the working place and beyond. While this is not an exhaustive enumeration of all important e-learning concepts, it lists the ideas that are important for the creation of a collaborative learning and a knowledge management system.

Self-learning organisational management

Self-learning organisational Management (SLM) is a concept that deals with combining knowledge management with business intelligence to create an environment that enables employees to share and gain knowledge with people who need or provide it (Schroffner et al., 2011). It is based on the idea that every employee has his/her own unique portfolio of knowledge, skills and experience that make him/her a valuable asset for the company. SLM gathers those portfolios in order to create a repository of knowledge and skills. This is done by evaluating the employees' abilities in certain areas of expertise within the boundaries of use cases. However, these use cases are also designed to identify the potential of each person who may require assistance to reach it. SLM is conceived as a means to continuously advance the employees' capabilities. It is important that an employee's newly gained skills become part of his/her portfolio so that he/she can share it with others and become a more efficient part of the educational cycle within the company.

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In addition, SLM acts as a tool to assemble a team that fits best the requirements of an upcoming project. Due to the portfolios it can match the employees' knowledge and skills with those needed of a task and suggest certain team members. Additionally, it can provide information about reliable combinations of workers due to constant assessments. This way it is possible to use the right people for the right jobs.

Social (e-)learning

Social learning is about any type of learning with and through the interaction with others. While this also covers traditional, face-to-face interaction, it is used here for virtual, online interaction. This way, the learning is done via Web 2.0 and social media concepts and technologies. For social learning to work efficiently, it is vital that certain requirements are met. These requirements are called the '*seven Cs of social learning*'. The central components are the content about which people should learn something and the connections between the people. With that the consumption of, contribution to, collaboration over, conversation about the content is possible. From a business point of view the control of the process is the most important.

A way of combining learning and interaction is a **collaborative e-learning community**. A community is a collection of people sharing the same goals, experiences, principles or interest. There exists an area of trust within a community so that its members can feel at ease while dealing with others. Due to that a community supports learning in various ways. Despite the fact that individualised trainings would achieve exceptional results, educational courses in enterprises are often based on generalised standard courses and therefore are not fitting actual needs of the employees. About 70% of what is really important are not covered by any courses, because they deal only with how things are officially done (Henschel, 2001).

To cover those differences, steady communication with longstanding members is required. From those senior colleagues, new employees can learn the rules of how things are really done. To make that possible, there has to be a trusting relationship between the people – hence a community is needed.

Implementing a mentoring or buddy system can provide this kind of communication. Such a system is based on the idea that a person who is in need of new knowledge or skills is paired up with someone who possesses this knowledge and who is able to communicate that knowledge or teach that skill. Those people could not only be a trainee and a senior employee but also two longstanding employees. Such a buddy relationship is independent from any hierarchical organisation. The mentor could be a technician teaching a department manager.

To foster the interaction between the company's employees, it is not only important to provide them with the technological abilities but also to encourage them to actually employ them on a daily basis. One possibility to achieve this is the utilisation of Web 2.0 and social media. This is to be realized in **Enterprise 2.0** IT-Infrastructures (McAfee, 2009). A lot of people are familiar with the use of those technologies, so they are more likely to use them

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without resistance. Therefore it is easy for them to interact with co-workers and collaborate on content together with them.

Management of Collaboration (MoC) is an idea of a central instance that is responsible for bringing different parties together, easing their interaction and enabling efficient collaboration and innovation (Hacker et al., 2012). It is designed for bridging gaps and liaising between different groups with different backgrounds, understandings and knowledge. However, it is not only responsible for coordinating people but also technologies and resources of a company. With it, it can be possible to tear down barriers and doubts that may exist in the company. MoC can work as a connective instance for all the aforementioned concepts to offer a holistic social e-learning experience (Schmuck et al., 2013). It is important that the MoC is a separate instance that works as an enabler of the continuous improvement process.

Collaborative learning and knowledge management

A social e-learning platform can be based on an efficient Collaborative Learning and Knowledge Management (CKM). The central idea of the system can be SLM, which takes care of all portfolios and continued education concerned processes in the company. The MoC is responsible for the creation of an environment that enables and furthers the SLM's features. Therefore, it is important that there is an on-going interaction between SLM and MoC. The former has to describe what is needed for the knowledge management system to work. The latter has to derive specific requirements from that description and take care that all the necessary services and resources are provided.

The most important thing is the social interaction between the people who are supposed to work with the system. Therefore, the provision of adequate communication channels is of vital importance. As mentioned above, employing social media is a promising way of providing these channels. The MoC has to find a way to encourage and foster the interaction via these virtual ways of communication for the system to work. Whether such a community works and flourishes depends mostly on the level of trust between the users. Again, it is the MoC's task to find a way to create and nourish this trust. As collaboration does not only consist of interaction but also of working simultaneously together on the same content, suitable methods of achieving this have also to be available.

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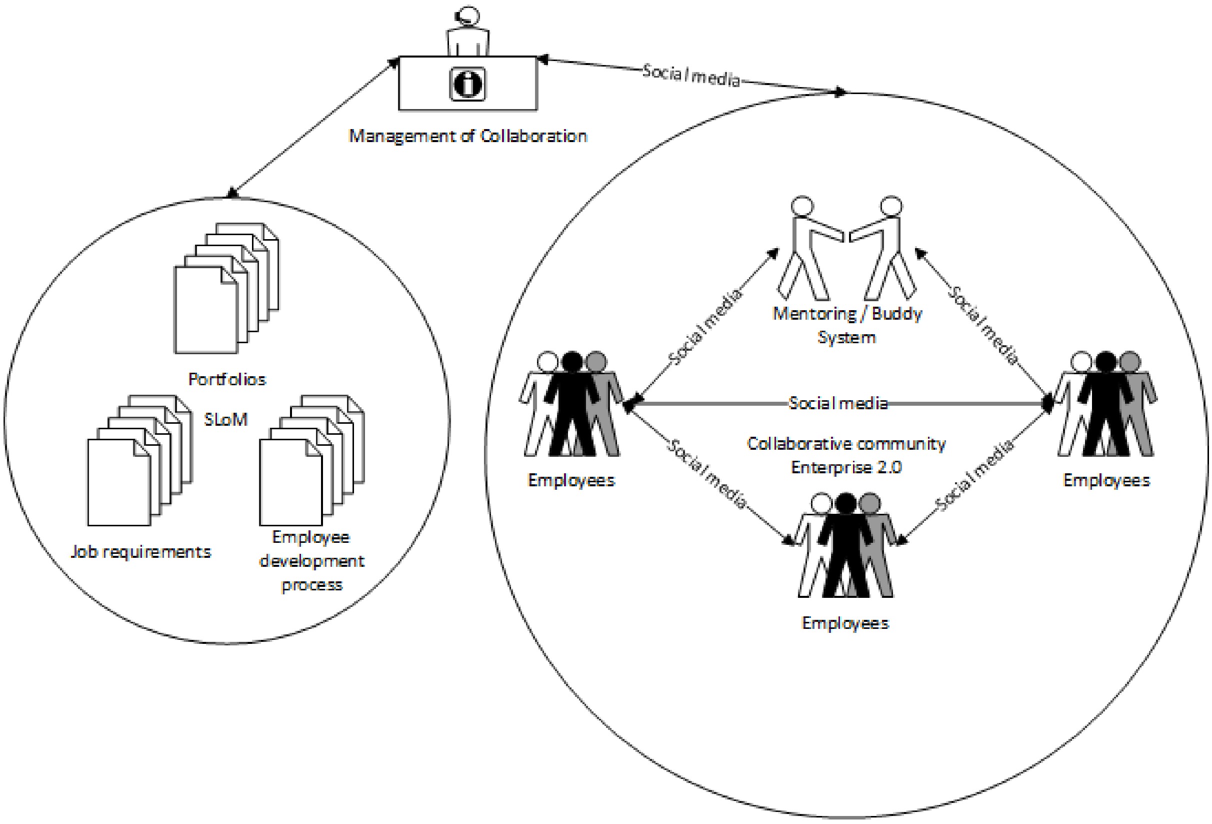

Figure 1. Structure of a CKM

The main idea of the CKM is to support the informal way of learning. This is achieved by supporting hands-on experiences and contemporaneous communication with experienced people. There exist different ways of how people can collaborate with each other. It is very essential that the experienced employee cannot only provide theoretical information but practical advice and visuals as well. This may be done via the simultaneous editing of a text file, the sharing of a screen, giving the experienced employee the chance to actively show how something is done in the working environment of the person that needs the knowledge or the utilisation of a shared writing space using a digitiser (Haber, Hasanovic, et al., 2013; Haber, Lampoltshammer, et al., 2013).

Figure 1 shows the structure of the CKM and the links between all its parts. The community part consists of all employees as well as the social media communication channels and the collaborative content. Although MoC interacts with the community, it is not directly part of it. Aside from supervising and fostering the communication process, it serves as the connection between the SLM and the collaborative community.

As soon as an employee requires some kind of knowledge or skill that he/she does not possess, the further education process is triggered, which is depicted in Figure 2. The employee reports the requirement. The request is checked against a knowledge repository, which consists of the employees' portfolios. These portfolios then yield a list of people who possess the knowledge required. The MoC chooses a suitable match from that list and sees to it that the two people get in touch with each other via the provided communication channels to form a buddy

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relationship. The mentor then teaches the person in need the knowledge that is required in an informal way.

Therefore, the mentoring is not supposed to be a lecture. The knowledge should be passed on as a kind of personalised learning-by-doing exercise whereby the mentor causally provides the information in the way the other person needs and maybe shows an example of how to do it and afterwards let him/her do it his-/herself. This way the person who has to learn something sees how it is done correctly and can try it out immediately under the supervision of the experienced colleague. This collaboration ensures that the knowledge repository is not just a central storage place for information. The repository becomes an active, involving instance that does way more than providing data. It consists of the people possessing knowledge, prepared to pass it on, improving their peers through interaction and teamwork. The associated supervised buddy system is based on this informal collaborative learning idea and designed to improve the knowledge and skills of employees as well as the process itself. This way, the more such mentoring partnerships are established and brought to a conclusion, the better the system will be. The gathered information about relationships which work out well helps with assembling project teams and assigning further buddies to each other.

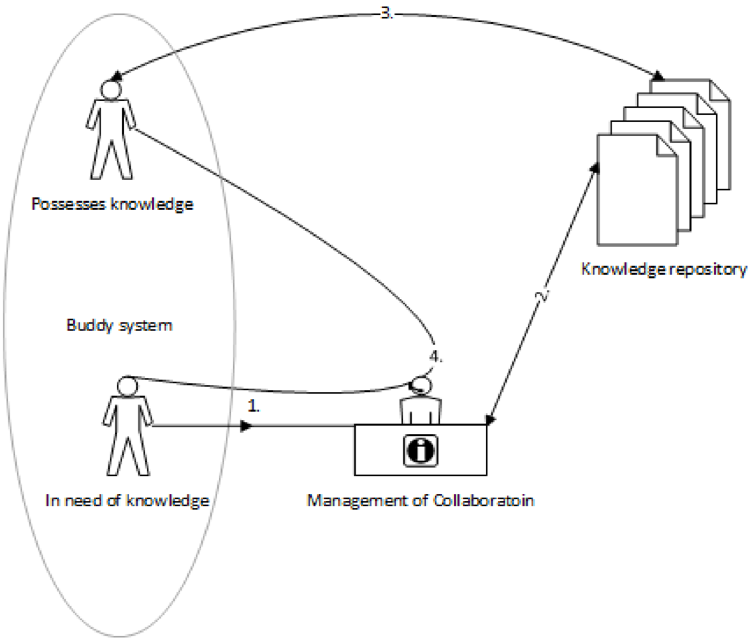

Figure 2. SLM Buddy System

It must be possible to measure the success of the process. Therefore, the newly gathered knowledge has to be certified and subsequently entered into the employee's portfolio, so that the/she can provide the information for others if required. Additionally, the entire mentoring process has to be supervised by the MoC. That is because it is part of a continuous improvement process. It has to be documented whether the interaction between the two buddies went well or met any problems. Those problems must be registered, analysed and resolved, so that future buddy relationships can go as unhindered as possible. However, the documentation must not stop there. It is crucial to assess the quality of the interaction on a work-related as well as on a private level between the two parties. It has to become part of the

ISBN 978-963-89559-7-5

portfolios which combinations of people work well with each other and which do not. The information about who knows and is able to do what and who works well with whom is vital when assembling new project teams or transfer somebody into a new department. It provides guidance for the planning manager to choose the right people for the right position which results in a much more efficient working environment.

Conclusion

A central instance that's only task is to be a connector between different parts of a company like MoC in combination with an extended knowledge management like SLM can be the foundation for an efficient management system. However, this system does not only provide information about which employee possesses which knowledge and skills for a manager but does much more. It creates a system that consists of processes and technologies that are custom-made for the sole purpose of sharing knowledge between all employees and further their interaction. Interaction is the key to a successful CKM because it is the main source of informal learning from which the employees gain the most. Therefore MoC can be seen as the navigator in combination with the drive motors SLM and CKM to establish an efficient Enterprise 2.0.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

RETHINKING PRODUCT DEVELOPMENT EDUCATION STREAM WITHIN AN E-LEARNING ENVIRONMENT

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Introduction

Faculty of Mechanical Engineering and Naval Architecture has educated about 90% of master students in mechanical engineering and naval architecture in Croatia. Since the enrolment of the first generation of students back in 1919 faculty trained engineers to support the technological and economic development of society. It provides students with training in a wide range of engineering fields among whom the two: engineering design and energy and process engineering gain most interest of prospective students. Following the changes in engineering theory and practice the faculty constantly updated existing courses to keep alongside with the latest developments in technology and, where necessary, introduced new courses to meet the changes.

A new Product Development education stream has been introduced within the implementation of Bologna framework scheme fostered at the national level. The aim was to implement more reflective teaching and learning, moving the focus from a procedural approach to reflection and conversation for gaining understanding and perception. The resultant courses were created aiming for a comprehensive lifecycle perspective of the disciplinary knowledge as well as development of student competencies such as responsibility, creative thinking and group dialogue. Assessment was pursued by a combination of oral presentation and written and project based examination. E-learning support tools have been introduced with the new group of courses in order to enhance availability of courses' material and communication with teaching staff.

In this paper we will present e-learning implementation of one of the course from the new product development stream that has been awarded as the best e-learning course at University of Zagreb in 2013. The general conclusion to be drawn is that this type of learning was perceived as very different for the students compared to earlier courses enhancing engineering students' interest for product development, increasing understanding for noncore-engineering aspects of product development (innovation, eco design, ergonomic, etc.) motivate self-learning and increase students' communication and presentation capabilities.

Product development stream of courses

The new product development education stream was built based on the consideration about requirements for the modern engineers that are well documented in literature (Crawley et al., 2007, p.2; Dym et al., 2005) and are results of the discussions with Croatian and Slovenian industry. Especial important insights for new product development education stream were results of the several workshops on design education held during the series of the international design conferences DESIGN (http://www.designconference.org) from 2000 – 2012 in Cavtat, Croatia.

Engagement in all phases of product lifecycle, complexity and multidisciplinary approach, teamwork, creativity and innovation are recognised as the main descriptors of the working environment for the modern engineers. Therefore instead of the existing education o the engineering methods and tools, the focus of the new education approach has been moved toward the whole product development process including engineering, management and ethical issues (Figure 1).

In parallel to the product development methods stream, the courses related to the computer aided support of the product development methods have been also introduced and developed. The new product development group of courses have been further developed accordingly to the upper part of the Figure 1 into three courses:

- **Introduction to Product Development.** The goal of the course is to give an introduction to multidisciplinary aspects of product development and innovation. During this course students should familiarize themselves with basic terminology and methodology that could be used in product development projects. Practical problems should be considered in cooperation with companies in order to simulate real product development situations.
- **Engineering Design and Product Life Issues.** The course aims at creating an understanding of the activities of innovation and technical innovations. It helps the students to comprehend innovation techniques and be able to create innovative technical solutions by their use. The use of the techniques is focused on product life oriented design and product life systems by introducing different design for x methods (environment, ergonomics, manufacturing, safety, services, etc.).
- **Integrated Product Development.** The goal of the course is to learn principles of the project integration, experimentation and virtual development in order to consider product development in the light of the business strategy of the company. The central part of the course is product development project where students will develop the new and innovative product for different areas (health, environment, agriculture, etc.) and deliver full technical description for it in order to be ready for prototyping.

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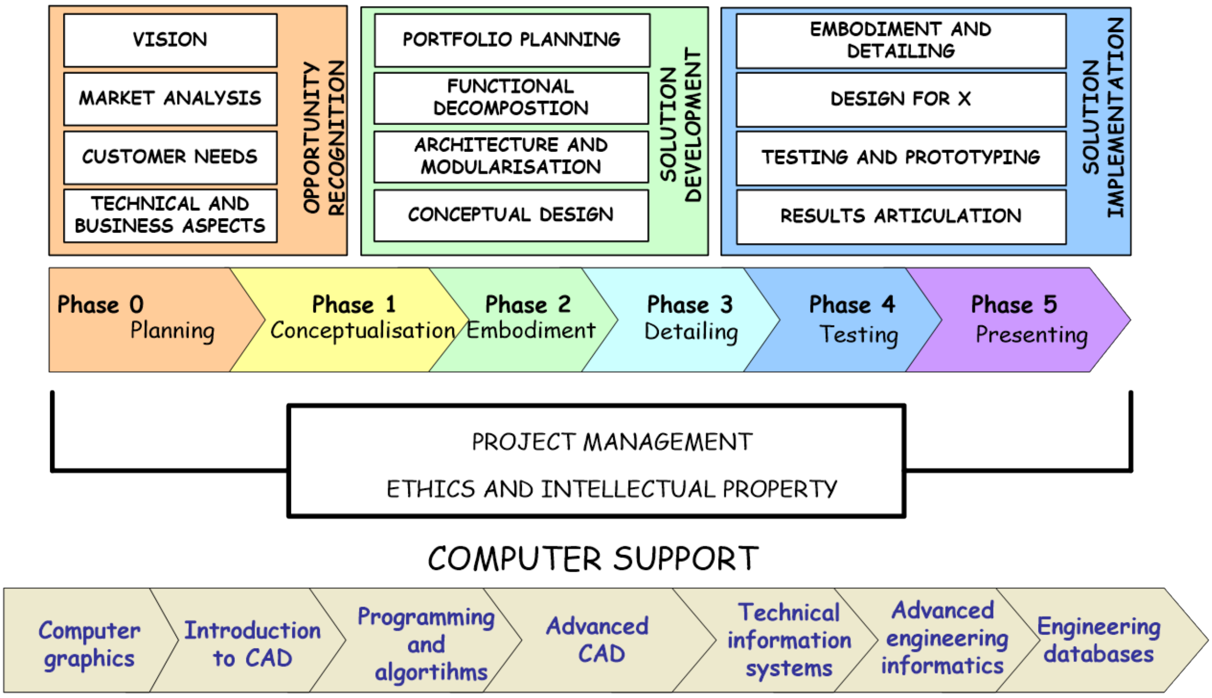

Figure 1. Educational model of Product Development Process accordingly to Ulrich & Eppinger (2004, p.7)

Pedagogical-didactic approach applied

Pedagogical –didactic approach that has been used for the development of the whole stream is based on the learning by practicing as is defined within CDIO (conceive, design, implement, operate) framework (Pahl et al., 2007) for future engineering design students. The approach is realised as combination of the classical lectures in the classrooms including real world examples analysis, self-learning by using different types of resources and activities, simulation tasks based on the gained knowledge during the exercises and self-preparation for the final examination. The key interactive elements of the courses stream are synchronous and asynchronous discussions as the main medium for knowledge and information exchange between teachers students.

Two main types of subject matter acquisition applied in courses are:

- Classical acquisition that includes learning activities in classrooms and laboratory like lectures, practical exercises for individual and teamwork based problem solving.
- On-line acquisition that includes access to the learning resources divided by didactical units, materials for self-learning that includes advance topics in the form of the articles and video materials, self-assessment quizzes individually created for each student and tools for information and knowledge sharing (discussion forums, wikis, on-line dictionaries, etc.).

Accordingly, didactical model that is applied for stream of courses is combining classical group learning and self-learning in order to enable for each student maximal flexibility and

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autonomy in learning process participation. The key idea of the courses development is to additional emphasise active role of students in knowledge exchange process undergoing during the courses execution. For each course the expected learning outcomes have been defined as a starting point for course structure development (Table 1). In order to support that, the learning process in the course stream is designed to enable gradual learning by experience, based on individual problem based tasks in the beginning of the first course up to project based team learning at the end of the last.

Table 1: Learning outcomes of course stream

Introduction to Product Development	Engineering Design and Product Life Issues	Integrated Product Development
To be able to understand the technical and business aspects of the product development process.	To be skilled in practice of defining and solving engineering problems.	To be skilled in market analysis and recognition the opportunity for new product development.
To be skilled in implementation of gathering data from customers and establish technical specification.	To be able to understand human behaviour in product lifecycle.	To be skilled in patent search and innovative problem solving.
To be skilled in creating product functional decomposition.	To be able to understand manufacturing and assembling issues for product development.	To be skilled in modelling the product in conceptual phases of the product development using standard languages and tools.
To be able to participate in engineering problem solving.	To be able to understand environmental effects in the product life cycle.	To be skilled in embodiment and detailed design of the new product.
To be able to understand the principles behind product modularisation	To be able to understand ergonomic aspects in product lifecycle.	To be able to plan simulation and experimentation of the solution in each phase.
To be able to understand ethical and intellectual property issues in product development	To be able to understand safety issues in product lifecycle.	To be able to articulate and present results of the development project.
	To be skilled in implementation of product-service systems.	

Engineering design and product life issues course

The courses stream is realised as set of the e-courses within Moodle LMS environment. The main motivation for application of the e-leaning methods in course stream was to increase the quality and efficiency of teaching by features that enable combination of the classical teaching methods and information technology. Specifically, the *Engineering design and product life issues* course was developed to enable active role of teachers and students in learning process and support both roles during the course execution. The e-course is divided in 15 thematic

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units (represented by cloud of keywords shown at Figure 2) that are supported by different interactive tools available within the environment.

Figure 2. Engineering design and product life issues keywords

The content and activities within each thematic unit is structured in progressive learning modules with following internal structure supported by different interactive tools:

- Resources with theoretical background with application to the examples acquired from real world.
- Self-assessment activity for students to assess current level of unit understanding and a feedback.
- Task (individual or teamwork) for practical application of the acquired knowledge and practicing learned methods and tools. For one of the unit, task is to disassembly real product in order to analyse requirements form the last phase of the product life related to recycling and propose redesigned solution for improvement of that phase (Figure 3).

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Figure 3. Students and teachers during disassembling exercise

Main tool for supporting interactive discussion during the course is forum. There are several different forums implemented: general forum for news related to the course execution, team based forums for group activities during the exercises, and discussion forums for "*those who would like to learn more*". Discussion forums are focused to the additional themes not included in 15 thematic units and enable students to extend their knowledge in topics like future of engineering design, design thinking or design solutions inspired by nature. They are provided with additional resources, and requested to submit essay based feedback on the topic that is evaluated by other students.

In order to additionally explain main concepts within the course, wiki based dictionary of the main concepts is provided and available for upgrade, as well as list of the famous mechanical engineers. These activities are voluntary with the goal to extend general level of technical culture among the students, and are very well accepted by students. Additional wiki is set up to provide general course info including rules of engagement, individual and team work, explanation of the grading scheme and links to the relevant web sites and literature. Calendar is used for announcing all important deadlines during the course execution.

Students' feedback is enabled by means of the evaluation form which enables them to assess content and methods applied in the course, quality of the learning resources, examination process and teachers.

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Discussion

Feedback after implementation of the all described features was very positive. Since the course was updated from the academic year to the academic year, it is reasonable to believe that it has reached the optimal ratio of what is offered to the participant in contrast to the requested results from them. During the first years of implementation students complained sometimes about amount of the different resources and activities that were necessary to process in order to pass the course. They needed some time to adapt to the extra activities that are not usually part of the engineering curriculum. Based on those suggestions, the course was tailored to the current extent.

Access statistic during the last execution year (2012/13) is showing that during the period observed was recorded more than 15,000 individual actions on different resources and activities conducted by 50 users. Transformed into the language of weekly actions, each user participated in about 300 actions in e-learning environment per week only for that course. This confirms continuous execution of the learning process during the whole period, partially influenced by intentional causal planned sequences of teaching activities. Discussion forums itself attracted more than 600 activities by half of the all involved users. Even the self-assessment activities were not additionally graded they were regularly used by 75% of the students that described them as especially important for understanding the each learning unit.

90% of the students that provided the feedback by anonymous survey described the teaching methods and learning resources as satisfactory and appropriate. 70% of them confirmed that they spent about 120 hours (4 ECTS equivalent) in order to successfully pass the course. 80% of them are satisfied with overall learning process and course as a whole. They particularly liked integration between the classical learning and practical task with diversity of the online resources and learning activities.

Conclusion

The implementation of new course stream on product development significantly differs from traditional engineering education that was practice before at our institution. Although students and teachers have been satisfied with the outcomes the main features of the product development students' education are still hard to address with e-learning technology. From our experience, one of the most important one is related to the practical work on analysis of the real products from different perspectives that is usually conducted in workshops. The similar issues are related to the laboratory focused work and experimentation. Learning by doing like for example during disassembling phase at end of product life cycle develops specific skills and experience that are hard to replace in virtual environment. Besides that, different aspects of the product development process are supported by different engineering software tools that are hard to integrate with LMS. Somehow those problems may be considered as the core of engineering education and leave the space for the future research in the area.

ISBN 978-963-89559-7-5

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

PROMOTING INNOVATIVE TRAINING & PERFORMANCE SUPPORT AT THE MANUFACTURING WORKPLACE. THE MAN.TR.A™ MODEL FOR LACE PROJECT

Fabrizio Cardinali, Infinity Technology Solutions, sedApta Group, Mehrnoosh Vahdat, University of Genoa and Infinity Technology Solutions, Davide Anguita, University of Genoa, Luigi Lupo, Infinity Technology Solutions, Italy

Abstract

Manufacturing is going through what many call the 4th industrial revolution with new technologies coming into place to disrupt the way we produce, distribute and sell goods in contemporary markets.

This paper presents an EU support action for Learning Analytics Community Exchange (LACE) which includes a specific work package dedicated to the study and promotion of innovative learning analytics approaches in the manufacturing work place. It presents an innovative training process based on maturity modelling called MAN.TR.A. which will be used in the LACE 30 months life cycle to detect, classify and analyze best practices in manufacturing training aimed at identifying process models and appraisal paths for those seeking excellence in the manufacturing training sector.

Europe's Smart Manufacturing challenge: from the Internet of Bits to the Internet of Things

After changing the service and content industry in the last decade, the web is now passing from the 'Internet of Bits' to the 'Internet of Things'. New disruptive technologies such as 3d Printing, Advanced Robotics and Cyber Physical Manufacturing are appearing that will revolutionize the way we produce, distribute and purchase goods in contemporary markets. Technology is not only about to change production plants and infrastructures.

When it comes to its workforce, Manufacturing is currently undergoing what many have called the 'Big Crew Change' which has already affected other skill intensive sectors such as Oil & Gas in the recent past (Cardinali, 2010). New processes and skillsets will need to evolve in synch in the quest towards a holistic transformation of how businesses conceive, design, produce and distribute artefacts in contemporary, digital, marketplaces. New production processes and models, such as *Produce on Demand* and *Make to individual*, matched with innovative business and financial models such as *Crowd funding*, are rapidly reshaping the way contemporary plants might plan and optimize their supply chains from the provision of raw materials and resources to final product distribution and sales.

In a nutshell, it is now clear that another '*webificatio*n' wave is about to hit industry. This time it will address the roots of goods fabrication and distribution, an economical space potentially with a much higher likely impact than that reported for the digitization of the content and service industry, with manufacturing still retaining a 17% share of the world's overall GDP, (Europe reported at 15.1% in 2012), despite the massive off shoring and de-industrialization forces influencing western economies in the recent past (Figure 1).

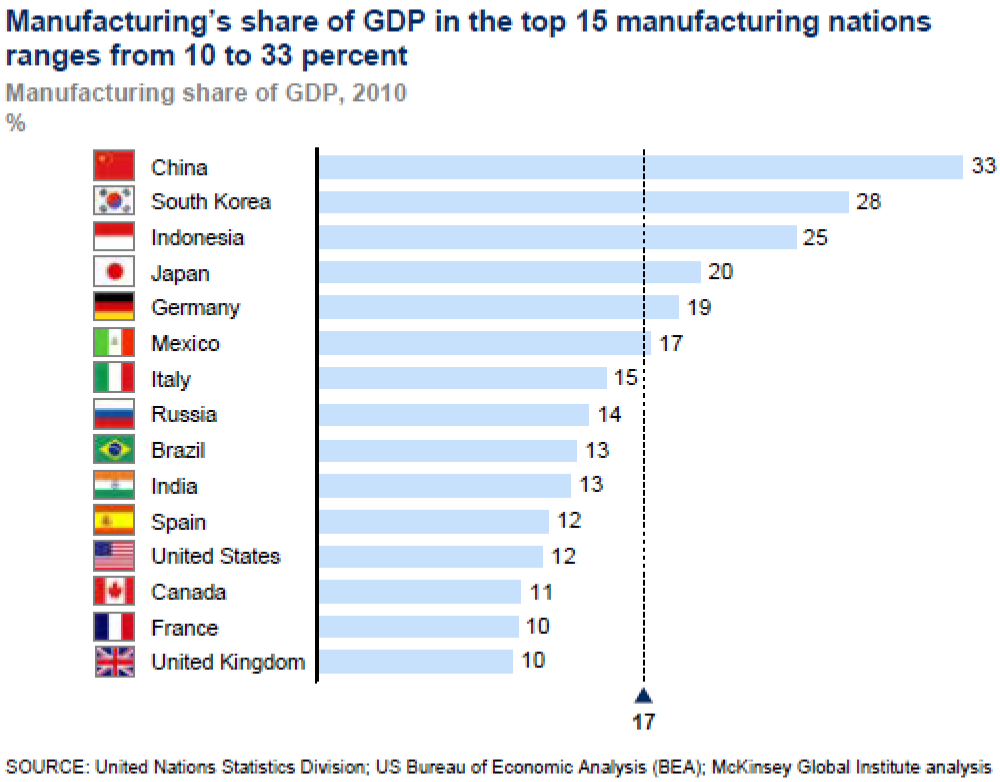

Figure 1. Manufacturing Share of GDP – Top 15 manufacturing nations by GDP % (Manyika et al. 2012. p.22)

What many call the '4th industrial revolution' is most likely to happen within the next decade and with the potential to completely change world trade balances, rewarding those who picked up on the change and invested in the training and support of their workforces at the right time, re-insourcing jobs and competences. Luckily Europe, along with other western economies, hasn't completely de-industrialised and today the challenge for Manufacturing leadership is still an open question (Figure 2). It is also well known that manufacturing has a strong spill-over effect on the rest of the economy and especially on overall productivity. Each euro of added final demand in European manufacturing generates around 50 cent of additional final demand in other sectors of the economy. Regaining Europe's manufacturing leadership will revitalize the knowledge and technology base of the whole European economy, which is crucial for achieving sustainable development.

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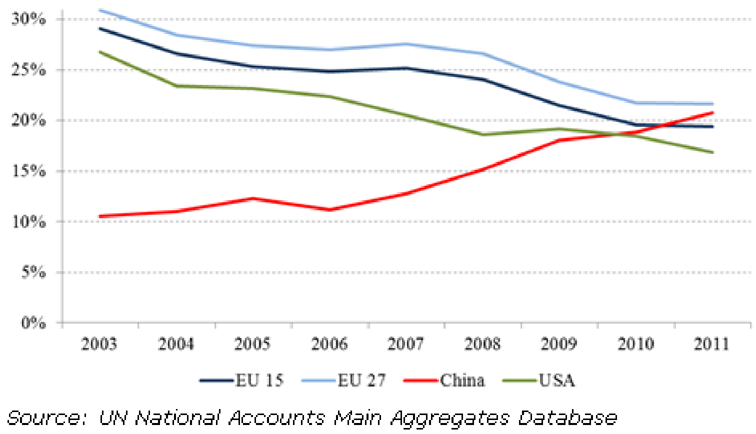

Figure 2. Europe's Manufacturing Share of GDP – EU 2013 competitiveness report (European Commission, 2013)

Smarter Training for Smarter Manufacturing

With the pace of change affecting manufacturing today, accelerating the pace and quality of STEM (Science, Technology, Engineering, Math) teaching directly within the curriculum plans in secondary and higher education of its future managers is as urgent as improving process and technology skills directly at the workplace of its current workforce.

Despite the evidence that supports these claims the majority of research currently under development in manufacturing is about technology implementation. It directs little attention to the users and how they master this technology (Aiman-Smith & Green, 2002). This is becoming an important issue whilst manufacturing is changing fast, and engineers need to learn new types of skills and to keep pace with change and new trends (O'Sullivan et al., 2011).Industrial training has its own pedagogical and cognitive perspectives and should be addressed within dedicated research projects in a different manner than other types of educational provision. Additionally, the typology of knowledge found in the workplace differs from what is found in educational settings, since it depends heavily on the experience of working contexts and conditions (Eraut, 2009).

Improving the skills of people at the necessary speed and level may be achieved only by the massive use of learning technologies. A survey in 2005 in a variety of industrial settings confirmed that many workplace environments already were using technology-aided learning methods, and had a strategic plan for e-learning. However, only a small number indicated that this plan was efficient and that they could measure the return from their investment on training (Bonk et al., 2005). Despite its historical inclination to measure and assess performance, neither analytics nor performance indicators were linked to those processes adopting technologies for educational purposes

As a result although manufacturing systems have done valuable labour on staying up-to-date with the big changes affecting their market today, the need for proper personnel training and

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appraisal has been highly under-estimated, mostly passive and inadequate, lagging behind the pace and quality of improvements to the other pillars usually addressed during manufacturing transformation initiatives, namely Plants, Infrastructures and Processes.

The LACE Project – Promoting learning analytics for better training and performance support at the workplace

The LACE Initiative (Learning Analytics Community Exchange, www.laceproject.eu) began its work in January 2014. This project funded by the European Commission, brings together a group of leading academic, industrial and governmental stakeholders[1] with the aim to promote the adoption of learning analytics and improve education and industrial training. Within the next 30 months the nine LACE partners will be promoting knowledge creation and exchange on Learning Analytics (LA) and Educational Data Mining (EDM); increasing the evidence base; contributing to the definition of future directions; and building consensus on interoperability and data sharing.

From the very beginning the activities of the Lace project will be directed towards three main investigation axis, those of primary and secondary education, further and higher education and industrial training involving broader communities. The area of industrial training will be analyzed in a dedicated Work Package by partner Infinity Technology Solutions (short name ITS, www.itsinfinity.com) an innovative Italian SME active in Manufacturing IT recently acquired by a new Public Private industrial investment group named sedApta™ (www.sedapta.com), first of a series of M&A actions targeting the acquisition of leading EU SMEs to merge them and create a stronger EU player in the emerging global marketplace for Smart Manufacturing IT solutions.

With a long experience in the use and standardization of analytics and key performance indicators (KPI) for process monitoring and appraisal, Manufacturing is a very capable industry case to benchmark the level of analytics maturity for training and the potentials of their adoption within workflow based training and performance support initiatives.

Promoting Analytics for Manufacturing Training & Performance Support

The Manufacturing industry and its enlarged supply chain eco system have been using advanced analytics and data mining techniques for more than a decade to support process measurement, monitoring and improvement. Today the area of manufacturing intelligence and analytics is one of the fastest growing sectors of the Business Intelligence world. Manufacturing organizations use Key performance indicators to evaluate their success, or to

[1] Open Universiteit Nederland, NL; Cetis, the Centre for Educational Technology and Interoperability Standards at the University of Bolton, UK; Institute for Educational Technology at the Open University, UK; Infinity Technology Solutions, sedApta Group, IT; Skolverket, the Swedish National Agency for Education, SE; Høgskolen i Oslo og Akershus, NO; ATiT, Audiovisual Technologies, Informatics and Telecommunications, BE; EDEN, the European Distance Education Network, UK

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evaluate the success of a particular activity in which they are engaged (Fraser et al., 2012; Fitz-Gibbon, 1990). Sometimes success is defined in terms of making progress toward strategic goals but often success is simply the repeated, periodic achievement of some level of operational goal (e.g. zero defects, 10/10 customer satisfaction, etc.).

Using KPIs within process modelling and improvement has gone a long way in manufacturing. ANSI/ISA-95, or ISA-95 as it is more commonly called, is an international standard developed by and for global manufacturers defining a five layer abstract reference model (Figure 3) describing the plant environment and its operations from low level 'machine to machine' automation to high level 'business to manufacturing' transactions. It was developed to describe and standardise performance analytics and indicators to be applied in all industries, and in all sorts of processes, like batch processes, continuous and repetitive processes.

The underpinning value of a model like ISA95 has been that to create a 'process standardisation culture' within the industry, with the aim to unify definition and measurement of performance indicators, in a continuous drive towards persistent improvement and appraisal of processes, usually called 'maturity modelling'.

As a consequence 'Maturity Modelling' has recently become a very hot topic due to the rapid 'transformation' forces running through the manufacturing world with high end analysts such as Gartner™, Atos™, McKinsey™ and the like rallying plants to analyse, measure and monitor the degree of formality and optimization of processes, from *ad hoc* practices, to formally defined steps, to managed result metrics, to achieve active optimization of the overall production effort for their clients.

With such a background it is highly likely that industrial stakeholders when approached with new training solutions promising improvement for their workforce by using analytics will want to 'observe and measure' such metrics using the same approach and wave length used for the other processes in their work space. This is especially true if they will need to justify investments into new scenarios to their IT and Finance departments, require the integration of solutions in the cockpit and, last but least, need to report results up through their decision chains used to decide upon increased data aggregation levels and decision support dashboards.

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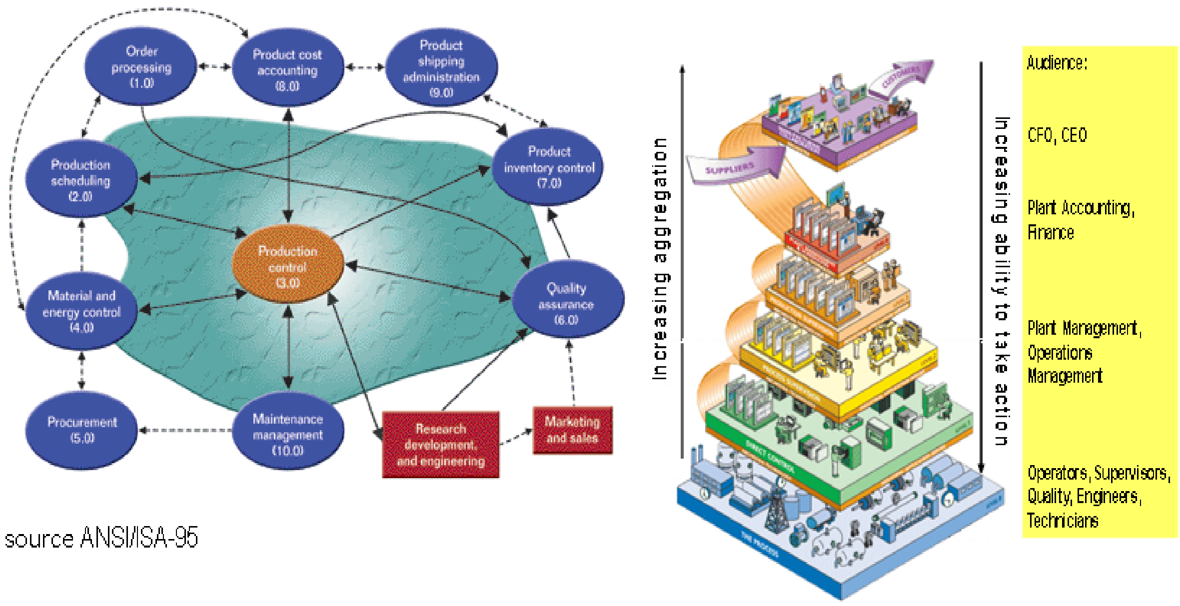

Figure 3. The ISA 95 Manufacturing Abstract Model by ANSI (DBpedia, 1995)

Reporting will be another key request, possibly available through an approved management framework such as the balanced scorecard (Cobbold & Lawrie, 2002), which is a semi-standard structured report, supported by design methods and automation tools that can be used by managers to keep track of the execution of activities by the staff within their control and to monitor consequences arising from these actions.

In conclusion proposing learning analytics to manufacturing executives will always imply assessment of the changes applied to the underpinned training processes, in order to detect successes and pitfalls, and above all the ROI of performed changes. If we want to promote analytics at the manufacturing workplace, we will need to abstract the training processes underpinned, choose the right KPIs for measuring and monitoring and assess improvements introduced by the suggested changes with KPIs relying upon a good understanding of what is important to the organization and always considering which department will be responsible for measuring the performance.

Using the MAN.TR.A ™ Maturity Model for the LACE analysis

Studying and promoting learning analytics in the manufacturing workplace in order to identify good learning experiences will be at the heart of LACE WP5 activities throughout the 30 months lifecycle of the project. In particular a new study methodology will be used, the MAN.TR.A™ maturity level model, developed by sedApta Group companies involved in the Italian National Cluster for Intelligent Factory, or IIF (Figure 4).

The IIF Project is Italy's leading technological cluster recently awarded by the Italian Ministry of Universities & Research (MIUR) to a consortium of 22 core partners and 76 associated partners coming from leading Manufacturers, Universities and Research centres representing Italy's manufacturing scene. With an overall planned investments of more than 48 ML Euros

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of which 11 ML Euros is co-funded by MIUR, the project aims to preserve and re-launch the Italian manufacturing context, taking into account the distinctive features of the Italian manufacturing system and the evolution of European and Global industry according to H2020 agendas as defined by the European Commission and the European Factory of the Future Association EFFRA.

One of the drivers behind the engagement of the sedApta Group of companies in the IIS initiative is the definition of a Manufacturing Training Analytics maturity modelling device (The MAN.TR.A cube™, short name MAN.TR.A^3), that will be used within LACE case study and reporting activities.

The MAN.TR.A^3 model (Figure 5) is intended as a way to help the analysis, classification and monitoring of training processes within 3 axis meant to discover their level of maturity in terms of well defined, observable and repeatable workflows, with measurable KPIs to be monitored within an overall (training) improvement and appraisal strategy.

To achieve this, the MAN.TR.A^3 model blends achievements coming from many years of development in the areas of Competency, Process and Maturity modelling and is developed around 3 main classification axis defining respectively:

1. Training Outcomes. Being the entry point under which to start classifying the incoming training experiences under analysis and expressing the target training outcomes expected
2. Training Processes. Representing the process workflow under which the training experience takes place, during delivery
3. Training Maturity. Representing the scale of maturity of the training process under observation, ideally implying at its highest levels the use of repeatable processes and KPI analytics for performance monitoring and continuous appraisal

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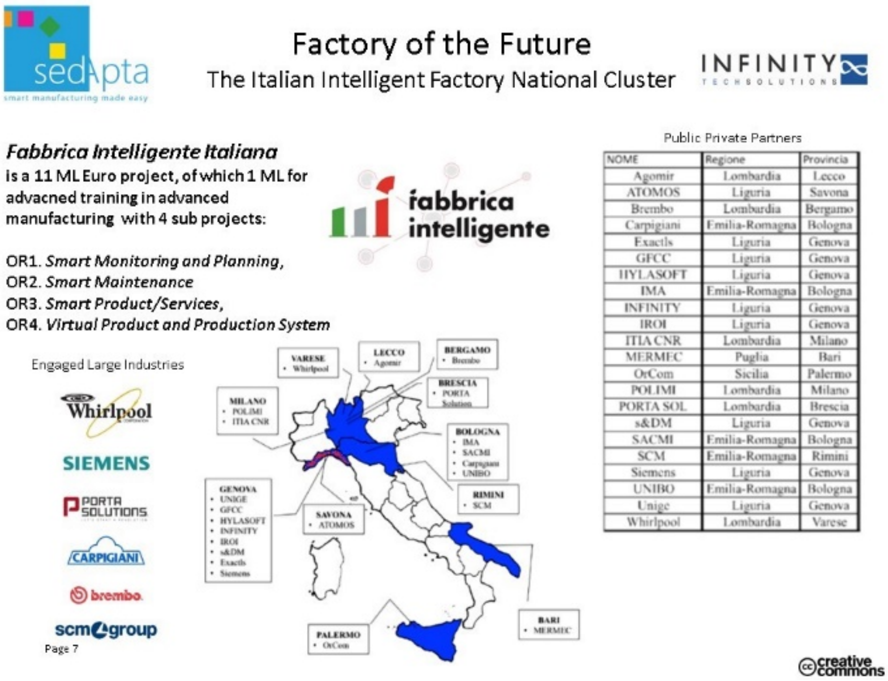

Figure 4. The Italian Intelligent Factory (IIF) initiative

For each axis several different scales and approaches were investigated and verified models selected in order to show that they were well understood and appreciated by the stakeholders of the sector under investigation.

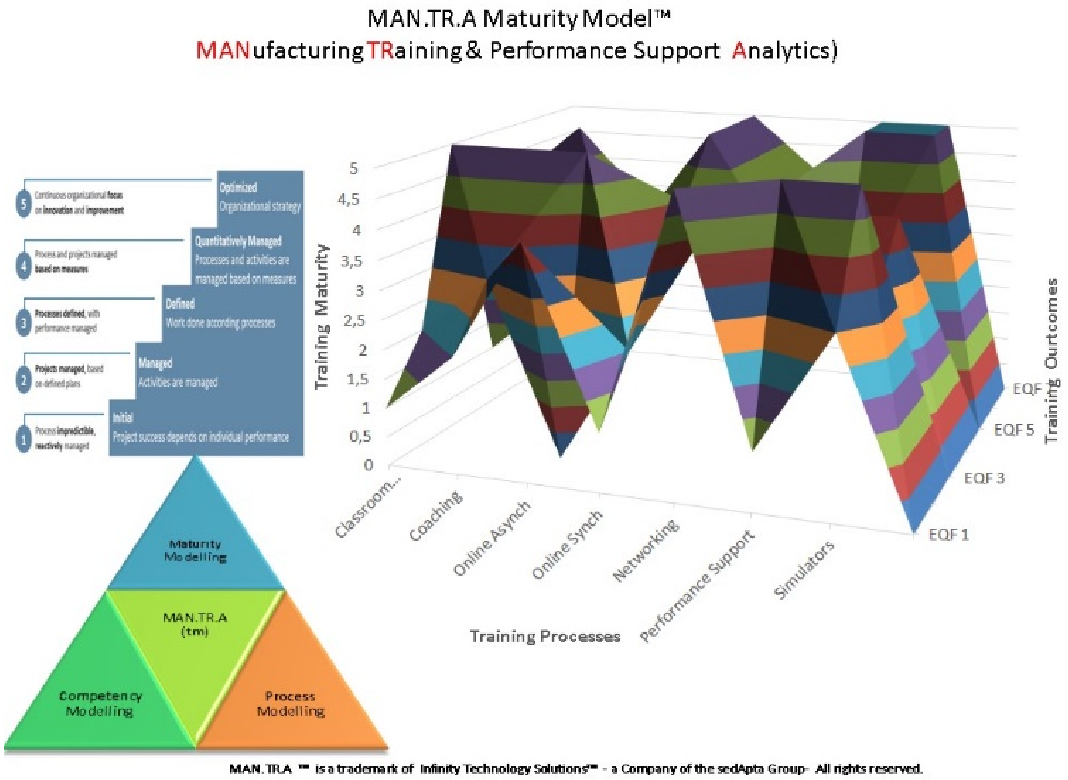

Figure 5. The Manufacturing Training Analytics Maturity Model – MAN,TR.A ™

In particular for Axis 1 of the MAN.TR.A³ (Training Outcomes) an independent skills classification translation and alignment meta-model was searched given the many areas and regions expected to enter the analysis, possibly with different skills vocabularies, taxonomies and curricula. The selected model was that of the European Qualification Framework (EQF – http://ec.europa.eu/eqf/home_en.htm) due to its popularity in the European vocational space and training agencies (Figure 6).

The second axis of the MAN.TR.A³ space (Training Processes) is then meant to describe which training strategy is used to achieve the predefined training outcome. This axis scale had several options to define training strategies, from those more appropriate to a pedagogy oriented model, something highly volatile in the industry sector, to those enabling a formal classification of the procedures and flows of processes used when delivering the training experience. The latter was selected because it enables analysts to combine workflow notations within each entry describing not only the 'as is' process used in the case but possibly also its 'to be' optimization.

Level	Knowledge	Skills	Competence	Example
Level 1	Basic general knowledge	basic skills required to carry out simple tasks	work or study under direct supervision in a structured context	
Level 2	Basic factual knowledge of a field of work or study	basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	work or study under supervision with some autonomy	lower secondary school (FI)
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems	(GCSE Grades A*-C UK)
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities	Abitur, vocational school
Level 5[1]	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others	HND
Level 6[2]	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups	Honours Bachelor Degree, vocational university German State-certified Engineer, Business Manager and Designer (Fachhochschule) Bachelor, City and Guilds Graduateship (GCGI), German Fachwirt, German Operative Professional
Level 7[3]	• Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research • Critical awareness of knowledge issues in a field and at the interface between different fields	specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams	Masters, vocational university (Fachhochschule) Masters, City and Guilds (MCGI)
Level 8[4]	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research	Doctorate City and Guilds Senior Awards - Fellowship

1. ^ The descriptor for the higher education short cycle (within or linked to the first cycle), developed by the Joint Quality Initiative as part of the Bologna process, corresponds to the learning outcomes for EQF level 5.
2. ^ The descriptor for the first cycle in the Framework for Qualifications of the European Higher Education Area agreed by the ministers responsible for higher education at their meeting in Bergen in May 2005 in the framework of the Bologna process corresponds to the learning outcomes for EQF level 6.
3. ^ The descriptor for the second cycle in the Framework for Qualifications of the European Higher Education Area agreed by the ministers responsible for higher education at their meeting in Bergen in May 2005 in the framework of the Bologna process corresponds to the learning outcomes for EQF level 7.
4. ^ The descriptor for the third cycle in the Framework for Qualifications of the European Higher Education Area agreed by the ministers responsible for higher education at their meeting in Bergen in May 2005 in the framework of the Bologna process corresponds to the learning outcomes for EQF level 8.

Figure 6. The European Qualification Framework used for Axis 1 of the MAN.TR.A³ classification device
(source: http://ec.europa.eu/eqf/documentation_en.htm, http://en.wikipedia.org/wiki/European_Qualifications_Framework)

The Training Processes workflows listed in axis 2 may be further detailed using a BPM (Business Process Management) notational device such as that made available by the Object Management Group (OMG – http://www.omg.org) for describing workflow activities and

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roles, already well known and accepted by industry analysts and stakeholders when detailing working processes in the manufacturing industry (Figure 7).

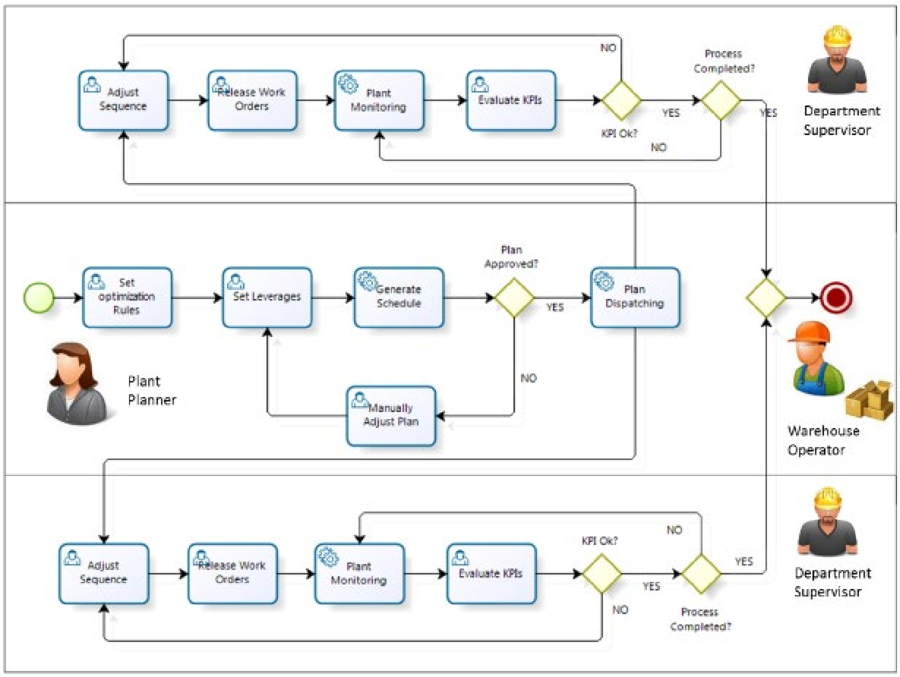

Figure 7. Example of a BPMN 2.0 workflow used by sedApta analysts for describing manufacturing processes

The third and final classification axis of the MAN.TR.A³ space is that expressing the Training Process Maturity level.. For such an axis many maturity model samples are available on the market. From those developed for the Software Engineering Industry (e.g. the Capability Maturity Model Integration, CMMI; from Carnegie Mellon University) to those more recently designed to support process analysis and improvement in the manufacturing sector (e.g. the Manufacturing Maturity Model, MMM, by ATOS origin) and their supply chains (e.g. the Supply Chain Operations Reference, SCOR, model by PricewaterhouseCoopers). Each of these maturity modelling approaches come with the goal of bringing processes to higher levels of standardization with predictable performances measurable by means of well-defined and agreed KPIs. Many KPIs have been designed and circulated for such purposes such as those directly included in the ISA and SCOR models or the independent library from American Productivity & Quality Center (i.e. AQPC Process Definitions and Key Measures) and ISO (i.e. the ISO22400 key performance indicators for manufacturing operations management). All KPIs, from wherever they come, need a high level of maturity to be identified, measured and reported within standard and reusable processes, together with the capability of their continuous assessment and reporting by means of scorecards in order to abstract, at the needed decision levels, data to support decision-making regarding new actions and process improvement. Finally each model comes with its compendium of more or less formal appraisal strategies delivered through specialized consulting services and training (e.g. the Standard CMMI Appraisal Method for Process Improvement, SCAMPI).

For the third axis of the MAN.TR.A[3] space (maturity level) a scale of 5 has been chosen shortlisting the de facto maturity levels usually used for defining process maturity in the manufacturing industry, to help understand their value to sector decision takers.

Conclusions and further work

The effort of studying and promoting learning analytics in the manufacturing workplace in search of good learning experiences, has not been underestimated at the start of the LACE Project. Prior to approaching manufacturing stakeholders to collect and report cases during the 30 months lifecycle of the project, the project has equipped itself with a sound study and reporting methodology named MAN.TR.A[3] which will guide the identification, analysis and positioning of industrial cases using analytics within workplace based training and performance support presenting adequate RIAD (*Reusability, Interoperability, Accountability and Durability*) levels within adopted processes.

Further work will include the development of a MAN.TR.A abstract reference architecture for optimized training and performance support processes at each of the MAN.TR.A cube levels and a MAN.TR.A appraisal methodology to guide Manufacturers towards 'to be' processes with improved training maturity levels and efficiency.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SMES: GENERATING SOCIAL CAPITAL THROUGH NETWORKS AND SOCIAL MEDIA

David E. Gray, University of Greenwich, Mark N.K. Saunders, University of Surrey, United Kingdom

Introduction: SMEs Networks and Social Capital

In a national UK survey, Gray et al. (2012) found a strong engagement amongst SMEs with online information and communication technologies (ICT), some of it linked to social media. Alongside traditional media SMEs talked about using LinkedIn to target customers and Websites as interactive tools to connect to customers, gauge their needs and even talk to them in real time using Live Chat. Yet, none of the entrepreneurs regard themselves as experts. The perception was that ICT and, within these, social media were regarded as a "necessary evil", and there was no choice but to engage very proactively in this area. Respondents saw themselves as using their networks with a number of communities including their customers, associates and even former employees, as a means of generating social capital.

The importance of these findings prompted additional research in this area. This new study took as its focus SME use of social media and sought to address the following research questions:

- What are the key business advantages SMEs gain from using networks and social media to generate social capital?
- What are the relative advantages (and disadvantages) of online and traditional forms of social media within this?
- Which forms of social media (if any) have SMEs tried but considered not worth pursuing?

Gathering data on what SMEs see as the advantages (and disadvantages) of both online and traditional forms of social media, and the communities they connect do (both virtually and physically) help make clear SMEs' use of web technologies as well as their relationship with more traditional ways of accessing social capital.

The use of Information Communication Technologies (ICTs) by SMEs

SMEs are a vital part of the UK economy and contribute significantly to economic growth and employment. Department for Business Innovation and Skills (BIS) data (2013) shows the number of private sector SMEs grew from 3.7m in 2000 to 4.9m in 2013, and the number of people they employ increased from 8.6m to 14.4m. In 2013, these large businesses had an estimated combined turnover in excess of £1,702bn, just below 52% of the turnover of the UK private sector.

In 2012 over 95% of UK SMEs with 1-49 employees had Internet access, this proportion rising to 99.5% for SMEs with 50-249 employees (ONS, 2013). However, compared with larger organisations, the proportion of SMEs using social media, whilst increasing is far smaller. For example whilst only 40% of SMEs with 10-49 employees use social networks such as Facebook and LinkedIn, this proportion rises to 53% for SMEs with 50-249 employees and 81% for organisations with 1000+ employees (ONS, 2013). Usage of other social media such as Wiki based knowledge sharing tools was even lower being about 7% compared to over 26% for organisations of with 100+ employees. As with larger organisations, the most popular reason for SMEs using social media was to develop their business image or to market products, although, once again their use of social media for these purposes was less widespread (see Figure 1).

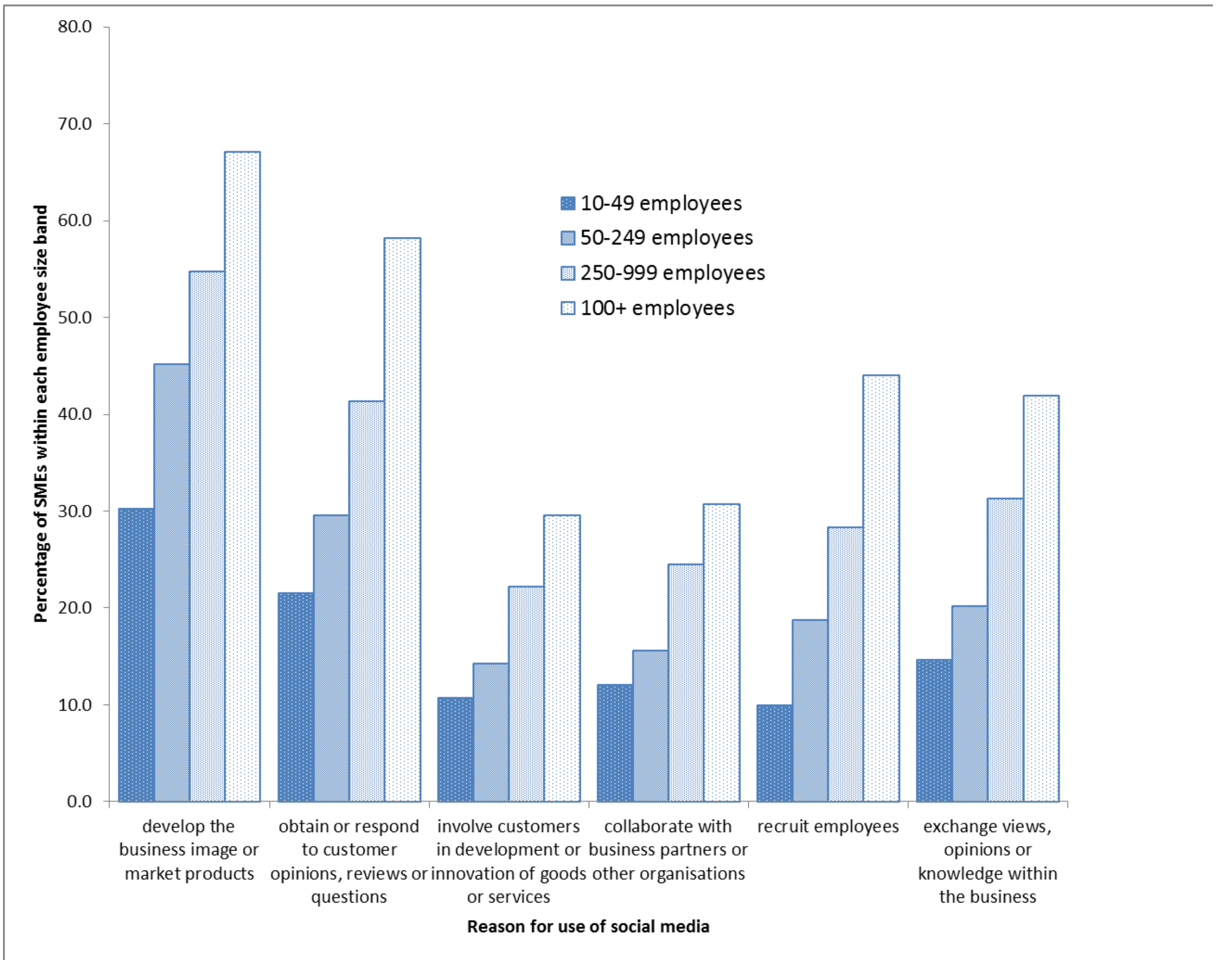

Figure 1. Reasons for the use of social media by size of organisation (Gray et al. 2012)
Source: Office for National Statistics 2013

In summary, although access to the Internet by SMEs is almost ubiquitous, and their use of social media is growing, SME use of social media is far lower than for larger organisations,

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being used predominantly for developing business image or marketing products, or obtaining and responding to customers.

Methodology

The research design for the new study comprised the use of quantitative findings from the Gray et al. (2012) national study (as baseline data that generated further key research questions), secondary data analysis of previous studies in this area, and qualitative data generated through three focus groups and five in-depth interviews. Potential focus group participants were identified through the relevant regional Chamber of Commerce and existing database sources at the Universities of Surrey and Greenwich, 20 participants being selected to reflect on the importance of social capital to their business success, and how they make use of social media and networks to build the business. Two meetings, each of approximately two hours in duration, were subsequently conducted with heterogeneous samples of SMEs to explore:

- Which social media they make use of (e.g. LinkedIn, Facebook, Twitter);
- How they use these media and their importance for the business;
- The role of their business website and their experience of search engine optimisation;
- The key lessons they have you learned in terms of making effective use of social media in their business;
- The role of live networking events and the balance between face-to-face and virtual networking;
- The future use of social media and networking in their business.

For the SME interviews, a sample comprising both typical cases and critical cases was selected to allow exploration (particularly extreme cases) of experiences with social capital and social media. These interviews were in-depth, lasting between 45 minutes and one hour. Findings were validated by holding a third focus group where data and preliminary analysis were presented for comment and confirmation.

Findings

Introduction

The findings presented here comprise two main sections: (1) Consideration of successful SMEs and their use of social capital drawn from secondary analysis of data gather in the 2012 study and (2) exploration of how and why SMEs access and use the various forms of social media and associated issues. The second of these uses data gathered through the two focus groups, the post validation focus group and the five SME case studies. This triangulation of data gathering methods is an approach that confers greater reliability and credibility of the findings.

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Successful SMEs and the use of social capital

Part of the 2012 research considers the importance of networking and of social media to over 1,000 SMEs. It highlights that while nearly 90% of SME's used networks and social media, some 66% considered using networks and social media of at least some importance for their continuing success. It also highlights that using networks and social media was considered significantly more important for continuing success by SMEs with fewer employees than SMEs with a larger number of employees[1] (see Figure 2). Yet the 2012 research study also highlights that whilst over 35% of SMES did not consider their use of networks and social media were effective, 46% had never purchased external advice or consultancy in this area.

Alongside the use of networks and social media, the 2012 research study found that having a website was also considered to be of at least some importance to the business's success by 86% of SMEs, over 40% of SMEs considering this extremely important. Whilst only 4% of SMEs did not have a website, over 20% did not consider their business was effective in its use of the website. In contrast to the purchase of external advice or consultancy with regard to using networks and social media, only 23% had never purchased advice with regard to having a website.

The 2012 research study found that successful SMEs generated social capital by being connected to their communities of customers, associates and other stakeholders. Whilst these successful SMEs engaged proactively with web-based and, in particular, social media to gain competitive advantage, direct referrals were considered extremely important to their continuing success by 67% of SMEs, this being the largest proportion of SMEs for any of the named forms of networking and social media.

After direct referrals, SMEs considered traditional networking events such as Chambers of Commerce meetings of at least some importance (44%) to their continuing success, 10 percent considering them of at least some importance. However, such traditional events were not considered by SMEs to be as important to their continuing success as search engine optimisation (considered of at least some importance by 67%). LinkedIn (44%) was considered of equivalent importance to traditional networking events, other web-based methods such as Twitter and Online discussion groups were considered less important. Importance to continuing success of some web-based methods differed with size of the SME; Linked-In and Online discussion groups were considered significantly more important to their continuing success by SMEs with less than five employees, some using LinkedIn to target customers. In contrast Twitter was considered significantly more important by SMEs who had started trading more recently, being used by some as a form of viral marketing.

[1] Chi square= 39.2, df=12, $p<.00$

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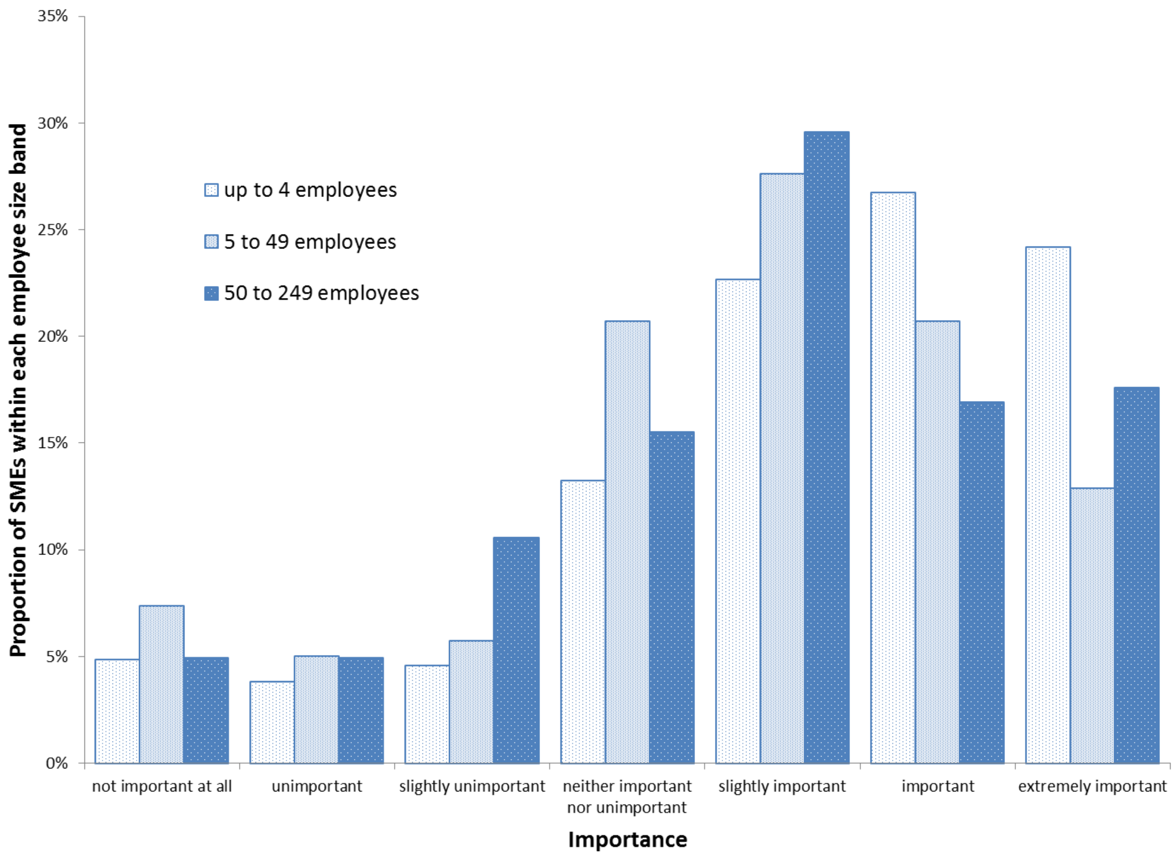

Figure 2. Importance of networking and social media to SMEs' continuing success

The 2012 research study found that successful SMEs networked with a number of different communities using a range of both traditional and web-based methods (see Figure 3). While IT and social media were regarded as a 'necessary evil', there was no choice but to engage very proactively in this area. Networks included their customers, associates and former employees who had moved on to become independent contractors. Networking was about making contact, talking to the right people whom, even if outside the SME, could offer feedback or advice or be used to outsource work. These networks were regarded as a '*community of people*' who might join in with a new business proposal or be used to buy in external expertise.

ISBN 978-963-89559-7-5

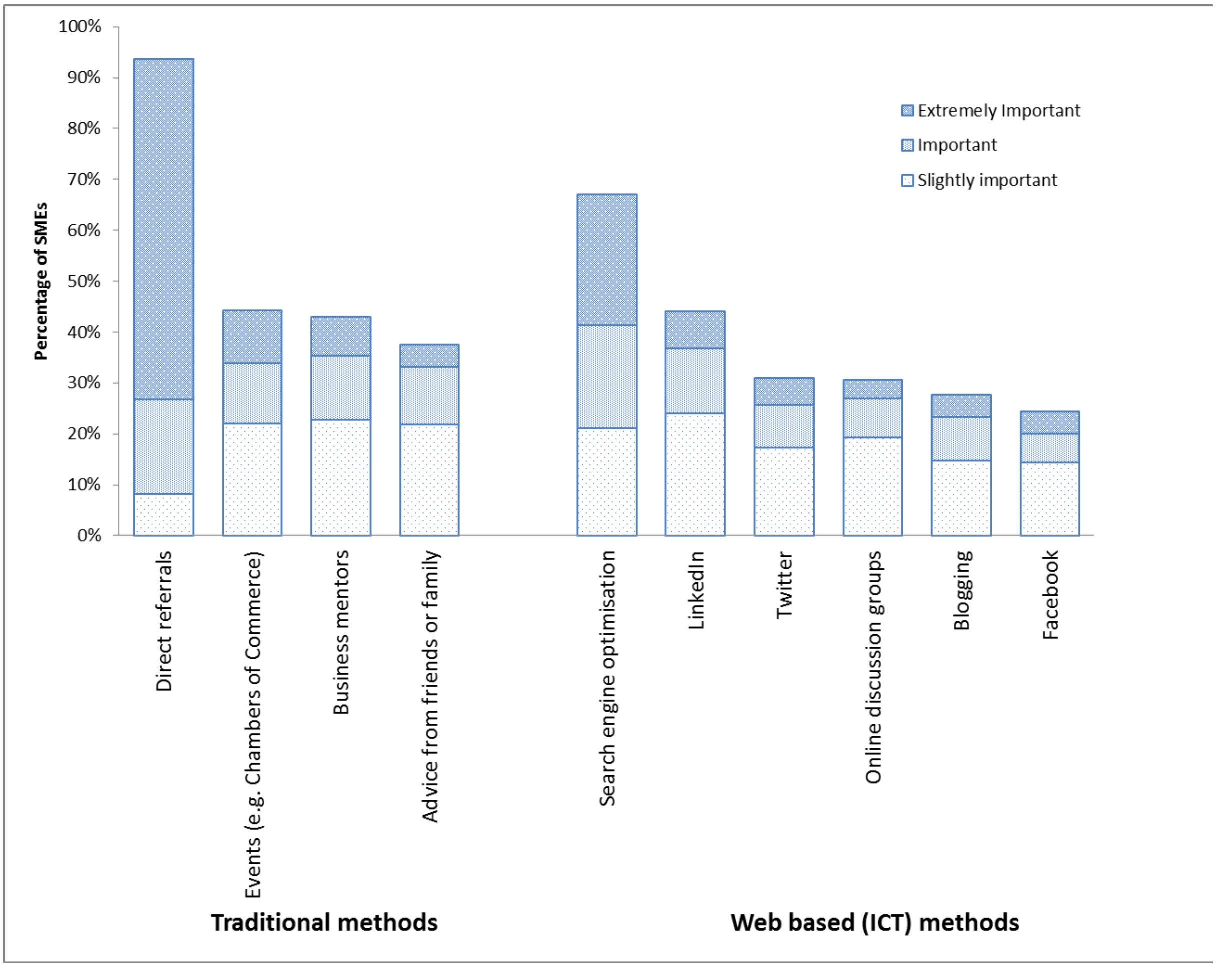

Figure 3. Importance of traditional and web-based (ICT) methods of networking to SMEs' continuing success

SMEs use of various forms of social media

Websites require regular updating of content. This does not just mean text, it can also include YouTube video clips, presentations, articles, etc. Websites need to be dynamic – not just electronic 'yellow pages' or brochures. The Holy Grail is search engine optimisation (SEO), that is, the business website appearing high up on the Google rankings. It needs to be borne in mind, however, that Google is only one of the search engines. Yahoo and Bing, amongst others, are alternative gateways to the internet. But whatever internet search engine used SMEs see themselves as disadvantaged compared to large corporates who have the resources and money to spend on SEO. Genuine experts on SEO are very expensive to hire and there are many 'sharks' selling their services who know only about as much as SME owners themselves. Some businesses are now bringing SEO 'in-house', partly because the kind of marketing graduates they are hiring are now trained in SEO skills. They are aware, for example, that SEO is nationally-based. So, what works in the UK, will need to be modified to work in the USA or China.

Some businesses repeat key words on their website landing page in order to improve SEO, but Google can often detect this and views such practices negatively. Repeated words also reduce

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the readability of content and detract from visitor satisfaction. But Google does like fresh content, so updating a blog can have a positive effect on Google rankings. Relevant and regularly updated content will always win over SEO 'tricks'. Content copied from one blog to another will have a detrimental impact on both blog sites!

LinkedIn is widely used by SMEs to showcase their business and 'to establish who you are'. It gives the business a window into the world, allowing businesses to build a relationship with their customers (from whom positive testimonials are important). LinkedIn is perceived as more dynamic and interactive than, say, a business website because 'you can be active, you can be seen', even encouraging customers and other businesses to pose questions and enlist in discussions. This includes special interest groups – posing and answering questions allows participants to build a positive image of themselves and their business (their social capital). Since Google is 'content hungry' regular LinkedIn posts helps SEO. Enthusiasm, however, is qualified – it is difficult to identify a direct link between activity on LinkedIn and business benefits such as increased revenues. You can get yourself too sucked into discussions, losing sight of the need to find new customers. There is also scepticism about LinkedIn's habit of eliciting skills endorsements. Finally, the amount of commercial advertising on LinkedIn is seen as an unnecessary irritation.

Facebook is widely used, but not as extensively as LinkedIn, often in more of a personal capacity than for business purposes. Indeed, some respondents were adamant that Facebook was not appropriate for their business model. However, some businesses find that Facebook can be more effective for marketing than LinkedIn. In general, however, few respondents talked about Facebook when discussing their business.

Twitter is widely used by some businesses, with a strategy for posting a minimum number of tweets per day – part of getting across the culture of the company to customers and other stakeholders. But as one respondent commented: 'Twitter is a useful medium for locating people who need training on the use of Twitter!' Another commented: 'I have clients that actually have gone on Twitter and they're on it so much. I've said to them … you're giving the wrong perception of your business…One's an MD of her business, and I said … you're tweeting all the time, people are thinking, well when are you doing your work?' So it is also important to be 'savvy' with the social medium being used. Twitter can be effective when used in conjunction with other social media such as the business' website and social media posts such as blogs.

YouTube is a potentially powerful medium. One business, for example, hired a professional cameraman to film the director giving a presentation about her products. The video subsequently achieved over 30,000 hits. However, one of the advantages of YouTube is that it encourages people to accept less than professional video standards, so it is relatively cheap to produce and upload your own video. iPads and iPhones can be used. Rather than send customers a user manual, it now becomes possible to video a demonstration of a product or service. 'They can use it as many times as they like, show it to their colleagues and that … works really well, really well and it's cheap'.

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Face-to-face networks are important both to supplement a social media presence but also in their own right. 'There's no substitute for it. You have to be in front of people and talk to them'. It is best, however, if events are at the start of the day or at the end of it, so they fit around the working day. But it is vital to be selective so as not to suffer from 'event overload'. Having a strategy for networking at events is just as important as having any marketing strategy.

Conclusion

Overall, few if any SMEs claimed to have expertise in the uses of social media (apart from those who provided consultancy in this area). However, they were keen to 'get a presence' in one or many media but realise they are on a learning curve. But whatever social media are used, they have to be 'fit for purpose' and appropriate to the business model being used. It is also clear that social media are not a substitute for face-to-face networking and events. Indeed, the strategy is how to integrate the two so that one complements the other.

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Acknowledgement

We would like to acknowledge the assistance of Kingston Smith, LLP who funded this research.

ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DEVELOPMENT OF A STRATEGY FOR SOCIAL MEDIA USAGE IN HIGHER EDUCATION

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Abstract

Social media (SoMe) is everywhere in our daily life. People have started to use social media in almost every aspect and field of life, however, limited attention has been paid so far to studying the potential of social media for educational purposes. So an important question is "How to use social media efficiently for teaching-learning processes?" To answer this question standards or strategies should be defined for a more effective and efficient social media usage in an educational context. Hence, being a part of an international research project[1], this article aims to develop a strategy for social media usage in higher education.

The article starts with (1) presenting findings of an ongoing international project researching the status quo- and potential of social media application for teaching, learning and research in higher education institutions. (2) After that, findings from the literature, qualitative research and web searches are related to the results. Based on the previous steps, in a final step (3), a general strategy for social media usage in higher education is presented as a framework for consideration by various higher education institutions.

Examples of Social Media Strategies from Universities: What Came Out of Research and Literature?

This research was carried out for framing a social media strategy that could be implemented in higher education. Hence, qualitative measures, namely data from literature, web searches and together with interviews of instructors from two countries, formed the scientific data on which our framework will be based.

[1] EU FP7 Era.NET RUS "SoMeCat" (Social Media as a Catalyser for Cross-National Learning), www.somecat.org. A joint project of the University of Perm (Russia), University of Ankara (Turkey), Nexus Institute of Cooperation Management and Interdisciplinary Research (Germany), and Zurich University of Applied Sciences (Switzerland).

Results of the case studies

For the Turkish case (N=12), two universities, namely Ankara University (AU) and Middle East Technical University (METU), were selected as sample cases. Ankara University was the institution that led the aforementioned international research, and METU is one of leading universities in Turkey in terms of technological innovations. Hence, the data was collected from 6 instructors from AU and 6 instructors from METU. It might be useful to emphasize one point here, that AU has complete online official programmes, so all the instructors and students have experience in both e-learning and blended learning, whereas METU uses social media and Web 2.0 tools to support traditional instruction and uses only blended learning.

For the German case (N=10), similarly two universities were selected. From the University of Konstanz (UK) 4 instructors were interviewed. It was found out that UK has no regular online courses, but usually supplements presence teaching with the Ilias Learning Management System (LMS). At the Technical University of Berlin (TUB), 6 instructors were interviewed. TUB uses Moodle as their LMS while having various online learning opportunities.

The findings that are stated in the following were derived from the two open-ended questions answered by the instructors during individual interviews. The interviews included other questions related to further research issues of the project: The instructors were asked whether they (1) know if there is a social media strategy at their university or not. They were also asked (2) for their suggestions for a Social Media Strategy that could be implemented in higher education. These qualitative data were first recorded, then transcribed, and emerging themes noted. Finally, the findings were converted into a report.

Of the 12 participants from the Turkish case, 9 instructors stated that there was no such strategy. Three instructors from Ankara University did not have any idea. One instructor said that "ICT should be a part of daily life. It should appear automatically in our daily processes". Thus, there is no strategy and there are not many opinions about the strategy. This is an expected result since all the implementations that use social media in education are individual attempts from a small amount of people.

At the University of Konstanz two instructors didn't know whether there was a social media strategy and one instructor stated the university definitely had no strategy. Another stated that press releases are also published via social media channels but rather than there being a strategy, there is "navigation by eyesight"; meaning you look as far as your eyes see, but there is no long-distance goal. At TUB a social media strategy will soon be implemented. An instructor, who was thoroughly involved in the area (working in the E-learning Centre), stated: "Now the focus is on better teaching methods and that is why e-Learning has become important". The other instructors did not know whether there was a social media strategy. Two of them pointed towards various social media activities at TUB but were not sure if there is a systematic strategy behind it.

As for the question about their suggestions for a Social Media strategy, the Turkish instructors provided following insights:

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- We can use technology as a powerful network for knowledge sharing. In-service training opportunities are needed for all instructors;
- A top-down and step-by-step strategy should be implemented for academic usage;
- A general course about social media can be provided to students like computer literacy courses. A culture can be established in this way and users will get used to it;
- Firstly, all instructors should become social media users. Moreover, I would expect the university to develop non-commercial social media environments;
- I use social media to develop communication between students and alumni. There should be a social media for academic purposes used only by universities;
- Special interest groups or learning communities should be set up for social natural engineering. By sharing creative experiences, a cumulative know-how can be created. Hidden experiences can be transformed into informative and meaningful information;
- Using top-down and bottom-up approaches continuously and providing training opportunities through e-Learning, everybody can be equipped with the necessary information and skills. But only by considering volunteers;
- There should be a system approach to support symposiums, conferences etc. to form databases and increase collaboration;
- First perceptions should change. If an encouragement strategy is implemented, and instructors share their experiences and thoughts, especially good examples and success stories, it would be useful;
- Everybody should use social media actively and regularly. Technical infrastructure should be enhanced and resources should be accessible at any time and from anywhere. For example, while doing my post-doctorate in a different country, I could search the library from my smart phone through an application, and libraries are open here 24x7 and full of people even at night.

Most of the suggestions were at an individual level rather than being institutional. Therefore, it is suggested that the starting point for implementing such a strategy would be at the individual level rather than the institutional level.

On the other hand, the suggestions made by the German instructors were as follows:

- We should make what makes sense. Teaching and research should be placed at the centre of our attention. Technology is not an aim in itself;
- We should use social media to allow more participation from both students and staff;
- Future instructors should be told what is expected from them in this area when hired;
- The primary focus should be on good teaching.

Based on the findings, it can be concluded that there are no strategies regarding social media use in the sample universities. Although participants from the Turkish and German universities gave some suggestions, the Russian and Swiss participants had none. In the following we will expand the focus to other universities and scientific literature.

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Results of literature and web search

Blazer (2012) had some recommendations for the establishment of social networking policies in school districts including:

1. Develop an appropriate usage policy for social networking,
2. Develop strategies for preventing, identifying, and responding to cyber bullying,
3. Adhere to federal guidelines governing students' Internet use,
4. Start with a pilot programme,
5. Try out different social networking sites,
6. Consider using specially designed education-based social networking sites,
7. Provide teachers with training on the use of social networking in the classroom, and
8. Develop strict guidelines for student-teacher communications.

On the other hand, there are some universities which have already developed their own strategy and started implementation. For example, Vanderbilt University has a "Social Media Handbook" containing a "Social Media Strategy Worksheet". They are pioneers in social media usage, and the handbook has parts like: How Vanderbilt is Using Social Media, Important Policies: Read These First, Getting Started, Tell Us About It! and Best Practices for a Successful Social Media Presence (http://web.vanderbilt.edu/resources/social-media-handbook/). While looking at social media strategy worksheet, it is seen that the strategy is intended for general purposes, and not specifically for educational purposes.

University of Cincinnati also has a "Social Media Strategy" (http://www.uc.edu/content/dam/uc/ucomm/docs/UC-Social-Media-Strategy.pdf). Their overall strategy is "to coordinate and strengthen the university's social media efforts and to incorporate social media as an integral part of an overall communications strategy". Their goals are to:

- "Build a collaborative university-wide social media environment.
- Strengthen UC's brand and improve UC's reputation.
- Recruit and retain students, faculty and staff.
- Build a culture of philanthropy.
- Establish social media as an official emergency and crisis communication resource".

However, none of the goals address the use of social media in teaching-learning processes.

Tufts University provides a template for their social media strategy (http://webcomm.tufts.edu/wp-content/uploads/SocialMediaStrategyTemplateFINAL.pdf). The university states that the purpose of Tufts University social media strategy is to ensure that they:

- "Use social media as an integral part of an overall communications strategy at Tufts.
- Leverage current outlets while also maintaining a clear vision for how we can continue to engage new audiences as the landscape changes.

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- Tell the Tufts story – stories that reflect the University's core values – and engage our audience in new and interesting ways.
- Support our schools, departments and offices at Tufts in their social media endeavours by providing guidance and best practices."

Tufts University also set up their goals for their Social Media Strategy. Some of the goals include ideas like: using a variety of social-media platforms that reach the university's various audiences to provide users with a sense of community, conveying the key messages of the University to a broad audience, enhancing the reputation for Tufts' social media presence, ensuring consistency in a style and approaches to social media across the institution, while recognizing the necessity to tailor tone and platforms to various constituencies, staying on top of trends and new technologies. But again, no items relate to the educational use of social media.

Kietzmann, Hermkens, McCarthy and Silvestre (2011) presented a framework that defines social media by using seven functional building blocks, namely: identity, conversations, sharing, presence, relationships, reputation, and groups. They stated that various social media activities are defined by the extent to which they focus on some or all of these blocks. The researchers explained the implications that each block can have from a business point of view.

Kaplan and Haenlein (2010) provided a classification of social media that groups applications, currently subsumed under the generalized term, into the more specific categories by the following characteristics: collaborative projects, blogs, content communities, social networking sites, virtual game worlds, and virtual social worlds. Moreover, they provided some suggestions for companies which decide to utilize social media. Although characteristics, like collaboration, virtual games and blogs, are the ones that may also have some premises from an educational point of view, the researchers only revealed business use cases.

Hence, it is obvious that universities' social media strategies have been developed for guaranteeing "web presence" of the university and having different goals than serving for supporting educational processes, and other strategies are studies that are promising from a business point of view which will be addressed in the following section.

Examples of Social Media Strategies from Business

Social Media Strategy Framework

A framework proposed by the Advanced Human Technologies company is presented in Figure 1. The company states on their website (http://ahtgroup.com/services/social-media-strategies) that they use their Social Media Strategy Framework primarily to help their clients who are at the initial stage of engaging with social media to understand what is required to create a social media strategy. They also state that a "Social media strategy is unique to every organization, so in consulting engagements we always use the approach that is most relevant to the client's issues and situation".

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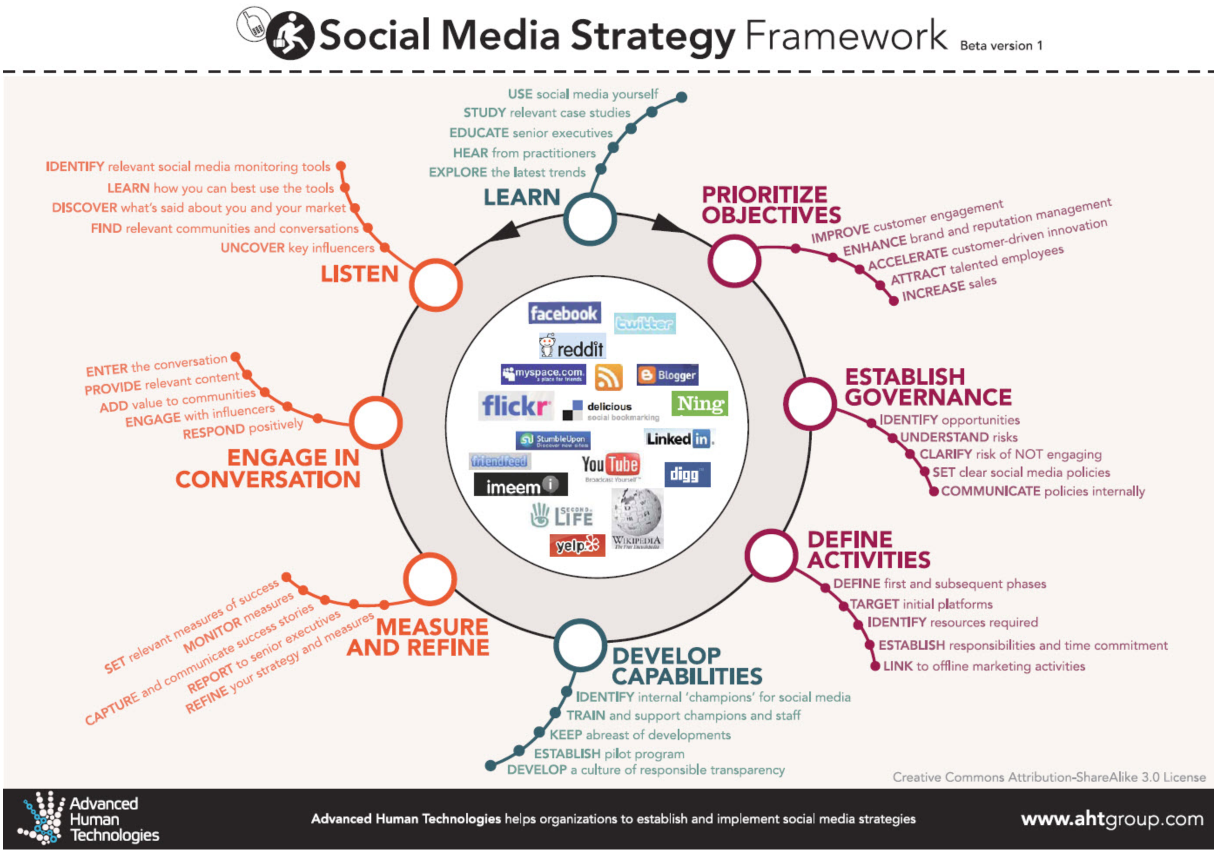

Figure 1. Social Media Strategy Framework (www.ahtgroup.com)

The Framework begins with LEARN, divides in streams of ENGAGEMENT and STRATEGY DEVELOPMENT, that come together in the ongoing imperative to DEVELOP CAPABILITIES.

Social Media Strategy Transit Map

Another example is provided by Smiciklas (2010) and named as the Social Media Strategy Transit Map (http://www.intersectionconsulting.com/2010/social-media-strategy-transit-map/). This "social media commuter" guide maps out the five main strategy arteries as (Figure 2):

- Discovery;
- Strategy;
- Implementation;
- Management;
- Audit.

The author asks readers whether and what stations they would add.

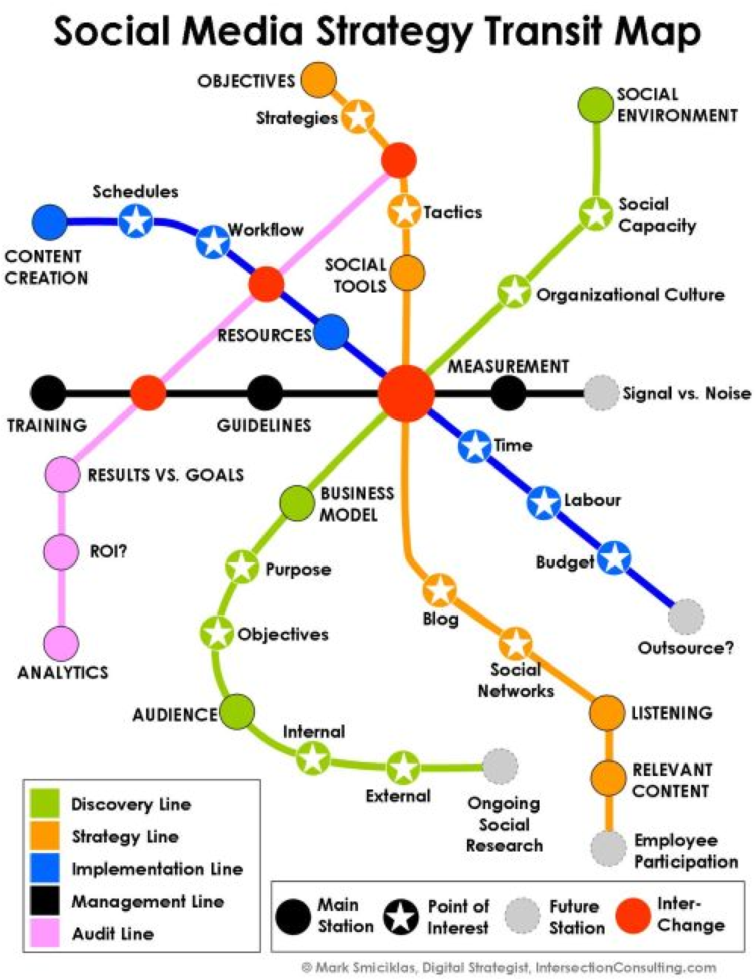

Figure 2. Social Media Strategy Transit Map Smiciklas (2010)

Framework for Social Media Strategy

From this point of view, our social media strategy will be the first attempt for defining a strategy to enhance educational use of social media with a focus on higher education institutions. On the base of the emerging themes of research articles, our research findings and suggestions made by instructors, and some templates provided from different universities, a framework for a possible SoMe Strategy has been developed by relating business scopes with educational aims. The proposed framework is shown in the mind map (Figure 3).

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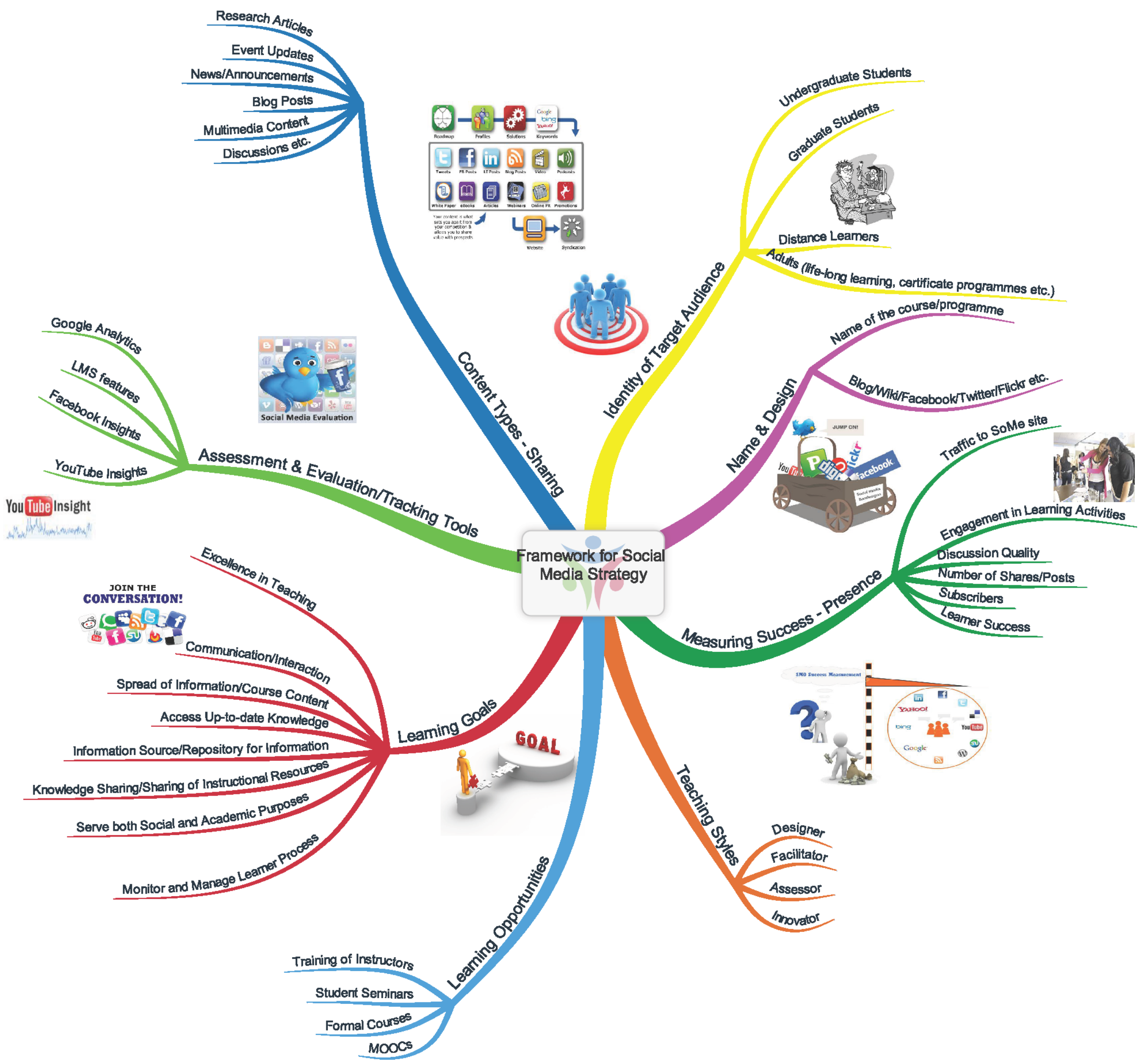

Figure 3. Framework for Social Media Strategy

The framework consists of 8 dimensions:

1. Identity of Target Audience,
2. Name & Design,
3. Measuring Success-Presence,
4. Teaching Styles,
5. Learning Opportunities,
6. Learning Goals,
7. Assessment & evaluation-Tracking Tools,
8. Content Types – Sharing.

For this framework, "Identity of Target Audience" was an important aspect since social media users in higher education will be adults. Adult learning theories, characteristics and SoMe preferences of higher education students are important inputs for any SoMe that will be used

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in a higher educational context. "Learning Opportunities" was another important aspect since SoMe can be integrated into any kind of e-Learning types like blended learning, webinar and MOOCs. "Learning Goals" are important because learning outcomes can be in cognitive, affective or psychomotoric dimensions or require different learning levels like the classification of Bloom's Taxonomy. "Content Types – Sharing" aspect is important as the types of shared files will determine the SoMe category. "Teaching Styles" are important since SoMe is a learner-centred environment and instructors should be adhering to a constructivist approach (this finding is also revealed from our research). "Measuring Success-Presence" is important in terms of assessing whether the right decision has been made and implemented. "Name & Design", in other words the selected and implemented SoMe tool itself is important in terms of its interface, usability and educational uses provided to students. Finally, "Assessment & Evaluation-Tracking Tools" are important to monitor student progress and effectiveness of educational implementations in a SoMe environment.

Conclusion

This framework is provided to reveal possible determiners of an effective implementation of SoMe in educational contexts. Researchers hope that these findings will shed some light on this area for leaders of universities for implementing in SoMe Strategies, and will also be used to drive a Social Media Toolkit, currently being developed within the international research project, which is aimed to be a guide for instructors in their innovative teaching implementations.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SOCIAL MEDIA AS A TOOL FOR TEACHERS AND STUDENT COUNSELLORS

Tom Vandries, Davy Nijs, Gerard Gielen, Catholic University College Limburg, Belgium

Introduction

Internet forced his way in to the most diverse areas of life nowadays. Students follow school activities through the electronic learning environment provided by the school, 'Dr Google' is our first source of information when we are sick and afterwards we schedule an appointment with our family doctor via his online agenda. But also in terms of human contact the internet plays his role as an important medium.

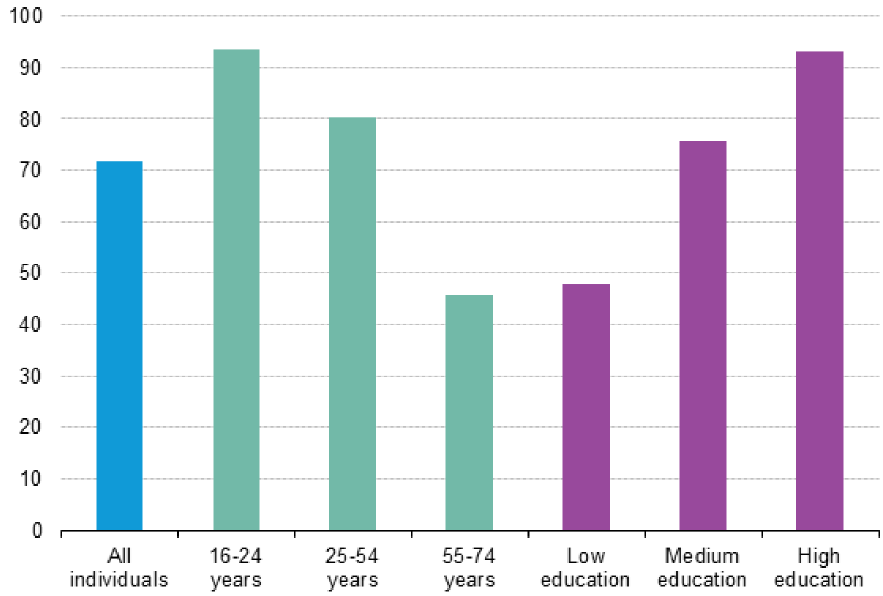

Figure 1. Internet use and frequency of use by individuals, 2013 (% of individuals) (Seyebert & Reinecke, 2013)

Internet access is available in 76% of the 'average' European households with a broad difference between specific countries. In Bulgaria 51% of the households has an Internet connection compared to 94% in the Netherlands (Seybert, 2012). Figure 1 shows that 93% of the European 16-24 year olds uses it at least once a week (Seyebert & Reinecke, 2013). Research from Grafitti and Jeugdwerknet (2012) shows the use of social network sites in Flanders by age group (Figure 2). Facebook is by far the most popular social network site used by youngsters (age 12-18). In this paper we will investigate the possibilities of the use of social media in educational environments, where it can add value as a prevention tool and as a medium for teachers/student counsellors to fulfil their responsibilities in taking care of children with extra socio-emotional needs. The focus is not on the use of social media as a learning tool, which has longer practice based value. In this we focus on the possible role online tools can play in the care policy of an educational environment. As an inspiration for this assumption we can rely on our current research about the use and implementation of social media as a tool with students with special needs living in residential care units.

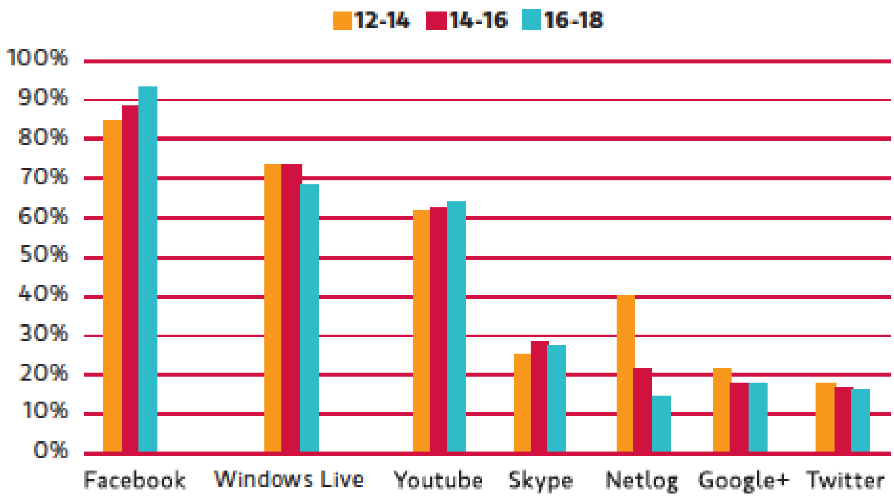

Figure 2. Use of social media by age group (Grafitti & Jeugdwerknet, 2013)

We describe these online tools as Internet based instruments that can be used before, during or after a student face-to-face contact. For example, an instrument where the student can choose from a range of counselling goals specified for every life domain. At the end of this instrument he and/or the teacher/student counsellor gets an overview of the chosen items. This can be a starting point for a counselling process between student and teacher/student counsellor.

Van Hecke (2012) points out the importance of social media in social care work and social care workers should be where children and young people are, and that's currently online. As young people spend a significant part of their time online, educational organizations should question the value of their presence in this hangout. For as it can be a tool for teachers and student counsellors to anticipate on obstacles threatening welfare and the learning potentials of youngsters. A small survey learned the willingness of schools for this kind of ambulatory (preventive) supporting of young people with care needs.

Online tools can be beneficial for both teacher/student counsellor and students. The supporting factor lies in the use of a different communication medium. We deal with children and young people who have grown up in a digital society, the so-called 'digital natives' (Prensky, 2001). For them, digital communication is an important part of their lives. Young people consciously choose this medium to meet a specific need that they want to satisfy (Eighmey & McCord, 1998). For this reason it is no longer possible to ignore the benefits of using internet in the guidance of children and young people (Vancoppenolle, 2008). Students wish to participate in today's e-culture. Their caretakers often have a 'healthy' protective reflex

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that restricts children and young people in their use of the Internet (Van Hecke, 2012, p.17). Therefore social media will not easily be deployed in care processes. This is a missed opportunity to prepare students for a digital society. Furthermore, it is a missed opportunity to make use of the advantages that online care has to offer.

Methodology

This year the Catholic University College Limburg (KHLim department Social Work) will end a 2-year research project (2012-2014) on the implementation and evaluation of social media in guidance of youngsters with special needs. The focus lies on two research questions: (1) what is the best way to implement social media (as a tool in guidance) in the practice of a social care organization? And (2) does the implementation and use of online tools in guidance in addition of direct life contact ameliorates the guidance process and the relationship and the satisfaction of this relationship between the social care worker and the youngster?

To answer the first question an implementation protocol was outlined using an international literature search. The protocol was developed based on the model of Grol and Wensing (2006). Several national and international experts on eHealth reviewed it. The online tools were implemented in the participating organization (Sporen vzw). We choose for a participatory process together with the social care workers. They were introduced in the use of online tools and were a major voice in the process. The second question was answered by using a pre-posttest design processing semi-structured interviews in which the methods were evaluated by counsellors and their youngsters in guidance. Furthermore, a quantative pre-posttest design was implemented. Both the satisfaction and the social care worker-youngster relationship were measured from the viewpoint of the youngster and his/her social care worker.

Online Tools

The introduction mentioned one possibility online tools can have during guidance processes, to support the goal setting process every counselling process starts with. In this section we present two more examples on how online tools can be used as a tool in the guidance of youngsters with special needs. In our research we focused on those youngsters with behavioural and socio-emotional challenges. In this research we used the computer and a social medium as mediator between teacher/student counsellor and youngster. This indirect communication holds lots of possibilities to also being used in educational environments, where it can add value as a prevention tool and as a medium for teachers to fulfil their responsibilities in taking care of youngsters with extra socio-emotional needs. In the mediation sessions between teacher/student counsellor and youngster different aspects of their school lives and personal problems will be discussed, resulting in goals and practical actions.

But at first we remark some points of attention. The tools used are common available web 2.0 tools and all have a hidden commercial intention. This raises issues on privacy and privacy

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settings. It compels for attention to media literacy both of the teacher/student counsellor and students when using them. Furthermore we advise to anonymize the data used in these tools, what should be an integral part of the guidance process using these tools.

Timelines

Students can be facing many difficulties during their academic careers and personnel lives influencing each other. To help them get a grip on their life and get a better understanding of these difficulties, we can use an online tool to create digital timelines. In these digital timelines youngsters can collect all the academic or personal events, which are positively or negatively influencing them and they want to share. These events can be illustrated by pictures, music, movies, etc. There are several scenarios in which these timelines can be used. Two examples to illustrate this

My life until now

In many cases students who get in contact with student guidance services have problems in personal home situations and already have got a turbulent and burdened past. With this tool the student can construct his or her own timeline. In several cases, writing down and constructing a timeline already has a therapeutic effect. Furthermore, it provides an overview of an often confusing past (Van Hecke, 2012). In the illustration below we see an example of a timeline made by a student. It gives a language for describing events often not yet possible to describe in words, but also a way to share it or co-create it with others.

Figure 3. An example of lifeline made by a student

My future

Another approach is to work towards the future with a student. With the digital timeline we can also construct 'the future life' of a student. He/she can illustrate the future he/she wants to life in. This future image can be a starting point in the student counselling towards concrete goals.

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Google Maps

We know Google Maps as a geographical tool. It is also possible to create your own private custom maps. In these maps you can mark 'your locations' name them and add a comment. In this tool we'll let students create their own map. By using Google Maps with a student, he or she can create his own directory of relevant places. It may help him/her to identify his/her place in the world and to reflect about this. He/she can point out on the map places he/she visited or liked and mark them with a flag. Also, areas can be highlighted or streets where students walked by. This method can be a nice icebreaker at a starting relationship in finding someone's personal problems and defining the most important topics of the necessary guidance process. Through questions the teacher/student counsellor learns a lot about the student. This information can be presented in a visual map and re-used during counselling.

There are several approaches, which can be used and combined. We will discuss two of them.

1. Social environment:
   One possibility is to work with the student to construct a map of its (social) environment e.g. friends, important family members, etc. This map gives several insights in the social network of the student. It provides an idea of the size and density of the network. It gives insights into the network-gaps (e.g. he marks only family and no friends or other persons) or network-possibilities. Further it can be a starting point to discuss places better to be avoided. This can be a major step forward in the support process.
2. Independency:
   A second possibility is to work on independency. The map can be used as a preparation of an upcoming event or displacement. For example, we are thinking of preparing to major routes to school, internship, home, etc. Also Google street view can be a nice addition. This can give a visual image of the places, which are discussed. This enables students to discover unknown places (e.g. a new school) or let them show 'their' homes etc.

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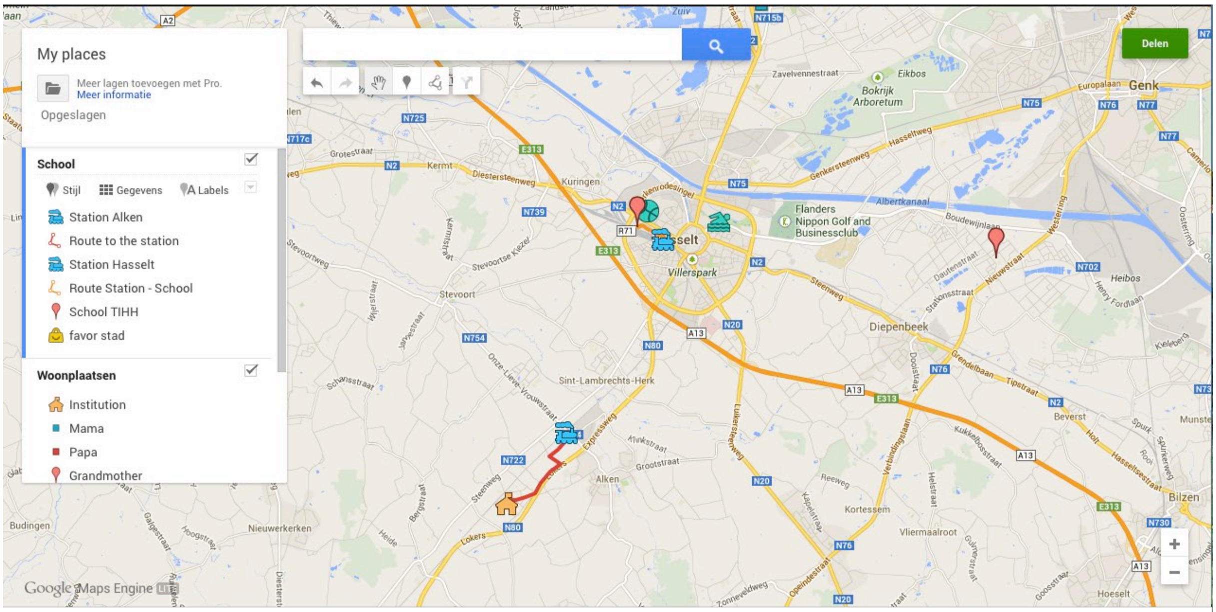

Figure 4. An example of Google maps made by a youngster

The benefits of social media as a tool for teachers and student counsellors

The broad use of Internet in education and care has already proven to have possibilities and hazards. Next to the possibilities to create a learning environment (e.g. blackboard) and to communicate with parents and pupils (e.g. Facebook-groups), social media can earn a place as powerful tool in student counselling in a school or care setting. Our research as described in this paper has proven the possibilities in residential care units for youngsters with socio-emotional problems revealing possibilities in other working area's as there are schools and other educational organizations.

In our research we have explicitly chosen for easy available 'free online tools' based on three reasons:

1. it lowers the threshold for students to get started with these tools,
2. an account created remains property of the student and
3. these tools are free to use.

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We will elaborate the benefits of online tools in school guidance process on four advantages.

1. The tools are consistent with 'their world'
   As the introduction mentioned large part of students are active online. There is not a strict separation between their online and offline life as they are 'inline'. It is an integral part of their lives. With the use of online tools we connect with this world and its (different) forms of communication. As we connect with them it could lower the difficulty to give – sensitive – information. This corresponds to an online disinhibition effect (Suler, 2004).
2. Online tools as empowering tools
   The use of online tools is a powerful choice to accompany youth in an empowering way. The students have their own account and manage their own data. They share this information with the people they choose to. Many tools have the possibility to invite other people to view or participate and co-create. This enables students to invite their own family, friends to collaborate with them, without losing ownership. Internet access is the only necessity to access their data.
3. Working independently and blended
   A third advantage of these online tools is the possibility to use it independently of physical contact with teacher/student counsellors. Blended processes make it possible to combine face2face contact with online activities. It gives a lot of free 'work time' (use it in spare time or when they feel the need to).
4. Removing barriers via a different kind of communication
   Internet tools use an asynchronous written type of communication. It is a language that is more common among youngsters and better reflects their world. This makes it possible to use it as an addition to the more known verbal method of counselling. Learners are used to work with social media. Using tools from their own context makes it less threatening. We take positive advantage of the so called online disinhibition effect. Suler (2004, p.321) explains it as "While online, some people self-disclose or act out more frequently or intensely than they would in person". Online tools give the students the opportunity to 'work' via a new communication medium with their teacher/student counsellors. Furthermore because some complex emotions are almost impossible to explain in words, these tools have several opportunities to use non-verbal communication.

Discussion

At the moment of writing we only have preliminary results of our qualitative research on the perceived effects and the experience of youngster and social care workers with these tools. The initial results give us insight in the potential of these tools as confirmed by social care workers and youngsters. Some of them explicitly mention the importance to combine online tools with face-to-face counselling (blended counselling). All of the respondents see a potential for specific groups of youngsters who will benefit from them. Furthermore many social care

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workers and some youngsters confirm the potential of online tools as part of a digitalizing guidance. Another group of youngsters perceive no specific added value for themselves.

Further research is required on the use of Internet as a medium for teachers and student counsellors to fulfil their responsibilities in taking care of children with extra socio-emotional needs. eHealth can be an extra platform to facilitate these counselling processes. We think some specific themes need further exploration. First of all an inventory of information on success factors and pitfalls of the use of social media within the counselling process in education is needed. As it is common in eHealth innovations sustainability is a big challenge. Organizations will have the need for a good implementation protocol to guarantee these tools to be used and outlined in their care policy.

We live in a digital society. Therefore it is important that both social care work and education embed digital media, tools and communication in their work. The use of social media as a tool can be one part of this (Van Hecke, 2012). Two online tools usable in counselling processes where it can add value as a prevention tool and as a medium for teachers/student counsellors to fulfil their responsibilities in taking care of children with extra socio-emotional needs are discussed. The tools are commonly available but will be used with a pedagogical 'twist' without loosing grip on privacy, media literacy and ethical issues. It can be a great help for teachers and student counsellors to connect with students. We can't ignore the Internet and social media as integral part of our professional toolkit.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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PERSONALIZED LEARNING & COLLABORATIVE WORKING ENVIRONMENTS FOSTERING SOCIAL CREATIVITY AND INNOVATIONS INSIDE THE ORGANISATIONS

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Janez Hrastnik, AMIS, Slovenia

Introduction

The general aim of the ARISTOTELE project was to foster workplace learning of employees through the use of innovative information technology tools and environments. The main objective of the evaluation framework was to design and to provide evaluation methods for the "pilot trials" of the ARISTOTELE project in which the tools were tested. The objective here was to define and provide the ARISTOTELE Evaluation Framework with all selected methodologies and required instruments (e.g. models, processes, criteria) which could be used to assess innovative learning models and processes. These methods were the basis for developing a set of indicators: They were used and applied to assess the outcomes of the ARISTOTELE project and to measure the impact. In addition, it built an assessment methodology to evaluate the effect of the integrated ARISTOTELE Platform, Tools and Methodologies on learning processes, collaboration and knowledge sharing in enterprises.

Hereby, the ARISTOTELE impact measurement concentrated on five main impact categories: costs, time, quality, outputs and fit with the organisation. These categories and the respective indicators served to quantify differences using the ARISTOTELE platform and tools in comparison to the technical solutions used before in similar circumstances. Thus, the aims were to identify objectively measurable performance indicators and to measure them applying business processes which are relevant both for the two application partners and potential users.

The internal design process of the business processes was to go back to the already identified work and learning practices (which fall into the ARISTOTELE key areas and are in a knowledge work context) and the requirements on one side and available ARISTOTELE platform functionalities on the other.

The industry partners in the project consortium together with business analysts and HR experts elaborated the final version of the business cases, proposals for their measurement and expected improvements. The associated business processes which were expected to be improved were identified.

This procedure guaranteed the relevance of the business processes used in pilot trial II both for the application partners (APs) and for the ARISTOTELE project.

Summary of the ARISTOTELE Evaluation Framework Section

The following table shows the overview of the whole ARISTOTELE Evaluation Framework: It presents the Evaluation Levels and their phases with the chosen methodologies which were used in the evaluation levels.

The first Iteration Cycle of the ARISTOTELE Evaluation Framework included the concept validation and the Pilot Trial 1 with the Usability Study and User Validation, whereas the second Iteration Cycle covered the Software Validation and Impact Measurement focusing on both (i) the validation of the ARISTOTELE platform and (ii) the impact evaluation of the usage of the integrated ARISTOTELE Platform and Tools.

Through the two iterations, the ARISTOTELE evaluation ensured the improvement and optimization of the ARISTOTELE models, methodologies, tools and of the ARISTOTELE platform as well as of the ARISTOTELE impact for best development and support of the ARISTOTELE outcomes and their long-term and sustainable usage and exploitation.

Table 1: Overview of the ARISTOTELE Evaluation Framework

Phases	Level	Name	Methods
Conceptual Evaluation	Level 1	Concept Validation (qualitative evaluation)	Phase 1: Individual Experts Reviews (internal and external experts)
			Phase 2: SWOT Analysis from Focus Group
Pilot Trial 1	Level 2	Usability Study (qualitative evaluation)	Cognitive Walkthrough
	Level 3	User Validation of Tools (qualitative and quantitative evaluation)	Functional Testing
			Quantitative Survey (Online Questionnaire)
Pilot Trial 2	Level 4	Software Validation and Impact Measurement (qualitative and quantitative evaluation)	**Phase 1: Software Validation** • Functional Testing (Validation and Verification) • Extended Oral Feedback on Usability Aspects (if needed)
			Phase 2: Impact Measurement • Semi-Structured Interviews on Impact (Platform and Tools) • Impact measurement (KPI) • Quantitative Survey (Online Questionnaire)

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Evaluation methods

Specifications

Pilot trial II was mainly conducted at the application partners (AP) AMIS and PHI, where five business scenarios were observed following a pre-post design: first, each scenario was observed under normal conditions (without the use of ARISTOTELE) and then using the ARISTOTELE tools and platform. 57 test persons from different main system actor groups and from both APs were involved. Both APs had access to their own installation of the ARISTOTELE platform with AP-specific data available.

Input for the evaluation activities was collected through different validation methods:

1. functional testing;
2. semi-structured interviews on impact (platform and tools);
3. impact measurement (KPI);
4. quantitative survey (online questionnaire);
5. implementation costs.

Method 3) required the development of KPIs regarding time, staff-costs, quality, accuracy and fit with the organisation.

Functional testing

In order to guarantee a reliable execution of pilot trial II, a functional testing has been performed. This testing focused on the functionalities of tools and services to be used by the Application Partners in the daily activities of their business processes. The results of the testing allowed identifying:

- some bugs that were still present in the tools/services under testing and that were fixed;
- some issues that was not possible to address in view of the experimentation (i.e. the last version of EUROPASS format is not managed by the CV analyser prototype)
- some issues that have been addressed to better support the experimentation (i.e. extension of the ticket matching approach by introducing matching based on word similarity).

Semi-structured interviews on impact (platform and tools)

At the end of the measurement phase without ARISTOTELE and the measurement phase with ARISTOTELE, 24 interviewees (in each case the same persons) have been interviewed on implicit details of the business scenarios and informal feedback on the impact of the ARISTOTELE tools and platform, especially on details on changes in the work process, problems/obstacles, IT-support of the ARISTOTELE key areas, usability aspects and improvements/proposals. The results tackled primarily the aspects quality, changes in business processes and usability.

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Impact measurement (KPI)

For each of the five business scenarios, several KPIs were measured during/before and after the phase in which ARISTOTELE was used. The indicators referred to different levels of complexity (overall business scenario, sub-process, single step). The results tackled primarily the aspects time, resources and to a minor extent quality.

Quantitative survey (online questionnaire)

The survey was administered at the end of Pilot Trial 2 and had four parts:

1. personal data, role and AP;
2. the System Usability Scale (SUS – Brooke (1996));
3. Part 3 on usability, validation and perceived usefulness;
4. Part 4 on platform validation and changes in business processes.

The results tackled primarily the aspects changes in business processes and usability.

Implementation costs

The partners involved in pilot trial II provided estimations on the following: CRMPA/MOMA on the internal costs for setting-up, maintaining and consulting activities of the pilot installations; AMIS on the internal costs for setting-up and maintaining activities of the piloting installation; PHI on setting up, technical implementation and training activities of a hypothetical complete installation of ARISTOTELE. This allowed extrapolating on a) the consulting costs for external clients (market prices); b) return of investment.

Overall evaluation results

Triangulation of the data coming from the different validation methods allowed condensing the results as follows:

1. The Human Resource Management (HRM) tool is a good candidate for a product that needs some improvements on the reported usability concerns and the integration of different languages and could prove direct and positive impact on the business processes.
2. The Personal Work and Learning Experience (PWLE) tool needs a better focus on and integration into business processes to provide substantial impact and measurable improvements on required time and resources.
3. The Knowledge Building (KB) tool (Recommender System) needs some improvements, but in general it can be considered as a good candidate for a product supporting the business processes within e.g. call centres.

The results of the evaluation level 4 could prove that the tested ARISTOTELE tools are providing support for the application partners with specific impact on their business

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processes. The findings could be used for the further development and improvement of the ARISTOTELE tools and platform towards valuable products with potentials for the market and acceptance by the application partners and other business customers for achieving values, advantages and impact within their own business processes and relationships with external stakeholders.

Limitations of the impact measurement can be seen in the following aspects:

1. Pilot trial 2 activities and daily operational business run in parallel threatened the validity of the data;
2. Pilot trial 2 activities constituted an additional workload for the test persons, which could have influenced negatively the attitude of the test persons towards ARISTOTELE;
3. Due to the complexity of the platform, only some aspects/tools could be evaluated;
4. Some test persons showed a certain resistance to change;
5. An even more extended period for pilot trial 2 would have helped to improve the validity of the evaluation data.

Impact measurement – evaluation results for BP "Customer complaints / fault report management"

AMIS is a telecommunications provider in Slovenia. The call centre tackles all kind of request from clients, dealing with contractual, technical, etc. problems and requests. Problems that cannot be solved directly by the first-level call centre agents are passed to specialised agents on other levels via a "ticket" (= standardised template for unsolved customer problems) system; the final result of the problem solving process is reported back to the client.

This BP used a version of the Recommender System which proposed semantically similar "tickets" of past problems and the implemented solution to the agent in order to solve the actual problem. The Recommender System was integrated into the graphical user interface of AMIS.

This business scenario started in September and October with the measurement phase without ARISTOTELE and switched to the measurement phase with ARISTOTELE on 8 November; data were collected till 10 December 2013.

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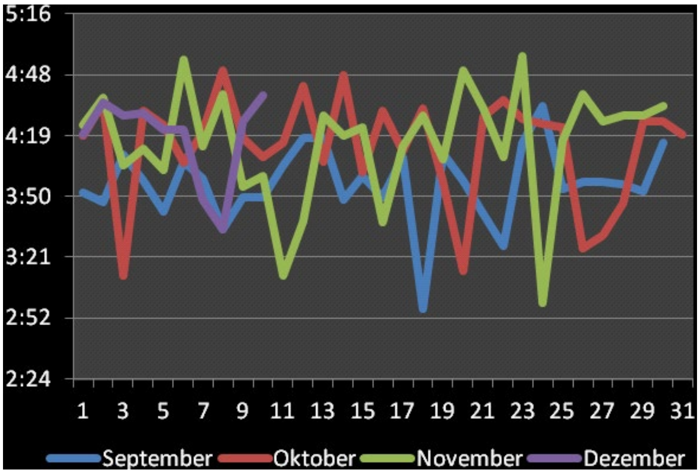
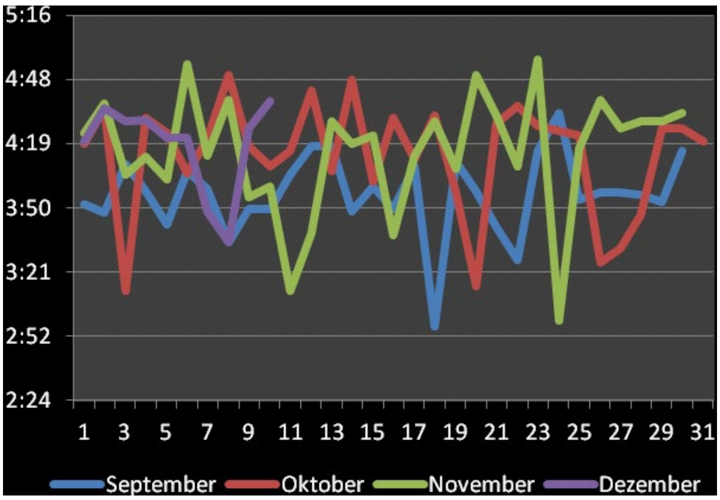
Table 2: Results of the KPI measurement

	Indicator	Sept 2013	Oct 2013	Nov 2013	Dec 2013
a)	How long is the average time from “Open a ticket” to “Closing a ticket”? (in seconds)	500010	446765	277931	240521
d)	AK-11: Average talking time on first level/time to answer to/solve a problem (in minutes and seconds)				
e)	AK-12: Percentage of unsolved problems (= amount of tickets that could not be closed on the first level divided by number of all tickets) (in percent)	13.14	8.1	9.7	7.2
f)	AK-13: Percentage of problems solved on the phone by Agent (not by SMS or email) (in percent)	86.85	91.87	90.26	92.78
g)	AK-21: Time from ticket is passed to 2nd level till 2nd level starts to work on it (in seconds)	21408	17845	24958	19080
h)	AK-22: Time from 2nd level starts to work on ticket till it says it is solved (in seconds)	415998	379721	197048	240530
i)	AK-23: Percentage of tickets solved at level 2 (in percent)	13.14	8.1	9.7	7.2
j)	AK-24: Percentage of tickets solved at level 3 (in percent)	0.53	0.55	0.34	0.07
l)	- The total talk time / period				

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The recommender system was operational from 8 November on

- Ad a) The average "life"-time of tickets dropped down substantially after the implementation of the recommender system (from approximately 139 hours in September down to 69 hours in December), although neither the amount of tickets (approximately 800 per day) nor the number of call centre agents did change;
- Ad d) From the curves it is already clearly visible that the variation of the average talking time within each month was much more important than the variation between months; the average talking time per month did not vary i.e. it was not possible to detect an effect of the ARISTOTELE tools on that;
- Ad e) There is a slight tendency of improvement over the measurement period;
- Ad f) There is also a tendency of improvement over time;
- Ad g) No apparent tendency could be detected;
- Ad h) There is an improvement from the measurement phase without ARISTOTELE to the measurement phase with ARISTOTELE, although level 2 did not use the recommender system; an indirect effect of ARISTOTELE could be that better informed first level agents give more useful hints to the second level in the ticket description;
- Ad i) Decreasing, as percentage on level 1 increased;
- Ad j) Decreasing, as percentage on level 1 increased;
- Ad l) See d).

Input from the interviews

The general impression was that the recommender system was very useful for unexperienced colleagues, because it helped them to learn from "old" tickets, which leads to a higher problem-solving capacity in the future. Experienced staff members did or not use it very often or used it in unexpected ways ("It helps me to save time, because I copy-and-paste the old description of the problem and just modify it according to the new problem"). No technical problems were reported.

The integration of the Recommender System into the existing platform was perceived as positive, but the perceived usefulness (and thus the opinion on it) was split into two: new first level agents acquired more rapidly the necessary knowledge; more experienced users considered the tool to be useful for new colleagues, because it saved them time and effort for mentoring them, but they considered it to be unnecessary for themselves ("For the more complicated issues, I can't find adequate answers; for the easy issues, I don't need it"). Nevertheless, they used the tool to find ticket descriptions that they could reuse for the new tickets.

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Return-of-investment-considerations

Assuming that an average call centre agent on the first level earns 10.00 Euro per hour and an agent on second level 15.00 Euro, the implementation of ARISTOTELE would be justified in economic terms if it would save approximately 2200 hours (10,978.40 Euro implementation cost divided by 5 Euro per hour) of second-level-agent-time.

As can be seen from the indicator measurement above, the percentage of solved calls/problems at the first level (line f) increase by 6% from September to December; based on 800 calls per day, this is a reduction of roughly 50 tickets per day which are not passed to second or third level; assuming that an agent on level 2 needs 30min to solve a ticket and – to simplify the calculation – ignoring the average talk time of the first level agent, every day some 1500min (=25 hours) of second-level-agent-time are saved. Thus, it would take some 90 days to justify the investment in the ARISTOTELE tools and platform (here: especially the recommender system).

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E-Learning at Work and the Workplace
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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DIGITAL STORYTELLING AS A REFLECTIVE PRACTICE TOOL IN A COMMUNITY OF PROFESSIONALS

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Introduction: Storytelling and Digital Storytelling

People seem to have an innate ability to represent their experiences in a natural way in the form of stories (Bruner, 1992; Ong, 2002) because they facilitate communication, describe content in a rich context and require less effort than more formal methods. We can tell a story for personal reasons, or to explain and teach a specific topic, so the term story can refer to either fiction or non fiction, depending on the context. In this paper we will use the term story to refer to the narration of a workplace experience. In the last few years many authors have recognized the importance of storytelling as part of the adult learning process. Schank (1995) suggest that all we have are experiences, but all we can effectively tell others are stories and learning from one's own experiences depend upon being able to communicate our experiences as stories to others. Other researchers have studied the role of stories in knowledge sharing in organizations (Orr, 1996; Prusak et al., 2012), in transmitting norms, values and to spark action (Denning, 2001), to promote strategic leadership (Boal & Schultz, 2007), to promote explicit tacit knowledge (Linde, 2001), to describe a problem and to suggest a possible solution (Jonassen & Serrano, 2002).

Since early times stories have been transmitted through different methods: orally, textually or through art, nowadays it's possible to create personal narratives using new digital media, and share it on-line, so "Digital" Storytelling is not a totally new concept, but it is only a new genre or new way of transmitting the stories. Digital Storytelling was originally developed by the Center for Digital Storytelling in the early 1990's mainly to support personal narratives (Lambert, 2013), but it evolved to apply to a variety of purposes and is now broadly used in many contexts (education, social, health promotion, etc.). A typical Digital Storytelling artifact is a video or a slide-show just a few minutes long and its essential elements include a strong point of view, dramatic questions and emotional content that keeps the viewer's attention and speaks directly to the audience: indeed, a digital story is often viewed as a strong emotional experience. Digital stories also convey a more detailed context than textual and verbal stories, facilitating tacit knowledge elicitation.

The study context: storytelling and professional practices

This exploratory study based on an ethnographic research (Ferranti, Nadin & Ravarotto, 2012), was carried out as a training project in 2012 and involved N=72 food safety professionals (physicians, veterinarians, biologists, chemists, nutritionists and prevention technicians) of the Veneto regional health system (North Eastern Italy). The training project was aimed at improving the cooperation between people belonging to different service industries that deal with animal health and food safety. For these professionals, during their everyday work, there are few opportunities to exchange information and talk about and solve critical issues. To fill this gap, we experimented with the creation of an on-line Community of Practice (Wenger, 1996). Initially the study was supposed to focus mainly on the analysis of relational processes and the thinking practices of a community of professionals that used for the first time the support of a platform and online forums, subsequently, the analysis of the interactions in the forums highlighted an interesting factor concerning the manner in which the various problems for discussion were presented: in fact, they always began from a true story of a professional incident that the narrator was protagonist of or that in turn he had heard about from others. One of the participants wrote the following:

> *"In the forum ... you see what other colleagues think about a particular problem, in particular if they have resolved it. Some cases are still unresolved. But you can find out about a case that you yourself have solved the issue, maybe even 10 years ago, so you may have a suggestion for the individual who asks for help"*

Very often the reaction of other colleagues, besides commenting on the story, was to discuss in turn a story from their own professional experience that either confirmed the same issue in other contexts, or provided a suitable solution in a similar context. In order to better shed light on the problems, pictures and photos taken by the same members of the community were also posted. Seeing thus the relevance that the emergence of narrative modalities in the processes of problem-sharing and problem-solving had taken on in the online community, we decided to support their "reflective practices" encouraging participants to create Digital Storytelling artifacts about the problems they perceived to be the most important. It is recognized that experience by itself does not always lead to improved professional practices, unless we reflect on it: so communicating our experiences as stories is not enough, reflection is recognized as an important process needed for real change. Learning Cycle of Kolb & Fry (1975), Schön's (1987) concept of the "reflective practitioner" and Gibbs (1988) Structured Debriefing, provided important theoretical references for this topic. As Schön (1991) notes, we need to capture those stories to make them objects of reflection and with the help of multimedia, these stories can be recorded. One of the purposes of the study was then to determine how a collaborative digital storytelling construction process could support reflection on professional practices. To this aim, the following research questions were explored:

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> *How can a digital storytelling activity support a reflective process to improve and diffuse good professional practices?*

Our working hypothesis therefore provided for the use of Digital Storytelling in two successive stages: the first stage understood mainly as an internal process within the community, to encourage reflection on one's own professional practices told by the stories, and the second as a product to be utilized as a support for communicating best practices both inside and outside the community (Figure 1).

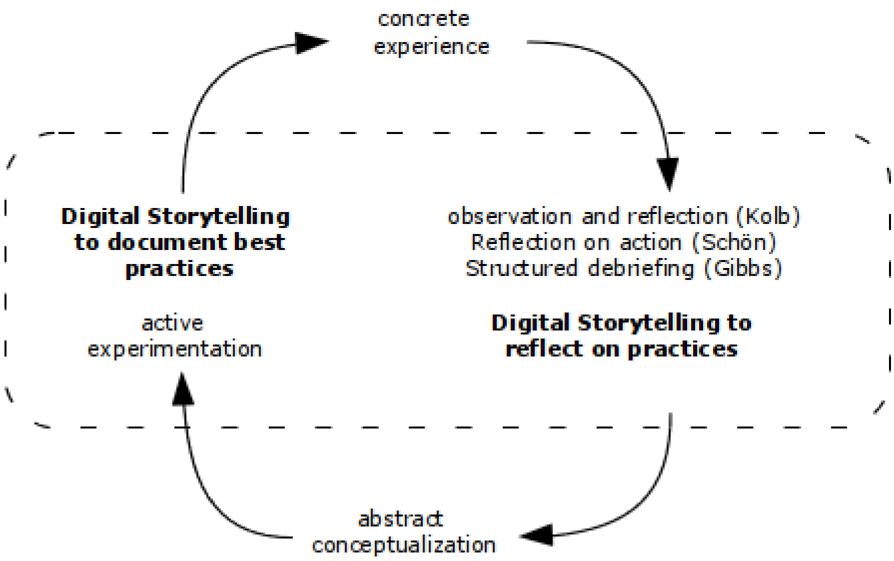

Figure 1. The implementation of a Digital Storytelling activity inside a general model on reflective practice based on the models of Kolb (1975), Schön (1987) and Gibbs (1988).

Creating a digital story as a reflective practice: the process

The stages of storytelling

In order to facilitate the process of narration of the stories taken from the participants professional experience and to save time, in our blended training program we decided to bring together all the participants on one day specifically dedicated to this activity. The participants worked in groups of 3-4 people telling each other stories taken from their work experience and then they chose which ones to discuss and elaborate. In a second step, they wrote the storyboards together and created by themselves the videos because before, the training course, participants had already learned to use some simple software video-editing tools. Prior to gathering in groups and telling their stories, we provided them with some "guidelines" in order to make them more aware of their role as storytellers and listeners, taking as a reference a number of conditions for encouraging participation in Mezirow's (1991) and Tyler (2009) "critical discourse":

- The time spent for each story on storytelling and for possible requests for clarification and comments should not exceed 10 minutes;

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- The story that was told had to have as a subject a non routine problem that required a creative or unusual solution or it had to be an issue that was not fully fixed by the protagonist;
- Everyone had to make themselves available to answer without reluctance questions for the purpose of making the issues clearer or expanding upon the issues rose by the others, and had to be as open as possible to accept comments, possible criticism and suggestions of potential alternative actions from the others, that could come out during the discussion.

This stage of storytelling and collective discussion of the stories was considered very important: in fact, in this manner one can negotiate shared meaning, and the listener also becomes a co-author of the narrative through a process of inter-subjective participation (Boje, 2001; Gabriel, 2000; Tsoukas, 2009). At the end, after hearing all the stories of their peers in each group, they chose to convert one into a Digital Story.

The storyboard writing stage and the creation of the video

Even in this second stage participants were provided with some precise directions for drawing the storyboard in which the following elements had to be clearly defined: the main character(s) (who); the context (where) and the events timeline (when); the content (what happened, what was the problem, how and why did it happen);

In addition to having a clear representation of the problem to narrate, we requested participants to pay particular attention to the broad description of the context, in that at times details are of fundamental importance in the solution of a problem and they help in making "tacit knowledge" explicit. The typical structure of a story in order to be recognized as well made, like the narratology of Propp, Greimas, Campbell and others, had to contain at least four elements: the existence of a problem or something that needs to be done and gives meaning to the story, a set of conceptual resources or materials that are necessary for the task, a set of established rules to be respected, and finally the recognition of the resolution of the story. For the purpose of stimulating reflection, we advised against choosing necessarily stories with a 'happy ending', and to also leave space for "cautionary tales" that in the context of work are often associated with bad practices. The other important aspects that we required participants to pay a lot of attention to were:

- maintain in the story a balanced level of emotional involvement;
- selection of the most suitable audience for viewing the digital product;
- intentionality (why that particular story was chosen, the underpinning morals and values).

With Digital Storytelling, the need to stimulate reflection must be balanced, an excessive degree of emotion that emerges from the story can seriously damage cognitive performance, particularly in the process of problem-solving: this criticism is clearly depicted by the Yerkes-Dodson law (Figure 2). Often is through emotional connection, rather than reasoning, that a story is evaluated (Bowman et al., 2013).

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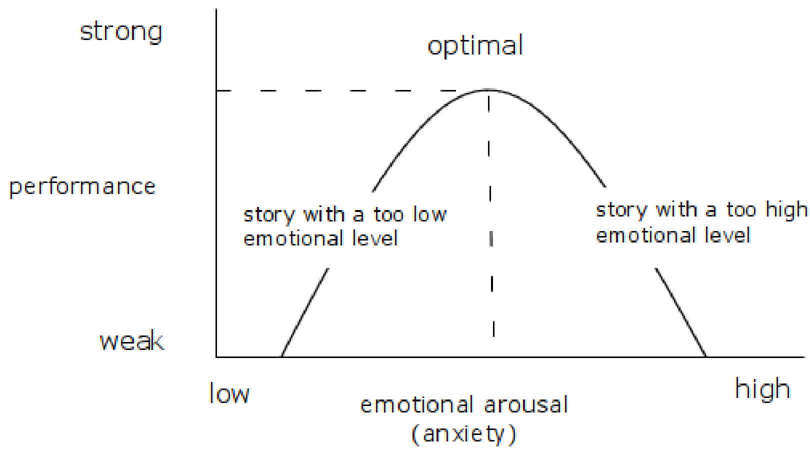

Figure 2. The Yerkes-Dodson law (Broadhurst, 1957) applied to the emotional content of a story

Lastly the choice of the audience also implies a careful adjustment in the language, in the level of tacit knowledge to use in the drawing of the storyboard and in sharing the morals and the values that one wants to communicate.

The reflective practices triggered

In order to stimulate reflective practices and to help to define the problematic moments of the stories, the groups were able to draw their "Visual Portrait of a Story" (Ohler, 2008): that is to think about the story more as a map of the critical moments and real "turning points", rather than just a series of events presented in sequence. These moments, identified through a group discussion, were used as stimuli for reflection on the ways in which the problems were resolved, unresolved or resolved in an unsatisfactory manner by the protagonist or protagonists.

The digital products created

A total of 14 Digital Storytelling items were created on various topics of interest to the community of food safety professionals: for example. how to deal with cases of transporting a pet abroad, how to follow the proper procedures to ensure one cooks mushrooms collected personally without toxic risks, how to create samples that test for the presence of pesticide residues in agriculture, and the most effective methods for water inspection, etc. The participants identified four possible audiences for Digital Storytelling:

- their peers in the community,
- schools/students,
- institutions and food companies,
- consumers and citizens.

Of a total of 14 videos created, as many as 8 were addressed to a target audience of colleagues: this was considered a significant element, linked to the willingness to share experiences among members of the community about specific professional procedures which could be substantially different (for example procedures for water chemical control, in testing

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histamine in fish, in mushroom edibility, seafood sampling and so on). All videos were also classified according to the way they exposed the problem:

- most of them, 11, (79%) proposed a problem resolved in an effective manner,
- while 2 (14%) make explicit a problem solved but not in a completely satisfactory manner,
- only 1 (7%) showed a problem that has not been solved at all.

The preference for creating "problem solved" stories, was strongly related first to the will to help them peers and share effective solutions, and also to their need to compare with one another the quality of solutions adopted. In all cases, all types of videos were recognized by participants as valuable, real "shared artifacts" on which to discuss and refer to, inside and outside the on-line forums.

Digital stories to document best practices: between a willingness to share and privacy concerns

It's interesting to note that about half of the digital stories produced (58%) had targeted specific audiences, community members or outside co-workers. The intent of this approach was not only to provide immediate and concrete help to solving common problems, including that of wanting to keep the presentation of best practices in a coded and easily accessible form, different from other solely textual formal representations. Particular attention on the part of all participants was given to the problem of privacy: while sharing photos and pictures taken from real contexts within the closed forums of the community and used for the creation of digital stories did not raise any particular concerns, some problems emerged when we proposed to share some stories representing contexts and highly sensitive material, with a larger audience on specialized websites or simply on their corporate website. The solution proposed was not to give up the sharing, but as much as possible to rework the digital stories trying to eliminate any references considered sensitive.

Video creation

The actual creation stage of the video took place in part in person or in part it was carried out long distance, through the community forum, where participants continued to work on their digital story. The lack of experience with the use of multimedia software on the part of some of the participants did not create particular difficulties because we originally provided for special training in their use in a series of laboratory meetings and we also had the help of more experienced colleagues. Interestingly, to confirm the fact that the images and videos used were actually derived from professional experiences, the majority of the material was obtained through the use of their mobile phones and not with professional video cameras or digital cameras.

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Some preliminary findings

To gather feedback on their perceptions on the process of creating a Digital Storytelling artifact from their work experiences we submitted a simple questionnaire mainly to investigate:

- the difficulty perceived in elaborating a story taken from a professional experience,
- the possible use of the digital story in the workplace context,
- the reflection on practices and competences stimulated by the digital story creation process.

The answers to the question about the difficulty revealed a favourable bias: the average "complexity" of all the stories created was high, both with regard to the narrative aspect itself as well as the professional content. This was a sign that the process of recalling "good stories" taken from their workplace experience, writing a storyboard and translating it all into an audiovisual form, was a real deep reflective process. Most of the professionals (54%) did not seem to have particular trouble at this conceptual stage (Table 1) even though a total of 46% showed some problems in elaborating the story (14% difficult, 32% not too easy).

Table 1: The perceived difficulty in elaborating the stories from professional experience.

Question 1: How easy was it to elaborate stories taken from your professional experience??	
Very easy	7,30%
Easy	46,40%
Not too easy	31,90%
Difficult	46,40%

The many members said in personal interviews, that the difficulties encountered in the process of formalizing workplace experiences into digital narratives was mainly of two kinds: one, because they often had to elicit a lot of tacit knowledge "embedded" in their practices, and two, because they realized that, telling a story about a problem-solving incident, would have revealed necessarily to others a great deal about their professional competences on the subject. Precisely this concern was taken into consideration by the question of how the process of creating a professional story and reworking the professional stories has made them reflect in depth on how to solve the problems proposed in the stories. Eighty-eight percent of participants said in this regard that the activity was perceived as very useful or useful and only 11% perceived it little or not at all useful (Figure 3).

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Figure 3. The perceived effect of the digital story creation process on reflective practices

Conclusions

The digital storytelling process helped the community to reach a higher level of awareness about their specific professional competencies and critical work issues, fostering high levels of commitment and motivation. This dialogic process can be a way to transform simple narrative knowledge into an intersubjective, negotiated knowledge. The apparent successful outcome of the narrative activity, creation and reflective processing of digital stories encourages us to further test the method in this and other professional contexts, not only when it is necessary to stimulate "reflective practices", but also when it is necessary to stimulate the emergence of a community of practice. In fact, during the collaborative creation of the digital story, the community can become a true community of practice.

In this respect then it becomes very important to mention the concept of "reification" of Wenger, this in fact implies that the production of concrete artifacts, and facilitating the negotiation of meanings, is an important element upon which the community is based on. But unlike traditional storytelling activities which often take place orally, the realization of a concrete digital artifact offers numerous advantages. Not only during the initial step of creation, as we have seen, but it has alternative uses even later, when it can be made available to others, for example to support the training of new employees, or remain as documentation of best professional practices of the community or made available in new contexts, where it can be negotiated and re-interpreted and where it can generate important feedback for the community.

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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE IMPORTANCE OF COLLABORATIVE LEARNING IN MULTI-PROFESSIONAL CONTINUING EDUCATION

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Introduction

Due to continuous advances in professional knowledge and the concomitant challenges posed in the workplace, professionals in most fields need to engage in further learning, both formal, as provided by accredited academic institutions, and informal, initiated in the workplace or fuelled by own initiative. Another way of remaining current is through inter- and intra-professional networking and communication using various media. The skills needed to be successful in the abovementioned activities are seldom addressed in the curricula of the initial qualifications. The challenge to both the professional bodies and the higher education institutions are to identify the skills that, over and above the subject matter expertise, need to be cultivated for the workplace. Many professions require additional formal qualifications after completing the initial full-time degree, which provide the ideal opportunities to cultivate skills and attitudes complementary to the subject expertise that will launch proponents into successful careers (Baartman & de Bruijn, 2011), and equip them for life-long learning.

Continuing education for practicing professionals often follows an e-learning delivery. While formal continuing education is coming under much pressure from MOOC (massive open online courses)-type offerings, such courses do not always deliver the desired completion numbers and quality of integrated learning. While e-learning is fraught with challenges, there are well-established design protocols for designing effective e-learning courses that will deliver content knowledge successfully. In addition, continuous learning should respond to the required workplace competencies, accommodate heterogeneous learners while being sustainable in the long run (van Merriënboer et al., 2009). Persistence is one of the greatest challenges in both classic e-learning and massive online courses (Walsh, 2012). Interaction and feedback which depends on online facilitation, is needed to establish a successful learning community (Collison et al., 2000). The role of the online facilitator is crucial in keeping participants motivated, engaged, on topic and guiding them to learn collaboratively (Boud, Cohen & Sampson, 1999; Collins & Berge, 1996), so as to tap into each person’s unique knowledge and insights. Learning facilitation has to respond to the context in which the learning takes place, “typically situated in professional or daily life; with regard to skills to be developed, with a strong focus on higher-order skills (e.g., setting own goals, evaluating and planning own learning) and professional skills” (van Merriënboer et al., 2009).

The Community of Inquiry (CoI) Survey (Garrison, Anderson & Archer, 2010) which has been developed for appraising the experience of students in constructivist online courses, was used to investigate the quality and suitability of e-learning in a continuing education course for a heterogeneous group of health and education professionals. The findings of the survey were triangulated with open-ended responses that address students' perception of their learning gains and professional learning needs.

Literature

Lifelong learning

In response to changing demands in the workplace and the need to improve knowledge, skills and competence with a work-related focus (van Merriënboer et al., 2009; Koper et al., 2005), qualified people often continue studying. A whole spectrum of formal, accredited, informal and incidental learning activities fill the void, some with doubtful merit. Higher and distance education institutions are therefore also providing more certified continuing learning courses (Koper et al., 2005). Continuing education is defined as „education for adults returning to university education after a break following their initial education" (Dinevski & Kokol, 2004). Learning design for continuing education that adequately supports the integration of knowledge, skills and attitudes in the execution of complex professional tasks, is largely unexplored (Baartman & de Bruijn, 2011).

Learning communities and online facilitation

Arbaugh clarifies the role of an online facilitator "to structure and organize their courses beforehand so they can focus on efficient engagement with their students while the class is in session" (Arbaugh, 2010). Boud suggests that "various forms of peer, collaborative or cooperative learning, particularly small group activities, are increasingly used within university courses to assist students meet a variety of learning outcomes. These include working collaboratively with others, taking responsibility for their own learning and deepening their understanding of specific course content" (Boud, Cohen & Sampson, 1999). Self- and critical reflection in conjunction with peer learning processes promote integration of knowledge, skills and attitudes needed in complex professional tasks (Baartman & de Bruijn, 2011; Boud, Cohen & Sampson, 1999). The role of the online facilitator is essential to the development of a learning community through interaction, scaffolding, and maintaining a friendly social environment and pedagogical approaches. "The instructor contributes their special knowledge and insights and uses questions and probes for student responses that focus discussions on critical concepts, principles and skills. By modelling appropriate online behaviours, the instructor can prepare students, alone or in groups, to experience moderating the conference for themselves" (Collins & Berge, 1996), and become more autonomous.

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Community of Inquiry

The quality of e-learning is often evaluated by using the Community of Inquiry (CoI) survey instrument, developed by Garrison, Anderson and Archer (2010), to obtain an indication of the three most salient aspects of constructivist learning, namely

- Teaching presence (the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes),
- Social presence (the ability of learners to project their personal characteristics into the community of inquiry, thereby presenting themselves as 'real people.') and
- Cognitive presence (the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication, and critical, practical inquiry).

The CoI framework has been well-researched and validated. The premise is that all three presences are necessary for the establishment of a learning community (Garrison, Anderson & Archer, 2010). The CoI website https://coi.athabascau.ca provides a comprehensive description of the model, underlying theories and relevant literature.

Background and context

The programme

The University of Pretoria has been offering a two-year, part time, multi-professional coursework Masters in Early Childhood Intervention (MECI) programme for healthcare and education professionals for seven years. The MECI program focuses on assisting professionals such as speech therapists, occupational therapists, physiotherapists, medical doctors, nurses, educators, educational psychologists, nutrition specialists and social workers in providing early intervention services. They are working with children between 0 and 7 years of age and within high risk contexts characterised by issues of poverty, HIV/AIDS, violence and abuse and chronic diseases. In modelling the collaborative requirements of the early intervention field, group work forms an essential part of the programme (Alant & Dada, 2005). It aims to develop critical thinkers who can use best practice principles from the field and apply them in their own situations. In order to gain from multiple perspectives, students are required to participate in regular online class discussions with lecturers and fellow class members during discussion weeks for each module. In addition they are also allocated to smaller, multi-professional study groups that work closely together over the two-year period, simulating the functioning of an early intervention team. These smaller teams are required to discuss and provide solutions to real life intervention challenges typically encountered in the South African context and to submit these discussions for formal appraisal.

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Online and face to face components

As the MECI students were usually situated all over South Africa, the African continent and at times abroad, an e-learning delivery was used. Although students meet twice a year for week-long contact sessions at the University of Pretoria, they completed the bulk of the academic work while not in physical contact with each other or with the university. The online sections of the programme were delivered using a learning management system (LMS); prior to 2011 WebCT5 Campus Edition, phasing in Blackboard LearnTM for the new 2012 enrolments who graduated in 2013. Online facilitation included the creation of a welcoming environment, approaching students personally, participating in synchronous communication and requesting frequent feedback. Three avenues for collaboration were provided:

- Asynchronous online communication using the LMS enabled sharing of knowledge, expertise, social cohesion and emotional support when needed, as the heart of the course was the online discussion tool. The aim of the discussions was twofold; namely task-related interaction in which concepts were explored and unpacked in various configurations of the whole class or groups, as well as social (ludic) interaction in ice breaker games and informal virtual "water cooler" forums and blogs. The facilitator graded discussions for evidence of higher-order learning.
- Synchronous chat rooms were used for brainstorming, team meetings and clarification, and the facilitator was privy to all conversations. The Who's Online function in WebCT CE was also well-utilised for check-ins, encouragement and motivation. Later BbCollaborate™ also assisted in bridging some of the physical distance between participants. Due to the Chat Room facility not functioning in Bb Learn™, later students used other means outside the LMS for immediate communication, particularly a mobile WhatsApp Messenger© group. Unfortunately the facilitator was not privy to these communications.
- Onsite contact weeks were scheduled on campus, during which time students attended lectures, worked in groups and most importantly addressed any issues in terms of group assignments and collaboration that could not be resolved in the online environment.

Participants

Students were fulltime professionals stationed all over the country and some outside the country. The age distribution of the largest group (2013 graduates) was as follows: seven in the age-group 25-30; four in 31-40 and one aged between 40 and 50. The spread of current ages also in the other respondents suggested that many had been working for a number of years before commencing this degree. Table 1 shows that on average 85% of students completed the course in 2 years. While the 2013 graduation rate was lower than the previous 5 years, it was not statistically significant. From the fourteen 2013 graduates, eleven participated in the survey, representing a 79% response rate.

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Table 1: MECI Graduate numbers

Graduating	enrolments Y1	graduates Y2	Respondents
2013	18	14	11
2012	20	18	5
2011	19	17	1
2010	19	17	3
2009	18	16	2
2008	14	13	3
2007	21	15	3

The Z-Score for the difference in completion numbers between 2012 and 2013 is -1.0317.
The p-value is 0.30302 and the result is not significant at $p < 0.05$.

Methodology

A pragmatist stance was adopted for the research (Denscombe, 2010), and mixed methods were used to analyse the data obtained from a variety of sources. A survey consisting of the 34 item CoI survey instrument using a 5 point Likert scale, (scoring 5 for "totally agree") was supplemented with demographic and open-ended questions. It was deployed using a commercial online survey instrument (Survey Monkey®) and distributed via an e-mail notification to graduates of the programme; 28 students who graduated during the past 7 years responded regarding modules taught by one specific instructor (AS). The responses to open-ended questions were collated per question and qualitatively analysed using ATLAS.ti© version 7, a computer-based qualitative analysis software package, using a grounded theory approach (Denscombe, 2010). We used the Student T-test calculator for 2 independent means on the Social science statistics website http://www.socscistatistics.com to analyse the results from the CoI. In order to confirm that the student experience did not change significantly over time, the responses were first grouped according to year of graduation, cultural group and age, and after verifying that no significant differences existed, grouped data were pooled again.

Rich descriptions of the course design and the nature of online discussions obtained from the lecturer / online facilitator (AS), who also acted as a participant observer in documenting student experiences, were triangulated with survey responses. The instructional designer (GP) who collaborated closely with the lecturer in designing the online course for delivery via LMS, and was instrumental in the initial training of the students in using the different online tools in the LMS, also provided context.

Findings and Discussion

CoI survey

The average scores obtained for all the respondents (n=28) in the CoI survey were calculated for each presence. Teaching presence (TP) was the most highly rated presence (average 4.50), followed by Cognitive presence (CP) (average 4.35) and Social presence (SP) (average 4.0). Considering the prominence of interaction and social exchanges in the course, the Social presence score prompted further investigation, as shown in Figure 1. Group Cohesion and Open Communication questions about the online medium showed lower scores. The 2013 graduates had a significantly lower average score ($p<0.01$) for Open Communication than the rest of the students combined. This was attributed to reported difficulties and user unfriendliness in the Discussion board and synchronous Chat tool in the new LMS that had been phased in and used for this group in 2012/2013. The lower Social presence seemed to be due to technical factors, and not due to a change in course presentation.

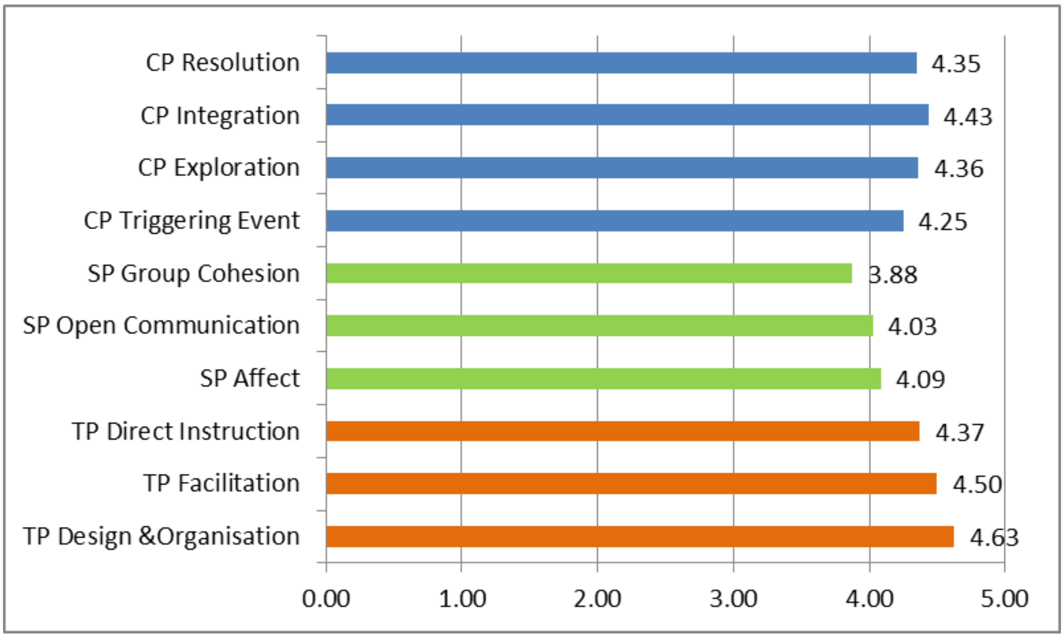

Figure 1. Average CoI constructs (n=28)

The excellent organisation of this online course was reflected in the high Teaching presence averages for design & organisation and facilitation. Facilitation style further enhanced and integrated team activities and cognition, illustrating that „course design and presentation mechanisms – together with excellence in online dialogue facilitation – separate the excellent online course from the mediocre or weak one" (Colins et al, 2000). High scores in Cognitive presence indicated the establishment of a learning community where students collaboratively explored the problems posed to them, integrated solutions and reached resolution and application. How the learning communities contributed to success in course completion and preparing participants for the workplace, will be answered from the analysis of the two open-ended questions.

Qualitative analysis of open-ended questions

The CoI survey had shown that Teaching and Cognitive presence particularly contributed to the formation of the community and hence enhanced the quality of learning. We triangulated those findings with the responses to the two open-ended questions in the survey. The responses to the following question were grouped into four themes, namely Collaborative activities, Teaching activities, Personal development and New approaches.

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> *Question: "The following course activity/activities contributed most to my successful completion of the course"*

Collaborative activities

This theme was by far the most salient, being coded 25 times, of which "class online discussions" (11 codes) was the most prominent. Others included team work, -team building, collaboration, brainstorming, onsite weeks, group assignments, self and team reflection and portfolio, and being a support system. It was clear that the team approach and community collaboration were important in keeping students engaged. According to the codes, it seemed that team activities contributed to some Social presence and to all aspects of Cognitive presence, as triangulation with the CoI survey's very high Cognitive presence (average 4.35) indicated.

Teaching and facilitation

The role of the instructor / facilitator was the second most salient theme with 8 codes, where students mentioned facilitation, feedback, instructional design, guidelines and schedule plan. These codes paralleled the high Teaching presence in the CoI.

Personal development

This theme was characterised by 5 codes representing self-evaluation, reflection, specialisation and critical thinking, which corresponded with the CoI framework Cognitive presence's integration and resolution phases.

New approaches in the curriculum

The curriculum and new approaches to their profession also contributed to students' success. Their responses were represented in 5 codes: practical, new, relevant content, cases studies and the ecological model. The following questions probed how the course prepared graduates for professional intervention.

> *Question: "The one aspect of this course that made the greatest contribution to my professional career was…"*

From the perspective of practicing their profession, respondents reflected on the contribution of their studies to their current career. The most salient theme was the team-related skills obtained in the course, followed by their own personal development, new intervention paradigms and integrating theory to practice.

Team-related skills

This most salient theme describing what they took from the course into their careers represented 23 coded passages. Team-related skills included, in declining order of magnitude: team meetings and –reflection, enhanced team work, trans-disciplinary teams, collaboration,

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introspection, differing insights, conflict management, online discussions, a common vision and cultural competency, many denoting necessary multi-professional attitudes (Baartman & de Bruijn, 2011).

Personal development

This theme was more salient in the workplace than in the course with 11 coded sections: self-reflection, self-evaluation, onsite weeks and critical thinking. The only notable suggestion was for more guidance on how to reflect.

New intervention paradigms and theory-to-practice

The codes included the ecological model, new approaches and information and challenging paradigms. A few students needed "procedures" to help applying theory to practice. This section confirmed that, while new theories were appreciated and made a difference, content was not the most important asset in the course.

While the facilitator's actions were not prominently mentioned, the CoI survey confirmed that the facilitator's guide-on–the side style was the key to the community (Collins et al., 2000; Collins & Berge, 1996; Arbaugh, 2010) and hence to achieving successful course outcomes, while personal development, characterised by self-directed and reflective learning, as well as relevant content contributed to the needs of their professions to a lesser degree..

Conclusions

Collaborative activities in the course were the most salient aspect, followed by teaching and facilitation activities, Surprising was how sensitive online discussions were to technical issues, as experienced by the 2013 graduates. Technical problems did not hamper the establishment of the learning community (Collins et al., 2000), as shown by the high esteem accorded to collaborative team work. This finding illustrates the commitment and motivation of these students who continued participating despite the difficulties and how they valued the online discussions. Collaboration, therefore, was the teaching and learning activity in this two-year online masters' course that, as reported by the ex-students, contributed most to their success. Behind this successful collaboration was a skilful online facilitator who maintained a very high Teaching presence, as measured with the CoI, and unobtrusively promoted the formation of a learning community (Collins et al., 2000; Arbaugh, 2010). Higher order thinking flourished in this community, characterised by critical discourse and reflection. Such activities are inherent in the practical inquiry model on which Cognitive presence theory was based (Garrison, Anderson & Archer, 2010). These findings corroborate the high cognitive presence obtained in the CoI survey as students explored and integrated new ideas in answer to the given questions and devised new applications to solve the challenges in their multi-professional working context. It can be concluded that the online discussions were central in enabling collaborative and team-based activities (Boud, Cohen & Sampson, 1999; Collins & Berge, 1996), which, being skilfully facilitated (Arbaugh, 2010) made the greatest contribution

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towards developing a learning community as defined by Collison et al. (2000) and achieved the learning outcomes as measured by the CoI framework (Garrison, Anderson & Archer, 2010).

The important aspects of the course that the alumni eventually experienced as valuable in their workplace, corresponded with those indicated as valuable for completion of the course, namely collaborative activities. This research illustrated how collaborative approaches to learning answer to van Merriënboer and co-workers' (2009) design approaches for life-long learning by being: "(1).responsive [to] required competencies; (2) flexible in order to serve highly heterogeneous lifelong learners, and (3) sustainable". As alumni, respondents clearly identified collaboration and team work as the skills they needed and used most in the workplace (Baartman & de Bruijn, 2011), and individuals learnt more from dynamic interaction with their environment and each other than from content alone, as reported in the open-ended responses. Team-related skills were indeed the most beneficial abilities taken to the workplace, followed by personal skills and self-reflection. Functioning well in teams provided professionals with lifelong learning opportunities (Koper et al., 2005) through the means to tap into the collective wisdom of their own professions, and the flexibility (van Merriënboer et al., 2009) to benefit from the viewpoints of other professions. In answer to Baartman's "black box" of learning processes (Baartman & de Bruijn, 2011), we propose that carefully crafted and facilitated collaborative online courses can develop the competences needed for complex professional tasks.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

VIRTUAL COLLABORATION IN THE BUILT ENVIRONMENT

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Introduction

Throughout the 2013 to 2014 academic year, three institutions have been collaborating in the education of three cohorts of students through the BIM Hub project (http://bim-hub.lboro.ac.uk); these are Coventry University and Loughborough University in the UK and Ryerson University in Canada. Students formed groups of six individuals, two from each university, including architects, construction engineers and project managers. The project was designed to create an authentic simulation of industrial collaboration and practices. At Coventry participation was optional (students had the alternative of forming collaboration with other Coventry students). At Ryerson and Loughborough participation was mandatory. They were set a project to design and plan a building for a particular site in Coventry through forming online collaboration, and reflect on their experiences. The study was funded by the Higher Education Academy in the UK with the intention of identifying which success factors led to effective online collaboration and is a follow-up to a previous project sponsored by the Hewlett Packard Catalyst Program (Soetanto et al, 2014).

Focus groups were conducted with the students at the institutions, the following analysis focuses on the issues faced and solutions identified in terms of the technologies involved and the strategies for successful collaboration. The analysis focuses on two of the universities and offers reflections based on their experience.

Coventry focus group

Five groups of students were asked a series of questions about their experience. Their comments are attributed to each of the five groups, labelled CUA to CUE.

Technology

Previous experience of usage

All students except one had used Facebook previously. Reactions of students to the question as to whether they had used it previously indicated the degree to which Facebook is an integral part of the students' lives, with the students at Coventry laughing at the idea of someone not using it, and the students at Loughborough being able to identify the one student who did not. Some had used DropBox in previous projects; none had used GoToMeeting.

Flexibility in use of platforms

Students moved between platforms in order to optimise communication for example the one group who stated: "If we couldn't use GoToMeeting we would use alternative methods, Facebook anything and it would work it would be pretty prompt, (CUB)" Others switched from platform to platform when communication in one proved ineffective, such as trying Facebook when they got no responses from emails.

Delineation of usage

Students also were selective about the platforms they used for specific tasks. GoToMeeting was used for synchronous meetings as it meant they could all view applications simultaneously. They all used Facebook if there was a need to get hold of someone from another institution quickly. All also used Dropbox to share materials, apart from one group that shared their documents on Facebook because one of the collaborating partners "filled it up and haven't cleared it out".

Effectiveness of the platforms

Participants had different perceptions of the effectiveness of GoToMeeting as a platform:

> *"GoToMeeting is the main meeting. It's working fine" (CUB)*

> *"We can share the screens as well, and we can show them what we've done, our work designs and rough sketches we have. It's a bit better because everyone at the same time can see it. If we use Skype we can't have a multiple discussion." (CUA)*

The limitation with the videoconferencing was not in the software, but in the hardware that was being used. The hardware provision in each of the universities was held to be substandard on occasions.

> *"There should be standard stuff for hardware. If you're doing remote working then people need to have good microphones and good webcameras because otherwise and better internet connections because some of them have been really bad." (CUE)*

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From a software perspective there was also problems with lack of compatibility between packages.

> *"Compatibility across various products is a bit of a pain. The Ryerson students were using 2013 and I was using 2014 which was a bit of a pain. I had to downgrade. It was just a nuisance really. That's cross-working across different (institutions)" (CUE)*

Virtual teamworking

Previous experience

Although all the students had worked in teams before, none had experience of virtual teamworking before beginning the project.

Rationale for participation

As noted above, Coventry was the one of the three institutions that offered participation as an option for its students. The students offered these reasons for taking part:

> *"Interesting to do a project which is essentially the project we've done for the past two years but doing it by a different way. All the lecturers are always raving about you will be working in international teams when you move on into industry so it was a nice idea to see how that was going to work." (CUC)*

> *"at university we tend to work with the same people all the time, we don't tend to work with people we haven't worked with before if it works you tend to stick with it." (CUC)*

> *"It's a different experience more challenging." (CUA)*

> *"CV enhancement" (CUE)*

> *"you get to be the leader, you get to be the secretary – you have different roles. So it's quite good because you learn how to do all kinds of work." (CUA)*

Comparison with face-to-face teamworking

The aspect of the project that the students felt was more effective than their regular project working was the opportunity to work with students at other institutions. This was felt to be a more realistic simulation of the working environment because this imposed the need to present themselves in an outward-facing professional identity to external people, rather than to friends from within their own institution.

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"It's something different, it's new and you don't want to let down the university if anything else. … it's important because it's not someone we're going to see day in day out at the university here, … it's more professional we're not yet in the career but it's definitely closer to that than just being with pals at the university." (CUA)

The disadvantage is the lesser efficiency in working with people that are unknown, compared to people with whom they have already built up a working relationship.

"Those that didn't do it wanted to stay with their mates. They've created their own little group and that's what they want to do. They've stayed in that group for the past three years now. They work more efficiently this way by staying in their groups." (CUA)

The added effort required by forming new groups for the virtual teamworking was seen as adding more authenticity to the exercise, as do cultural differences described above.

"I know when I struggle when I get a job so I might as well get used to it. I'm expecting it to help." (CUA)

"At least when you get out into the real life you won't be shocked by what is happening. By what's happening now I'm like "I'm not used to this – oh I have to work with so many people. W so now you have this experience to actually work with someone who (has different practices)" (CUA)

Loughborough focus group

At Loughborough students also were placed into their groups for providing feedback, these were given the group names LUR, LUG, LUP, LUL and LUB. Feedback was both spoken and written.

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Table 1: Technologies used by students according to written comments

	Listed by	Used for	Why used?	Issues with use
Facebook	three of the four group (LUL did not complete this part of the feedback)	Everything: file sharing, work updates, problem-solving, general arrangements. (LUR)	Easiest platform. Everyone uses it. (LUR)	People not using it enough (LUP). People reading comments but not responding (LUB).
GoToMeeting	all four groups	Meetings: Problem solving, designing – sketchup, updates (LUR). Hosting meeting (LUG).	Module requirement (LUR). Told to use it (LUP).	Lagging. Visual issues. Sound issues – feedback. Screen share lag (LUR). Connection/ speed issues. Echoes. Poor use due to not knowing it. Made computer crash (LUP). Good but determined by strength of connection. When two meetings were arranged simultaneously. Determining the host (LUB).
Dropbox	All four groups	File sharing and organisation. Keep track of work completion. Single portal for work storage. (LUR). Used for shared storage space and all access to files (LUP).	Free. Easy. Everyone uses it, Keeps track of work. Good for "live" docxs (LUR).	Wrong formats. Got busy/ cluttered. Dropbox got full (LUR). Not everyone used it. Not enough storage space (LUP). 2 people editing one document simultaneously :-P (LUB).
Word	Listed by one group	Used for writing reports (LUP)		Slow or crashes with documents of that size (LUP).
Email	Listed by one group	Communication (LUG).		Time difference for response time (LUG)
Sketchup, AutoCAD, AutoRevit, ArchiCAD, Candy	Listed by three of the four groups.	Sketchup used for diagrams/ models at concept stage (LUP). All used for diagrams (LUP). All Drawing/ graphical communication (LUG).	AutoRevit used by Canada (LUP).	AutoCAD Not used by all. Difficult to use (LUP). AutoRevit not compatible with AutoCAD sometimes (LUP). All: Different preferences and competency levels (LUB). All: Compatibility. Training. Ability to use software within group (LUG).

Several things emerge from collecting together the students' feedback to the choice of technologies. The first is the high degree of digital literacy evident from the choices the

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students make, selecting appropriate technologies for separate forms of communication, for example, social networking sites for fast communication, a videoconferencing platform with application sharing for synchronous meetings and DropBox for sharing documents. The efficacy of their choices only encounters problems when one of the groups used several platforms for sharing documents (seen in the previous section). Similar problems occurred with the design software being used. Not all members of the teams used the same software and there were compatibility and training issues in sharing documents between the different programs. Selecting one program and training all in its use, and selecting specific platforms for different aspects of communication and keeping to them, would both be recommendations for future cohorts of students.

Problems also existed for most of the technologies the students used. The hardware used did not support GoToMeeting effectively, and the processing power of the computers used in some cases could not handle Word documents of the size the teams created. DropBox did not have the storage capacity some groups required, though this could also be due to the students cluttering the folders with too many documents. There is also an issue with the awareness of the constraints of the software used. DropBox does not support two users editing a document simultaneously and GoToMeeting does not allow two different meetings to take place simultaneously using the same account. Building in scheduling and turn-taking into the use of these platforms would overcome these issues.

Learning from virtual teamworking

The groups were asked about what they had learnt about virtual teamworking from the project. The answers are shown below.

Students said that they had learnt to check understanding at the start ensuring that everyone understands the brief (LUB) and also to check file transferability and ensure all people using same or comparable software (LUB).

Teamworking can be improved by

- Getting all members involved by making time to ask each member for suggestions and providing encouragement (LUR). When project planning and forming group agreements keeping it short, simple and clear and doing it together with all person consensus (LUB). This was seen as an essential part of respecting team members; i.e. letting every team member have an input and express their views (LUG)
- Taking control and both showing authority early and defining roles early (LUP).

Students wrote that if they are working in multi-disciplinary teams they have learnt to make better use of the skills of the members of the team (LUR).

Where conflict arises, this can be addressed by

- going back to the brief and attempting to understand it, (LUR) and
- by the team leader by taking charge. (LUR)

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Meeting platforms

Students had two comments about virtual meetings; one of these was that meetings would be more effective if there was a preparatory period of trial sessions and tutorials (described as "try before you buy it!") (LUR). Another group was dissatisfied with the collaboration being entirely conducted remotely and suggested facilitating more face to face meetings with Coventry (LUL).

Value of the exercise

Finally, students were asked about the benefits and otherwise of taking part in the exercise. On the positive side, the groups said that this was an opportunity to work in multidisciplinary teams and that this enriched their work (LUR, LUP, LUG) and also that it gave them experience of international working (LUB, LUP). The project also gave them a chance to learn management techniques (LUB) particularly with larger groups (LUR) requiring clear communication (LUP) to a higher standard of work (LUR). This last point was also identified by one group (LUB) which echoed a statement by the Coventry students above, that they were working in a more professional environment because they were not working with their friends.

Finally students overall found the module forward-thinking and exciting (LUR) with benefitting their CVs (LUG).

On the negative side, students felt frustrated both by the technical issues (LUR), with students feeling that less trust should have been placed in untested software (LUP, LUG). Issues were also raised about the problems with having to rely on other students that were not reliable (LUP, LUL, LUB) and the waste in time due to meetings not being conducted properly (LUP). Some felt if they'd been able to choose the students they formed teams with, this would have been an improvement (LUB).

Finally two of the groups (and in a quick poll, this was the opinion held by about half the students in the class) stated that "SCREENS ARE NOT ENGAGING (LUP)" and "I still believe face to face meetings are key to success (LUL)" i.e. that conducting teamwork entirely virtually is not effective in itself and that effort should be made to enable face-to-face activity to take place.

Conclusions from the study so far

The above study only accounts for two of the data sets that are being accumulated from the project. Of these data sets the following conclusions can be drawn about the use of technology in virtual collaborations.

- The students showed high degrees of digital literacy, selecting specific platforms to achieve specific tasks, and moving fluidly between them to achieve the desired results. For quick communication all of the students used Facebook, of which all but one of

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the students was a user. Some had used Dropbox for previous collaborations at university. None had used GoToMeeting before.

- GoToMeeting was successful as a platform for holding meetings from a functionality point of view, however the hardware on which it was run was not robust enough to be reliable, with audio, video and connectivity problems being common. Using Dropbox to share documents only led to a problem when it became filled up due to lack of effective clearing out from partners. The digital literacy demonstrated by the students only broke down for one group in that they used multiple platforms for sharing documents which led to fragmentation and confusion.
- In future, it appears that students have the literacy to make their own choices concerning which software to use for communication. Facebook works effectively, as would GoToMeeting if hardware was available of a competent specification. One student suggested having dedicated machines for videoconferencing that could be optimised for audio and video and made available specifically for the module. The other issue is booking more than one meeting simultaneously on one account leads to problems. Booking one machine and one GoToMeeting "room" for meetings would avoid both of these problems.
- The other common issue across most of the groups was the lack of compatibility between different software packages. Ideally the highest standard and most recent version of the design packages would ideally be used, and students at all institutions trained in its use. This however will shortly be less of a problem if all design packages move towards a single industry standard.

All of the participants had experienced teamworking before, but none had experienced virtual teamworking. For both the students for whom the exercise was optional and those for whom it was mandatory, the same benefits and issues were perceived. These were:

- Working in international teams.
- Working in larger groups.
- Working in multidisciplinary teams.
- Working with people from outside the institutions and therefore having to present a "professional" persona.
- Working in different roles (in those collaborations which enabled this).
- CV enhancement.
- Greater authenticity of the exercise.

Finally, the resistance of half of the Loughborough students to the notion of virtual teamworking at all is of interest. As observed in previous studies (Childs & Peachey, 2013) resistance to virtual teamworking is not observed when students volunteer for the task, however, when the exercise is mandatory the cohort will include many participants for whom the idea of working solely at a distance is an anathema. It is frequently observed that there is a minority of people for whom experience on screen is not seen as authentic or sufficiently engaging, and the question remains to the extent to which this preference is accounted for in the design of learning activities.

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Summary

Overall the exercise was seen as an extremely valuable one in terms of providing an authentic experience of multidisciplinary international working and the following observations can be made:

- Students showed a high degree of digital literacy in selecting appropriate technologies for appropriate tasks.
- GoToMeeting was adopted successfully by the students, but hardware failures prevented its full use. Having a dedicated and specifically set-up piece of equipment with which to conduct the meetings which has undergone thorough testing may address this problem.
- A single portal for sharing documents may also address some of the issues that students had with storage limitations of Dropbox.
- Compatibility of software was a problem. This may be alleviated by all software adopting an industry standard.
- A proportion of students in the mandatory cohort showed the same resistance to virtual teamworking as noted in previous studies.

The study will continue to gather data on the students' experiences and these will also be presented at the EDEN conference in June. The long term goal of the project will be to develop these findings as guidance to the conducting of online collaboration to the education sector as a whole, and to draw together the students' experiences as a user needs analysis from which to develop a technical specification for a platform to support virtual collaboration in the education of building engineering students, and perhaps the industrial sector as a whole.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

LACE – CREATING A COMMUNITY ON LEARNER ANALYTICS AND EDUCATIONAL DATA MINING – STRUCTURING THE DISCOURSE

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Abstract

Discussions on MOOCs, on digital textbooks and new authoring and publishing models, on privacy issues related to digital practices, etc. have led to increased interest in Learning Analytics and Educational Data Mining. The European 7th Framework Coordination and Support action project, LACE (Learner Analytics Community Exchange) is devoted to structure this discussion and build communities that explore the potentials and pitfalls of the unprecedented availability of data related to education and learning. This paper gives a basic introduction to Learning Analytics and Educational Data Mining, presenting a generic framework and outlining how this will be used to support community building and discourse on different aspects of these themes within schools, higher education and the workplace. Learning Analytics and Educational Data Mining both only recently brought to the top of the educational technology trend lists, this paper argues that a discourse and co-design approach would be the best to follow for the broad range of identified stakeholders.

Introduction

When translating learning into numbers all kinds of discourse emerge, especially when the promise is that learners, teachers, local authorities, companies and others soon will have tools that make the churning and interpretation of these numbers available for all with a device. Enthusiasts and sceptics form positions, and the battle to come is less exciting for the many stakeholders that are oriented towards step-by-step improvements of learning based on sound evidence, within ethical boundaries. Moving the field of Learning Analytics (LA) and Educational Data Mining (EDM) beyond technology hype, prejudiced resistance and pedagogical straightjacket choice, there is a need for a sound framework identifying the critical dimensions of LA and EDM, so that focussed discourse within the particular stakeholder communities can identify the most promising designs for improved learning and developing education and training systems.

In January 2014, LACE, a 30 months Support and Coordination action project under the 7th European Framework Program kicked off with the aims to promote knowledge creation and exchange on LA and EDM; increase the evidence base; contribute to the definition of future directions; and build consensus on interoperability and data sharing. The project acronym expands to Learner Analytics Community Exchange, and LACE is eager to build on existing community activities, e.g., research being done in SOLAR (Society for Learning Analytics Research), and new EU specific targeted research projects; and to make sure that practices in Schools, Higher Education and Workplace learning are part of the conversation. These sectors are the focus areas of the project, in addition to Interoperability and Data Sharing.

The LACE project involves nine core partners[1] covering all educational sectors, with well established practice in research and European projects within technology enhanced learning. From the very beginning the activities of the project is directed towards involving the broader communities in creating a hub of evidence on LA/EDM supporting the discourse. (An Evidence Hub like the one created for Open Educational Resources http://ci.olnet.org is one of the deliverables of LACE).

The backdrop for LACE

It is probably no co-incidence that learning analytics and educational data mining, as for data analytics generally, are the subject of interest and excitement at a time of increasing global competition and large scale economic difficulties. The promise of using data to be more efficient and effective is obvious to many people, given the increased access to data from various sources. Data-driven education may also provide a sound basis for doing things differently, re-inventing parts of our approach to education and training rather than incrementally improving what we do now.

The Society for Learning Analytics Research (SoLAR) has defined Learning Analytics as 'the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs' (Cooper, 2012). A key element of analytics is that they are not primarily concerned with reporting activity or with theoretical insights. Instead, they focus on the provision of 'actionable intelligence' that can provoke or encourage practical action. In an educational setting, analytics allow learners and educators 'to increase the degree to which our choices are based on evidence rather than myth, prejudice or anecdote' (Cooper, 2012; Ferguson, 2013).

The terms "learning analytics" and "educational data mining" have emerged over the last few years, largely representing the identity of two research communities (Siemens & Baker, 2012). The LACE project is hesitant to present a too narrow definition of the concepts not excluding any topic of interest to this emerging community. From a LACE perspective learning analytics will be defined by what people do; and it will be emergent and changing. However, it makes good sense to look upon LA/EDM as multi-layered field, presenting a micro, meso and macro

[1] Open Universiteit Nederland, NL; Cetis – the Centre for Educational Technology and Interoperability Standards at the University of Bolton, UK; Institute for Educational Technology at the Open University, UK; Infinity Technology Solutions, IT; Skolverket, the Swedish National Agency for Education, SE; Kennisnet, NL; Høgskolen i Oslo og Akershus, NO; ATiT – Audiovisual Technologies, Informatics and Telecommunications, BE; EDEN – European Distance and E-learning Network, UK

ISBN 978-963-89559-7-5

perspective on the entities to be described. Finer-grained process data that are now increasingly available for analysis inform higher level policies, as described in Figure 1. This model from the UNESCO Policy Brief on Learning Analytics sees a convergence of the three levels with breadth and depth from macro and meso levels adding power to micro analysis (Shum, 2012).

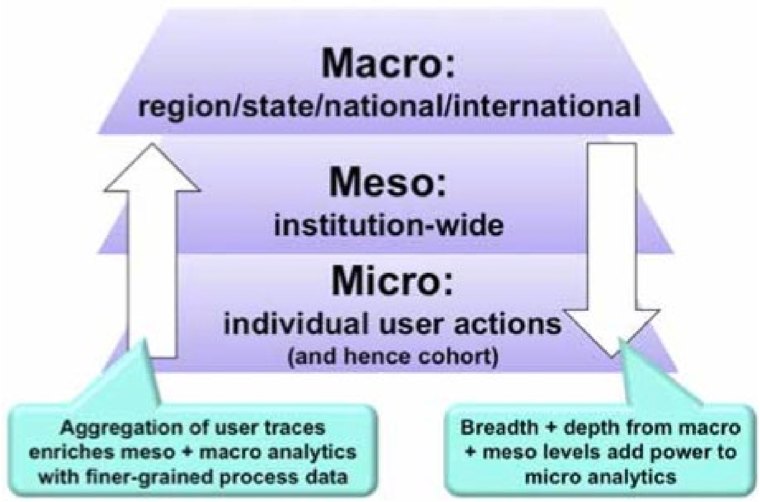

Figure 1. Levels of Learning Analytics (Source: UNESCO Policy Brief, November 2012)

The promises of Learning Analytics and Educational Data Mining may be conceived differently in the three sectors the LACE project will work with.

School education

Education ministries and their agencies are urged to find more effective and more economical systems for schools. Their challenge is made even harder because the school system must anticipate national needs for well-educated and skilled citizens, many of whom will have jobs that we cannot yet imagine. LA and EDM offer a valuable source of policy evidence but may also help to teach and assess 21st Century skills (Voogt et al., 2010).

Higher education

European universities are being forced into new ways of operating and new business models by a combination of the economic situation, government policies and globalisation. Although the picture varies across Europe, university management and staff are struggling to act in the face of new regulatory approaches, competition from the private sector, a changing relationship with the students influenced by fees and diminished employment opportunities, reduced budgets, a feeling of threat from the latest wave of e-learning in the form of the MOOC, and increased perception that university education is failing to deliver the kind of graduates necessary for long term viability of European economies. It is imperative that universities innovate in what they offer and how they deliver it. LA and EDM offer both new opportunities and a means to shorten the time to understand the effect of change.

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Workplace learning

Europe's economic strength is underpinned by manufacturing, agriculture and financial services and it is manufacturing that is where the LACE project focuses attention, in particular on smart manufacturing, which many analysts see as being the means for Europe to reclaim some of the global manufacturing productivity that has recently moved out of the region. To get manufacturing smarter, new educational practices and solutions need to be trialled, shared and adopted at a much faster pace than in the past and driven by data derived from the workplace and from the learning activities. Analytics are far from new to industry; therefore, it will be interesting to explore how LA and EDM would fit with already existing work patterns.

In the following this paper will introduce the generic framework for Learning Analytics developed by Greller and Drachsler (2012), which will serve as a tool for structuring the community discourse supported by LACE. With this tool in mind, the paper will lay out and explore some of the cross-points to be addressed by the project where thematic groupings (e.g., content & resources, support for learning, assessment & performance) are matched against educational sector levels.

A generic LA framework

Learning Analytics is about doing much more than before because data and tools are available to us. However, Learning Analytics also raises many non-technical issues about data ownership and openness, ethical use and dangers of abuse, – issues Drachsler and Greller describes as 'softer' issues and problem areas, which also need to be taken into consideration designing a generic LA framework (2012). These authors used a general morphological analysis approach (cf. Ritchey, 2013) to deduce the critical dimensions involved in a comprehensive discourse on learner analytics.

> *"With the framework, we take the presumption that responsible designers of analytic processes will not only implement what is technically possible to do and legally allowed (or at least not prohibited), but to consider holistically the outcomes for stakeholders and, even more importantly, the consequences for the data subjects, i.e., the people supplying the data (cf. the section on stakeholders below)." (Greller & Drachsler, 2012)*

The framework model (Figure 2) considers six critical dimensions. Each of the dimensions can be subdivided into several instantiations falling into that dimension. For example, the generic "stakeholder" dimension can have instantiations (values) like "learners" and "teachers." The list of instantiations in the diagram is not exhaustive and can be extended on a case-by-case basis. To stay with the above example, commercial service providers and even automated agents could also function as stakeholders in a LA process. It is useful to note that through connecting various (and also multiple) different instantiations of each dimension, concrete use cases can be constructed. The dimensions are "critical" in the sense that each of

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the six fields of attention is required to have at least one instantiation present in a fully formulated LA design, even if some dimensions are vaguer than others in this respect.

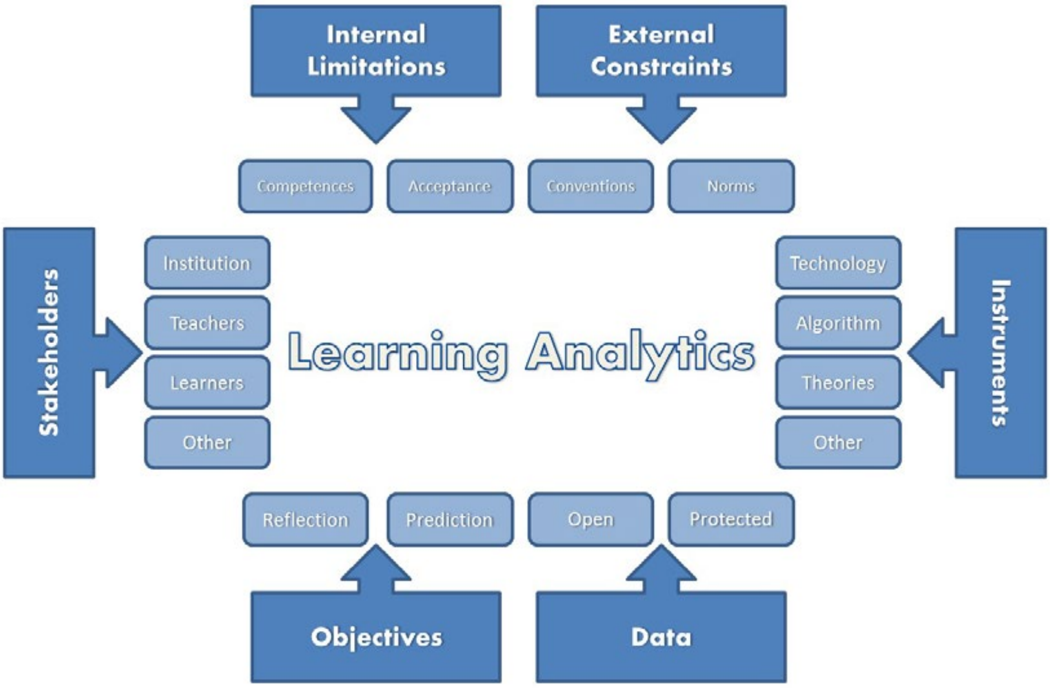

Figure 2. Critical dimensions of learning analytics

In the following the six dimensions are discussed more in detail, keeping in mind the tasks ahead of the newly started LACE project.

- **Stakeholders**: the contributors and beneficiaries of learning analytics. Institutions, teachers, and learners – they could all be suppliers of data and users of data. The stakeholder scenarios we will see in the future are complex and not well researched; many stakeholders have still to realise that they are concerned.
- **Objectives**: set goals that one wants to achieve. The promise of Learning Analytics is to unveil and contextualise so far hidden information out of the educational data and prepare it for the different stakeholders. Greller and Drachsler distinguished two fundamentally different objectives: prediction and reflection (2012). UNESCO (2012) listed five examples of LA: LMS/VLE Dashboards, Predictive Analysis, Adaptive Learning Analytics, Social Network Analysis, and Discourse Analytics. These categories of LA find different positions on the prediction - reflection continuum.
- **Data**: the educational datasets and their environment in which they occur and are shared. Data is key for learner analytics in a narrow sense; however, the terms for giving access to and for sharing the data are key to reap the benefits in a broader sense. Linking datasets are hugely interesting in terms of technical results, but may be counterproductive if not accepted by the learners. The soft issues of access to data are therefore a crucial aspect of this dimension, e.g., open vs. protected datasets, anonymisation, trust systems, etc.

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- **Method**: technologies, algorithms, and theories that carry the analysis. How raw data 'translates' into information depends upon the instruments we use, and their theoretical underpinnings. This field is dynamic and emergent, and it is a huge challenge to open the 'black box' and make sure that the users understand the limitations of their interpretations.
- **Constraints**: restrictions or potential limitations for anticipated benefits. Even if constraints are an integral part of all dimensions of the framework, restrictions and potential limitations are singled out for dedicated scrutiny. Especially, the ethical and legal aspects of data access and sharing need to be built into new LA/EDMI designs.
- **Competences**: user requirements to exploit the benefits. Tools do deliver impressive visualisations of complex datasets; however, without skills and competencies to interpret the results learner analytics may do more harm than good. Basic numeric and other literacies, as well as ethical understanding are not enough to realise the benefits that learning analytics has to offer (Greller & Drachsler, 2012). What competences is required for optimal exploitation of learning analytics data remains to be defined and could only be the achievement of community discourse the LACE project wants to contribute to.

Learner Analytics Community Exchange

The LACE project is designed to capture the key questions of LA and EDM as they arise, acknowledging that this is a young field of research. Therefore, the project has designed a loose framework for facilitating the conversation leading up to actionable insights into the key challenges. At the intersection between Thematic Group and Sector we can describe an idealised interaction: policy and research shape new practice, practice should inform research, and policy should be informed by research and practice. LACE aims to promote useful interactions at these points but also to make conceptual connections and open channels of communication that will increase knowledge cross-over.

The thematic groups are defined as follows:

- **Content & Resources** will include the production, use and management of resources with educational value. These are likely to be mostly digital resources but need not be so. The opportunities analytics opens up for enhancing the quality of intentionally educational resources, for aiding resource discovery and for the creation of "smart content" all come under this thematic group.
- **Support for Learning** will include analysis to inform or guide both teachers and learners. Support for reflective practice, for course design, for early warning of difficulty, for identification of need, etc are all part of this thematic group.
- **Assessment & Performance** will be concerned with the application or design of objective measures of what a person can do, knows etc. This thematic group includes the use of analytics to enable new forms of assessment, to make assessment in authentic contexts a viable proposition, to increase the status of non-traditional

ISBN 978-963-89559-7-5

assessment instruments, and to generally enrich the range of assessment and feedback methods.

The intersection between thematic group and sector defines cross-points that, in theory, should burst with heated discourse once prodded with the right community exchange instruments of the project. These are project inventories found in most projects, e.g., a community website, social media practice, reports and briefs, etc. In addition, the project will populate the LACE Evidence Hub, which will give a well structured overview of the key challenges, issues, potential solutions, research claims, and the evidence, content resources, and organisational and personal resources that could back up the carefully drafted statements in knowledge system. Drawing heavily on the Evidence Hub and ideas gathered during the project a Policy Delphi process will be conducted to expose differences of perception and vision from a group of researcher and practitioner experts selected from the project's liaison organisations and from people who have participated in LACE activities. This will consider views on what is desirable, what is feasible and the obstacles to making what is desirable happen.

It is too early in the project to have a firm opinion of what the cross-points will unveil. However, the frameworks presented give grid for making projections about future discourse. We conclude this paper with some projections related to the 2014 theme of the EDEN conference, e-learning at work and the workplace.

Further discourse on LA & EDM and workplace learning

Among the 18 themes for the 2014 conference at least 7 directly address LA and EDM. These seven themes can be clustered in three groups, – one related to competence management and assessment; another to scaling up work based learning by ICT; and the third addressing institutional quality management. We will shortly touch upon the LA and EDM issues related to each of these clusters.

Competence management and assessment

Technologies for formalising and exchanging information of competency frameworks (cf. InLOC – Integrating Learning Outcomes and Competences[2]) allow for systems that help individuals to position their own competences in relation to a norm defined by a company, an industry group, a professional quality body, etc. Gap analysis could give both the employer and the employee means to define actions related to employability, task management, workplace learning and training etc. The locus of intervention could be content and resources (e.g., learning outcomes linked to educational resources); support for learning (e.g., personal learning profile vs. idealised task competence profiles); or assessment and performance (e.g., competency profiles for teams to help selection). When designing systems in this domain it

[2] InLOC is a European standardisation project – see blog archive of project lead Simon Grant http://blogs.cetis.ac.uk/asimong/category/inloc

ISBN 978-963-89559-7-5

would be advisable to walk through the LA framework presented above in order to identify potential stumbling blocks. For instance, access to data could be dramatically changed if the system is designed from learning vs. a control perspective.

When designing LA systems for the workplace of today one should acknowledge that discipline knowledge is only one critical yardstick in competence management. Learning dispositions and the transferable competencies associated with skilful learning in diverse contexts are increasingly important, and a field that the learning analytics field has yet to engage with (Buckingham Shum & Deakin Crick, 2012).

Scaling up work based learning

Traditional approaches to manufacturing and to workforce training are no longer adequate if Europe is to compete globally. The digital marketplaces are developing rapidly, with crowd sourcing and crowd funding schemes, and Produce on Demand and Make to Individual models, – spurred by the introduction of Internet of things, 3D printing and other technological innovations. Talent driven innovation is one of the main drivers of global manufacturing competitiveness, which leaves up-skilling of the workforce imperative. Still missing are tools to support the training process and the assessment of its efficiency. A 2005 survey of a variety of corporate settings confirmed that many companies already were using technology-aided learning methods, and had a strategic plan for e-learning. However, only a small part specified that this plan was efficient and that they could measure the return of investment in training (Bonk, Kim & Zeng., 2005).

Learning analytics is an emerging method of learning assessment and appraisal in the workplace. By analytics of learning behaviour of employees, it is possible to understand who needs more training, and in what process. It also allows seeing how training can be the most efficient and cost effective. LACE project will the coming two years explore the evidences of Learning Analytics in the workplace, particularly in smart manufacturing.

Quality management

The EDEN conference themes focussing on student guidance services, assessment and evaluation, retention techniques, and performance support all address the main areas of LA research, where we start seeing some results (Ferguson, 2013). In these areas the main challenge is to make the already existing data available for analysis. Universities and other educational institutions have a long tradition of analysing and reporting data, before anyone put the EDM label on the activity. Even if the objectives are glorious (e.g., retention and support), the data remain unanalysed even if new instruments are brought to the market. Only an approach of discourse and co-design may engage the necessary stakeholder so that the full potential of LA and EDM in quality management can be exploited.

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Conclusions

The New Media Consortium Horizon Report 2014 for Higher Education (Johnson et al., 2014) puts up Rise of Data-Driven Learning and Assessment as a mid-range trend driving changes in higher education within 3-5 years. The report points out "while interest is considerable, higher education in general has yet to fully embrace these sorts of processes. Privacy and ethics are just beginning to be addressed, but the potential of using data to improve services, student retention, and student success is clearly evident". The same can be said for schools and workplace learning. Potential is a promise, not real before delivered on. For LA and EDM to deliver, there is no quick fix in a new technology, a LA dashboard or ground breaking algorithm. LA and EDM must be approached from a holistic and systemic perspective, balancing the critical dimensions identified in the LA framework presented in this paper. The LACE project is founded on the assumption that usage context is key to the success of these new technologies. Therefore, the communities need to be engaged in exploring the different contexts. Learning Analytics may well have only one year or less time-to-adoption (Johnson et al., 2014), however, the short history of technology-enhanced learning has shown that availability of a technology is just one factor leading up to successful adoption for most stakeholders.

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E-Learning at Work and the Workplace
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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

EDUCATIONAL TRIAGE IN HIGHER ONLINE EDUCATION: WALKING A MORAL TIGHTROPE

Paul Prinsloo, University of South Africa, South Africa, Sharon Slade, Open University, United Kingdom

> *"Are students walking around with invisible triage tags attached, that only lecturers can see? Is this fair? Or is it just pragmatic? Like battlefield medical attention, lecturers' attention is finite. And as class sizes and workloads increase, it is becoming scarcer" (Manning, 2012)*

Introduction

It is difficult to understate the scope and impact of the changes facing international and national higher education. Terms such as "disruption" and "innovation" (Christensen, 2008), "disaggregation" (Wiley & Hilton III, 2009), the "unbundling and unmooring" (Watters, 2013), "revolution" (Altbach, Reisberg & Rumbley, 2009), and "crisis" (Carr, 2012) have become endemic to discourses on the current and future states of higher education.

Against this backdrop, higher education institutions increasingly need to make strategic decisions regarding opportunities and alleviating risk. Risk within higher education both mirrors the broader societal dimensions of risk, and also presents additional aspects including the danger of obsolescence, changing funding regimes, the impact of technology on content, assessment and the role of faculty, the increasing diversification of forms of higher education and student populations, and concerns about student success and retention (Altbach, Reisberg, & Rumbley, 2009; Long & Siemens, 2011).

Within this context, higher education and in particular open distance and e-learning (ODeL) increasingly relies on the harvesting, analysis and use of available data to inform strategic decisions regarding enrolment, marketing, curriculum development, the appointment of staff, student assessment and increasingly, strategies that inform initiatives to increase student retention and success (Long & Siemens, 2011; Oblinger, 2012).

The harvesting and analysis of student data therefore offers opportunities for higher education institutions to respond, timeously and appropriately, to identifying students who are at risk of failing or dropping out. The opportunities offered by learning analytics have, however, also brought to the fore concerns regarding a number of issues such as governmentality, data privacy, consent and other ethical issues and challenges (Booth, 2012; Clow, 2012, 2013; Long & Siemens, 2011; Oblinger, 2012; Siemens, 2011; Slade & Prinsloo, 2013; Wagner & Ice, 2012).

The central question this paper poses is "how do we make moral decisions when resources are (increasingly) limited?"

Due to the fact that the notion of triage originates from medical practice, we also have to consider whether the notion of triage provides a useful heuristic in *educational* settings. Biesta (2007, 2010), for example, raises legitimate concerns regarding the transferability of concepts between the medical and educational domains of practice.

In this paper we will

- briefly introduce learning analytics as tool in the practice of educational triage;
- provide a short overview of the notion and practice of triage;
- discuss educational triage;
- assess the potential of educational triage to responsibly and ethically respond to legitimate concerns about the "revolving door" in distance and online learning and the sustainability of higher education.

Towards a definition of learning analytics

Central to the notion of educational triage is how student and institutional data are used (its purpose and processes), its tools and algorithms, who benefits and the ethical implications of the criteria used. Learning analytics are emerging as a valuable technology (Long & Siemens, 2011; New Media Consortium 2011, 2012, 2013, 2014) to make sense and understand data resulting from students' learning activities and respond appropriately to increase the effectiveness of students' learning and optimise the allocation of institutional resources.

During the first International Conference on Learning Analytics and Knowledge (2011), learning analytics was defined as "the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs" (Long & Siemens, 2011, p.34). Learning analytics is still an "emerging discipline" (Siemens, 2011) and learning analytics' role is "to support sensemaking and not to supplant it" and "Learning analytics does not make decisions, it enables them" (Siemens in Diaz and Brown, 2012, p.3).

Recent articles regarding the potential of learning analytics in higher education summarise some of the current hype surrounding learning analytics' potential to shape the management of teaching and learning. For example, Wagner and Ice (2012) explore the potential of learning analytics in higher education with the title "Data changes everything" (Wagner & Ice, 2012).

ISBN 978-963-89559-7-5

To understand the potential and possible risks of learning analytics to inform educational triage, we need to explore the historical development of triage as well as the moral principles guiding triage.

A short overview of the history of the notion of triage

The concept of triage is more typically associated with medical treatment where it refers to a classification or sorting of injured patients and the subsequent allocation of treatment according to the severity of their wounds (Winslow, 1982). The original purpose of triage was to conserve human resources in times of crises and to carry the interest of the sick and wounded at heart.

Triage is described by the World Medical Association (WMA) as prioritising treatment and management "based on rapid diagnosis and prognosis for each patient" (WMA, 1994, par.7). The diagnosis and treatment is carried out systematically "taking into account the medical needs, medical intervention capabilities and available resources" (WMA, 1994, par. 7). The basis of triage is therefore the balancing of the scope of treatment in the context of limited resources and health status of patients. The WMA (1994) also acknowledges that triage raises a number of ethical problems. Triage categorisation (WMA, 1994) involves the following criteria:

1. Those who can be saved but requiring immediate treatment (priority 1, immediate)
2. Those not in immediate danger but needing urgent medical care (priority 2, delayed)
3. Those requiring only minor treatment (priority 3, minimal)
4. Those who might need reassurance or sedation (no specific triage tag)
5. Those whose condition exceeds the available therapeutic resources, and cannot be saved in the specific circumstances of time and place, or complex cases that require a choice between them and other patients (no priority, expectant)

Beauchamp and Childress (2001) suggest four basic moral principles providing a common framework used in the analysis of medical ethics, namely

1. Respect patient autonomy: the patient has the right to refuse or choose their treatment.
2. The notion of beneficence requiring a practitioner to always act in the best interest of the patient.
3. The need for non-maleficence – "first, do no harm".
4. The scope of justice that includes the distribution of scarce health resources, and deciding who gets what type of treatment and the priority/sequence of treatment. The principle of justice ensures that privilege or others forms of capital should not determine treatment.

Joynt and Gomersall (2005) point to the fact that there "are enormous difficulties when justifying decisions in relation to prioritisation" (p.38). As a way to overcome these difficulties, they suggest that a focus on "an acceptable process" instead of focusing only on

ISBN 978-963-89559-7-5

the moral principles will alleviate some of the practical issues around the justification of triage. The proposed process contains four key procedural elements namely

- The need for transparency where all relevant parties, "including the public have complete access to the decisions and the reasons for the decisions".
- The "use of any rationales that all parties can accept are relevant to the fair use of the health resources in question".
- To ensure that "a formal and accessible mechanism should exist for appeals or challenges".
- An "oversight mechanism, preferably external" that exist to "monitor the first three conditions". (p.38)

Triage in (higher) education

The picture of the (often) dismal student retention and course success rates in higher education in general, and distance education in particular, can paint pictures of students as the "walking wounded" (Graber, 1996), with higher education seen as a "revolving door" (Barefoot, 2004; Yorke, 2004). The concept of the 'wounded' student is embedded in many of current practices in higher education (Manning, 2012).

There is, however, an inherent moral dilemma in allocating the risk and the scope of risk *just* to students – as if higher education institutions are always effective and fair, and secondly, as if macro-societal influences such as an economic downturn or retrenchment do not impact on students' ability to survive higher education (Subotzky & Prinsloo, 2011). Student success and retention (as well as its opposite of failure and dropout) are the result of a complex, multidimensional ecology with many different and often mutually constitutive variables dynamically interacting.

The notion of triage is reasonably well established in the contexts of primary and secondary school education (Booher-Jennings, 2005; Cobbold, 2010). There is, however, a lack of direct referencing to the notion of triage in higher education research, though issues of optimisation, analytics and addressing the needs of under-prepared students are well-documented.

A number of authors (e.g., Biesta, 2007, 2010) question the appropriateness of practices that seem to work in medical contexts directly to educational contexts. As Biesta (2010) indicate, there are important ontological and epistemological differences between the two contexts and we should therefore be critical in assuming that the epistemological and ontological assumptions underpinning triage in medical contexts can be uncritically applied in educational contexts.

Triage and open distance and e-learning: Mapping the risks and potential

Slade and Prinsloo (2013) propose a number of principles underlying learning analytics as moral practice which include recognising that learning analytics (and implicitly educational

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triage) can be immoral. Based on the potential of learning analytics as moral practice, it follows that educational triage, in the context of limited resources, will involve making difficult decisions. Even in the context of medical triage the "complexity of disease and heterogeneous nature of general ICU patients, and our lack of quantitative knowledge of ICU outcomes" makes it almost impossible to "define enough specific conditions under which individual triage decisions should be made" (Joynt & Gomersall, 2005).

The moral principles – autonomy, beneficence, non-maleficence, and distributive justice – (Beauchamp & Childress, 2001) provide useful pointers for considering the practice of educational triage. It would, however, seem as if the principles do not transfer directly or easily to an educational context. Education is not a "causal technology" or a "process of 'push and pull'", but an "open and recursive system" (Biesta, 2007, p.8) where the factors impacting on student retention and success are complex, and often interdependent and mutually constitutive (Subotzky & Prinsloo, 2011).

We would therefore propose an adaptation of the principles suggested by Beauchamp and Childress (2001) as follows:

1. *Student and institutional autonomy as situated.* Student success and retention are not the sole responsibility of either students or the institution, but a dynamic and often non-linear result of interdependent and mutually constitutive factors (Subotzky & Prinsloo, 2011). Both students' *and* institutional autonomy should be acknowledged. The autonomy of both role-players is, however, bounded or situated in national and institutional policy frameworks and structures. Educational triage therefore finds itself in the nexus between respecting student autonomy but also, at the same time, ensuring the long-term sustainability of the institution.
2. The notion of *beneficence* requires institutions to always act in the best interest of the student flows from the social contract between higher education and students (Slade & Prinsloo, 2014). Educational triage as moral practice is primarily based on higher education's commitment to be student- centred and not allowing students to register for particular courses, or continue on selected trajectories, if analyses clearly show that the continuation of the trajectory is neither in the interest of the student nor the institution. Providing access to higher education should never be providing access to failure (Meisenhelder, 2014).
3. The third principle indicates the need for *non-maleficence.* Based on the procedural proposal by Joynt and Gomersall (2005) that transparency should characterise not only the analysis but also the diagnosis, prognosis and outcome, it is clear that the principles of non-maleficence and beneficence are two sides of the same coin.
4. The fourth principle of distributive justice poses a more difficult and interesting challenge for educational triage. Joynt and Gomersall (2005) state clearly that factors "such as ethnic origin, race, religion, sex, social status and ability to pay, and age should not be considered as acceptable criteria on which to base a triage decision" (p.38). We can imagine that in a medical *crisis* situation, that these factors should not play a role.

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One the other hand, we should also acknowledge that resources, whether access to affordable health care, social services, infrastructure, and security is often (and increasingly so) based on a combination of historical privilege, initiatives to address past injustices, and socio-economic and ideological decision making. We simply cannot negate the impact of "causal power of social structures" (Elder-Vass, 2010). (Also see Apple, 2004; Bauman, 2012; Bernstein, 1996; and Chomsky, 2013). We propose that it is immoral not to take into account the historical impact of some of these factors in considering the classification of students in educational triage.

Conclusion

In this article we considered the complexities of "making moral decisions when resources are limited" (e.g. Joynt & Gomersall, 2005). The effective allocation of increasingly limited resources, although not new (e.g. Hartley, 1995), challenges higher education institutions to take concerns regarding student failure and dropout seriously. Institutions increasingly rely on the analysis of data through algorithms to determine students' chances on success, or risk of dropout and allocating resources according to a system of triage. Students are classified in different categories based on an assessment of their educational risk and the cost of increasing or ensuring their chances on success.

Though educational triage is germane to higher education within the discourses and practices of accountability, governmentality and the optimisation of resources; there is a dire need to explore the epistemological and ontological assumptions underlying and informing these discourses and practices.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SPATIAL ABILITIES: A GROUP OF BASIC WORKPLACE SKILLS DEVELOPED THROUGH GEOGEBRA 3D

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Bernadett Babály, Szent István University, Hungary

Another PISA shock from Hungary: failure in mathematics partly explained by deficient spatial skills

Results of the 2012 survey of the Program for International Student Assessment (PISA, 2013) revealed a sharp decline in performance both in Mathematics and in Science for Hungary. The first analyses of the causes of yet another decrease of performance in these, economically important areas have revealed low educational expenditure, too frequent curricular reforms and outdated teaching methodology. A detailed analysis of tasks where performance is especially low were mostly those involving spatial abilities. Hungarian art education has traditionally focused on the acquisition of classic European rules of representation (rendering methods of linear perspective) and included knowledge previously taught by Descriptive Geometry, once an individual discipline, later a part of Mathematics and Art and Visual Culture (the name of the discipline for art education in Hungary). In the last decade, Art became an elective from age 13 (Grade 7), and thus the cohort taking the PISA test is the first that may have reached secondary school without any art lessons in the period decisive for the development of spatial abilities: 13-16 years.

Task types "Shape and Space" in the PISA assessment focused on one or more basic skill components (reconstruction, mental rotation, change of viewpoints, estimation of surface size, etc.) required the utilisation of spatial abilities in everyday situations. These tasks were typically included in the Art curriculum (cf. an overview in Kárpáti, Babály and Budai, 2013), therefore, increase in performance cannot be expected solely from a more efficient education in Mathematics. Moreover, spatial skills are among those core abilities required for the majority of skilled jobs and also a wide variety of professions. Therefore, the demonstrated lack of these skills may emphasize the importance of educational efforts aimed at the development and assessment of the perception of space and the creation and modelling in space. In a recent national assessment project, we developed a visual skills framework for curriculum innovation (Kárpáti & Gaul, 2011).

Spatial skills identified and evaluated in this Framework are as follows: Spatial perception, Orientation in space, Experiencing space, identifying spatial qualities, Interpretation of spatial structures, longitudinal and cross sections, Spatial representation (2D), Representing spatial qualities based on visual perception, Representing positions in space (2D), Creation of spatial sensations caused by the organisation of visual elements (e.g. rhythm, balance), Representation of changing experiences of space through time, Reconstruction of space, Reproduction of space, abstraction, Creation of spatial objects (2D and 3D), Design, Modelling, Creation, Construction. Information and Communication Technologies may be instrumental in the enhancement of this competence area. This paper presents a research project aimed at developmental, authentic assessment of spatial abilities through the new, 3D version of the GeoGebra software.

Dynamic visualisation through 3D GeoGebra

GeoGebra, this innovative, dynamic visualization software was created by Markus Hohenwarter and originally intended for use in secondary level science and mathematics education. It is available as an open source application and can be installed on any platform that is suitable to run Java. Today, however, it is available in 62 languages in 122 institutions of 190 countries. With more than 45,000 online study material available, about 5.5 million copies of the open source software were being used in schools in 2012. Thousands of volunteer developers broaden the range of applications daily.

Its latest version, GeoGebra 5.0 (http://wiki.geogebra.org/en/Release_Notes_GeoGebra_5.0) includes 3D functionalities and is ideally suitable for digital creation in space. Perhaps the most important feature of this version is that it connects different representations of objects with their geometric display and algebraic description. GeoGebra is a dynamic system because users get a virtual designing kit with the program that enables them to visualize any spatial problem. Unlike designing on paper, the initial objects (points, straight lines…) can be freely moved while the objects dependent upon them move along with them based on their geometrical connections. Thus, students practicing mental rotation can actually rotate a linear representation of a cube and see its shape changing according to the change of perspective. Discovery learning at its best, the system can also be used for testing the level of spatial perception.

Through an integration of the GeoGebra 5.0 Beta and 4.x, we may develop virtual learning and evaluation task sheets that activate spatial skills in an authentic setting resembling manipulation and orientation in real space. The task shown on Figure 1 requires the selection of a cross section from among alternatives. After having made a selection, the student receives immediate, dynamic feedback about the appropriate solution and may understand if and why his or her choice was wrong.

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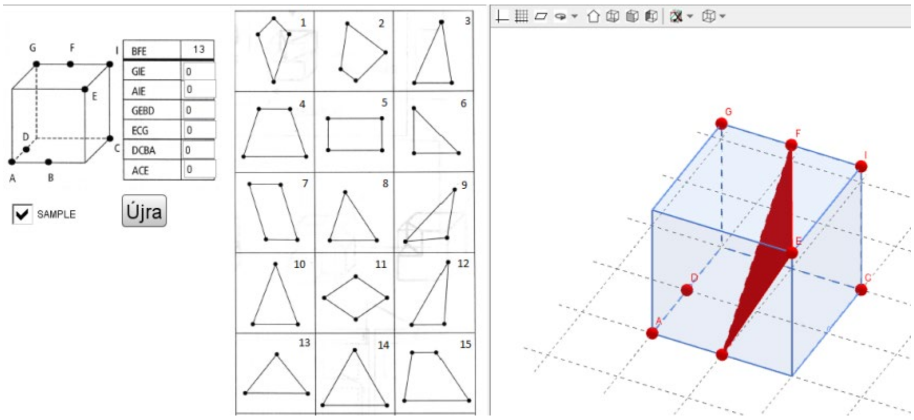

Figure 1. Let us select the suitable shape, which the cube is on his edges, we get some of the binding of granted dots

On Figure 2, we show a dynamic task sheet that develops high level abstraction and reconstruction of space. The student is asked to create a two-dimensional figure, and rotate it around a spatial axe. Several tasks can be built on this basis. The parallel sides of the string trapezium 4 cm and 2 cm, his stems 3 cm long. The shape rotates around the axis of the symmetry. How large are his surface and his volume for the object got so? (It is a truncated coin!)

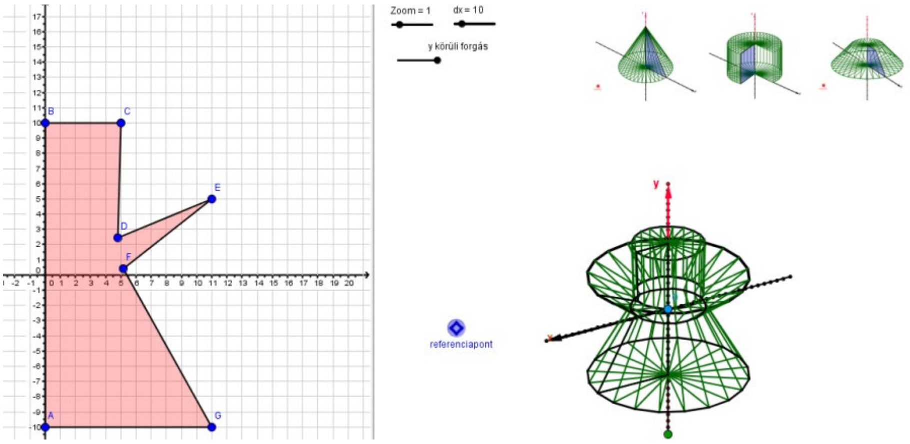

Figure 2. Creation of a spatial figure through rotation of a two-dimensional plane

The highly interactive task represented on Figure 3 may be utilised to develop skills of solving tasks of spatial geometry.

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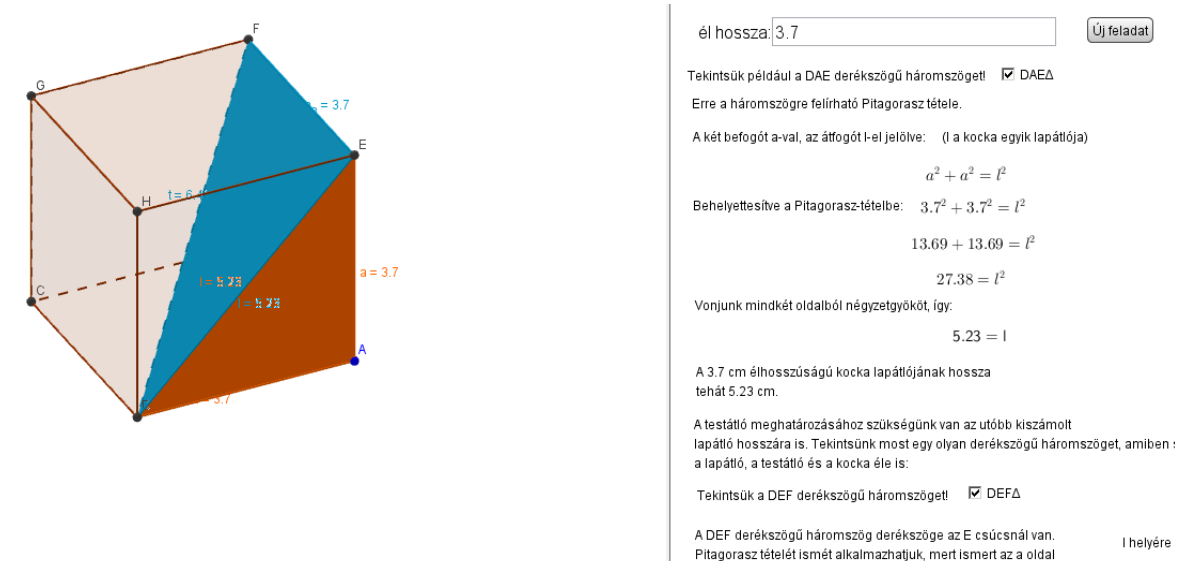

Figure 3. Interactive task sheet for calculation

Here, students may determine the length of the edge length of the cube and may follow the steps of the computation of the size of the diagonal. Help is provided as it is needed, in a step by step manner, so students may use the task as a support for solving a home assignment or practicing computation techniques. The 3D, dynamic representation of the figure helps the development of mental manipulation as it enables constant comparisons between a cross section and a shape in space. As all the parameters of the task can be varied, it is easy for the teacher to develop another task based on another geometrical shape, like a pyramid or sphere.

As the cube is the figure most frequently used in Mathematics education, the tasks represented on Figures 4 and 5 can be optimally used to develop mental manipulations necessary for the reconstruction of a figure based on its floor plan, or the selection of the correct floor plan related to a figure. Here, dynamic potentials of GeoGebra are optimally used to support mental imagery.

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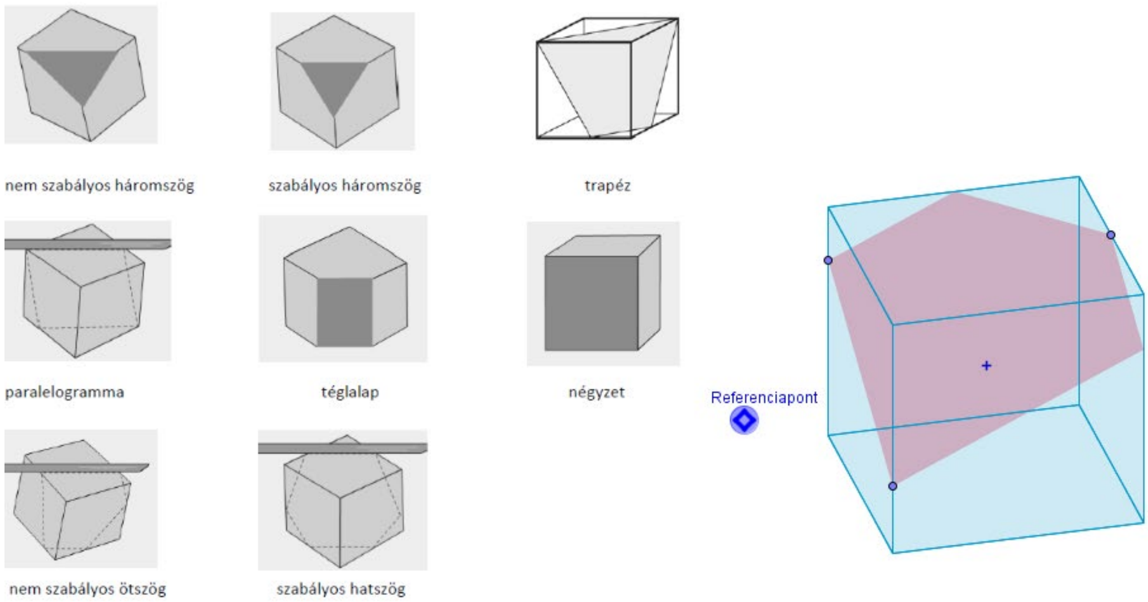

Figure 4. Intersection of a cube

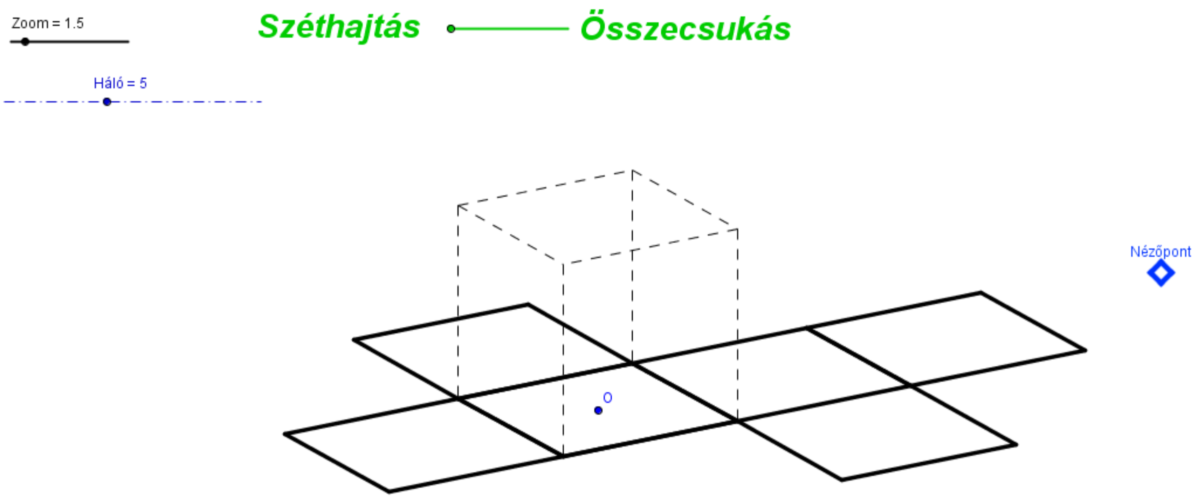

Figure 5. All nets of a cube

It is important to go beyond orthogonal axonometric tasks and show examples that involve central axonometric knowledge as well. These tasks pave the way to the perception and understanding of spherical geometry and the 4d "hypercube" (It is an object, that every "sides" is a 3D cube). These tasks do not only enhance spatial skills but also build a motivation to acquire them on higher levels.

3D GeoGebra is ideally suited to represent buildings and their floor plans from different axes and thus give an idea about a historic building in space (Figure 6):

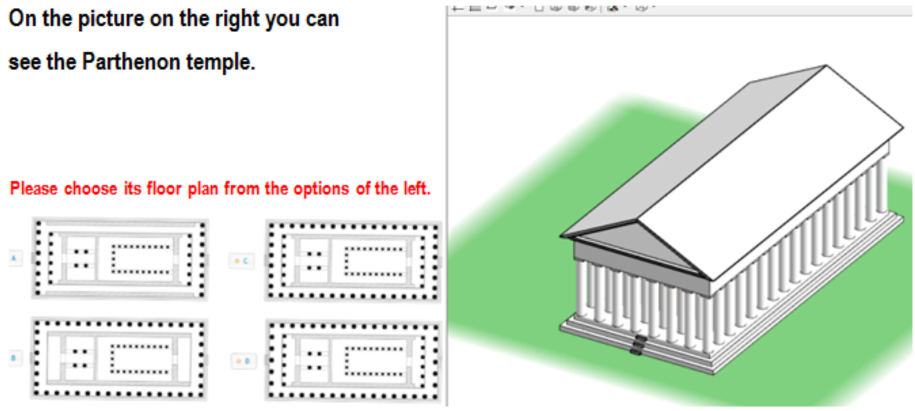

Figure 6. Floor plan and reconstruction of the Parthenon
The image of the building may be rotated to experience views from various angles

Assessment of spatial skills

Manipulating objects in space through two-dimensional abstractions has been accepted as a valid means of identifying spatial skills and assessing them – however, working with generations of students deeply immersed in multimedia technology, we found this solution unauthentic and idiosyncratic. Edutainment and gaming applications (like those developed by the Quest to Learn project) have long been using sophisticated virtual spaces that activate skills ranging from orientation to memory, manipulation to construction. KINECT transmits real movement to virtual space and thus provides authentic orientation experiences. The Leonar3Do software enables users to manipulate in real space and create 3D images that can be shown through a 3D printer as sculptures or objects. Manipulation in virtual space is being employed at the Harvard Mental Imagery Lab where a spatial aptitude test is developed using Virtual Reality and Augmented Reality solutions. Our methodological objective is to integrate these digital solutions in educational assessment in the visual arts.

We employ digital technology in two forms: first, to provide students with a personalised, flexible, online practicing and testing environment. Second, we started experimenting with three-dimensional (3D) software solutions that provide authentic methods for creation, manipulation and perception of space in a dynamic virtual environment. In this paper, we give a brief account of our first results comparing traditional and innovative evaluation methodologies.

In order to contextualise visual skills as important and assessable components of education, we joined the "Development of The Assessment of Cognitive and Affective Skills and Abilities Project" of Szeged University. In the first phase of the Visual Literacy sub-project, we developed and piloted a set of paper-based and digital tasks. Later, the best tasks were included in eDIA, the *online, adaptive testing environment* of the project that provides an easy-to-use, freely available for all Hungarian schools testing environment. The spectacular visual appearance of the tasks of eDIA makes it an enjoyable visualisation tool that makes it

ISBN 978-963-89559-7-5

easier to comprehend spatial problems than black-and-white, abstract axonometric projections in traditional paper-based tests. During electronic assessments, students work in an environment that resembles social web sites as well as gaming applications. Usage studies show that they can orientate in the menu without effort. In the "Visual Culture" task package, we always provide practice items that show manipulation options and also a voiceover for slow readers. Digital images provide a life-like representation of space and reproduce complex spatial situations accurately.

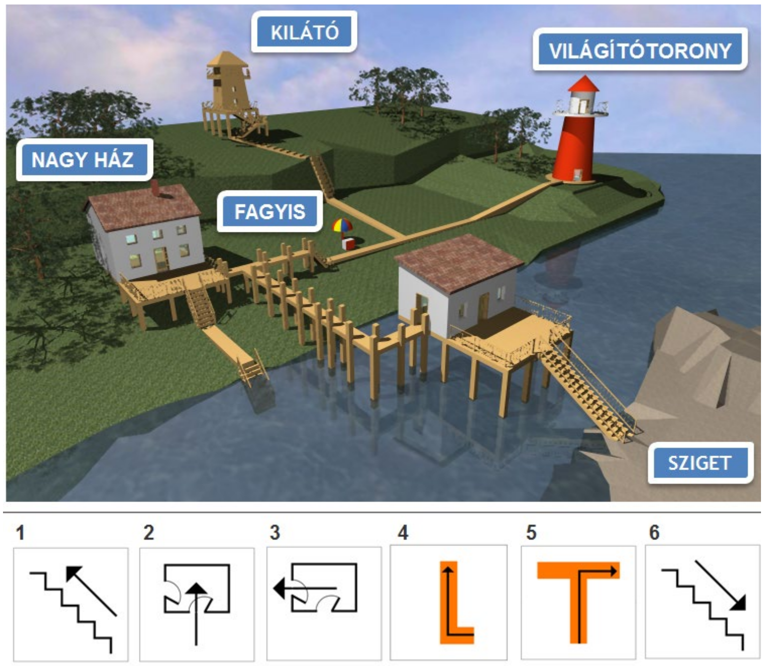

Figure 7. Finding your way around in a virtual space, using directions represented by signs (shown below). Task for 4th graders (age: 10 years)

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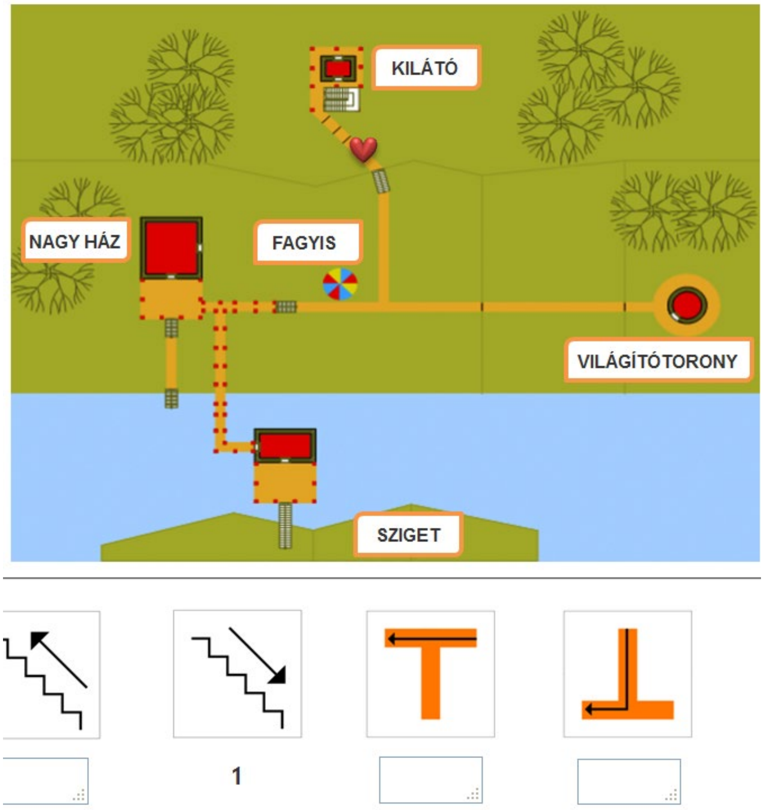

Figure 8. A more difficult version of the spatial orientation task in Figure 1 (for 6th graders, aged 12): the virtual space is depicted as a map, directions represented by signs.

Task response types include marking, colouring and moving images, entering text, joining text and picture or forming groups of items. Cognitive skills involved in perception, design and creation are targeted simultaneously, just like in real life. Visual skills are in the focus, but other competences are also targeted, revealing the *interdisciplinary significance of art education*.

In eDIA, results of Art and Visual Culture may be compared with four core disciplines (Mathematics, Mother Tongue, Science and Foreign Languages) as well as eleven other areas of studies (including Music and Media Arts) to reveal correlations and cognitive, affective and psychomotor gains resulting from education through art. In its final form, the eDIA-system will monitor personal development, offer tasks for individual skill enhancement based on previous results. Art teachers may thus design individualised teaching-learning processes that supports talent development and caters for special needs (like mental or psychomotor deficits) at the same time.

ISBN 978-963-89559-7-5

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Acknowledgement

Research reported in this paper is supported by the *Development of Diagnostic Assessment Project*, co-ordinated by the Research Group on the Theory of Education of Szeged University. (Project No. TÁMOP-3.1.9-11/1-2012-0001)

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

VOCATIONAL EDUCATION AND THE EVOLUTION OF THE COMPUTING DISCIPLINES

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Introduction and Context for the Study

Throughout the relatively brief history of IT, undergraduate teaching programs in the IT disciplines have had to cope with the traditional antipathy of universities towards vocationally-based education. This resistance towards vocationally-oriented education has been a common feature of universities since their origins as educational institutions. The earliest universities followed the example of the ancient Greek academies, in favouring disciplines which focused on pure knowledge, independent of its application in practice (Ruegg, 2004). Consequently, throughout most of the history of the university, studies in the fields of engineering and technology were excluded on the grounds that they were too 'utilitarian', lacking in the theoretical foundations deemed appropriate to a university academic discipline (Guagnini, 2004). It was not until the late 19th and early 20th century that the disciplines associated with technology and the applied sciences began to earn widespread acceptance as suitable fields of study for universities (Ruegg, 2004).

Five IT specialist disciplines have been recognised and defined by the American Association of Computing Machinery (ACM): Computer Science (CS), Computer Engineering (CE), Information Systems (IS), Software Engineering (SE) and Information Technology (IT). Many of the accounts of the formation of these IT-based disciplines show initial reluctance by many institutions to accept their academic legitimacy as technology-based fields of study (see e.g., Aspray, 2000; Baron & Mounier-Kuhn, 1990). This paper summarises the key findings of a study whose aim is to examine the way in which these disciplines have been treated within the higher education system of an entire region – the State of Victoria in Australia. The study takes a historical approach, examining the way in which IT education has evolved within the undergraduate teaching programs of Victoria's higher education institutions. It describes how the academic/vocational divide has affected the evolution of IT education, and evaluates the level of success achieved by IT disciplines in earning recognition in undergraduate teaching programs.

Context for the Study – Higher Education in Victoria

Victoria is one of seven states (and two territories) which comprise the federation of Australia. Although it is the smallest of the mainland states it is the most densely populated, and its performance against most of the key economic indicators puts it in first or second place when ranked against the other states. Its population of about 5.7 million is highly centralised and urbanised, with about 4.2 million living in the state capital city, Melbourne.

In order to understand Victoria's higher education system, it is first necessary to understand the basic structure of the Australian higher education system and the way it has changed during the period covered by the study. Historically, most higher education institutions in Australia have been government-owned and controlled, with State governments having responsibility for establishing and running the institutions, and the federal government directing educational policy and providing the bulk of the funding. In Victoria, the University of Melbourne (established in 1853) remained the State's sole university until the late 1950s, supported by a range of technical colleges and other specialist educational institutions offering vocationally-oriented education and training in a variety of fields of study. A similar pattern of development of the higher education sector was followed in the other Australian States.

Community demand for higher education began to increase rapidly during the 1950s, causing the federal government to expand and restructure the sector. A central feature of this restructure was the creation in the early 1960s of the so-called 'binary system', which aimed to formalise a two–tier structure for higher education institutions. One tier comprised the universities which were expected to be research-oriented, and to offer bachelors degree programs which were more theoretical and focus on higher-order general cognitive skills. All other institutions were grouped into the second tier under the general title of Colleges of Advanced Education (CAEs); they were to be vocationally-focussed, do minimal research, and mainly offer diplomas as their highest level of qualification, with an emphasis on instruction in the knowledge and skills required for particular workplace tasks.

The establishment of the binary system led to a major re-structuring of the higher education sector. For the first tier, the main change was the introduction of new universities; in Victoria, three such universities – Monash, Latrobe and Deakin were established to supplement the University of Melbourne. The picture was much more complex for the second tier, which comprised a much larger and more diverse set of institutions. In Victoria the number of CAEs peaked at more than 35 institutions focusing on a variety of professions and vocational outcomes. By the late 1980s, when amalgamations had significantly reduced the number of CAEs, the State still had about 20 such institutions. Most CAEs underwent significant changes as they adapted to their new roles in the binary system. In particular they sought to dispel perceptions of themselves as the 'second-class' of higher education institutions and to be treated as equals to the universities. As part of this ambition, they gained approval via the State governments to over-ride the binary system's proposed restriction on the qualifications they could offer, and included bachelors degrees and even masters degrees in their programs.

In the late 1980s the binary system was abolished, and replaced with a new unified national system for tertiary education. The distinction between universities and CAEs was eliminated, and funding arrangements were changed to encourage higher student enrolments, increase the sector's responsiveness to marketplace pressures and bring about organizational mergers

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to create economies of scale. The outcome of these reforms was a complete re-organization of the higher education sector, with CAEs amalgamating with existing universities or merging with one another as new universities. In Victoria this process of re-structuring and amalgamation took place very quickly, beginning in about 1990 and being largely completed by the mid-1990s. It resulted in the reduction of the number of institutions to eight universities, catering for a rapidly increasing student population. The reforms broke the divide between vocational and 'academic' institutions and increased the exposure of universities to market forces. Universities were increasingly treated as mass-market education providers, which were expected to move towards financial self-sufficiency and eliminate their dependency on government funding. Although there has been much controversy about the impact of these changes on higher education, the basic structure which they established for the sector has remained unchanged to the present day.

The remainder of this paper examines the way in which IT education evolved against the backdrop of the changing higher education system. Note that the number and diversity of the institutions involved mean that it is impossible in a paper of this length to do more than describe broad general patterns of the evolution of IT, and omit the many cases where some programs within individual institutions differed in some way from the norm. A fuller description of events, including consideration of these differences can be found in Atchison (2013).

The Evolution of IT Programs in Victorian Higher Educational Institutions

Period 1: Emergence and establishment – 1960-1990

In Victoria, computing education first emerged in about 1960, and the pattern of its development ran broadly in line with the binary system's division of responsibilities between the two higher education sectors. The four universities generally confined themselves to programmes in the then best-established IT disciplines of CS and CE, and maintained their resistance towards vocationally-oriented programs throughout most of the period. Only Deakin University maintained a significant emphasis on vocational programs in computing, and these came as a consequence of that institution's origins as the product of a merger of CAEs; its two applied computing programs had been established in its constituent CAEs prior to the institutional merger in which Deakin was formed.

By contrast, in CAEs the main emphasis was on vocationally-focussed computing programs, explicitly aimed at preparing graduates suitable for workforce needs for computing professionals with skills in developing and implementing computing applications. By the end of the period, twelve CAEs were offering at least one IT-based program of this kind. These programs were usually located in either a business or science faculty, but regardless of differences in the names of programs and their location within the institutional structure, their program objectives were described in similar application and practice-oriented terms. Their curricula covered a similar range of topics, including programming, systems analysis and design, computer hardware, operating systems, database, computer applications and data

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communications and networking, but with individual variations in emphasis according to the program's origins and orientation. Despite the perceived lower status of CAEs and the failure of these IT programs to conform to the disciplinary models recognised at that time by the ACM, they were widely regarded by industry as providing the best IT graduates. A federal government enquiry into IT education in 1976 found that many employers were unhappy with the nature of the education provided by the more academically-oriented university programs, and preferred to employ CAE program graduates, who had a better grounding in the practical aspects of organizational computer use (De Ferranti & Smith, 1976).

The process of formation of most of the applied computing programs can best be explained in terms of what Metzger's (1987) model of disciplinary formation described as subject parturition. Initially a set of computing units was established to support the application of computing as part of a specialist program in another discipline; over time, the number of computing units grew to the point where they took on an independent existence as a separate program of study. The parturition process did not always mean an immediate complete separation between the 'parent' discipline and its computing 'offspring'. The two disciplines often continued to co-exist, perhaps as separate but related majors within a common degree program – for example a stream of computing units in an accounting major might evolve to become a specialist major in business computing alongside the 'parent' accounting major within a business degree. The process of evolution from supporting units to the status of an independent specialist program was normally spread over a period of several years, but the speed with which it occurred depended on a range of factors which were specific to each institution.

Within business faculties, accounting was the discipline which was most commonly associated with the initial introduction of units in computing, and therefore it was the most common disciplinary 'parent' of specialist business-based computing programs. But computing units were also common in many business programs which emphasised quantitative and mathematically-oriented approaches to the study of economics, or which dealt with the use of systems for business processing, and they too became the starting point for computing programs in several CAEs. In the later years of the period, advances in the use of computers for word processing and general office work led to some computing programs evolving from business programs which focused on administrative or secretarial studies and information management. In science faculties, the disciplinary roots were not so variable; applied mathematics, quantitative methods and operations research were almost universally linked as the initial source from which science-based computing programs evolved.

The difference between the disciplinary roots from which applied computing programs formed meant that it was commonplace for separate programs to be established in different faculties within the same institution. In fact, by the late 1980s, most of the CAEs which taught computing offered two applied computing programs – one based in a business-oriented faculty and the other in a science-oriented faculty. Despite the surface level similarities in the curricula of these programs, the differences in the underlying applications on which the programs focused enabled the institutions to justify maintaining them both.

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Applied computing programs went by a variety of names. In business faculties, they were initially widely labelled as 'EDP' or 'data processing' programs, but over time this term was replaced by 'business computing' as the most common name; 'Information Systems' or 'Business Information Systems' were relatively uncommon, but began to become more popular towards the end of the period. In science faculties all programs were labelled with the names 'computing' or Computer Science', with roughly equal numbers of each. Despite the shared name, the CS programs at CAEs were clearly distinguishable from their counterparts in universities; they had the same vocational objectives as other applied computing programs, whereas the university CS programs were more theory-based, narrower in their scope, and focused on the nature of CS as an academic discipline.

Period 2: Re-organization and Consolidation – 1990-1996

The round of institutional mergers and re-structures which accompanied the elimination of the binary system played a major role in re-shaping the IT educational environment. Most of the mergers brought together two or more institutions which offered multiple IT programs of different types, which meant that each new university had to take decisions about how they should be accommodated within the re-structured institution. In most cases these decisions served to consolidate and strengthen the place of IT disciplines within the academic hierarchy.

The first important aspect of this process of consolidation was the formation of specialist IT-based departments. Although specialist IT-based departments had been common in the universities before the mergers/re-structures, most of the IT programs in the CAEs had remained alongside the discipline from which they had initially evolved. The institutional changes provided the opportunity for IT to separate itself and its programs from these disciplinary partners. By the end of 1996, the vast majority of IT programs in all universities were offered by organizational academic units which specialized in IT, independent of other disciplines, which gave IT a much stronger disciplinary presence in each university. There were, however, only limited signs of any form of disciplinary convergence between the separate IT disciplinary specialisations. In most universities, the new IT-based departments remained in the faculty from which they had originated, which meant that the IT programs remained scattered across 2-3 different faculties, usually those of science, business and engineering. The most notable exception was at Monash University, where that institution's re-structure was used to bring all aspects of computer-related education together into what was claimed to be Australia's first specialist IT faculty, consisting solely of IT-related academic departments.

A second key effect of the re-structures was to broaden the range of areas of IT which each university covered in its academic programs. Whereas institutions in the previous period usually offered only 2-3 different IT-based programs, by 1996 there was an average of about 5-6 specialist IT programs per university, covering a broader range of IT disciplines. In most cases, each merged university retained (sometimes in modified form) all the IT programs which had previously existed in the institutions which were involved in the merger; in only a few cases did the institutional mergers lead to two programs from the different institutions

ISBN 978-963-89559-7-5

being combined into one. Hence, despite the decline in the number of institutions, the overall number of IT programs offered across the higher education sector remained much the same.

The most noticeable change in the range of IT disciplines offered by the re-structured universities was the rise to prominence of the discipline of Information Systems. By the end of 1996 almost every university offered a program of that name (or a comparable name, such as Business Information Systems or Business Systems). However, this increase in IS programs was due chiefly to changes in nomenclature, rather than to the establishment of new programs; only at the University of Melbourne was a new IS undergraduate program (and the department which offered it) created from scratch during the period. In all other universities, the new IS programs were formed as re-named versions of applied computing programs which had carried over from the previous period.

This meant that IS joined CS and CE as the best represented of the IT specialisations, with almost every university offering at least one specialist program in each discipline. Most universities also continued to offer at least one other generalist applied IT program of the type offered by CAEs in the previous period; these were commonly labelled as Bachelor of Computing or Bachelor of IT. The first specialist Software Engineering programs also appeared at three universities in this period, closely associated in each case with the university's CS program. A handful of other specialist programs also developed alongside the 'mainstream' IT disciplines during the period; they covered emerging areas such as multimedia, network engineering and systems support, and were the vanguard of a much larger group based around specialist areas of computer technology and its applications, which appeared in the next period.

Period 3: Growth and Expansion – 1996-2003

The dominant influence on the development of IT education during this period was the rise in public interest in computing which accompanied the so-called dotcom boom of the late 1990s. As a consequence of the technological developments in areas like multimedia and the world-wide web, and the continuing increase in the accessibility of computers, the period saw a surge in interest in IT education which was reflected in rapid increases in student demand for IT-related programs. As well as attracting greater interest from domestic Australian students, IT was also a popular choice among international students, whose numbers in Australian universities increased dramatically throughout the period. For IT departments, the rapid rate of technological change combined with increasing student demand to create pressure for new academic programs.

These pressures for new programs were also exacerbated by the impact of broader trends in the higher education sector. Federal government policies continued to favour the development of universities as mass education providers, leading to strong increases in enrolments of domestic students in Australian universities and even higher increases in the number of international students. This created a larger and more diverse student population with expectations that university programs would accommodate their various vocational

ISBN 978-963-89559-7-5

educational needs. Consequently the design of IT programs began to be affected as much by what was perceived to be likely to be popular with the student market as by the dictates of disciplinary standards.

The net effect of these pressures was that by 2003, shortly after student demand had reached its peak, the number of IT programs offered in Victorian universities was almost double the number which had been offered in 1996. The new programs were spread across a wide variety of areas of IT and IT applications; some were off-shoots of the mainstream IT disciplines focusing on advances in traditional technologies, but most were based on emerging specialist areas of technology, such as web design, e-commerce, games development, security and mobile computing. The introduction of these new programs was driven by a mixture of motivations. From a purely academic point of view, they aimed to build and disseminate a base of knowledge around newly emerging technologies such as multimedia and the web and their application in areas such e-commerce, media, computer games and the like. Secondly, they aimed to meet a vocational objective of satisfying perceived market need for new types of IT specialists such as web designers, information architects, games developers and the like. Finally, they aimed to take advantage of the opportunity presented by the increased levels of public interest in IT, and attract students who would not be interested in the traditional IT disciplines.

Although all universities increased both the number and the variety of IT programs they offered during this period, the number of new programs and the themes on which they focussed varied between universities. Each IT-based department shaped its strategy to suit its own circumstances, and the outcome in terms of program offerings varied accordingly. By the end of the period, all universities offered programs in the four mainstream IT disciplines – CS, CE, IS and SE, and almost all of them offered some form of generalist IT program of the kind which the CAEs had originally offered. Beyond that, each institution had its own unique blend of specialist programs in particular aspects of computing technology and different areas of computer applications.

Period 4: Decline – 2003 - present

This period was dominated by the effects of a decline in student demand for IT education which was longer and more pronounced than the period of growth which preceded it. Between the peak of student demand at the height of the dotcom boom and the point when its decline ended in about 2008, the demand for IT programs across all universities fell to about one-third of its peak levels and about half the level which existed in 1997, prior to the beginning of the boom. During the remainder of the period demand plateau-ed, with only minor fluctuations up or down from one year to the next. Although it is only indirectly relevant to universities, it is worth noting that a similar trend occurred in secondary schools, where the number of enrolments in the optional IT units in the final year of secondary education fell from their peak in 2001 to a level which was less than half of what the units attracted when they were first offered in 1992. It is also worth noting that similar problems of

ISBN 978-963-89559-7-5

declines in student numbers and quality were observed at universities throughout much of the developed world during this time (see e.g. Benokraitos et al. (2009); Granger et al. (2007)).

The collapse in student demand made this period the most turbulent in the history of IT education in Victoria. Declining government funding levels made economic viability an increasingly important consideration in internal university assessments of their academic departments and programs, which meant that the likelihood of a program's survival was determined more by its market appeal to students, than by its claims to disciplinary legitimacy or its perceived fit with industry needs. Where IT had flourished in the previous period as a consequence of its increasing student demand, the decline in demand now exposed IT departments and their programs to severe critical scrutiny. Their response took two contradictory forms – on the one hand, many programs whose student numbers had declined were closed down, but on the other hand, new programs were established in the hope that they could re-capture the lost market. For the first couple of years of the period, the number of new programs actually matched the number of losses, so that the overall number of IT programs offered remained roughly the same. It took until 2005 for the severity of the slump to become clear, at which point the rate of closures began to excess the rate of commencements, and program numbers began to decline. By the end of the period, the overall number of IT programs offered in universities had returned to similar levels to those which existed in 1996, before the dotcom boom began.

Most of the program losses (and the short-lived additions) were in specialist areas of IT applications; in particular areas such as e-commerce and multimedia, which had prospered during the dotcom boom, declined significantly. Program losses also extended into the mainstream IT disciplines, which meant that by the end of the period almost all the universities had ceased to offer at least one of the ACM's set of core disciplinary programs. The most successful area in terms of new programs was in games development – an area of IT which has no disciplinary recognition from the ACM, offers relatively few employment opportunities in a niche industry segment, but has market appeal to students (which has been seen to be misguided in many cases).

With levels of student demand remaining at historically low levels and enrolments correspondingly low across virtually the entire sector, it is unclear what the future holds for the IT disciplines in Victorian universities. The ongoing lack of student demand makes its future doubtful, unless it can re-establish the strong vocational connections which drove its initial emergence. Although IT education programs are unlikely ever to disappear completely from universities, without a turn-around in demand they may be forced to revert to the kind of supporting roles in association with other disciplines which they held in the CAEs.

Conclusions

This brief overview of the history of IT education in the Victorian higher education sector has highlighted a number of important features about the way in which has developed:

ISBN 978-963-89559-7-5

- Disciplinary legitimacy and recognition: Of the ACM's five core disciplines, only CS and CE can claim to have been universally accepted from the beginning as legitimate academic disciplines in the institutions covered in the study; the other disciplines did not achieve that status until the reforms to the higher education system broke down the barriers between 'academic' and vocationally-based IT. Interestingly, the vocationally-based generalist applied computing program which has been the most commonly offered type of program over the study period was the last type of program to earn disciplinary recognition from the ACM.
- Disciplinary diversity: The rapid rate of technological change and the changing demands of the student market have led to higher education institutions offering an extremely diverse range of IT-based academic programs. The programs in the disciplinary areas recognised by the ACM have been far out-numbered by programs addressing specific specialist aspects of IT and its applications.
- Volatility: There has been an extraordinarily high rate of turnover in IT program offerings, particularly in the changing student market place of the last 15-20 years. The speed with which institutions have been willing to dispense with IT programs suggests that the 'hold' which IT has on its place in the academic hierarchy is at best uncertain, and at worst tenuous.
- Vocational emphasis: After providing the dominant rationale for IT programs up until the abolition of the CAEs in 1990, the influence of vocational requirements has been significantly reduced and replaced by student demand as a key driver of IT program offerings
- Influence of external factors: 'Non-academic' factors such as the structure of the higher education system, government funding policies and market forces have played major roles in influencing the shape of IT education.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SUPPORTING TEACHER TRAINING: ICT, THE SPÉIS PROJECT AND IRELAND

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Background

The education system of the Republic of Ireland has undergone fundamental and significant changes over the past 25 years. There have been major alterations to the curriculum at both primary and post-primary levels. At a strategic and policy level several other issues have begun to make a deep impact. These issues include social inclusion, early identification of children with learning difficulties, multiculturalism, partnership with parents, rights, language learning and identity and, significantly, ICT all becoming central to the planning of quality educational provision. A formal, denominational and divided (academic-vocational) system has been forced to re-evaluate its most basic assumptions and structures in recent years. Despite this, fragmentation of the system remains a marked feature. A continuing and noteworthy challenge has been identified as the need to develop the links between the early years sector and the infant classes of primary school and between the child-centred primary sector and the more rigid subject-based and exam-driven post-primary sector.

This latter point is critical in looking at the scale and impact of ICT deployment. Assessment, quality, progression and achievement at secondary level rest almost entirely in final exit-stage examinations, which are the sole vehicle for ascertaining attainment and determining entry to third level (Junior Certificate and Leaving Certificate). These examinations rely on clearly defined curricula, memorization and intensive academic recall. Competence is barely addressed nor are other attainments during the six years of the secondary cycle taken into account. While these examinations are being reviewed and a move to more holistic assessment systems is being developed, there is evidence of strong resistance and uncertainty.

A rapidly changing society has meant that teachers in Ireland have found themselves facing a range of new challenges in the classroom in recent years. The inclusion of children with special educational needs into mainstream schools and the unprecedented increase in the numbers of students from different ethnic and cultural backgrounds have been identified as among the most significant challenges in recent years. New technologies have emerged which play a central role in the way young people communicate and learn and teachers have been required to adapt their teaching to reflect the new reality. An increasingly diverse society, changing family structures and the emergence of new social problems have added to the complexity of teachers' role.

Contexts and fragmentation

The training and development of teachers in Ireland has been historically differentiated between secondary and primary. Only primary teachers have specialized teacher-training colleges. These have been operated along traditional lines and are operated exclusively by the religious denominations, which control almost all primary education in Ireland. An interesting element in the role and function of teacher training was the specific role assigned to language teaching in the Irish language. National policy, following the achievement of independence for the Irish Free State in 1922, focused strongly on the teaching of Irish in an effort to preserve and promote its use after almost two centuries of decline, neglect and oppression.

In this paper, there is an examination of a recent innovative initiative by the Church of Ireland College of Education (CICE) in Rathmines in Dublin. This project emerges out of a new emphasis on ICT and its role in the formation of teachers in their training and development. CICE has implemented an e-supported portfolio system of learning scaffolding for its teacher-training program. This project – Spéis (*School Placement e-Integrated Scaffolding*) – was designed by a consortium of Finnish and Irish educationalists and e-learning experts to provide the first teacher placement e-support and portfolio system in Ireland. The project deployed advanced technologies to enable creation of a platform where academic staff in the College, student teachers and administrative personnel could plan, design, implement and review an ICT supported learning architecture.

The Spéis project supplements and complements recent developments in Irish curriculum reform and is seen as a template for future e-learning supported initiatives in the wider field of teacher training and support. This paper also investigates the kinds of teacher-training support implemented and cross-references these to the changed primary curriculum, the Irish government's *E-learning Road Map* and the move towards competence based learning and the utilization of e-portfolios in the wider Irish educational and learning contexts.

The specifics of the Spéis project can be viewed against the changing and evolving context of teacher training provision in Ireland with specific reference to the central role of a number of considerations – ethnic and cultural diversity, massive inward migration, the role and promotion of the Irish language and the need to instil flexibility and creativity in the teaching role at a time of real social and economic crisis with the impact of the financial and banking collapse in 2008. Developing a professional portfolio at undergraduate level has been seen by CICE as a first step in a process of advanced teacher training that looks to a future of changing demographics, expectations and technologies. It enables student teachers to begin the process of critical reflection which is necessary for them to develop as reflective practitioners. Spéis is an innovative e-supported project and program, among the first in Ireland.

ISBN 978-963-89559-7-5

Evolution of the Irish Schooling System

Throughout the nineteenth century, education policy in Ireland and the operation of a standardized schooling system remained highly contested areas. Issues around religious influence, national identity, political struggle and denominational control dominated discourse. The neglect of the Irish language (Gaelic) and of Irish culture in general was an important charge made against the national school system. With independence from Britain in 1922 for the majority of the island, education policy became central to the creation and maintenance of identity. The Department of Education was established in 1924. The Constitution of 1937 set forth fundamental rights and principles relating to education, but education and strategic policy/planning remained totally subservient to a centralized system of rules and regulations in which compulsory language teaching, denominational control and a rigid focus on memorization in an examination dominated system remained the norm. The influence of the Department of Education pervades the entire Irish educational system, especially at primary and secondary levels, where it controls regulations, standards, operational criteria, curricula and examinations. Only vocational (technical) schools had oversight from local authorities and elected public representatives.

Training and development of teachers in Ireland has been historically differentiated between secondary and primary. Only primary teachers have specialized teacher-training colleges. These have also operated along traditional lines and are under the exclusive authority of the religious denominations, which control almost all primary education in Ireland. An interesting element in the role and function of teacher training was the specific role assigned to language teaching in the Irish language. National policy focused strongly on the teaching of Irish in an effort to preserve and promote its use after almost two centuries of decline, neglect and oppression. After independence, the priority was to recruit and train as many teachers as possible to be proficient in Irish and teaching through the language. Secondary teacher training follows a very different pattern where graduates merely go through specialized postgraduate training. This paper focuses on the adaptation of advanced technologies to support teacher training at primary level.

In terms of official policy, Ireland has a number of national strategies covering training measures in all areas as well as research in ICT in schools and in e-learning. There are central steering documents for most ICT learning objectives in both primary and secondary education, except for knowledge of computer hardware and electronics, developing programming skills and using social media and using mobile devices which are only at secondary level. In primary and secondary schools ICT is taught as a general tool for other subjects or as a tool for specific tasks in other subjects. At primary and secondary education level recommendations, suggestions and support are provided in the hardware areas of computers, projectors, DVDs, videos, TV, cameras and mobile devices. Support is only for smartboards and virtual learning environments, but not for e-book readers. At primary and secondary education level recommendations or suggestions and support are provided in the software categories, multimedia applications, digital learning games and digital resources, but support only for office applications. According to official policy documents, teachers at

ISBN 978-963-89559-7-5

primary and secondary levels are expected to use ICT in all subjects and students are expected to use ICT in class, and also for complementary activities in language of instruction, natural sciences, and social sciences at secondary level, and for complementary activities only in the arts. There are no central recommendations on the use of ICT in student assessment. Public-private partnerships for promoting the use of ICT are encouraged.

Change, adaptability and CICE

In 1992 Irish primary teacher training was addressed in the context of a major government policy paper, *Education for a Changing World*. This proposed a restructuring of teacher training and integrated structures of academic and professional training for trainee teachers. The Church of Ireland College of Education (CICE) was established specifically to meet the needs of the minority protestant population in Ireland and operated under the patronage of the Church of Ireland. Founded originally in 1811, the College has played a significant role in Irish education through periods of significant change. By the 1990s, it linked its teacher training efforts to the Bachelor of Education degree program offered by Trinity College Dublin. The increasing professionalization and the growth in graduate entry to teacher training produced a dramatic new emphasis on innovation, multidisciplinary linkage and the need to address quality in competence-based learning. At national level, the *Education Act* (1998) addressed governance and policy and ushered in an era of sustained innovation in the modernization of Irish structures.

Specific challenges have remained however in teacher training with regard to innovation, use and adaptation of new technologies and advanced ICT support systems and the effective teaching and development of fluency in the Irish language. CICE has been ideally placed to draw on its own rich traditions of education and pedagogical development but also upon its strengths as a small college with a specific remit to safeguard minority perspectives and ethos in a rapidly changed and transformed external social and economic environment in modern Ireland. In 2011, CICE had identified a number of issues that were complicating the teaching mission of the College. These related to the scattered and remote nature of many Irish schools operating under Protestant patronage. They also related to the changes in the degree structure being proposed and developed in the B.Ed. program. All these factors (as well as the implications of the financial and banking crisis for public expenditure in Ireland after the crisis of 2008) meant that the College now required the development of a learning management system and remote supervision tool for the practical placement module of the B. Ed. degree program.

The Spéis initiative was designed to create and implement an e-supported portfolio system of learning scaffolding for the CICE teacher-training program. In recent years, all teacher education in Ireland has developed so that it is based on a primary degree. This degree is now standardized as a four-year program. In the final year students are expected to undergo a teaching placement in a school – which could be anywhere in the country. Given the remote and inaccessible nature of schools in many areas and the sparse numbers of the protestant

ISBN 978-963-89559-7-5

community in many areas, this means that schools can be quite geographically scattered. The teaching placement lasts three weeks and during this time, student teachers are expected to complete a series of activities, observations, interventions and supervised activities to a set standard. This has also proved very expensive for both the monitors and tutors who have to examine extensive written records, essays, journals and also physically travel to the various placement locations to undertake on-the-spot supervisory and monitoring activities.

In 2012, the teaching placement was extended to 10 weeks and was expected to require substantially more supervision, follow-up and monitoring. It is in this context that the College decided to move to a virtual learning, mentoring, supervision and communication system. This e-support system was designed to achieve a number of outcomes:

1. Method of supervision and contact for trainee teachers and supervisory tutors in CICE.
2. A means for on-line engagement with trainee teachers.
3. An e-forum and seminar framework for group learning and exchange.
4. A method to manage classroom practice and learning.
5. A means for trainee teachers to upload assignments, materials, essays and journals of reflective practice.
6. Integration of pedagogical processes and technology solutions to meet CICE requirements
7. A creative and dynamic mechanism to support placement processes over 10 weeks in various and remote locations.

There were 32 students on the initial program. The new system came into force in the 2012-13 academic year. The first placements will occur in the 2014-15 academic year. It was agreed to pilot the program in 2012-13 in the Church of Ireland College of Education.

Spéis – *School Placement e-Integrated Scaffolding* - was designed and developed by a consortium of Finnish and Irish educationalists and e-learning experts from Universal Learning Systems and Context Learning Finland. These specialists had extensive previous experience in the design of innovative learning architectures supported by advanced ICT systems, all of which created added value for educationalists, pedagogical policy experts and language design experts. These previous projects included collaboration, among others, with Haaga-Helia University of Applied Sciences (Context facilitated design and implementation of their new learning portal in Finland), the University of Helsinki (Context developed future learning spaces for the teacher-training department), National University of Ireland, Galway (ULS work on innovative distance and open learning support systems) and Open Discovery Space where ULS is National Coordinator for Ireland.

The aim of Spéis is to provide the first teacher placement e-support and portfolio system in Ireland. The project deploys advanced technologies to enable creation of a platform where academic staff in the College, student teachers and administrative personnel can plan, design, implement and review an ICT supported learning architecture. The Context Learning

ISBN 978-963-89559-7-5

Environment (CLE) concept was developed for efficient and smooth digitalization of learning processes and learner administration. The ultimate objective and outcome of this process was the successful and accurate implementation of e-learning technology solutions that enabled a smooth transition towards digital learning. CLE used tested and tailored open source technologies integrated with commercial applications. The first priority of CLE is user-friendliness and seamless operation between different functional modules. The system has built-in tutorials, to provide users with on-demand support when necessary.

The Spéis implementation process included the following stages:

1. Detailed identification of needs (1 workshop)
   - Review of existing resources and source material
   - Learning process mapping with main focus on placement periods
   - Identifying areas in which technology can be applied to foster learning and improve the effectiveness of learner management and follow-up
2. Development and implementation plan (based on workshop results)
   - Defining learner and teacher/mentor processes and tools
   - Integration of pedagogical processes and technology solutions
   - Implementation plan
3. Technical implementation
   - Tailoring and configuration of CLE solutions for CICE's ICT environment
   - Integration of communication, management and evaluation tools into CLE
4. Piloting
   - User training/induction
   - Testing CLE solutions and tools with a pilot group
   - Pilot follow-up, collecting feedback, evaluating the process
   - Identifying critical development needs
   - Making the necessary improvements into CLE solutions and tools
   - Quality management (ULS)
5. Launching the full B.Ed. on-line program

Spéis supplements and complements recent developments in Irish curriculum reform. It is seen as a template for future e-learning supported initiatives in the wider field of teacher training and support. The Spéis initiative addresses the kinds of teacher-training support implemented and cross-references these to the changed primary curriculum, the Irish government's *E-learning Road Map* and the move towards competence based learning and utilization of e-portfolios in the wider Irish educational and learning context.

In Ireland schools are encouraged to incorporate what is termed an eLearning plan into a Whole School Plan. The Whole School Plan sets out the school's educational philosophy. It sets out the school's aims and plans for implementing the curriculum and managing its resources. The eLearning Plan is a subset of the Whole School Plan and it takes into account

ISBN 978-963-89559-7-5

the ICT resources available to the school and the level and competence of staff to implement the plan. A clear definition of eLearning is needed at the outset to enhance the success of this strategy. The National Centre for Technology in Education (NCTE) describes eLearning in their handbook for schools:

> *eLearning is simply learning that takes place with the assistance of digital technology. The use of computers and other digital devices together with online learning tools and materials are the prerequisites for eLearning to take place.*

Now, and in the near future making good quality online resources, tools both interactive and static will enable anywhere anytime learning which can enhance personal and self directed learning. eLearning could be video recording or online interviews, collaborative blogs maximizing the Web 2.0 tools available. The required features and functions for the roll out of Spéis include:

- Learner (user) data management;
- Management of learning activities (on-line, classroom) and remote supervision;
- Management of assignments, essays, learning materials, journals of reflective practice, etc.;
- Synchronous communication and group collaboration tools;
- E-forum for sharing ideas and building knowledge;
- E-portfolio.

Conclusions

In the context of the European Union's Agenda for new skills and jobs, recent forecasts of future skills and needs anticipate an increase in jobs requiring high or medium-level qualifications. However, such qualifications need to be accompanied by key competences that equip teachers to work in intercultural, multilingual and rapidly changing circumstances and to contribute to creativity and innovation. The development of key competences should include both subject-based and transversal competences that will motivate and equip student teachers for further learning.

With Spéis there is an intention to contribute to enhancement of transversal key competences by student teachers through their ICT supported training. The methods are founded on a holistic view of student teacher learning, personal and social development. This goes beyond subject boundaries and finds application in a wide spectrum of curriculum subjects such as social sciences and history, arts and culture, environmental education and languages.

The specifics of the Spéis project have been outlined against the changing and evolving context of teacher training provision in Ireland with specific reference to the central role of the Irish language and its promotion. Teachers, like other professionals, need to gather and demonstrate evidence of their growth and achievement over time. Developing a professional portfolio at undergraduate level is the first step in this process. It enables teachers to begin the

ISBN 978-963-89559-7-5

process of reflection which is necessary for them to develop as effective practitioners. There are many kinds of portfolios. Some portfolios are showcase in nature and indicate samples of the best work. Spéis is an innovative e-supported one, unique in Ireland. E-learning best practice and its adoption in Irish schools using this project and other allied initiatives is designed to promote digital access and excellence as well as a relevant and more competent professional profile for teachers in a dramatically changed external environment.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

INVESTIGATING THE STRUCTURE OF THE OPEN UNIVERSITY OF BRAZIL

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Introduction

The Open University of Brazil (UAB) was officially created in 2006, inspired by a number of previous experiences in distance education in Brazil, notably the CEDERJ consortium in the state of Rio de Janeiro, and other pioneering experiences in Mato Grosso and Minas Gerais (COSTA 2007). Its main goal was to provide opportunities for higher education in regions not served by traditional institutions.

UAB offers courses primarily to in-service teachers and those involved with K-12 education, in order to provide them with formal education to meet the demands of their profession. The existence of teachers without a higher education diploma, or without a diploma in the one's actual area of work was (and to an extent still is) a problem in Brazilian basic education.

The enactment of an education bill in 1996 (LDB; Lei de Diretrizes e Bases) recognized the importance of distance education in Brazil and set up initial parameters for regulation. Distance education was seen as significant contributor towards providing the necessary qualification of in-service teachers, for teachers in a country with continental dimensions such as Brazil, which a strong concentration of population and educational opportunities in large cities and metropolitan areas.

In the UAB system, the IPES are responsible for pedagogical and operational aspects of courses implementation. Local and state delegates have the role to be the maintainers of the presence support poles. And the federal government, in particular the Coordination for Higher Level Staff Improvement Foundation, responsible for funding and establish official rules.

In order to answer these demands UAB functions as a consortium, articulating existing institutes of higher education (IHE), such as the federal universities. These are responsible for the pedagogical and operational aspects of course implementation. The federal government, under the auspices of the Ministry of Education is responsible for costs incurred by the IHEs, including the necessary costs associated with infrastructure and personnel. The local government, state and/or municipality, is responsible for providing the infrastructure (building, equipment, human resources) for the functioning of the municipal support centres which are places that provide face-to-face support, resources, tutoring, access to the internet, and places for testing.

As of September 2012, UAB had 264,390 enrolled students, with more than half focused on teaching degrees (129,249, *licenciatura* and 59.177 in *pró-licenciatura*) and others in general bachelors (24,667), and post-graduate (59,177, non-masters) degrees and a small group engaged in a newly approved mathematics masters degree (2800 students) (Teatini, 2012).

The study presented here aimed to provide a broad overview of a research program focused on two important aspects of the UAB system – the university and the municipal centres. It began with a mapping of the field and the professionals with whom this student has his first touch when he entered the UAB system (municipal centres). At the current stage of our research, we are working with the study of distance learning offices located at the universities (usually termed NEADs). We are also traversing these two spheres (the centres and NEADs), studying the production and dissemination of educational resources throughout UAB. Our goal is to enrich the discussion regarding the UAB, and more broadly, an understanding of the practices and regulation of distance learning education in Brazil.

Research project

This project is part of a larger research agenda focused on investigating UAB, an under-researched project and, as with many other governmental projects, on which suffers from a lack of up-to-date, reliable information. Initial research focused on the municipal centres (*pólos*), which form the capillarity of the UAB system. These are comprised of a physical setting (such as a library, a school or a dedicated space) in both large and small cities around Brazil, created in partnership between the federal government and the municipalities. To date, over 600 such centres exist (data provided in 2012; a map can be seen here http://educacaoaberta.org/uab). Considering that Brazil has 5565 municipalities, the penetration is of approximately 11%. Our investigations began by researching the structures, and especially the profile of the coordinators of the centres (Duran et. al., 2012)

The second phase of this project turns towards the university systems, in order to describe and provide an initial profile of the distance education centres (known generally as NEAD, *Núcleos de Educação Aberta e a Distância*). The UAB system currently involves 103 institutions of higher education from around Brazil. Each of these institutions has a coordination centre dedicated to be the interface between the federal government, higher education institutions and the local centres. They are responsible for creating, conducting, evaluating and promoting the courses, which are offered, at a distance, to the municipal centres, sometimes in multiple locations around the country simultaneously. To date there is little beyond institutional data to help us understand to how the NEADs formed in each university, and how they established a legal, political and academic relationships with the existing traditional structures of the university. In this project, we aimed to investigate this

ISBN 978-963-89559-7-5

timely issue as *existing* universities in Brazil and worldwide begin to look at new, more open models for online teaching. As such as worked to 1) provide a profile and descriptive information on the NEADs in order to begin characterizing the diversity of implementations and how we could characterize the "institutionalization" of the UAB; and 2) investigate the use, production and policies regarding the use of educational resources, with a particular look towards the Open Educational Resources (OER) movement. In this article, we present some of this preliminary data.

Open Educational Resources

The movement towards OER has provided impetus for serious change in IHEs around the globe. The growth of MOOCs in their many formats is just the most recent manifestation of a movement that is aimed at "openness" in education, and which has, in the last ten years, been catalyzed by OER:

> *"OER are teaching, learning and research materials in any medium that reside in the public domain and have been released under an open licence that permits access, use, repurposing, reuse and redistribution by others with no or limited restrictions" (Atkins, Brown & Hammond, 2007)*

> *"The use of open technical standards improves access and reuse potential. OER can include full courses/programmes, course materials, modules, student guides, teaching notes, textbooks, research articles, videos, assessment tools and instruments, interactive materials such as simulations and role plays, databases, software, apps (including mobile apps) and any other educationally useful materials. The term 'OER' is not synonymous with online learning, eLearning or mobile learning. Many OER — while shareable in a digital format — are also printable." (UNESCO/COL, 2011)*

The tendency towards "opening up" resources is evident not only in developed nations, but has also captured the attention of universities in Brazil. Even though only a handful (5) institutions are members of the Open Courseware Consortium (OCWC), Brazil has been the setting for vibrant discussion regarding OER in policy at all levels, and a number of IHE are investigating the possibility of integrating OER and open practices into their agenda (see for example, http://www.oportunidadproject.eu/pt). OER have the potential to not only decrease textbook costs (a common and important concern) but also promote increasing outreach and capillarity, which is at the core of the mission of an institution such as the "Open" university in Brazil.

Municipal Centres

Between 2011 and 2012, research concerning the municipal centres was carried out. In this study 68 municipal centre coordinators from the northern, north-eastern and southern regional centres were interviewed. They were asked to define their career, analyzing the

ISBN 978-963-89559-7-5

official systems of evaluation and indicating procedures to optimize these evaluative processes. Through interviews, the career and profile of centre management was investigated. Then, regional pairs of coordinators were set to visit each other's centres' simulating an evaluation. The process was incremented via an online support system (LMS), where a *netnography* was carried out to help enrich the categorization of facilities and to help us identify the difficulties faced by these important actors within UAB. This represents approximately 7% of the UAB centres, and the majority of these were established since 2008.

Within the UAB system, these municipal centres are the locus of student activity. They are equipped with laboratories, libraries, offices, classrooms and conference rooms where distance learning tutors/facilitators and students meet. This blended regime is a characteristic of the UAB system. The centre coordinator is responsible for the academic and administrative management of the centre. Coordinators must be a public school teacher, a graduate with at least 3 years of experience in teaching basic or higher education. Multiple IHEs that are part of UAB can offer courses to students in the same municipal centre, though increasingly these institutions are focusing on centres within their state. A coordination effort exists to plan for the proper use of the centre considering the multiple courses offered simultaneously.

On average, these poles serve 70,000 teachers. The majority is concentrated in cities among 20-30 thousand inhabitants (relatively small cities). Regarding the distances between these cities and the capitals of their states, we find a heterogeneous picture: approximately 1/3 is situated about 63 miles from the capital, 1/3 about 187 miles and 1/3 are about 310 miles.

The total number of courses offered at the time of the interview was 908. The average number of courses offered in each of the centres was 13.3. These courses are divided in initial and continued training. 43 of 68 centres under analysis (63%) offered courses in mathematics; 75% offered pedagogy, represented by 51 centres. The majority of centres, which offered continuing education, were situated near larger cities and the majority of these courses were about distance education (35 poles).

We identified three types of municipal centres:

- First, centres with a large number of vacancies. These poles are situated near of capitals, in cities with 70-150 thousand inhabitants and have an emphasis on continued education.
- Second, in cities of 20-30 thousand inhabitants, offering a mix of initial and continued education courses.
- Third, the poles are located in towns that are more distant. Approximately 310 from the capital of their states, with about 10 thousand inhabitants, offering between 5 to 10 courses, focused on initial training. Curiously, the third type of centre meets the highest proportion of student to inhabitants in the cities/regions where they are located.

ISBN 978-963-89559-7-5

This initial typology of centres helps us began an investigation of an important aspect of the UAB. The data collected here can provide interesting avenues for cross-case analysis between the centres and the NEADs, which serve them, as we shall see below.

NEADs

An investigation into the NEADs began in 2011, when a semi-structured protocol for an interview/focus group was drafted to identify relevant questions related to the production, access and dissemination of educational resources within UAB from the perspective of the IHE, their NEADs, and their relationship to the municipal centres. By approaching the research from the perspective of educational resources we aimed to go beyond the resources themselves, understanding the dynamic relationship between the different stakeholders and institutions. The questionnaire was aimed at eliciting information in the

1. production of educational resources,
2. access to the resources,
3. relationship between the NEADs and the municipal centres,
4. dissemination and distribution of resources and finally
5. rights related to resources.

Semi-structured interviews were conducted the staff of three NEADs, one located in the northern, another in the central, and yet another in the southern part of the county. These data were analyzed using software for qualitative analysis in order to investigate emerging categories *within* the five areas of interest. Reports were compiled for each of the universities, which helped provide a general panorama regarding the five criteria in each university.

These data and analysis were used to expand and re-visit the protocol. We found it important to dwell into the relationship between the NEAD and its academic and political relationship to the institutions they served. Questions regarding educational resources were refined based on the types of production and dissemination practices we surveyed in these two institutions. For Phase 2, during the second semester of 2013 and early 2014 ten IHEs participated in a focus group or interview (at times done face-to-face and others, at a distance) using the expanded and reviewed questionnaire. The initial three institutions participated once again in order to update and expand data. Below we present data on the research conducted for Phase 1 with the three universities.

NEADs are implemented differently at different institutions. A simple way to notice this is the nomenclature these organizations take in each IHE even though the agency, which is responsible for UAB (CAPES) at the federal government, has created a norm regarding their naming in its financing spreadsheets.

In some places the NEAD is known as SEAD, signifying that this is a department or secretariat (*Secretaría*), connected directly to the rector's office, functioning much like a university administrative body. In others it is known as CEAD, as a centre for teaching or service, and its

ISBN 978-963-89559-7-5

administration is connected to a collegiate group (a group of professors that administer the centre). This is usually the case when certain institutes or schools within the university already have a leadership role in distance education.

It is important to highlight this discussion as it speaks to how the NEAD relates and is seen within the overall structure of the university. Many universities present an internal demand and pre-existing experience with distance education, in others it can exemplify a response to governmental demands. CAPES terms these structures NEADs in the sense that they could function as cohesive centres for research, teaching and service within the institutions, able to solicit and be responsible for external funds (government) and internal funds (through a university foundation). In this sense, an inductive policy focused on the concept of an integrated nucleus was meant to promote the type of structure that would allow for an integrated and efficient approach to the management of funds.

We highlight the experience of three institutions in Brazil. The first functions in a decentralized fashion, whereby each academic unit preserves its autonomy in the development of activities within distance education. Each academic unit promotes graduate, undergraduate and extension courses through special projects, with the support of the SEAD. As highlighted above, in this case the SEAD functions as a secretariat or office, articulating projects approved by the collegiate faculty in each unit. It has no collegiate body of its own, with a small working group, under the auspices of the university administration (*reitoria*). The articulation between different projects is conducted at the SEAD through monthly consultations to the EAD Forum (Distance Education Forum) – a group constituted of representatives from the undergraduate and graduate offices and each academic unit (SEAD, nd).

The rector's office foments distance education initiatives in each academic unit through special calls for proposals. Between 2003 and 2013 many projects were aimed that fomenting distance education courses within a) traditional (face-to-face) curriculum; b) development of new processes and technologies, research in distance education and c) production of educational resources, such as learning objects. The SEAD has a group dedicated to publications, in partnership with the university press so as to publish textbooks and reference books focused on distance education, financed primarily through funds from UAB. In 2009, the NAPEAD (Nucleus for Pedagogical Support for Distance Education) was created, aimed at the production of digital educational resources (SEAD, nd). An intention exists to create a central open repository of educational resources, which has not yet taken place.

The second university has a long-term experience with distance education, and in 2009 opened the AEDI, an *assessoria* (Office for Distance Education Support, in free translation) connected directly to the rector's office. In a Brazilian university, an *assessoria* is generally a place with extreme bureaucratic flexibility, as its members can be nominated directly by the rector of the university and the activities can be demanded of the academic units as a demand from the rectory, without the demand for a collegiate decision in each unit, and only by the highest university body to which it is connected.

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At the second university the *assessoria* (AEDI) has as its function to direct the distance education policy at the university at all levels of teaching. It has qualified technical staff focused on distance education, for pedagogical and LMS support, as well as content creation (video, animations, and others). The AEDI is responsible to negotiate incoming resources, and for the elaboration and supervision of distance education projects. It also supports a collegiate group formed by distance education course coordinators (UFPA, 2011, p.108). This represents a more centralized model, and is characterized by concentrating resources and actions, as well as promoting the articulation between UFPA and other national programs.

From the beginning the university articulated its distance education strategy in partnership with other universities, partially due to strategy, and partially due to a lack of funds. Partnerships took place to provide educational an initial set of resources for its courses. Some resources were created in consortiums of universities, with rotating responsibilities. Others originated from other institutions, and made available through cooperative agreements. Such agreements include the Open University, UNED (Spain) and CEDERJ (a pre-UAB consortium from the state of Rio de Janeiro, mentioned above), especially material for the mathematics course from UFF (Leite & Teixeira, 2008). In many cases the resources (such as those brought through the CEDERJ consortium) were adapted to local conditions and contexts.

The academic units at the university have decentralized centres for the production of educational resources, but can call on AEDI for support and partnerships. In each case, the course professors the collegiate faculty from the units control the process and have ultimate responsibility for the resources. Even though no single prescription exists for the resource, the courses offered by the university include a printed booklet, an online environment (LMS), web and video conferencing tools. The printed material is produced exclusively for each course and is made available only to the matriculated students in the LMS (AEDI, nd), with plans to develop an open portal that would provide access to a wider range of resources created under the auspices of AEDI.

A third university created its NEAD in the 1990's (pre-UAB) in order to target the demand for teachers at the initial levels of schooling. The course, a pioneering initiative in Brazil, followed a blended format (much like the UAB model), aiming to introduce alternative pathways to higher education, optimizing human and financial resources (Alonso & Neder, 1996). In 1996, the NEAD already offered courses in pedagogy, natural sciences and mathematics, and in 2000 opened up a line of research focused on distance education within a master's program in public education (Possari & Neder, 2009, p.4).

Contrary to the other two examples, in this university, NEADs were created, over time and through local demand, in each academic unit. It is currently located within the School of Education. Since 2013, a central Office for Education Mediated by Information and Communication Technologies was established to help direct, foment and coordinate a university-level effort to integrate educational technologies. These include, but are not exclusive to UAB-related initiatives. This model demonstrates the possibilities of more

ISBN 978-963-89559-7-5

bottom-up and decentralized (but coordinated) approach to the integration of NEADs within the university system.

Since no document exists to formalize the NEADs within the university system, the attributions of those working with the NEAD are not formally recognized within the university Preti (2009). Partnerships made it possible to acquire resources and equipment, and financial resources were reverted maintain technical staff and educators without depending on the institution's funding limitations.

The NEAD has established multiple international partnerships (Neder, 2000, p.150), which includes a pedagogy course offered to Brazilian students who work in schools in Japan (UFMT, 2010).

Educational resources are focused on printed resources produced mainly by local faculty and printed locally, but importantly, not by the university press. This speeds up the process, but it also leads to high costs, since only a small number of booklets are printed to fulfil the demand of the offered courses. The resources are not openly offered, only being available to the matriculated students of the specific target course.

Conclusion

The initial data presented here aimed at demonstrating a multifaceted research project that is being conducted to investigate the Open University of Brazil. As a large, national and cooperative project, the UAB has been able, in relatively little time, to expand the outreach of distance education, particularly to in-service teachers, throughout Brazil through a publicly funded project.

We aimed to present an introduction to the research currently being conducted, to demonstrate the complexity of the UAB system and how a centralized but flexible system has lead to multiple implementations. We can highlight the challenge of openly providing access to resources in these higher education institutions. Though all institutions demonstrate an interest in open resources, challenges related to licensing and academic culture still hamper or slow down the plans to make these resources widely available.

Additionally, universities have found different implementation models as they strive to integrate UAB and other distance education initiatives into their fold. These challenges can help provide guidance to future initiatives and promotes reflection as to the role of universities in an increasingly "open" system of higher education.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

PROFESSIONAL DEVELOPMENT ON AN INTERNATIONAL SCALE: COUNCIL OF EUROPE – PESTALOZZI PROGRAMME VIRTUAL COMMUNITY OF PRACTICE

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Abstract

Communities of practice as organisations of learning have developed different forms as: task-based, practice-based or knowledge based communities (Barab et al., 2004). The paper presents a case study of a successful community of practice developed under the umbrella of Council of Europe Pestalozzi programme for teacher development. The programme itself is transformative, enabling the combination of a number of processes and conditions of learning. One of the most important ways of supporting teacher learning and professional development for education professionals is through ongoing activities within the virtual community of practice (vCoP).This paper presents the opportunities and challenges inherent to such an endeavour.

Introduction

International trends on educational policies are shaped by the processes of globalisation and 'Europeisation' (AOO, 2019). It is in this time of constant dynamic interactions of global ideas about school practices and local school system that both local and global are changed. Nations continue to independently control their school systems while being influenced by this superstructure of global education processes (Spring, 2009). Within this global educational superstructure the following institutions and intergovernmental organisations emerged as relevant stakeholders: World Bank, Organisation for Economic Cooperation – OECD, World Trade Organisation – WTO, United Nations, UNESCO, European Commission and Council of Europe. This educational superstructure is characterised by global flows of ideas, institutions and people enabling development of global networks (Spring, 2009). Communication and information technologies allow easier exchange of information and ideas about education, its policy and practice.

In 1949 by 10 countries, the Council of Europe was founded to develop throughout Europe common and democratic principles based on the European Convention on Human Rights and other reference texts on the protection of individuals (CoE, 2014). The primary aim of the

Council of Europe today is to create a common democratic and legal area throughout the whole of the continent, ensuring respect for its fundamental values: human rights, democracy and the rule of law. These efforts are being done within different areas such as political, social, educational arena. Under the umbrella of Council of Europe the Pestalozzi programme was developed as a training and capacity building programme for education professionals. Its aim is to carry the message of Council of Europe and its values – democracy, respect for human rights and dignity and the rule of law – into the practice of education (formal, non-formal and informal) and to support member states in the move from education policy to education practice in line with these values. The programme targets education practitioners because they are the ones who make a difference in day-to-day practice in the classrooms and all other spaces of learning (Pestalozzi programme, 2014). The Programme works using different approaches to achieve its goals: trains education professionals to become multipliers for Council of Europe values; develops the necessary transversal attitudes, skills and knowledge for sustainable democratic societies; promotes and models an appropriate and effective pedagogy; initiates, follows up and monitors a cascading process on the national level; networks education professionals – as a key profession – across Europe into a community of practice around the principles and values of the Council of Europe (Pestalozzi programme, 2014).

At the same time it maintains a network of trainers (trained by the programme; currently about 150) and an online Community of Practice (about 1,400 members). The paper presents an analysis of the Pestalozzi programme Community of Practice, its organisation and activities that enable professional development of teacher across Europe. The term community of practice has long ago surpassed its original idea of apprenticeship model where soft knowledge is transferred through the situated learning (Lave & Wenger, 1991). Today we can recognise three types of communities: task-based communities of learning, practice-based and knowledge-based communities of learning (Barab et al., 2004).

Structure and organisation of the virtual Community of Practice (vCOP)

Pestalozzi programme Community of practice is a virtual learning community; community of practice hosted by the NING platform. A platform is the technical support for what a community of practice does or can do. It includes the main activities, which shall be promoted, the spaces, which need to be created, and in which the activities can take place. These aspects are translated into technological features, which in turn are determined by the technical base adopted for the community. VCoP is a distributed community shared by different stake holders (teachers, headmasters, university staff, NGO staff, National Liaison Officers and other education professionals[1]). In traditional educational situations, all learners are required to learn the same thing at the same time.

[1] Education professionals are all those who have an active part to play in the day-to-day practice of education.

ISBN 978-963-89559-7-5

> *"Communities of practice have the following components that distinguish them from traditional organizations and learning situations: different levels of expertise that are simultaneously present in the community of practice; fluid peripheral to center movement that symbolizes the progression from being a novice to an expert; and completely authentic tasks and communication" (Johnson, 2001).*

The core content of the vCoP is organised in specialised sub-groups/rooms linked to projects of the Pestalozzi programme. Participants in activities of the Pestalozzi Programme are invited to become members of the vCoP. This concerns participants in the training activities of the Pestalozzi Programme such as the modules for trainer training, the Summer School as well as the workshops and national events (if the organisers so wish). It also concerns the members of the network of national liaison officers (NLO) or participants in other activities such as research and development projects where they meet face-to-face. Last but not least this concerns the participants in local (national or regional) groups dedicated to the dissemination and cascading of the Pestalozzi Programme. These rooms are invitation only and deal with a specific set of ideas and members in order to successfully conclude the trainings/projects that are currently ongoing[2]. After a few years the changes on the platform were made and open rooms were created as to insure further communication, cooperation and learning. Open rooms (public spaces) exist for the benefit of the community at large.

Open rooms are accessible to every member without invitation and where you find discussions and exchanges of interest to the whole community. There are 4 open rooms:

- Reception – for welcoming, guiding and orienting new members through different actions; including announcements and updating members on recent developments;
- Coffee shop – Open group for informal discussions and exchanges beyond the purely professional;
- Professional development – for moderated discussion on topics of professional interest;
- Cascading – for a structured exchange of information and mutual support regarding the dissemination and cascading on the local, regional and national levels.

Invitations are made by the Secretariat except in the case of local groups for which either a moderator or another active member of the vCoP is designated group administrator. Each person responsible for a group of members supports the activities and actions of the members of the group. When signing in for the first time each member is asked to provide some information about them which will be displayed on their page (My Page) and which is also the basis for the function member search. It contains information about the professional background, the involvement in the Pestalozzi Programme, languages spoken and centres of

[2] For example: action research, teacher manifesto, core transferal attitudes skills and knowledge, think tanks, joint master degree

ISBN 978-963-89559-7-5

interest. Each member also disposes of a full mailbox feature and can use the blog feature of the platform to share information and resources.

This NING base will be supplemented by the use of appropriate further technical tools to create an integrated web of appropriate and adapted features: the creation of a 'hub' will serve as an interface between the (closed) Community of Practice (on NING) and the wider interested public of education professionals.

How is the Pestalozzi vCoP a community?

One might consider what allows us to call the Community of Practice a community? Members of the vCoP share, through the platform, stories of their practice, of what happens in the classroom when they try out new methods and design new lesson plans transforming the training into informed and competent actions through their practice. In the process of sharing their stories, participants, members of the community, start developing a common body of knowledge and 'lore'.

> *"The first characteristic of practice as the source of coherence of a community is the mutual engagement of participants. Practice does not exist in the abstract. It exists because people are engaged in actions whose meanings they negotiate with one another. (…) Practice resides in a community of people and the relations of mutual engagement by which they can do whatever they do" (Wenger, 1998).*

Members of the vCoP, in the process of learning with their peers, in their workplace, negotiate meanings about what their joint enterprise is. A common 'language' has developed also with a shared 'lexicon', that is not merely a jargon but rather a 'repertoire' (Wenger, 1998), that helps negotiate meaning across languages and understandings. Co-developing of answers to issues of educational practice by discussing, exploring and developing workable solutions together with practitioners and other partners are at the heart of the community.

The vCoP of the Pestalozzi Programme seeks to promote and provide opportunities for collaboration through community building. It develops a community model for supporting learning and promotes learner engagement with members and in educational settings in Europe and elsewhere. It engages members in learner-centred, pro-motive interaction to foster connection and a sense of belonging. Participants voice their feeling of belonging and identity:

> *"I would describe it as a very strong and rich experience that empowers the linguistic and cultural competencies. It provides opportunities to learn from different people, and is based on the same principles which I personally support and try to live and work by in my daily life". (Z, Teacher and PHD student, Croatia)*

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This member expresses what Wenger (1998) calls the ‘negotiation of meaning’ in CoPs: “*Practice is about meaning as an experience of everyday life*”. Learning is not something one starts and stops; it is a continuous process of recommenced negotiation. There is no guarantee for this negotiation to be harmonious and we do not intend to imply that the communication in the community is always smooth. The relationships between members show different dynamics. If there are predominantly collaborative, there is much space for ‘grit’. As in all online social media, the form of communication, through mostly short posts imposes a frame upon the interaction of members. All social media platforms have a design that shapes the interaction that can take place in that given space.

Learning together, knowledge construction, co-development of answers

The vCoP of the Pestalozzi Programme seeks to promote and provide opportunities for collaboration through community building, knowledge construction, learning (by doing and telling) and learning together. Depending on the role played by the individual as a member of the wider team, learning within a community can be either a positive and proactive or a passive experience, where the collective wisdom of dominant members of the group shapes other individuals’ understanding of the community and its roles (Kennedy, 2005).

We have seen how the community creates and supports a sense of belonging, federating good will around a shared enterprise. The shared enterprise that builds the Pestalozzi community is a shared vision of what the purpose of education should be. Teachers are motivated to change practices from a traditional stance to learner centred approaches. Because today’s education systems tend to focus on the maintenance of a broad knowledge base and the preparation of young people for the labour market, while lacking investment in the personal development of the individual and the preparation of young people to become active citizens in our societies, the teachers involved in the vCoP believe that educators have an important role to play today to change the vision of education. They strive to answer the challenges posed today to our democracies by phenomena such as discrimination, violence and violation of human rights. Democratic governance of schools, education for democratic citizenship and intercultural competence are at the centre of the issues that are part of the everyday conversations that teachers hold on the platform.

The learning takes place among peer educators through experiences, through self-directed learning and though reflective and critical friendships. Members take advantage of their workplace learning for their professional development and to create their own professional identities. Teachers are thinking about learning and teaching while engaged in specific actions in actual contexts.

> *“This is very important and a different way of looking at things from traditional learning models, as it takes emphasis away from knowing how to teach and places it firmly on doing teaching.(…)it is also very intuitive; fitting*

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> *with the common sense view that knowledge is demonstrated though informed and effective action." (St.Clair, 2008).*

The knowledge thus created is always 'knowledge in the making' and is never accepted as an end product.

A large part of the conversations that happen online, revolve around telling stories of teaching and getting feedback from peers. Teachers therefore learn critical skills of giving effective feedback, developing a voice in an environment that is 'safe enough' to help be prepared to question our own knowledge and views. This creation of knowledge through interaction and cooperation is placed in the realm of informal learning vs. formal learning in traditional educational institutions. Such an approach allows for a teacher education process that educates for uncertainty, ambiguity and opens a path for new possibilities.

> *"The shift to capacity-based models works well for educational research, where insight tends to come from many people working in different settings, rather than a few Einsteins" (St.Clair, 2008).*

The role of stewards in facilitating knowledge construction

As the participants move into the open spaces and start conversing with peers they have never met, the role of the community stewards becomes crucial:

> *"(...)as a newcomer's stories become accepted (s)he becomes a legitimate member of the community. In turn, this contributes to the knowledge of the community" (Habhab-Rave, 2008).*

The stewards of the vCoP are selected by the Secretariat following a call for interest and their role is to facilitate and moderate the vCoP. Stewards are members who have integrated the core of the vCoP. Their role is manifold, and they are instrumental to guiding the path for newcomers. In particular the stewards play the following roles: establish human presence, participate in coordination of the vCoP, Lead meaningful and goal oriented dialogue, participate in online actions, help members move forward (Figure 1).

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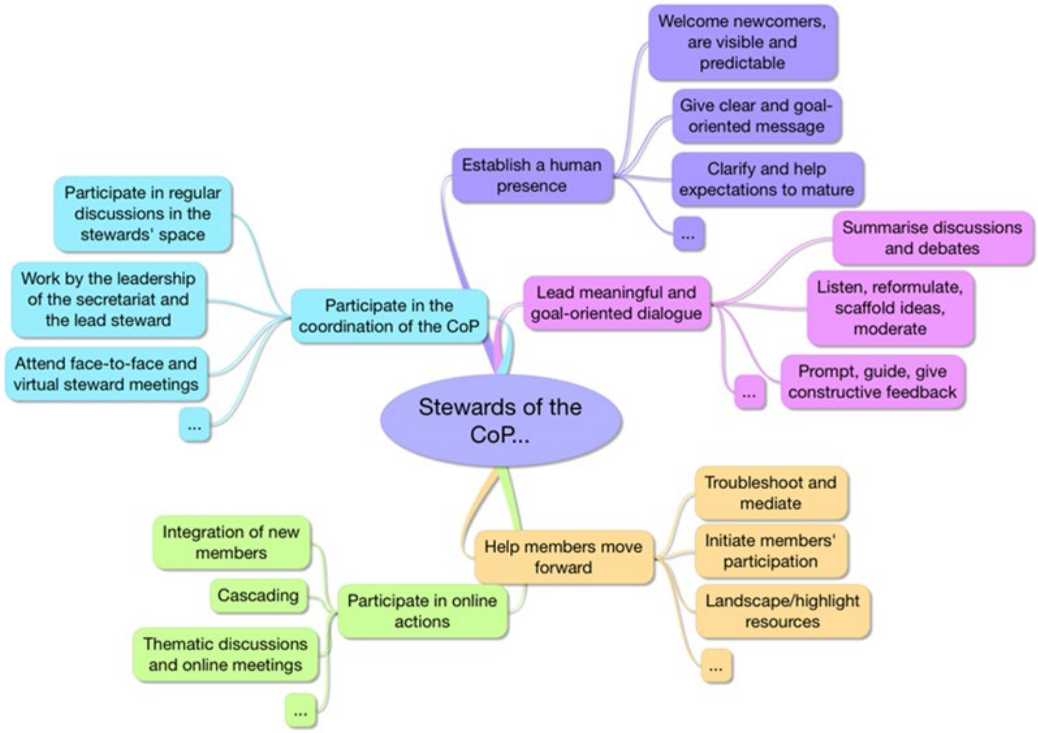

Figure 1. The role of the stewards of the vCoP

Community life-cycle in a designed online space

Every community has a natural lifecycle. Haythornthwaite, Kazmer, Robins and Shoemaker (2000) state the following stages of community development: initial bonding, early membership, and late membership. In the initial bonding, new comers join the vCOP platform when they are either recruited by one of the local dissemination groups (this is a minority) or they arrive through the channel of the Council of Europe application process, when they apply to a to face-to-face training event or course. When a new comer arrives, (s)he meets coaches and peers in a closed room. From the beginning and during the early membership, the new member will also have access to the open rooms of the platform, but observation shows that in the majority of cases, it is only in a second step that *certain* members will 'latch on' to the concept of the vCoP and perceive a benefit, for themselves, to participate in the open spaces.

When a member joins, (s)he is part of *the periphery*. However, in communities of practice, peripheral roles play an important part in the community of practice "*by developing and using skills that require collaboration and mixing different types of expertise*" (Johnson, 2001). As (s)he engages into the courses and online activities and completes the course (s)he has then a choice to move to *the core* of the community by starting to share resources and stories of 'doing teaching' or to remain in the periphery either as a '*lurker*'[3] or by leaving the community altogether. It's worth noting that the vast majority of members never delete their account, but

[3] A lurker is a member who consults and reads on the platform, even uses the content in their teaching, but does not contribute to the commons by posting content

ISBN 978-963-89559-7-5

this is not a show of their fidelity, as we have no ways of measuring the frequency with which members visit the platform.

The members who arrive in the vCoP through a co-located event (where they meet their peer 'in the flesh') tend to share a common identity amongst themselves within the wider community. For the first months of their participation they will mostly interact, face-to-face and online, in a context of blended learning, with other practitioners who have applied to a training session and thus share common concerns or interest for a theme. Finally, in the phase of late membership members feel safe and free to join different rooms and start opening their own discussions on topics of interest. Thus getting involved in design and creation of community of practice and taking ownership of the ideas and issues present in the communities, contributing to knowledge production by taking on different roles of moderators, critical friends or participants in different discussions e.g. http://is.gd/PestProg.

Looking ahead

The Pestalozzi vCoP seeks to promote community building, collaborative knowledge construction, individual learning and learning together. It was developed to enable continuing development of education professionals across Europe and globally. It is important to recognise the need to develop and share knowledge in a distributed environment and international context. Also, the face-to-face encounters help the evolution of the community to be quicker and stronger (Hildreth et al., 2000). There are a number of benefits of this on-line community of practice. Usually continuing professional development has pressures at national and school levels.

> *"These arise from demands for increased quality and the need to implement the National Curriculum as well as the impact of public reporting and inspection in education. On the other hand there are needs of individual teachers who may wish to act as far as possible as autonomous professionals" (Craft, 2000, p. 5).*

Successful communities are able to sustain themselves over multiple generations of members without becoming brittle. They grow their collective knowledge-in-use „practice". As communities continue to exist over time, embracing new members, switching roles, creating tools and expanding activities, they are in fact learning form their experience (Riel & Polin, 2004). The vCoP will continue to function as an invitational community and it will be part of the task of the stewards and the secretariat to decide what to make available for the wider public through the different channels. It is important that the vCoP remains a closed, invitational space, in order to continue to dispose of a safe learning space where practitioners are comfortable relating their 'mistakes' and 'failures'. The opening to the public would possibly constitute a threat to this safe space. If the community opened its gates to the wider public the vCoP might lose its quality of protected 'trust zone' thus preventing the type of peer

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learning that takes places in it. The Pestalozzi vCOP can be seen as one of the more successful communities of practice, but still there are issues and questions that need to further addressed:

- There is a case to consider regarding spaces for professional groups i.e. teachers, teachers of a particular subjects, teacher trainers, school heads, school psychologists, parents, etc. but to date the closed rooms correspond to projects, not interest groups.
- Additional research is needed to understand why certain members adhere and others don't: it would be very interesting to provide insight on what characteristics push some practitioners in the programme towards reflective practice in the vCoP compared to others.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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FROM CARER TO CARERPLUS: THE TRANSLATION OF A DIGITAL COMPETENCE FRAMEWORK INTO A BLENDED MOBILE LEARNING PROGRAMME FOR THE DOMICILIARY CARE SECTOR

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Abstract

This paper outlines the processes and challenges involved in the translation of a digital competence framework designed for the care sector into a coherent blended learning programme for carers and care workers across Europe. The work here describes the digital competence mapping processes deployed to develop the curriculum and learning architecture for the CarerPlus programme. It employs Bruner's notion of the spiral curriculum and is built around an activity-based pedagogy to promote significant learning gains. The programme comprises several interrelated courses that target the development of digital competences in the domain of social care interventions with ICTs, professionalization and the enhancement of the quality of life of care recipients. This work has been carried out under the European funded CarerPlus project that is situated against a background of the aging demographic across Europe. The two central aims are: (a) to provide a pathway for the development and professionalization of care workers through the acquisition of a set of digital competences; (b) to combat social exclusion in older persons through their care context, utilising newly acquired digital skills and knowledge.

Introduction

The CarerPlus project is set against a background of an ageing European demographic. Figures indicate that by 2050 the ratio of older persons to those with capacity to work will have increased to 53 senior citizens per 100 Europeans of working age (Münz, 2007). This upward shift can be linked to improved healthcare and efficacy of medical treatments that have extended life expectancy for the majority of the population across the European states. The result has been an increased pressure on social and medical support systems to cope with an aging population. To help mitigate these pressures, there has been an effort to increase the autonomy and independence of older people, for example by taking measures to support older persons in their homes rather than refer them too swiftly to the medical care system.. This is an obvious solution but not one that is easy to achieve, and we must be wary of creating an environment that perpetuates a state of social exclusion (Selwyn 2004, 2006; Warschauer,

2004) where the older population become "prisoners" in their homes. It is vital that we continue to find ways to keep older people active and independent within society, through connections with their family, friends and community.

Recent research has shown that a large proportion of the older population in Europe can be encouraged to use technology-based services. It indicates that modern ICTs (Information and Communication Technologies) and AAL (Ambient Assisted Living) technologies can support ageing in the community and at home, with the result of radically improving quality of life. A key mediator between ICT-based opportunities for ageing well in the home and their integration into older people's lives, lies in the available human resource represented by the domiciliary care workers and the set of digital competences they possess.

As the recently commissioned UK 'Crossroads' report summarises:

> *The Internet is an important tool for carers, which can help to improve their ability to care, and increasing internet usage presents an ideal opportunity for service providers to reach a wider audience. Different carers have different needs and no one solution or type of website will suit everyone, so it is important to consider all the issues involved in offering online support and to weigh the advantages and disadvantages of each type of website. (Crossroads Report, 2011. p9)*

Another study, in the context of the CARICT project, has illustrated the diversity as well as complexity of this domain. Fifty two ICT-based initiatives for caregivers in Europe were analysed (Schmidt et al., 2011) and from the evidence gathered it was concluded that ICT-based services empower both care recipients and carers and improve their quality of life. This was achievable at reasonable cost and did not dehumanise the subjects in question (Carretero et al., 2012).

There are two key aims for the European funded CarerPlus project that are of significance against this background of an ageing European demographic. First, to provide a pathway for the development and professionalization of care workers through the acquisition of a set of digital competences; second, for the care worker to play a central role in combating social exclusion in older persons through the care context, utilising and passing on the newly acquired digital skills and knowledge.

Two of the key CarerPlus project actions have been first, to derive an empirically grounded digital competence framework for the care worker context and secondly, to then translate this into a blended mobile learning programme. This has provided an opportunity for innovation in the form of exploring the use of micro-certification via the use of a badging system that can scaffold a fully accredited programme offering. The goal is to exploit the synergy between (a) the care worker – building their professional profile through digital competence acquisition based on authentic activity and (b) interaction with the older person (care recipient) – resulting in enhancement of the digital skillset of the care recipient.

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Methodology

The principle stages (Figure 1) in the development of the CarerPlus programme are reported here and described under four different phases.

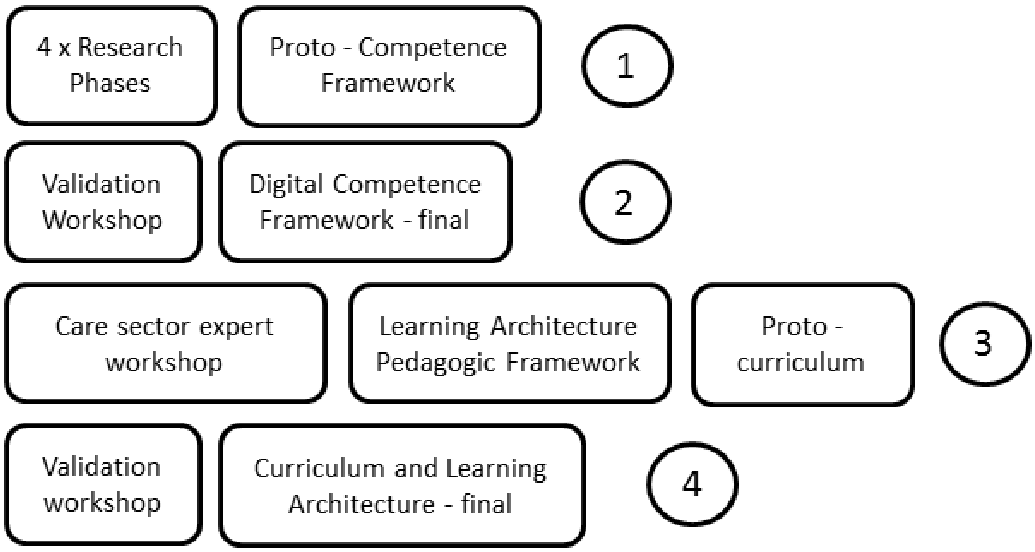

Figure 1. An outline of the principle stages (1 to 4) in the development of the CarerPlus programme detailing the production of the digital competence framework and the definition of the curriculum and learning architecture.

Development of the proto competence framework

Four research phases were designed to investigate the relevance of digital competences in the care sector, as well as to identify the digital knowledge and skills likely to emerge within care workers' activities in the near future. These comprised: (i) a literature analysis; (ii) expert focus groups; (iii) semi-structured individual interviews with experts; (iv) questionnaire delivered to care workers and caregivers. The detail of this work has been previously reported in Valenta et al. (2013). The results of these activities led to the development of a proto digital competence framework.

Validation of final digital competence framework

The proto digital competence framework was subjected to a one-day critical review workshop with invited experts who were drawn together to interrogate the three core domains of the framework: general digital competence; enabling digital competence in care; care specific digital competence.

Course mapping and learning architecture creation for the programme

A care sector experts' workshop with trainers was used to build an initial framework for the CarerPlus programme elements. This drew on interview statements from carers and care workers, the elements of the proto digital competence framework and the input of the

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experience of the experts. The aim was to generate and map out the curriculum themes to create the overall shape and format of the programme. During this stage the philosophy and principles of the design were articulated for an initial instructional design approach.

Validation of final learning architecture and curriculum

A validation workshop was used to critically analyse the shape and contents of the whole programme. This brought together expert viewpoints from across the sector. These conversations were used to identify core themes and structure and scaffold the remapping of the curriculum against the digital competence framework, with the aim of achieving closer correspondence between the two.

Results

Outcomes from Stages 1 and 2

The digital competence framework (Figure 2) was the main outcome of stages 1 and 2 of the methodology described above. It covers three core competence domains as follows:

1. General digital competence – these are baseline, or foundational, competences that are adapted from the significant work of Ferrari (2012) and colleagues from the DIGCOMP project (Ferrari, 2013). It covers identified competences under the four organising themes of information, communication, content creation and safety.
2. Enabling digital competence in care – this covers competences that are grouped under the four themes of acceptance, adaptation, progression and support.
3. Care-specific digital competence – this addresses competences that cover the areas of independent living and social participation for care recipients; personal development and social integration of carers; and care coordination.

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Figure 2. Overview of the CarerPlus digital competence framework (DCF) detailing the three competence domains and associated themes. Circled numbers indicate the total number of individual competences that are grouped under each domain. Each competence is described in terms of knowledge, skills and attitudes and levels of application.

Outcomes from Stages 3 and 4

The development of the curriculum and learning architecture for the CarerPlus programme has been informed by three complimentary reference points (Figure 3). First, the ground up analysis of interview statements and subsequent association into an organisational map, second the orientation derived from the digital competence framework (DCF), third, the overarching aims and objectives of the CarerPlus project. These reference points have been important in building a programme that can be translated into a catalogue of short, discrete courses that are meaningful to those participating, and capable of delivering a transformative learning experience.

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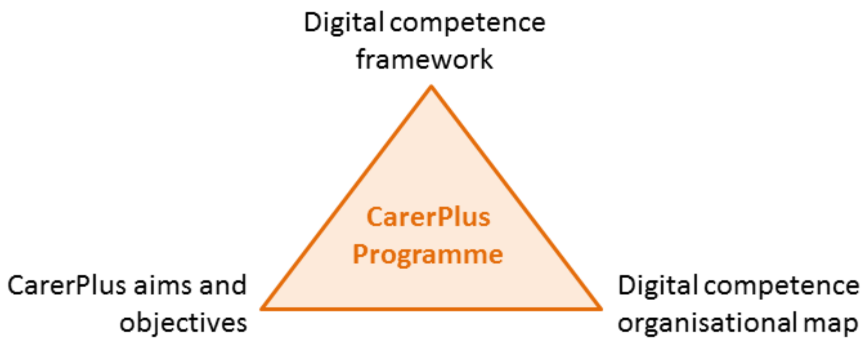

Figure 3. Reference points for the development of the CarerPlus programme based on the CarerPlus project aims and objectives, the digital competence framework (Figure 2) and the digital competence mapping activity (see Figure 5).

Design philosophy

Building a design philosophy has been an important driver for subsequent course development and is exemplified in the three key principles that have underpinned the approach taken to designing the CarerPlus curriculum and the supporting learning architecture:

1. All learning should be driven by authentic activity (Ormrod, 2004);
2. Basic knowledge skills and attitudes should be revisited in more depth in a 'spiral curriculum' (Bruner, 1960) (Figure 4);
3. Peer support and learning should be encouraged by providing opportunities to share experience.

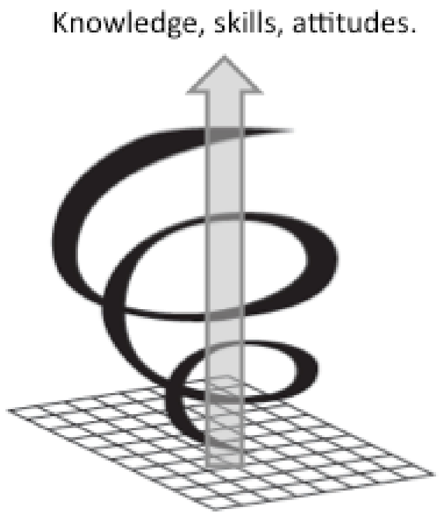

Figure 4. The idea of the spiral curriculum design is that it reinforces knowledge skills and competences at various levels (Bruner, 1960).

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As indicated, the architecture of the programme was developed from the ground up and utilised data from target group interviews collated and analysed by experts. This effort identified discrete but interrelated course areas that would provide a meaningful and authentic scaffolding architecture in which the digital competences in the identified domains can be developed.

The curriculum and learning architecture validation workshop allowed experts to review and suggest the organising themes for the programme and validate the pathways that would be available to participants enrolling on the programme (Figure 5). The resulting programme comprises a total of five courses: two core compulsory courses that must studied one after the other; followed by three electives in areas of professionalization and the provision of social care interventions. The programme is designed to work in a blended setting with all activities supported by a virtual learning environment and an online, social network community. Each of the individual courses is approximately 35 hours in total and designed to run over a period of eight weeks with short, small group, weekly face-2-face sessions with a mentor. Assessment is via portfolio submission and multiple choice questionnaire completion that also add a formative feedback dimension.

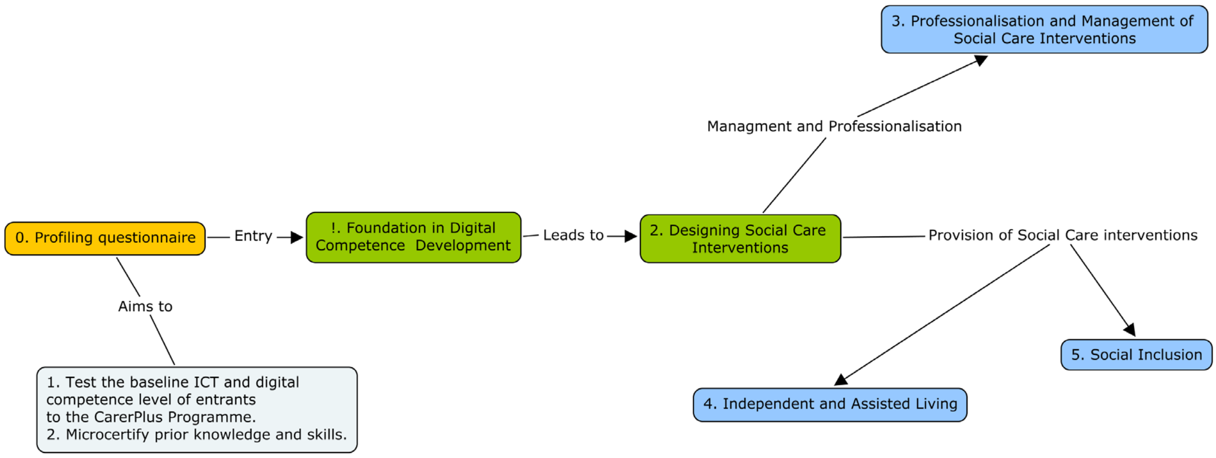

Figure 5. Overview of the CarerPlus programme detailing the core courses (1 & 2) and electives (3, 4 & 5), and the programme entry profiling tool (0).

The five courses cover the following areas:

- **Course 1**: This course covers foundational digital competence and is designed to lead the participants from a novice or beginner state to one where they are confident in both the use of mobile Internet devices, basic applications, security, privacy and digital content. These competences are foundational in that they are used throughout the programme. Much of the activity here relates to the DCF domain of 'general digital competence' that is relevant to the development of general ICT literacy
- **Course 2** is the second core course and situates the care worker as a designer of care interventions to develop capability to build and test solutions to identified problems. This knowingly resonates with an action research approach. The course references the DCF domain of enabling digital competence in care that seeks to make the application

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of digital technology possible, sustainable and accepted by both care workers and care recipients.

- **Course 3** focuses on the professional development activity of the participants to enhance their competences in the areas of planning, reporting, communicating and networking and professional profile building. It reinforces competences from course 1 and maps into the DCF domain of care-specific digital competence, in particular personal development and social integration of carers that can generate enhanced employability in carers.
- **Course 4** focuses on promoting independent and assisted living. It is orientated towards designing and implementing social care interventions with ICT to support and promote independent living for care recipients. It draws on work already carried out in the foundation course 1 & 2 with a central pillar of the course being enabling the participants to build coherent and manageable intervention plans.
- **Course 5** focuses on ensuring that participants will be able to design and implement ICT based interventions with care recipients that promote opportunities for social inclusion that impact care recipient wellbeing and quality of life and the social participation for care recipients and builds on elements drawn from previous courses.

Course development model

The practical aspects of the course development have been built on the adoption of the iCARE model, based on the Dick and Carey (1978) instructional design model outlined in '*The systematic Design of Instruction*', pioneered by San Diego State University, and the work documented at Middlesex University (Mojab & Huyck, 2001). In brief, it comprises five design stages titled: Introduction, Connect, Apply, Reflect, and Extend. This model is underpinned by the expectation that individual learning will be scaffolded by digital resources and will drive the self-development of competences. This is strengthened by coupling it to peer supported online activity in the virtual learning environment. The learning design model is one that promotes an active learning pedagogy (Bonwell & Eison, 1991) such that the learning and teaching approach is driven by activities that promote both student engagement with the materials and interaction amongst the learners, reinforcing their development, acquisition and application of digital competences.

Discussion

One of the difficulties in moving from a fully configured [digital] competence framework to a programme structure is evidently not the of choice topic areas but rather balancing the organising themes. Competence frameworks tend to offer linear, categorised breakdowns of the knowledge, skills and attitudes within a domain of practice, often with a professional focus. A tension exists between the emphasis on the 'atomistic' accomplishment of a competence framework and the demands of a learning and teaching programme that will be operating on a more holistic, socially sensitive set-up. Therefore, achieving a balanced approach to both DCF and programme development requires a flexible and reflexive design

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approach, one that oscillates between the DCF and the evolving curriculum and learning architecture. This has been achieved in the CarerPlus project by combining prototype outputs with validation workshops. These have acted as key conversational nodes in an iterative design and development process that has led towards finalised outputs.

The design of the programme has also been sensitive to the learner journey to ensure a coherent path from participant entry, study progress through to the exit trajectory. These three elements have been scaffolded by:

- An entry profiling tool to baseline participant skills and knowledge and to assess their readiness to study and attitudes to ICT use;
- Micro-certification delivered through a badging system that rewards skills acquisition and promotes positive learning behaviours and community activity in the VLE;
- A specific course on professionalization that supports personal development planning and enhancement of the individual's professional status and social capital.

Finally, an important element of sustainability has been built in to the programme through a 'train the trainers' pathway that offers advanced participants an opportunity to become mentors for the programme.

Conclusion

The process of translating a competence framework into a functional programme of meaningful courses for professional development is a challenging one, particularly when the design constraints include considerations for positive impact on both the participants from the target care-sector and the care-recipients. Successful completion of the CarerPlus programme has required bringing together a number of perspectives and reference points that have incorporated expert views from across the sector. Combining this with clearly articulated development and delivery models has been critical to ensure the development of a coherent programme that maps tightly enough to the underlying digital competence framework. The outcomes of the CarerPlus pilot programme will be reported in a later study, following pilots that are running in five European countries. Ultimately the success of this project will be judged on the impact. *For care workers, this impact should comprise an understanding of their own professionalization needs and the acquisition of necessary skills, attitudes and knowledge to enhance their professional profiles; for older people there should be a clear enhancement to their quality of life.*

ISBN 978-963-89559-7-5

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Acknowledgments

The CarerPlus project (297304) is co-funded by the European Union under the Competitiveness and Innovation Framework Programme – ICT Policy Support Programme. The work described here was carried out under WP2 led by 3s Unternehmensberatung GmbH, AUT and WP4 led by King's College London, UK.

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SUPPORTING STUDENTS THROUGHOUT UNIVERSITY CAREER: THE STAY IN PROJECT

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Introduction

The paper presents the findings of research and design activities carried out during the first year of the STAY IN project[1], aimed at establishing an e-guidance and e-support system throughout the study career for the benefit of higher education students. Starting from a brief introduction on the main issues in educational attainment and drop-out phenomena in Europe, the proposed contribution from the project is given, and first findings from research, as well as the consequent design choices, are described.

Guidance for retention in higher education

Educational attainment and drop-out in European Universities

The strategic framework for European cooperation in education and training, adopted in 2009[2], sets specific benchmarks for tertiary education, namely that by 2020 the proportion of 30 to 34 year-olds with tertiary educational attainment should be at least 40%. According to Eurostat figures 2012, while the EU average (37.5%) is increasing, some countries show a different trend: in particular, where Ireland, Luxembourg, Sweden and the United Kingdom, the proportion of 30 to 34 year-old men and women with tertiary educational attainment was already 40% or more in 2011, less than 25% of citizens in this range of age have a tertiary education in the Czech Republic (25.6%), Slovakia (23.7%), Romania (21.8), Malta (22.4%) and Italy (21.7%), as was also the case in Croatia, the former Yugoslav Republic of Macedonia and Turkey.

[1] STAY IN Student Guidance at University for Inclusion is a project co-funded by the European Commission, under the Lifelong Learning Programme. For further details: http://stay-in.org
[2] Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ('ET 2020'): http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:119:0002:0010:en:PDF

Alongside with the achievement figures, retention figures should be also taken into consideration to draft the overall picture: according to the recent study of the NESET network of experts for the European Commission (Quinn, 2013):

> *"The most successful countries in terms of completion are Denmark, United Kingdom and Germany and the least successful are Italy, Hungary and Poland. However even Denmark as most successful only has around 80% completion and Italy's rates are as low as 46%. Therefore completion appears to be a significant problem across the EU"*

Literature states that there are several factors affecting retention, mostly depending on institution, and some not directly depending from institutions, such as socio cultural factors, i.e. access to educational opportunities, financial support, perceived utility of universities' degrees etc.

Tinto and Pusser (2006, pp.6-16) argued that the conditions for student success are: Commitment; Expectations; Support; Feedback; Involvement – and they relates to institutional integration. The NESET network argued that the socio-cultural factors extrinsic to the institution and to higher education, such as access to educational opportunities/attainment at school level, also play a role – therefore institutional measures alone cannot fully address the issue (NESET, 2011).

However, institutions in their autonomy can effectively act to improve retention rates: the NESET network of experts identified 14 types of initiatives, carried out at institutional level that turned to being effective in reducing drop-out, namely:

- Type 1: Preparing students for higher education;
- Type 2: Supporting students into higher education;
- Type 3: Tracking student engagement with higher education;
- Type 4: Creating a more relevant and supportive curriculum;
- Type 5: Creating more responsive pedagogies;
- Type 6: Fostering positive approaches to learning;
- Type 7: Improving formative assessment;
- Type 8: Improving student study skills;
- Type 9: Offering financial support to students;
- Type 10: Offering counselling and personal support to students;
- Type 11: Fostering student personal networks;
- Type 12: Targeting support for specific disciplines;
- Type 13: Targeting support at specific groups of students;
- Type 14: Demonstrating the future utility of higher education (Quinn, 2013).

The level of action is thus comprehensive of measures related to access, ongoing support, and career (exit) support, with a strong focus on personal needs of individual students, and encompasses pedagogical and didactical arrangements, as well as support services development and deployment. The interlocked goals of widening participation and promote

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retention will require a range of adjustments and modifications in higher education across countries – structural, functional, organisational changes. Higher education institutions have been in past few years challenged by a number of issues, such as, in example, a different students' body, that requires adjustments to address the needs of students at risk of exclusion, including older adults, less affluent and well-educated people, women with dependent children, ethnic minorities and rural population; the embedded use of ICTs in learning, that required new competences for teachers and tutors; a stronger link between business and academia; and generally an improved contribution to society (Third Mission of the university).

Some of these dimensions, such as new pedagogies and didactics, a greater distance learning offer, and generally flexible provisions for students, are already in place, or anyway increasing and improving amongst universities in Europe. Other dimensions, like guidance and counselling services, are less developed.

According to policy and research papers (EUA, 2009; ESU, 2006; Osborne, 2006), in facts, guidance and counselling services at the university are still focused on the initial-ending phases (Katzensteir et al., 2007). Public (policy) goals with regard to guidance services fall into three main categories: (1) learning guidance; (2) career (labour) guidance; (3) social guidance. About all European Universities offer access guidance (educational guidance) and career guidance (labour guidance). Between the enter and the exit moments, the support offered by the institutions is less clear and in any case not structurally implemented. This element can be very relevant when considering that, even if there are only a few studies investigating the timing of drop-out, it is clear that drop-out is most likely during the first year of study (Larsen et al., 2013), therefore after the access moment.

An ongoing support in terms of guidance and early detection of students at-risk, should be put in place in a structural way, and should include a comprehensive information offer, the access to services both in situ and online, and a greater awareness by the teachers and tutors on how to approach and support and engage students.

Support students throughout the university career: a proposal

The STAY IN project, started in October 2012, is aimed at providing a comprehensive support to students focusing on the ongoing study career, both in presence (student offices) and especially at a distance, by means of a multi-level channel of communication and a continuous dialogue with the student.

The hypothesis of the project were mainly:

- The focus on "disadvantaged students", more than on "students with disadvantaged background": it is a fact, widely recognized, that students from disadvantaged background might have more problems in tertiary education attainment, however it is also a fact that many students with no-disadvantaged background anyway drop out from higher education;

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- The importance of online services: while e-learning is already in place in many universities, there is little evidence of e-services;
- The emphasis on continuous guidance, in particularly for students at the first year of higher education, to support them in the period of transition;
- The cooperation among all services available at the universities, and the direct involvement of staff, aimed both at raising awareness about the retention issue and at fostering active participation from the academic and technical staff in supporting students. This means an improved communication of the entire university community, which of course includes students.

STAY IN was planned in order to investigate about the factors leading to drop out, and to design, develop and pilot, on the basis of these findings, a possible proposal to offer an improved support to students.

First findings

Between January and May 2013 a research analysis was carried out, in order to identify the students' needs, and act to fill in the gap between support needs and support provision. The overall methodology adopted combined three methods of data collection and analysis: a set of Key Informant Interviews; a Literature Review of theory, research and practice on student guidance and counselling; a Student Survey. In all three sets of data there was a clear consensus that (Cullen, 2013):

- students should not be homogenised into static target profiles. Their needs are shaped by a process that is continually evolving, as they progress through the study life cycle, and as their circumstances change;
- guidance services need to reflect this process, addressing a spectrum of needs that begin with the transition between school and university, and end with the transition between university and the external world, particularly the world of work

The survey (546 completed questionnaires[3]) in particular offered some interesting data, by making explicit:

- a general gap between support needs and support provision;
- a gap between the supply of support and perceptions of the utility and usefulness of the support provided;
- an inadequate basic information.

[3] The majority of questionnaires were completed by students from Italy (38%), Spain (36%) and Hungary (19%), where the STAY IN model will be piloted. 7% of the questionnaires were completed by students from outside these three countries, covering a wide spread of institutions in Greece, Montenegro, the UK, Portugal, France, Ukraine, Romania, Germany, Sweden, USA, Canada.

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Further elements have to be taken into consideration, such as the problems experienced while studying:

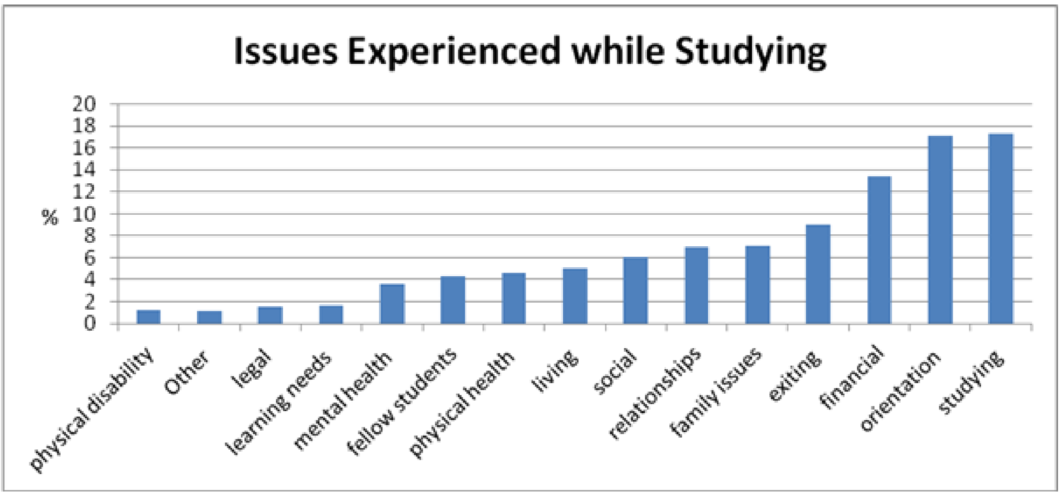

Figure 1. Data from students survey (Cullen, 2013, p.28)

Problems related to studying (like timetable issues and examination issues) are cited by 17% of the sample, 'orientation' problems (like issues around finding information on first arrival) are cited by 17% of the sample, and financial issues (for example paying tuition fees and paying for books) affected 13% of the sample. Other significant issues cited were issues around 'exiting' study (lack of careers advice, for example); family issues; relationship issues and social problems (for example feeling isolated). This has been confirmed in answers to open question "In your student experience, what would you say are the three biggest problems and issue students face whilst studying?". While the need of an improved and rational information system was already identified at the proposal stage, some new elements required attention, such as the provision of study skills learning events.

Summarising, the set of elements of the service design includes at least (Cullen, 2013):

> *"Information and advice elements aimed at the whole student community (for example website; Handbook); face-to-face advice and support elements (for example one-to-one counselling); group elements (for example student 'buddying'); on-line elements (for example an on-line Forum)."*

and

> *"The optimum benchmark the service design should aim at would provide: an on-line information service; a Student Handbook; one-to-one consultation; personal guidance tutors; 'one stop shop' in which services are integrated; 24 hour access to services"*

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As a consequence, the institutions should act in order to:

- redesign of the basic information system, aiming at providing a coherent orientation across working units of the university, and a consistent information across sub-websites of different departments and faculties;
- develop a single point of access for information and services (one shop stop);
- improve or develop online based services, based on a blended model;
- design and develop devoted services to answer to specific needs (e.g. study skills);
- focus on the student needs, and be supportive at all levels (teaching, administrative, professional and technical staff);
- develop ancillary services aimed at improving the quality and effectiveness of service provision, like awareness-raising actions; a Student Charter; training for students and staff; regular workshops for students in study skills; continuing professional development for professional counselling and guidance staff; a monitoring system to continuously assess the level and nature of student issues and potential problems, and to assess the performance of the counselling and guidance services provided (Cullen, 2013, p.5).

The development of a comprehensive support system thus requires a strong commitment from the university staff at all levels: this is in line with the strategy for the modernisation of higher education as mentioned above, and necessary to promote integration of the new tools and on a new vision of the university community.

The STAY IN model

STAY IN seeks to propose a model contributing to the development of e-services in the field of guidance and counselling, although a more general concept of e-support underlines the project approach. As a starting point for the technical development, the WISP platform was adopted. WISP – Web-based Integrated Services Platform is a multi-channel open source platform developed in the frame of the ICT-PSP project eGos for e-guidance for employability and e-government purposes, that at present enables e-guidance practitioners to deliver their information, advice and help services to final beneficiaries by using different ICT-based tools such as video-conferencing, phone calls, e-mail, chat-rooms, forum, etc. The platform has been adapted to the STAY IN needs by adding profiles consistently with the level of access to the services, i.e. student has direct access to all available services, users (that can be in example secondary schools students looking for information) can access information, but cannot ask for specific (face-to-face or group) services.

Taking into due consideration the outcomes of research work, the STAY IN framework has been therefore drafted as follows:

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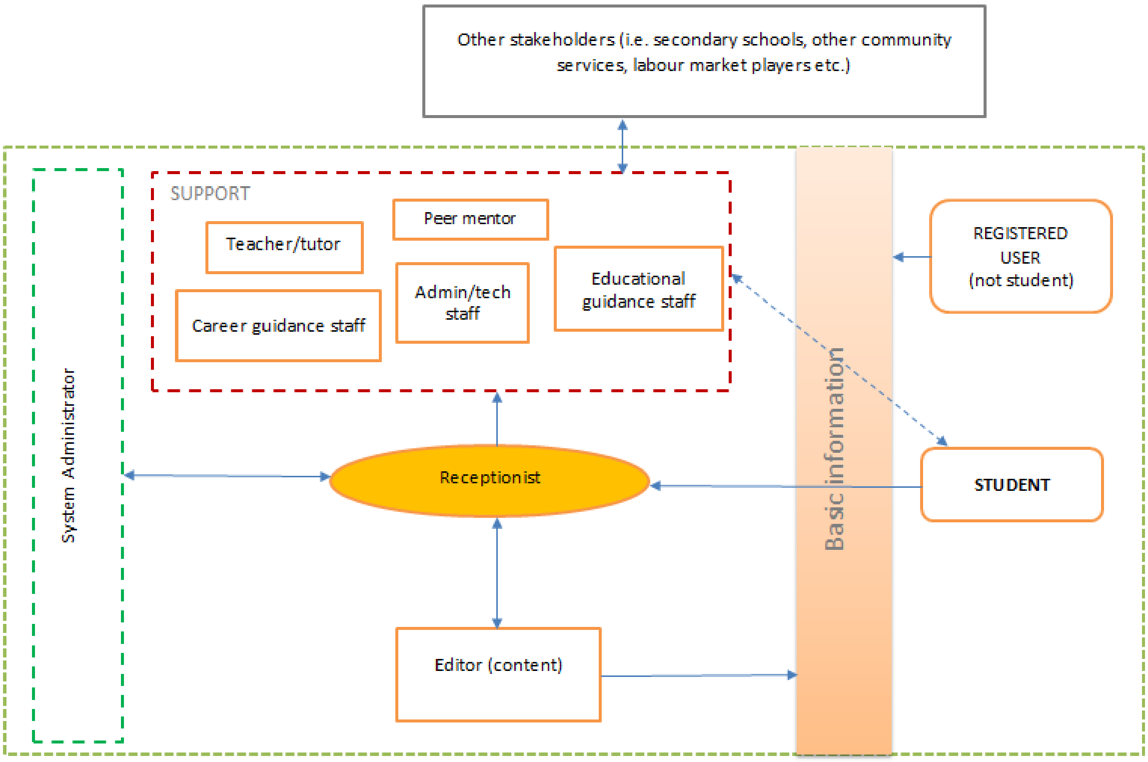

Figure 2. The STAY IN system (STAY IN consortium, 2013)

The green line encompasses the players acting within the online environment, and the rows draft the communication flows between them. A key role is played by the Receptionist, who receives all instances and requests from the students and switches them to the appropriate service. Once the person/service is appointed, communication will take place directly between the student and the reference person.

The platform allows the full process being carried out online, from the first contact, to virtual meetings and asynchronous communication. However, even if the first contact is established online, when applicable and/or preferable, meetings can be organised at the services premises or at the telephone, in order to meet as much as preferences possible. The support persons, who can be, as outlined above, teachers, for didactic support, guidance practitioner, for guidance and orientation, counsellors or even administrative staff (taking care of the study plans modifications, in example), are committed anyway to track the ongoing process within the platform: this will allow a monitoring on how the system is able to answer requests, and will also allow the organisation to identify frequency of problems and potential weaknesses, then to act in order to enhance quality of services.

In January 2013 the platform is ready as beta version and pre-piloting activities have begun in three organisations, namely the Budapest University of Technology and Economics in Hungary, the University of Seville in Spain, and the University of Macerata in Italy. According to specific needs, some of the e-services will differ from a piloting organisation to another; this will allow also assessing the adaptability of the proposed tool and system to different contexts in Europe.

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Beyond the technical development, a great effort has been made to involve concerned people since the design phase, by organising focus groups, workshops, and consultations. We believe that, even if the tool plays a relevant role in the future adoption, the key element for the success of any initiative is the commitment of people and shared vision and goals: awareness about the not-neutral role of each of the players in providing improved guidance and support services to higher education students, should be therefore amongst the main objectives of the action.

Conclusions

The STAY IN project seeks to contribute to an improved guidance and counselling provision for higher education students, focusing on online support services. The action is aimed at enhancing the quality of educational services and at improving retention rates. Research and design activities carried out so far, including literature review, interviews to key informants, a student survey and a series of events to raise awareness and involve university staff, made evident at least: a) the need of students to be effectively supported and engaged during the study years, especially in the first year of the university (managing transition), and "minor issues", such as e.g. study skills development, can be "major issues" in the decision of dropping out; b) the need of conceiving the institution as a community, where all players, from teachers to students, from administrative staff to guidance practitioners, should share the same vision and be committed toward a common goal; c) the need of further research on e-services and e-support: while flexible learning provisions, especially for distance education, have been put in place, e-services at the university are less developed.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE AGILE LEARNER – USING NEW TECHNOLOGIES AND SOCIAL NETWORKS TO MAKE LEARNING A LIFESTYLE, NOT AN EVENT

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Introduction

Education has traditionally been understood as a time-limited process that transpires over a period of months or years, culminating in a capstone event that qualifies a person for successful completion. Students partake of learning for a defined period of time, and then matriculate to real-life after having concluded their education. This 'train-place' model of career development assumes that an individual is able to gain the relevant knowledge, skills, and abilities prior to entering the workforce, and maintain the skillset with relatively little need for up-skilling (Corrigan & McCracken, 2005).

Rapid social change and the burgeoning pace of information creation now allows, and perhaps even requires, people to adopt a lifelong learning mind-set. It is estimated that the amount of information present in our world doubles every 18 months today (Gantz et al., 2007), an amount that required 25 years to amass in the recent past (Fuller, 1982). Traditional educational models have not kept pace with these changes, and are struggling to maintain their identity within a continually evolving milieu.

A new model for learning, borrowed from the fields of information and communication technology (ICT) and software development is being proposed that may help learners more readily adapt to the rapid pace of change. Agile Development was originally designed to promote greater efficiency in a transformative technical environment (Beck et al., 2001). Agile Development was unique in its approach to change because it placed a higher value on people and interactions over processes and tools. In addition it promoted a fluidity of learning by advocating for a rapid iteration of ideas in a changing environment and a focus on concrete outcomes. Throughout the past decade, educational practices have begun to mimic ICT growth patterns, and as such may benefit from an adaptation of the Agile Development Model applied to education practices. The Agile Learning Model is being proposed to increase efficiency and help learners to more quickly determine their own learning needs, build their own learning cohorts and determine their own learning outcomes.

Origins of the Agile Methodology

Since its inception, the field of ICT has struggled to formalize the processes used to develop software. Because software development is a highly complex endeavour, it was thought that adopting more formal processes of technical creation and advancement could lead to improved quality in software output. Various methodologies were developed over the years, but most have suffered from considerable overhead, resulting in more focus on process than outcome.

In 2001 a group of software developers met with the goal of creating a more efficient development process. This group, which came to be known as the Agile Alliance, consisted of advocates of most of the popular software-development methodologies of the era. Their discussion culminated in the "Manifesto for Agile Software Development" (Beck et al., 2001), which outlined the group's core beliefs and recognized the value of flexible thinking and response to change over adherence to structured plans and contracts. The overall focus of the agile method is the creation of rapid iterations in search of learning, an emphasis on a collaborative approach to product development, and placing a value on people over process (Highsmith, 2001; Highsmith & Cockburn, 2001).

Agile for Learning

The Agile Learning methodology is not proposed as a replacement for formal education. It is a paradigm shift, moving to incorporate the key elements of iterative problem solving and collaborative learning, while simultaneously de-emphasizing hierarchical structured learning. As such, it could be tailored to suit formal educational systems, as well as for self-paced informal learning and scholarship within communities-of-practice. Individuals who are instructed in Agile Learning methods from an early age (e.g. primary or secondary school) would further benefit from the model's principles, as they encourage lifelong learning and continuous professional development. This more accurately reflects the needs of society and supports the concept of an evolving, global knowledge base.

The Agile Learning Model proposes the following basic values:

- Individuals and interactions over processes and tools;
- Acquisition of knowledge over exam preparation;
- Collaborative learning over teacher-led learning;
- Responding to change over following a plan;
- Self-reflection and adaptation over conformity.

At regular intervals learners reflect on the efficacy of their learning, and then adjust accordingly. Because the agile methodology originated in the software-development industry, the process is uniquely well-suited to online learning. The basic tenets of the methodology fit well with online studies, and there are many online and virtual tools to support the agile process. Moreover, it is flexible enough to accommodate learning in larger classes, including

ISBN 978-963-89559-7-5

massive online open courses (MOOCs), without over-taxing the instructor or mentor leading the class.

The advantage of the Agile Learning Model is that it requires learners to assume responsibility for their own learning. Accountability for learning outcomes furthers the growth of innovative problem solving and reinforces an internal locus of control (Masullo et al., 2005). While individuals may choose to form a community to support their learning, the entire process places the learner at the centre of the model. As a result, individuals are free to adopt a learning style that works for their specific needs, increasing success in both tangible and psychosocial terms.

The Agile Learning Process

The circular nature of the agile process is ideal for education because it acknowledges that learning is a continuous process. Agile brings the focus of learning down to small, discrete elements so that learners can rapidly and repeatedly iterate through the entire process. For example, a learning need in an anatomy class would be identified as "What is the effect of frontal-lobe damage?" rather than "How does the brain work?" The core idea is to keep the learning cycles short so that students can adapt the next iteration based upon learning from the previous iteration.

Figure 16. The Agile Learning Process

Although circuitous in nature, the model is best described as a series of steps which move in a directional manner, and which may be repeated to meet evolving needs. Any educational

ISBN 978-963-89559-7-5

event, formal or informal, begins by identifying a learning need. In formal education this may manifest as a project assigned by the course instructor. In informal or workplace learning, the need may be defined by a skills deficit. The agile model assumes that the entire need cannot be discovered at the onset. Instead, learners proceed after identifying a partial need, and then on future iterations adapt their learning process to incorporate subsequent discoveries.

Students next determine if they need to form a learning group for support in this process. Once again, this step may be guided by an instructor in a formal education setting. For informal and workplace learning environments, ad-hoc groups may be formed for brief learning processes and then disbanded upon completion. This is similar to the process used to assemble project workgroups in a workplace setting.

The next two successive steps of the Agile Learning process are similar to prevailing learning processes. Students must research new information, consider the implications of various outcomes and then incorporate that learning into their existing knowledge base. There is an implied understanding that there are multiple avenues to knowledge acquisition and that individuals are capable of addressing learning needs through self-identified pathways. It also reinforces cognitive processes of problem solving and critical thinking as well as the soft skills of initiation, collaboration, self-evaluation and adaptive change.

Agile Learning differs from existing models in its final step, and offers flexible solutions to the complex problems of a rapidly changing world. Students must take the responsibility for reflection on the learning that has just taken place. Agile Learning assumes that learning is a continuous process. Students are therefore encouraged to reflect not only on the knowledge obtained, but also the process that led them to the knowledge acquisition. Furthermore, students should come away from this reflection with identification of one or more elements that need to be studied in the next iteration. This leads the student to restart the process in order to learn more, while adapting the process to more effectively help them learn.

Self-Organizing Teams

A core concept of the Agile Learning methodology is the idea of self-organizing teams. Younger generations often resist educational projects that require team-based learning and struggle to conform to the demands of an assigned work group. However, collaboration is an essential function of the majority of jobs in society. Bridging this gap has long been a struggle for educators as well as employers who seek to hire workers with the skills to organize and manage project teams. The creation of self-organizing teams or learning communities may provide a viable solution, as they seek to unite individuals around a shared interest and embed the values of personal responsibility and active influence on the group. Universities and other higher learning institutions are increasingly adopting the use of learning communities to encourage collaborative learning and fellowship. The success of such programs underscores the benefits of Agile Learning in promoting self-awareness and assuming personal responsibility for achieving learning outcomes (Long, 2012).

ISBN 978-963-89559-7-5

The advent of social networking tools such as Facebook, LinkedIn and Google+ are ideally positioned to facilitate the creation of self-organizing teams. Learners can now easily connect with people of similar interests or with similar needs. The connection of tools like this to readily-available online learning tools allows learners to create their own communities of practice for purposes of learning. Care must be taken to ensure that chosen tools augment the learning process, a process that can be reinforced by the requirement for self-reflection and iterative change. Thus, rather than using technology to amass existing information, the learner is required to 'do something' with the knowledge in order to bring the concept or problem further in its development. With each iteration of the idea, new tools may be required to solve resulting problems, further supporting the use of divergent thinking and collaborative problem-solving. The Agile Learning pedagogy is well-suited to adapting to an evolving online environment as the technology available continually changes and improves.

Agile Learning in Assessment

As noted earlier, Agile Learning is not a replacement for formal learning processes, including assessment of learning. Agile is a root process that can easily fit within formal learning structures. Assessment can play a key role in the self-reflection portion of the agile process, whereby learners regularly reflect on their learning process to determine if they are being effective. The benefits of assessment in an Agile Learning environment are a deeper understanding of the integration of processes and outcomes, including assessment of attitudes about teaching methods, knowledge, and skill acquisition; application of learning; and performance improvement (Mattox, 2012). Therefore, while learners may utilize the Agile Learning methodology to acquire knowledge, there continues to be a need for formal assessment to determine if learning has taken place.

Summary

An Agile Learning approach to education can provide learners with a valuable toolset to help them adopt a lifelong approach to learning. The paradigm of self-guided inquiry marries well with both formal and informal learning systems and is proposed as an alternative to traditional models of instructor-led and scripted dialogues. The approach assumes that learners do not know what they need to know, but are able to discover that by iterating ideas through a defined process. In this manner, learners are given flexibility to acquire knowledge using divergent methods and are empowered to create their own learning community for support as needed. A regular period of self-reflection helps this learning community to refine and adapt their learning methods to changing realities. The process is simple enough to allow a focus on knowledge rather than on the process, while simultaneously providing a framework to guide learners through a continuous feedback loop. The promotion of personal responsibility for achieving learning outcomes offers long-term benefits in self-efficacy and adoption of a lifelong learning approach to personal and professional growth.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

MAJOR COMPETENCIES TO MANAGE MINOR OFFENDERS

Consortium of MAJMIN – LLP - Leonardo da Vinci – Development of Innovation Project – Project Number: 517580-LLP-1-2011-1-RO-LEONARDO-LMP

Abstract

The basic idea is to promote a shift in approaching the criminal justice systems when dealing with juvenile offenders: instead of applying punishment-oriented sanctions, a system reflecting the juvenile justice concept would regard juvenile suspects as participating members of society having rights, obligations, and responsibilities. Such a system would provide special protection for juvenile offenders, as well as opportunities to undo or rectify the consequences of their misdeeds.

The basic requirements for such transformation are a more developed social system for assisting vulnerable juveniles and their families, stronger infrastructure for the prevention of juvenile crimes, more options among the alternative and non-custodial measures to be imposed on juveniles in conflict with law, and the possibility for juvenile offenders to exercise their rights throughout administrative and criminal proceedings, as required by the UN Convention on the Rights of the Child.

Rationale of and background to the project

The Council of Europe is defining a juvenile as someone who is criminally responsible but has not reached criminal majority. Delinquency refers to acts which are dealt with under criminal law, although some countries do include antisocial or deviant behaviour in their juvenile penal law. The juvenile justice system is a formal system that is part of a wide approach to delinquency, including the police, the prosecutor system, the probation system, and youth institutions, but also agencies such as health, education, and social welfare (Council of Europe, Rec. 2000, 20).

The factors contributing to delinquency include social exclusion, migration, racism, gender inequality, violence (societal and domestic), and breakdown of the family, lack of positive role models and the influence of media. All these factors need to be addressed when we approach juvenile crime.

European Council emphasized (2007) that prevention is the key to solving the problem of young offenders. Family, school and society all have important roles to play in educating and re-educating young people. Juvenile delinquency accounts for an average of 10.5 percent of crime, although it can rise to 22 percent in some countries and that there is no central database available within an EU institution that allows comparing crime statistics on the different types of juvenile and urban crime. EC particularly stressed the delay of activating in national, regional and community levels structures to combat delinquency. "It's that 'negligence' that renders even the most modern national penal systems for juveniles unable for implementation, due to the lack of appropriate mechanisms, infrastructure and social participation which are necessary to ensure their effective function (Batzeli Report toward EC, 2007).

Two main reasons to the EU countries to be concerned:

- There is an aggravation of crimes committed by minors (especially concerning crimes like robberies, rapes and homicides);
- The age of juvenile delinquents is getting more and more younger nowadays, with minors of 8 to 13 years old being registered as offenders.

However, at the same time as concern over juvenile crime and violence is increasing, there is a parallel concern that the system for tackling such crime and violence is slow, ineffective and over-burdened. Delays are commonplace, public confidence is low and re-offending rates are as high as or even higher than for adults. These developments have led, at least in a few Member States, to a popular response for a more repressive approach, which is reflected in higher rates of custody for juveniles and a shift from a needs-led (or 'welfare') model to a punishment-led (or 'just deserts') model.

The Recommendation of the Council of Europe on social reactions to juvenile delinquency indicates that:

- the juvenile justice system is only part of the overall response to juvenile crime;
- the juvenile justice system should avoid repressive approaches and focus on education and reintegration;
- juveniles should at least receive the same level of procedural safeguards as adults;
- depriving juveniles of their liberty should only be used as a last resort and that, as far as possible, interventions should be carried out in the juvenile's home environment.

Having in mind all the above, the consortium worked together in order to develop an integrated professional training platform for the personnel directly or indirectly involved in the work with juvenile delinquents. A special emphasize was put on the VET provision for the first layer of target groups meaning groups of professionals like:

- G 1. – personnel directly involved in juridical assistance (lawyers, magistrates, policemen);
- G 2. – personnel directly involved in penalty assistance (guardians and other prison personnel);
- G 3. – personnel directly involved in social assistance (probation councillors, social operators, social assistants);

ISBN 978-963-89559-7-5

- G 4. – personnel directly involved in pedagogical assistance (educators, teachers, tutors, other didactic personnel);
- G 5. – personnel directly involved in psychological assistance;
- G 6. – personnel directly involved in medical care.

All the categories above are initially trained as general professionals in their specific field without any specific focus on the particularities related with juvenile delinquents and their social and psychological profiles. There is no specific VET provision in the EU to be delivered at this time in this very sensitive area.

This is why the consortium carefully analyzed the specific training needs of the above mentioned personnel, designed an appropriate multi-dimensional curriculum, produced adequate educational tools and training resources (including e-learning outcomes), piloted these outcomes in the partner countries, refined them and produced final versions in English and partner countries languages. Using the local and regional networks of beneficiaries and stakeholders, the VET provision will be delivered toward the specific target groups. Feedbacks will be collected and published on the web platform of the project.

Nevertheless, a focus on non-formal professional training for the members of the families was foreseen. As a side effect, the structures directly or indirectly dealing with juvenile delinquency took benefit and had the opportunity to improve and to reform their mechanisms and sub-systems.

Investigation of the field (state of the art) and innovative character

The problem of minor offenders (MO) does not represent a new challenge in Europe and ways of managing to avoid re-offending are at the core of professionals' preoccupations. For the Consortium members the idea of innovating the practices, methods and systems in managing the MO came out from a good cognition of the judicial system concerning MO and from the current the reality, which demands for immediate solutions.

Once identified, the problem was consequently approached by Consortium through formulating hypotheses and scientific methodology, in the view of which desk research was performed (surveys on reference documents, i.e. *"Report of the Working Group of the Consultative Council of European Prosecutors"* (2010) presenting peculiarities of juvenile justice, juveniles before & during the hearing, enforcement of decisions concerning juveniles/follow-up of the juvenile; *"Juvenile justice systems in Europe – current situation, reform developments and good practices"* (2006) – an in depth comparative study on reported juvenile delinquency, the sentencing practice and their efficiency concerning crime reduction and rehabilitating young offenders); *"UN Convention on the Rights of the Child"* (1990), etc.). Eurostat and National Institutes of Statistics have been another precious source.

The last step consisted in debates with professionals and stakeholders who gave a valuable input to our theoretical approach. Each Consortium member participated as expert in the process of analyzing and defining the problem, of precise identification of the needs.

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The innovative aspect of this project consists in treating the punishments of MO and the whole procedural chain in a new approach, that lead the MO not directly within the prison environment where he will be liable to re-offending, will find himself isolated of family, school, society and from where it will be highly difficult to socially reintegrate him, but in re-thinking the legislation and procedure towards "MO serving the sentence outside of the penitentiary", under supervision and benefiting of assistance and counselling, by being in contact with the elements that keep him connected to the community he belongs to.

The project offer an innovative scheme of clusters, operating at national and local level, in which at the middle stands a partner of the Consortium (P) that relates with other social actors having as employees professional staffs working with MO: justice departments, reinsertion authorities, education providers, families and civil society. (P) will collect the representatives of the target groups by the help of these actors. The way of composing the clusters will allow getting inputs from traditional educational system and from special school system too. Clusters will design together a new EQF curriculum for developing inter-professional transversal competencies for better dealing with MO. The curriculum will operate with overall elements and prevention & post-punishment follow-up elements.

Aims and objectives

The goal is to increase the specific professional training provisions that will enforce the involvement of different parts involved in the management of juvenile crime, for a better response to the needs for social inclusion of minor offenders.

The general objectives were:

1. To upgrade the professional competencies by specific professional training of different categories directly or indirectly involved in the management of juvenile criminality and in the assistance of minor offenders;
2. To endow the family members with specific competencies;
3. To increase the functionality and inter-operability of the structures that manages the juvenile crime.

The target groups

Direct beneficiaries:

1. Professionals directly involved in juridical assistance (lawyers, magistrates, policemen);
2. Professionals directly involved in penalty assistance (guardians and other prison personnel);
3. Professionals directly involved in social assistance (probation counsellors, social operators, social assistants);
4. Professionals directly involved in pedagogical assistance (educators, teachers, tutors, other didactic personnel);

ISBN 978-963-89559-7-5

5. Professionals directly involved in psychological assistance;
6. Professionals directly involved in medical care;
7. Family members that should take care of minor offenders.

Indirect beneficiaries:

1. The state structures that manage the juvenile crime (probation services, child assistance and protection directorates, police, penitentiaries administration);
2. Minor offenders.

The main outcomes

1. Research Report focusing on:
   - minor offenders categories in the EU,
   - institutions and organisations involved,
   - specific categories of professionals,
   - mechanisms, criteria and good practice examples of dealing with minor offenders;
2. EQF based curriculum for VET training of professionals;
3. VET provisions
   - methodological guide,
   - handbook,
   - eLearning facility,
   - ECVET based evaluation/certification methodology;
4. Training course;
5. International symposium under EfVET.

Under the current situation in which societies are challenged by the misdeeds of the minor law breakers and they are seeking for solutions, in which representative segments of professionals interacting with juvenile offenders (juridical, penalty, social, pedagogical and psychological assistance, medical care staffs, educational and training staffs), have few or no special training in the field of dealing with minor offenders, a specific methodology and curriculum (including psychological training) for them becomes extremely useful. And here is the point where this project will introduce the innovation, will induce the change.

Among the noticeable changes to be brought by the implementation of the project and the application of its outcomes we emphasize: fully recovered and reintegrated minor offenders, diminished juvenile criminality, decrease of the state's costs with inmates and afferent staffs in the system (tribunal, court of appeal, prosecution, prison, etc.).

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Methodology

The basic idea is to promote a shift in approaching the criminal justice systems when dealing with juvenile offenders: instead of applying punishment-oriented sanctions, a system reflecting the juvenile justice concept would regard juvenile suspects as participating members of society having rights, obligations, and responsibilities. Such a system would provide special protection for juvenile offenders, as well as opportunities to undo or rectify the consequences of their misdeeds.

The basic requirements for such transformation are a more developed social system for assisting vulnerable juveniles and their families, stronger infrastructure for the prevention of juvenile crimes, more options among the alternative and non-custodial measures to be imposed on juveniles in conflict with law, and the possibility for juvenile offenders to exercise their rights throughout administrative and criminal proceedings, as required by the UN Convention on the Rights of the Child.

More concrete, the used methodology consisted of:

- Desk and field research to identify minor offenders categories in the EU, institutions and organizations involved, specific categories of professionals, mechanisms, criteria and good practice examples of dealing with minor offenders), finalized by a Research Report;
- Designing phase for creating an EQF based curriculum for developing inter-professional transversal competencies for better dealing with minor offenders. This curriculum was build on the achievements of the Research Report and on both the needs of professionals managing the juvenile criminality and on the needs of minor offenders;
- Designing phase for elaborating the training materials (methodological guide, handbook, eLearning facility – as web-based platform, ECVET based evaluation/certification methodology). These VET provisions were strongly correlated with the EQF based curriculum, designed under the previous phase. All materials were designed in EN and translated by partners according to their needs;
- Piloting the curriculum and VET provisions through an intensive training meant for the target groups (professionals interacting with juvenile offenders). The course was held in each partner country and was finalized by training certificate. Both the curriculum and VET provisions were refined, adjusted based on the training phase;
- Increasing awareness upon the issue of efficiently dealing with minor offenders and disseminating the project's outcomes through an international symposium organized under EDEN.

ISBN 978-963-89559-7-5

European added value

The project has high European added value. It shows clear connection with European Union's internal and external policies concerning the need for effective promotion and safeguarding of the rights of the child, such as the European Commission communication of July 2006 entitled *"Towards an EU strategy on the Rights of the Child"*, which encompasses more than ten of the EU's policies, including civil and criminal justice, employment, development cooperation, trade negotiation, education and health, setting out at the same time, support Member States' efforts in this field.

Legislation, however, alone is inadequate and systematic approach is needed to support implementation of innovative measures for efficiently managing the issue of minor offenders and for their social integration. Analysis of statistical data provided by reliable resources for juvenile justice shows that the level of juvenile delinquency has not decreased; it is still high (it accounts for an average of 10.5 percent of crime) and it can rise to 22 percent in some countries. The project raises awareness on necessity of new European approach in juvenile justice systems in the partner countries, especially regarding the professional training for acquiring transversal inter-disciplinary competencies of the professionals operating in the field.

Linguistic and cultural issues have been appropriately addressed by providing the following outcomes in national languages: EQF based curriculum for VET training of professionals; methodological guide and handbook addressing to professionals working with minor offenders, also on DVD; eLearning facility containing VET provisions, research data, links to specialized websites; information about the project in partners' web-sites; training course (which will be held in national languages). This will ensure the exploitability of the project outcomes to end-users, who are at the core of change for renewing the juvenile justice systems.

The project indicates visible benefits accruing from collaboration of educationalists, VET trainers, judicial experts, penitentiary staffs, and stakeholders across national borders including the implementation of an International Symposium to be held in Denmark where experts and stakeholders will be invited. The European Union will benefit from this project which will ensure development of innovation and transfer of knowledge and experience at European level.

Expected impact of the project

The outcomes of the project will be used by the envisaged 4 main target groups:

1. professionals directly involved in juridical, penalty, social, pedagogical, psychological assistance and in medical care;
2. family members taking care of minor offenders;

ISBN 978-963-89559-7-5

3. state structures that operates in juvenile crime and
4. minor offenders.

Therefore the envisaged impact concerns the increasing capacity of the minor offenders as marginalized category to move from social exclusion to social integration by: appropriate manner of managing juvenile crime, by providing specialized support and assistance to minors, by new transversal inter-professional competencies acquired by professionals dealing with minor offenders. This will be acquired by distributing the Research Report to 300 experts, stakeholders, authorities' representatives and juvenile justice institutions in 6 countries and by performing 6 training courses with 120 professionals (20 per country) who are directly involved in the management of juvenile justice. Additionally, the DVD with VET provisions (EQF based curriculum, methodological guide, handbook, evaluation/certification methodology) will be distributed to 600 end-users (100 per country) in 6 countries. It is estimated that 65% of these will become active users. We expect 70% of them to adopt this model. Moreover, the Consortium will collaborate with 30 educational institutions during exploitation period. It is envisaged that at least 12 of these organizations will be prepared to adopt the model methodology beyond the project life.

The eLearning facility will be used by experts and professionals in the field and by family members of minor offenders, by the local communities and all those interested in improving the efficiency of the system. We estimate an approximate number of 600 visitors per year.

The minor offenders will be involved through the daily and current activities carried out by all categories of professionals that directly interfere with them and who will be beneficiaries of the project's outcomes.

The project aims at increasing the specific professional training provisions that will enforce the involvement of different key-players of the management of juvenile crime, for a better response to the needs for social inclusion of minor offenders. By this, it aims also at finding and experimenting practices and methodologies, at starting the confrontation process and fostering work with minor offenders in order to avoid re-offending and to support, accelerate and promote their social inclusion.

The project thus lay foundations so that experimented products/methods are updated, widely used & developed in partner countries but also in other countries interested in the development of functional systems for juvenile justice and of efficient solutions for social integration of the minor offenders.

ISBN 978-963-89559-7-5

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From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN xxx

THE ROLE OF KEY-STAKEHOLDERS AND COLLABORATORS IN THE LONG-TERM SUSTAINABILITY OF AN E-LEARNING PORTAL: THE CASE OF OPEN DISCOVERY SPACE PORTAL

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Abstract

E-Learning resources, learning technologies and applications are becoming more and more popular in Europe, attracting the interest of the European Union and individual governments. E-Learning portals can be proved to be a "deus ex machina" solution in the global budget reduction for education. Stakeholders have a direct influence on factors that stimulate sustainable development and growth of technology and infrastructures and can greatly affect the sustainability of a project and its outcomes. The ODS project aims to create a pan-European E-Learning portal (multilingual open innovation platform) which acknowledges that engagement of stakeholders and their collaborative interaction with content, technology, software, webinar management service providers and e-publishers is very important for the success and long- term sustainability of the project. Thus, drawing on first-hand experiences from own research, as well as on previous knowledge, a new "stakeholder and collaborator analysis framework" and "engagement strategy" is proposed and developed for this purpose.

Introduction

E-Learning resources, learning technologies and applications are becoming more and more popular in Europe attracting the interest of the European Union and individual governments. ICT use in the schools is increasing as well as the access for the EU citizens to online resources at home However, there is plenty of space for further development of the use of ICT for learning purposes since the percentage of such kind of use remains lower than 40% in some EU countries (European Commission, 2013)

Globally, spending on e-learning at K-12 level is predicted to grow at a 33% between 2012 and 2017 (Eurostat, 2009). Conversely, many countries are reducing their education budget. However, some countries are still investing heavily in educational and learning technology, since they are either starting from a lower base or have not been (acutely) affected by the economic recession. These countries tend to invest more on new eLearning (Eurostat, 2009; European Commission, 2013). Generally, learning technology is far more pervasive and, for example, the increasing availability of iPad and mobile devices would suggest penetration will continue to increase.

Recent studies showed that (most of the users are using computer/internet at home followed by the work place. Only in the group of age, 16-24 the home use is followed by the use of computer/internet in education.

Moreover, Figure 1 (data from Eurostat, 2009) presents the computer/internet use in education as a percentage of individuals in EU27 that used ICT in the past three months before the study in every country belonging in EU27 plus Norway. What is noteworthy is that as the age grows the use of computer/internet in education declines.

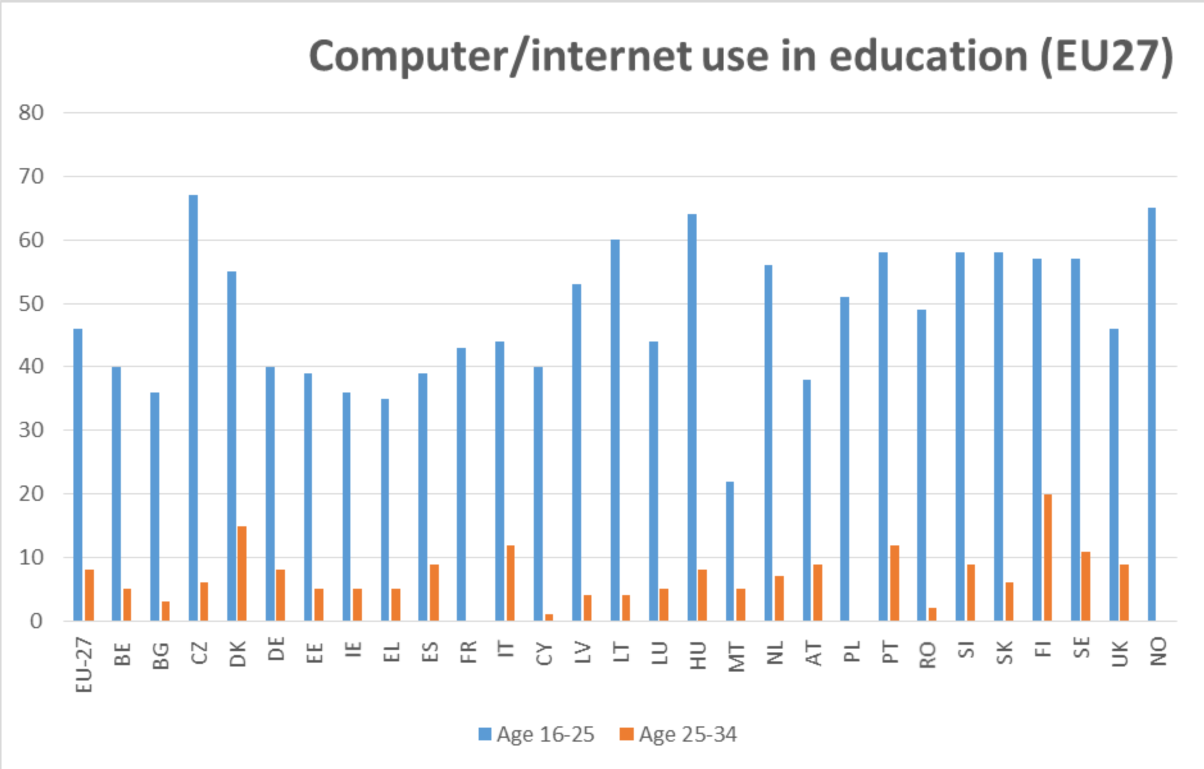

Figure 1. Computer/internet use in education (EU27)

E-Learning portals/platform can be a “deus ex machina” solution in the afore-mentioned eLearning environment helping in the improvement of cost-efficiency of education. One of the main success factors for every eLearning portal and OER initiative in order to be sustainable and successful is the requirement to identify its main/key stakeholders and collaborators, address their needs, requirements, and overcome their barriers (Faust et al, 2013). Following Downes (2007), by sustainable we mean “has long-term viability for all concerned”. Stakeholders, collaborators and customers have an important and decisive role in the success of any project and online portal, since their requirements, interests, motivations, and satisfaction are important factors for development and sustainability of the project. The

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identification and analysis of the key stakeholders/customers and collaborators has an important role for the success of any project implementation and specifically for the design of the business plan and marketing strategy required (Bryson, 2004). Similarly, in the context of OER, sustainability is closely linked not only to the financial viability of the initiative but also to the identification and analysis of the key stakeholders' needs and requirements as well as the ways of fulfilling them. This has a significant impact on the growth and expansion of the project community and, thus, the sustainability of the project.

The case of Open Discovery Space project (ODS)

Open Discovery Space project (ODS) aims to develop an eLearning portal that will enable teachers to better respond to diversity and heterogeneity in the classroom and to adapt learning materials, resources, scenarios, tools, technologies, software and objectives to individual students' learning needs. ODS portal will allow teachers to compile personalised sets of learning materials; to constantly monitor progress without having to interfere in the learning process; to re-align learning objectives and strategies in response to progress made; and to use a vast variety of engaging and interesting learning materials, effective eLearning resources and tools that more effectively facilitate, motivate and engage online learners.

However, in order to ensure the success and long-term sustainability of ODS. It is critical not only to identify its key stakeholders interests, motives and expectations towards the projects and its outcomes but also to identify strategies for fulfilling their needs and actively engaging with this diverse community of actors, who in some cases act both as "consumers" and "producers" of content. In order to achieve these aims the current paper present the key stakeholders analysis and engagement strategy created by the ODS consortium. This identification and engagement strategy framework can be used also as a generic model in other OER cases, projects and organizational structures in order to facilitate stakeholder engagement and long term sustainability of the project.

ODS Key Stakeholders and collaborators Engagement Strategy Development Framework

Background

Stakeholders have a direct influence on factors that enhance the sustainable development and growth of technology and infrastructures (Rangarajan et al, 2013). Freeman (1984) published a book with the title "Strategic Management: A Stakeholders' Approach" which remains the bible of stakeholders' analysis and engagement strategies development. He states that stakeholders are likely to contribute significantly towards the developing policies and objectives for efficient functioning in a region, organization or project, opinion that is verified by Coombs et al. (1998) who emphasize the important role of stakeholders in the success and long term sustainability especially of Research and Development projects. More specifically Freeman (1984) defines stakeholders as "groups of power" that without their support an

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organization/project can "cease to exist". Finally, planning incorporating stakeholder involvement is considered to be a more sustainable and effective approach than conventional planning (Faust et al, 2013; Global World Partnership Technical Advisory Committee, 2000; Giordano et al., 2007; World Bank Group, 2008).

Freeman (1984) and Rangarajan et al. (2013) established the foundations of the modern stakeholder analysis process development proposing a three-level framework for the analysis and engagement assessment of the key stakeholders of an organization. The first level of this framework (rational) involves the understanding of "who" are the stakeholders, the creation of a stakeholder profiling and the identification of their potential interest and motivations regarding the operations of the organization as well as the early identification of potential barriers that might appear in the relationship between those stakeholders and the organization that aims to engage them in its operations. The second level (process) involves the action of the organization to engage and retain a tight relationship with the afore-mentioned stakeholders while the third level (transaction) involves the boundaries that the organisation establishes in the negotiation with the stakeholders.

ODS stakeholder and collaborator analysis strategy

ODS consortium used the well-established background knowledge on stakeholder's analysis as a guide in the development of its unique stakeholders' analysis and engagement strategy following the three levels of Freeman's framework. This framework can be generalised and be applied in any other project and organizational structure.

For identification and analysis the key stakeholders, a purpose-built framework was developed (see Figure 2 below):

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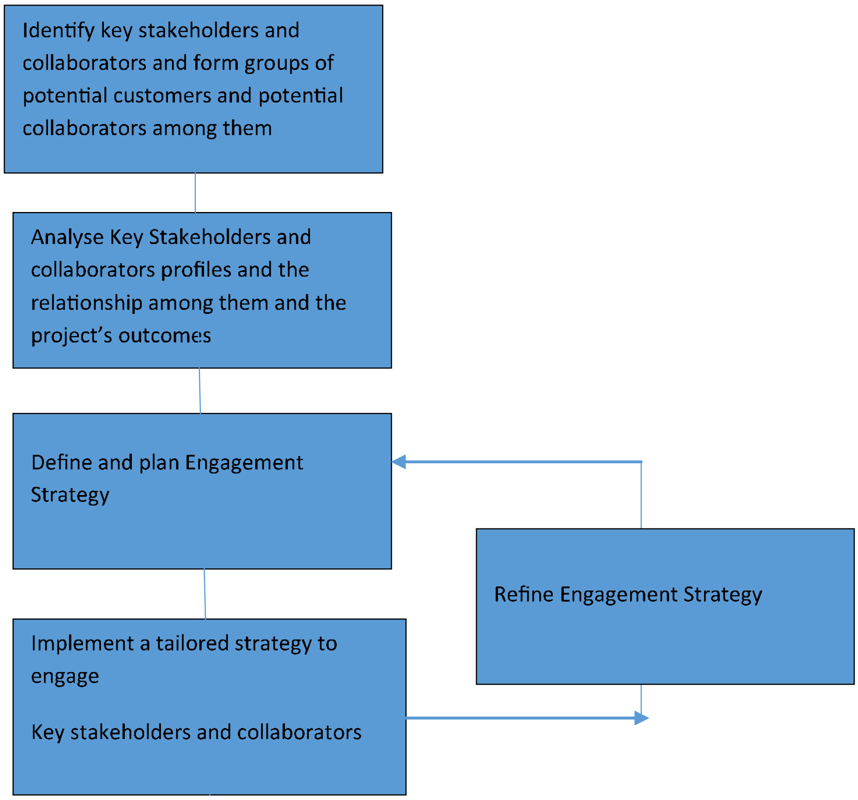

Figure 2. Stakeholder and collaborator engagement framework

As presented in the Figure 3, the key stakeholders involved in the ODS projects are classified into three different categories. The first category refers to those stakeholders that will be the main customers of the ODS consortium. ODS consortium needs to address them as the main target market, or potential customers, for the project's results. The second category includes those stakeholders who proved to be collaborators of the ODS project's outcomes and innovations. Finally, between those two groups there is a "grey" area that includes those key stakeholders that can act both as customers as well as potential collaborators. The ODS portal also offers also a special area for the affiliated partners.

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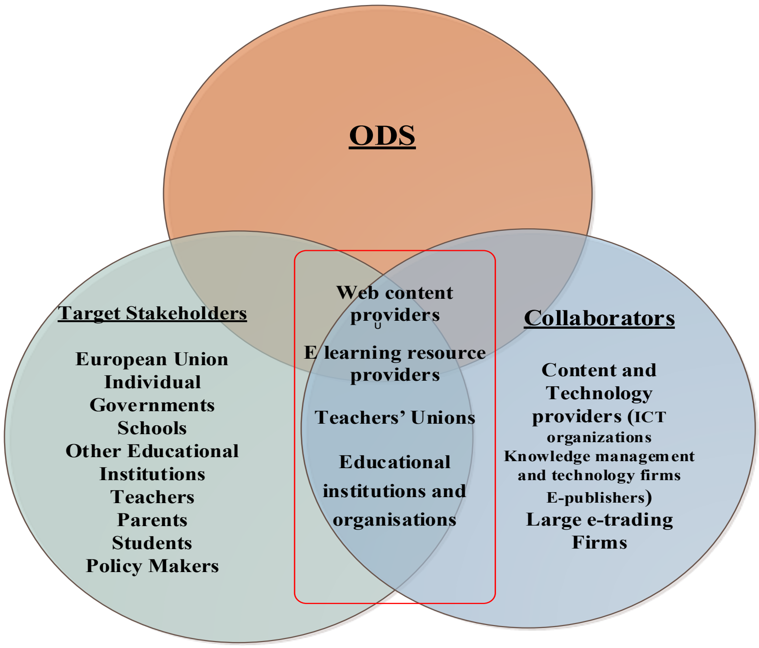

Figure 3. Key stakeholders and ODS relationship

The following step, after the afore-mentioned filtering of the stakeholders, involved their profiling identifying roughly their main interest and motivation and what the ODS portal will offer to address their requirements.

Description of the "customer-type" key stakeholders

European Commission

European commission is one of the most important and influential key stakeholder for the project, along with teachers and teachers' communities and networks, since it is willing and motivated to provide support in order to exploit further the advantages of a successful portal and long term sustainability beyond its funding. European Commission has an interest in the portal since it will enhance and unify education processes in a pan-European level. The source of this motivation is the improvements, enhancement, opportunities and the options that the ODS will provide to European education -enhancing its flexibility, efficiency and, specifically providing (in the future) better educated human capital resources.

Individual Governments and Ministries for Education/ policy makers

Individual Governments, Ministries for Education and Policy makers are also key stakeholders for the ODS project with high power over the project outcomes and very high interest on the project's outcomes. Governments will have mainly the role of a demand factor using the new portals in a more institutionalised manner wanting to provide better education towards the improvement of the "societal welfarism" of their citizens.

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Parents, Parents' Communities, and students

Parents and students are on the demand side of the stakeholders involved. They want to have access to a wide range of constantly- updated, educational materials presented in a user-friendly environment. It will be useful for them the proposition of relevant material and the access to premium content.

Students and their parents can support the ODS portal by using, and reusing, the portal's content as well as by evaluating and continuously providing feedback regarding the content and the functions of the portal. As more and more students will use the portal and exploit benefits from it, the portal will become more and more popular, resulting in it being more attractive for organizations, content providers, and technology developers who will want to share, market and advertise their own educational material and activities. Moreover, as the students and the parents (along with the teachers) will be the day-to-day users of the ODS portal, their feedback on the functionality of the portal and on the identification of potential bugs, errors or harmful material will be vital.

Description of the ODS potential collaborators

ICT organizations, Knowledge management technology firms and e-Publishers

The organizations that develop information and communication technologies or organizations that are active in Knowledge management by identifying, creating, representing and distributing knowledge, have the infrastructure, the experience and the market share to produce products and services competitive to the ODS outcomes. ICT organizations in cooperation with knowledge management firms, web content providers and e-publishers will offer competitive products to the ODS project's outcomes. Moreover, Knowledge management technology firms in cooperation with ICT organizations can provide E-learning portals using their vast knowledge databases.

Moreover, e-publishers will provide their content to the ODS portal either in the form of free content or premium content provided to the users charging them a fee. They will also have a great opportunity to expand their business against the traditional publishers. Similar to the web-content providers, e-publishers have also the advantage of promoting and advertising their content as well as financial benefits from the premium content. They will exploit further the educational content distribution channel that the ODS portal will create. Large e-publishing organizations might develop, in cooperation with web content providers and ICT organizations their own portals, to promote, share, and market their own educational material.

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Training software developers

Training software developers although focused on the development of portal to make more efficient the training of employees in specific sectors, have the required knowledge, experience and resources to provide broader educational material and create products competitive to the ODS portal.

Description of Stakeholders that can act both as customers and as potential collaborators

Web content providers and other relevant stakeholders

Web content providers, ICT organizations, knowledge management technology firms, as well as web content management firms and providers, are the business actors from the side of support as well as from the side of the demand of the project's outcomes and they can also act as possible collaborators. They can support the portal providing content under a form of a contract or formal cooperation in form of memorandum of understanding (MoU). The web content providers have the advantage of promoting and advertising their content as well as financial benefits from premium content that the users will have to pay for. In order to have access to the resources and exploit further the educational content distribution channel that the ODS portal will create. Web providers except of ODS portal collaborators can also be in the side of the competition acquiring the knowledge needed to build similar types of portals.

E-learning resources providers

They will provide their content to the ODS portal either in the form of free content or premium content provided to the users with a fee. However, they will develop in cooperation with web content providers, e-publishers and ICT organizations their own portals to promote, share, and market their own educational material.

Educational organizations/Schools and networks

Educational organizations/Schools are the target stakeholders of the portal. A number of 2000 schools in almost 23 European countries will be engaged in innovative eLearning ODS practices and outcomes validation processes. ODS consortium will implement the project activities in 600 schools during the school year 2013-2014 (September 2013 – April 2014). The implementation will be in the following countries: Greece, Netherlands, Finland, France, Germany, Austria, Italy, UK, Portugal, Latvia, Estonia, Lithuania, Belgium, Ireland, Spain, Croatia, Cyprus, Bulgaria, Denmark, Turkey, Poland, Hungary, Romania and Serbia. Moreover a large-scale-validation phase, will take place during the school year 2014-2015 involving 2,000 schools all over the Europe. Some of these organizations might be appear later on as a possible competitor by creating their own similar types of portal with the cooperation of web providers and e-publishers.

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Teachers and Teachers' Communities

Open Discovery Space is a project that is targeting its community towards various stakeholders of teachers, teacher trainees and curriculum developers. Overall, the aim of the Open Discovery Space consortium is to mobilise 10,000 teachers and 40,000 students in the framework of the proposed activities (requirements elicitation, implementation and assessment, validation), from start to implementation phase of the project.

Teachers, Teachers' communities, networks, associations and other professionals involved in the learning procedure have an active role contributing to the learning material of the portal as well as evaluating it. Especially teachers and teachers' communities will offer the most, since teachers are the key players in the modernisation and continuous improvement of education. As a result of collaboration Teachers, Teachers' Communities, networks and associations can put pressure on the educational institutional to obtain and adopt new technologies, resources, applications, methods and materials in order to enhance their educational purpose. Among other methods, being part of a network allows them to improve the quality of their teaching and exploit further the educational content distribution channel that the ODS portal will create, supporting their motivation and satisfaction. ODS consortium aims that teachers coming to the trials will learn and understand resource-based learning and scenarios.

Relationship between the ODS service and the Stakeholders

Figure 4 shows the relationship between ODS and its stakeholders. This relationship diagram is very important for ODS consortium to manage its stakeholders closely. The thicker lines represent stronger relationship with these stakeholders in a matter of support, dependency and influence while the thinner lines represent a weaker relationship.

The key stakeholders relationship diagram showing – the European Commission, the individual governments and education ministries, the schools and other educational organizations and finally the teachers and the students. The teachers are the main targeted group as this project aims intends Open Discovery Space to be a project that is targeting its community towards various stakeholders of teachers, teacher trainees and teacher curriculum developers. These creates a bidirectional dependent relationship between the ODS services and the stakeholders that act as sponsors, promoters, customers and feedback providers.

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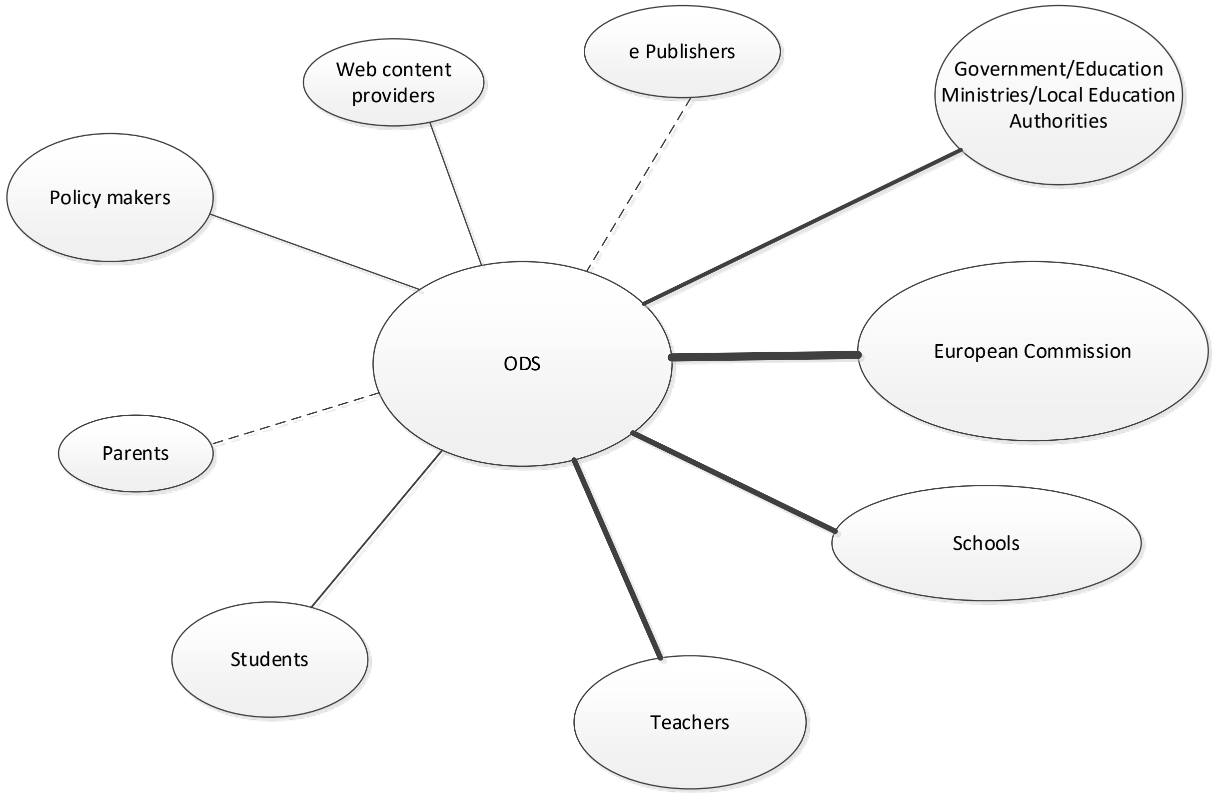

Figure 4. Relationship Diagram between the ODS service and its stakeholders

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Stakeholders and collaborators identified interests, barriers, and motivation factors

The Table 1 below presents the identified stakeholder's interests barriers and motivations based on SWOT analysis results and user requirement surveys.

Table 1: Stakeholder's interests barriers, and motivation factors

Stakeholders and Collaborators	**Main concerns and barriers**	**Main interests and motivation factors (What each stakeholders/collaborators want from ODS and what attracts them)**
European commission	- Enhancing flexibility, efficiency, usability and specialisation by providing a Pan European Education system. Challenges associated with different educational and cultural barriers applied in different European countries. - Difficulty in dealing with many stakeholders' to address their individual requirements. - Challenges related to the massive adoption and diffusion of such web portal in the formal/ informal, non-formal education, state/private education and lifelong learning education.	- The use of an E-learning portal, that will facilitate and enhance the sharing of educational material amongst all European schools aligned with EU educational policies and goals. - ODS is a portal that interconnects schools and teachers that helps them to co-improve: - There will be efficient dissemination and exploitation of the project's outcomes to all interested parties.
Government/Education Ministries and Policy makers	- Improving government's educational scheme for providing higher quality of education to increase the prosperous of human capital resource in the society. - Adopt the policies imposed by the EU - To make sure they are analysing the educational system properly and making the best decisions to improve it. - Difficulty of integrating different educational system and learning approaches applied across Europe - Challenges associated with different legislation schemes concerning education itself and the dissemination of educational materials in different European countries.	- To receive regular reports regarding educational system to update and improve their educational policies. - To ensure outcome of using this portal is aligned with EU/Local educational policies. - ODS is providing cutting edge learning tools to improve the educational system of the schools and learning outcome of students. - ODS portal is compatible with various educational systems of European countries. - ODS will provide policy makers with updated analytics and data from all schools. - ODS using its impact assessment tool will provide regular report to policy makers regarding its impact on schools, curricula and educational policies.
Schools	- To improve the EU/Local Government educational policies by satisfying the needs of their stakeholders (Students, Teachers, Parents and etc.) - Challenges related to the sustainability of updating portal. - To deal with the challenges will cause due to hard and soft structural differences (facilities and resources, etc.) that exists in state and private schools across the Europe. - Difficulties of building commitment and trust amongst schools to share their best practices regularly in their communities.	- To set up and share an efficient portal satisfying teachers' and pupil's needs and improve their educational outcome. - To ensure achieving continuous economic efficiency through the use of the ODS portal in their schools. - ODS provides a user-friendly learning portal which can satisfy the needs of users for different educational levels. - ODS will provide users continuous support.

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Teachers	- To Provide high quality teaching and assessment for students using modern educational and impact tools aligned with school's regulations and policies. - Difficulty to convince them to get involved and get their long term commitment to the portal. - Time restraints applying changing the teaching paradigms will be problematic at early steps. - Difficulties to build a trust among teachers to share and spread their teaching materials and experiences. - Difficulty of having systematic control to avoid copyright infringements of materials on the ODS portal	- To use an integrated educational portal in order to facilitate and improve their teaching and assessment methods to provide a higher quality of educational services to their students. - To enhance their ability to update their knowledge and skills using and sharing their experiences. - ODS is an updated sources of educational materials, content and repositories through a single E-Portal. - ODS provides an efficient distant learning environment with user's friendly features and tools. - ODS provides an interconnected E-portal for teachers and tutors across the Europe to share their best practices, innovation and scenarios. - ODS provides continuous on-line training support for teachers. - ODS using its impact assessment tool can provide regular report to teacher for their impact on learners.
Students	- To Receive a high quality of education using modern and interesting methods and tools in an environment that is conducive to learning and to be successful in the real world and be prepared for higher education and working environments. - Time constraint applies for convincing and attracting students to use this portal. - Using this portal might be distracting to younger pupils. The learning activities can drive them more to the game side rather than help them focus on their learning	- To use a distant learning service in order to enhance their educational efficiency, motivation and interest to their courses. - To develop meaningful relationships with their teachers and peers. - To involve who the data collected from the ODS portal making decisions that affects themselves and their schools. - ODS is an efficient distant learning environment with user-friendly environment and fascinating features for students from different educational levels. - ODS provides updated educational material according to their interests supervised by their own teachers and schools and positively engage them. - ODS facilitates students studying method using modern tools and digital technologies and is compatible with common gadgets (Mobile phones, I Pads, tablet, etc.). - ODS provides students with continuous learning materials, scenarios and lessons.
Parents	- To make sure their children are receiving high quality of teaching resources and materials in a safe and world class educational environment under the supervision of qualified teachers and staff members - Difficulty to convince parents particularly in lower levels that using this portal will not distract their children from their study and will not waste their time.	- To increase their children's interest to their studies and enhance efficiency of their educational outcomes. - To make sure this portal will not distract their children from studies and materials uploaded in the portal are of high educational quality. - To receive regular reports from the school regarding efficiency of using ODS portal on their children's outcome. - ODS will bridge the gap among teachers and parents. - ODS can provide parents with a tool to personally monitor their children's activities.

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Web Content Providers and E-Publishers	- To increase their profitability and market share by emerging to the new market with different groups of customers. - Large number of advertisements could be distractive for users. - Difficulty of convincing users to reserve the publishers' copyright. - Difficulty of persuading users to buy the e-materials legally. - Due to the large number of providers, updating process and integrating all content in the portal would be complex or lengthy.	- To achieve long term profitability - To be reassured about the low risk of copyright. - To use the portal to expand their commercial activity in the emerging open education market. - ODS provides a portal with a large group of users to sell or promote their products, tools, technology and services. - ODS could enhance their brand loyalty by getting involving in a project sponsored by EU. - ODS provides stakeholders a categorised group of customers to find the best marketing method for each target market.

Stakeholders and collaborators engagement strategy recommendations

In order to effectively engage its stakeholder's, an organization/financial entity should open up their decision processes in order to become more sensitive towards the motives, interests and expectations of its stakeholders/collaborators (Jensen et al., 2013).

Having created the profile of the key stakeholders/collaborators, analysed their main interests, motivation and the relationship among them and with the project/organisation, the next step should involve the creation of a tailored engagement strategy to address their requirements.

E-learning content providers, ICT organizations, Learning Content Management Systems providers, knowledge management technology firms, Learning providers as well as web content management firms and providers, can support the ODS portal by providing content under a form of a contract or formal cooperation in form of memorandum of understanding (MoU). This will enhance the effectiveness of the portal with more complete and updated content which will also provide trustworthiness and usability. As it was afore-mentioned, Web content providers will have the advantage of promoting and advertising of their content as well as financial benefits from premium content that the users will have to pay for in order to have access to the resources and exploit further the educational content distribution channel that the ODS portal will create.

On the other hand, e-publishers can provide their content to the portal either in the form of free content or premium content to the users with a fee. They will also have a great opportunity to expand their business against the traditional publishers. Similar to web content providers, and e-publishers have also the advantage of promoting and advertising their content as well as financial benefits from the premium content. They can exploit further the educational content distribution channel and the other services on the same wavelength that the ODS portal will create.

More specifically, Web-content providers and e-publishers have a general interest in increasing their profitability and market share by emerging onto the new market with

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different groups of customers. While regarding their cooperation with the ODS portal will be interested to:

- Achieve long term profitability.
- Be reassured about the low risk of copyright.
- Use the portal to expand their commercial activity in the emerging massive open education market.

In order that the ODS consortium may engage these stakeholders in its activities and secure a long term cooperation and sustainability of the project, the ODS consortium is considering engagement strategies that derive directly from the aforementioned influence/interest analysis matrix (see Figure 4). As such, these strategies can be classified into two distinct groups, as it can be seen in the table below

Table 7: Engagement Strategies

Influence/ Interest Classification	**Stakeholders**	**Engagement Strategies**
"Players" High Interest & High Influence	EU, Governments / Education Ministries, Policy Makers	Provide an innovative OER portal with an active community of users, facilitating this way the change in behaviour regarding Open Education and Open Educational Resources Actively seek "collaboration" with these stakeholders so as to integrate their views and opinions but at the same time offer unique information about innovative OER content and information that could facilitate their policy making processes regarding OER adoption and Open Education "Empower" the stakeholders in this category to actively participate and proposed changes/enhancements/adaptations that may reflect the "local" dimension and/or culturally different parameter in the context of OER.
"Subjects" High Interest & Low Influence	Schools, Teachers, Parents, Students, e-Publishers, web-content, software and technology providers	To provide an active portal with a large community of users so that it creates a "network effect" for individual users to participate. "Empower" individual users to actively participate, contribute and propose changes for the continuous enhancement of the ODS portal To provide an active portal with a large community of users so that it creates an "appealing" online marketplace for commercial providers (content and technology) to sell or promote their products and services. To integrate analytical tools in the portal for content providers and publishers to obtain information and feedback (user analytics) about what customers are buying and determine how to adjust their technology, marketing and product mix to spur continued purchases. To introduce conversation and mapping tools for providers and publishers to discover what customers are saying about them, no matter if it is positive, negative or neutral. These tools will also let ODS clients to identify the most important influencers in the Web 2.0 realm. To promote the view that the ODS portal will enhance their brand strength and their customer loyalty since these providers will actually get involved in the outcomes of a project sponsored by EU and promote more these indolent to attract more customers. To provide copyright protection for the material broadcasted through it, and promote the content of the individual users/creators (i.e., teachers, etc) as well as content and technology providers. To provide membership which enable them to sell the e-learning resources, software, and tools which are not freely available but are cost effective.

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Conclusion

This study found that the a key success factor for every eLearning portal and OER initiative in order to be sustainable and successful requires the identification of its key stakeholders and collaborators and address their needs, requirements and identify ways that they can overcome the barriers that they may have. Stakeholders, collaborators and customers have an important and decisive role in the success of any project and online portal, since their requirements, interests, motivations, and satisfaction are important factors for development and sustainability of the project. The identification and analysis of the key stakeholders, customers and collaborators has a key role for the success of the project implementation as well as in the design of the project business plan and marketing strategy (Bryson, 2004).

In the context of OER, sustainability is closely linked not only to the financial viability of the initiative, but also to the identification and analysis of the key stakeholders' needs and requirements as well as the ways to fulfil them. This has a significant impact on the growth and expansion of the project community and thus the sustainability of the project. Our analysis of the ODS portal, which aims to offer a pan-European, multilingual and innovative E-Learning service provides evidence that the identification, engagement and collaboration of stakeholders such as teachers, parents, students, webinar management service providers and e-publishers in relation to the portal's content, technology and software, is instrumental for the success and long term sustainability of the project.

The proposed stakeholder and collaborator analysis framework includes the most basic and important steps in the development of a stakeholder/collaborator analysis and engagement strategy, starting from the identification of the interests and motivations of the stakeholders, moving towards an analysis of their relationships with other projects and organisations, and concluding with the creation of a tailored strategy to exploit the best outcomes from them.

Finally, a comprehensive characterization of every stakeholder and their role in relation to the ODS portal will be used as the foundation of enhanced communication mechanisms among them, which will provide further benefits and will prove vital for the long-term sustainability and exploitation of the project's outcomes.

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Acknowledgement

As members of the Open Discovery Space EU-funded project, the authors gratefully acknowledge the financial support of the European Commission. The Open Discovery Space project is funded by grant No. CIP-ICT-PSP-2011-5, Theme 2: Digital Content, Objective 2.4: eLearning Objective 2.4.

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DISTINCTIONS BETWEEN COMPUTER SELF-EFFICACY OF PUPILS AND TEACHERS IN ELEMENTARY SCHOOL

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Abstract

The aim of this study was to establish whether there are differences between the computer self-efficacy of pupils and teachers (N = 507) in the context of the classroom, as a developing workplace of the teacher in elementary education. The survey covered 184 teachers and 323 pupils in elementary school. The results show that there is no statistically significant difference in the Basic Computer Skills dimension. In other words, both pupils and teachers assess their own self-efficacy in Basic Computer Skills equally. Further, the results show a statistically significant difference of the medium effect size in Media-Related Skills. In other words, pupils assess their self-efficacy in this dimension higher than the teachers. The results also reveal a statistically significant difference in the medium effect size concerning the self-efficacy dimension of Web-Based Skills, i.e. the pupils' assessment of self-efficacy in the skill of internet use is higher than the teachers' assessment of self-efficacy in the same area. The results also show that pupils generally assess their computer self-efficacy more highly than the teachers do, which may be explained by the fact that these pupils are digital natives, belonging to what is known as the Net Generation, while their teachers are known as digital immigrants. This paper explains the implications of these results for modern multimedia student-centred classes, and the role of the pupil and teacher in such classes.

Introduction

The workplace of a teacher in primary and lower secondary education (in state and private schools, or as a tutor) is specific in terms of the use of new media (new digital technologies). What is specific is that today's teachers organise the classes where pupils who were born in the new digital multimedia environment learn. Prensky (2001) calls these generations of pupils digital natives, also recently identified as the Net Generation (e.g. Tapscott, 1999; Dziuban et al., 2010). Due to the characteristics of the multimedia environment in which these pupil generations were born and their informally developed competences in using the new media, these generations require a significantly different organisation of classes. These pupils require active methods of learning, and pupil-centred classes where they construct their own knowledge by interacting with the environment. In these kinds of classes, the teacher acts as a facilitator of the pupils' activities and the co-constructor of their knowledge. The significance of modern pupil-centred classes is that they are organised, among other things, with the help of new media. This justifies the comparison between the teachers' competence in using new media and that of the pupils of the Net Generation. This is pertinent given the fact that some teachers have a lower level of competence in using new media, which calls into question the possibility of organising classes that satisfy the needs of today's pupils. Therefore, lifelong learning has become highly significant for a teacher's workplace, especially when it comes to in-service lifelong learning *for* and *with the help of* new media. The teacher's workplace allows teachers to learn in parallel with their pupils when organising classes with new media. This type of lifelong learning (of teachers, but also of pupils) is defined as situated learning, which is explained by the situated learning theory.

Situated learning (Brown, Collins & Duguid, 1989; Lave & Wenger, 1996) which follows up on the postulates of activity theory (Engeström, Miettinenand & Punamäki, 1999; Leonyev, 2009) derives from the domain of constructivist theories of learning and is based on processes stimulating mainly informal and active learning, i.e. constructing learning. In line with this, learning is viewed as a social process of (co-)construction and reconstruction of knowledge in a social (cultural and historical) and physical (multimedia) environment. In addition to being an excellent framework for explaining lifelong learning (among other places, also in the workplace), situated learning is also significant from the new media aspect, especially when it comes to social media (generally, Web 2.0) (McDougall et al., 2010). New media require the user to be active, to research, to communicate and manipulate objects, etc., which are some of the elements of situated, or (socio) constructivist, learning. Situated learning is a learning process that appears simultaneously in work-related situations (e.g. in the workplace) where the learned abilities, values, skills and knowledge must also be applied (Brown, Collins & Duguid, 1989). Collins (1988, p.2) defines situation learning as:

> *"the notion of learning knowledge and skills in contexts that reflect the way the knowledge will be useful in real life".*

One of the main features of situated learning is participation (Lave & Wenger, 1996), and what is known as a community of practice. This shows that situated learning is a learning process where, by applying what has been learned in real-life situations and by interacting with the social and physical (multimedia) environment, one learns and simultaneously applies what has been learned. The application of what has been learned activates new learning. Thus, a person (teacher) in his or her learning (work) process becomes what is known in didactic theories as a reflective practitioner (Appleby et al., 2010), which is one of the specificities of the teaching profession and the classroom as the teacher's workplace. According to Herrington, Oliver and Herrington (2007), learning situations are those that:

1. provide authentic contexts that reflect the way the knowledge will be used in real life;
2. provide authentic activities;
3. provide access to expert performances and the modelling of processes;
4. provide multiple roles and perspectives;

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5. support collaborative construction of knowledge;
6. provide opportunities for reflection;
7. provide opportunities for articulation;
8. provide coaching and scaffolding; and
9. provide authentic assessment. The teaching process, as a targeted and joint activity of the pupil and teacher, possesses all the above-stated characteristics of situated learning.

What has turned out to be significant in the context of teachers' lifelong learning in the workplace with the help of new media is also their motivation, which is affected by their perception of their own computer self-efficacy. Computer self-efficacy may also be significant for teachers in view of the fact that they work with children of the Net Generation who were born in the multimedia environment and have very highly developed competences in using new media. In the context of situated learning, as an operative form of lifelong learning, computer self-efficacy is a very important factor for teachers since they learn, among other things, also in collaboration with their pupils with the help of new media.

Computer self-efficacy

What is significant for using new media at work (in this case, in class) is the very decision to organise learning with the help of new media. According to Moos and Azevedo (2009), motivation also affects the decision to (successfully) use and learn with the help of new media. This motivation, among other things, expresses itself as perceived self-efficacy in using new media. In other words, when using new media to organise classes and learning, and in the workplace, what is important is (perceived) computer self-efficacy. The theory of computer self-efficacy is not completely original. It derives from Bandura's theory of self-efficacy (1977). Computer self-efficacy concerns one's own perception of the ability to use a computer in order to successfully perform a particular task (Murphy, Coover & Owen, 1989). The computer self-efficacy theory is also useful to explain the successful performance of work tasks, as well as learning with the help of computer technologies, because it is applicable in different social situations where people use IT, including in the workplace.

Thus, Hill, Smith and Mann (1987) were amongst the first to carry out research of computer self-efficacy in order to find the relation between computer self-efficacy and the decision to use a computer. The study was conducted on 304 pupils. The results show that higher computer self-efficacy is related to more positive and more frequent experience in using the computer, as well as with future more frequent use of the computer and other digital technologies. In the end, the authors conclude that the use of a variety of IT can be predicted through computer self-efficacy based on positive and frequent previous uses of the computer. Whitley (1997) obtained interesting results in a meta-analysis of computer self-efficacy and computer perceptions in the territory of Canada and the USA on a sample of secondary-school pupils on one hand, and university students and adults on the other hand. The results of the analysis showed that pupils in higher secondary education had a more positive affective perception of computers and a higher level of computer self-efficacy than university students

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and adults. Brosnan (1998) carried out a survey on computer-related anxiety and computer self-efficacy and their effect on the performance of tasks on a computer using a sample of 50 students in the UK. The results of the survey show that the lower the computer-related anxiety, the larger the number of resolved tasks; and the higher the level of computer self-efficacy, the more students are able to predict particular actions and control work on the computer. Salanova et al. (2000) carried out a study on the effect of the level of training for work on the computer and the frequency of the use of computers and computer self-efficacy on work burnout in Spain on a sample of 140 adults working on a job requiring the use of IT. The results show that better training in using the computer and more frequent use of the computer may be considered as predictors of a higher level of computer self-efficacy. Further, persons with a low degree of computer self-efficacy more often exhaust themselves in circumstances where they have to frequently use the computer. The results show that a higher degree of computer self-efficacy in jobs that require the use of IT may reduce the work burnout syndrome. Potosky (2002) conducted a survey on the perception of computer self-efficacy as an outcome of computer training in 56 respondents with specific knowledge and skills in using the computer at work, and their computer playfulness. The results show that a perception of higher abilities and knowledge of application is related to a higher degree of computer self-efficacy. Moreover, the results indicate that a higher degree of computer playfulness and a better perception of one's knowledge may be considered predictors of a higher degree of computer self-efficacy. It was also shown that respondents who express a higher degree of computer playfulness have a higher degree of computer self-efficacy. Deng, Doll and Troung (2004) conducted a survey on the significance of computer self-efficacy in new and unknown situations of applying IT on 153 IT engineers. They wanted to grasp the significance of personal autonomy, cooperative support and learning capacities in computer self-efficacy. Their further goal was to find out the relation between computer self-efficacy and intrinsic motivation in conjunction with the efficient use of IT. The result was that intrinsic motivation has a significant effect on computer self-efficacy in the successful resolution of tasks. Furthermore, a person's autonomy, his or her ability to learn (the ability to adapt) and collaborative assistance (the assistance of associates) also have a significant role on the application of IT in new and unknown situations to resolve particular tasks. This shows that computer self-efficacy still has a significant role in the use of computers and in resolving IT-assisted tasks, but this is not restricted to previous experience in using the computer, since there are also other determinants, such as personality traits, learning ability, ability to work in a team, etc.

These theoretical concepts and research results show that the nature of the teacher's workplace, i.e. the classroom, conforms to the postulates of situated learning. On the other hand, lifelong learning happens *in situ* at the workplace. As far as the teacher is concerned, this is the classroom where such processes of work and learning occur in cooperation with the pupils. In addition, it is impossible to view the modern organisation of Net Generation pupil-centred learning outside the context of the use of new media. Therefore, it is fair to compare the teacher's and the pupils' competence in using the new media, that is, their computer self-

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efficacy, which, according to the above-mentioned research, may be significant for the organisation of work (teaching in class), but also for the teacher's workplace itself.

Therefore, this research was conducted with the purpose of comparing computer self-efficacy in teachers and pupils in elementary school.

Method

Sample

The sample (N = 507) consists of elementary school teachers and pupils, including 323 eighth-grade pupils and 184 class and subject teachers in Croatia. In terms of the pupil subsample, there were 157 (48.6%) male pupils, and 166 (51.4%) female pupils. In terms of the teacher subsample, there were 23 (12.5%) male teachers, and 161 (87.5%) female teachers. A total of 73 (39.7%) teachers work in town schools and 111 (60.3%) work in village schools. In terms of their workplace, 66 (35.9%) are class teachers, 116 (63.0%) are subject teachers, and 2 (1.1%) work in extended stay programmes. With regard to their experience, it ranged from total beginners (0 years of work experience) to 44 years of professional experience, which gave an average of 15 years of professional experience.

Instrument

The computer self-efficacy scale (Teo & Ling Koh, 2010) consists of twelve manifest items. Each item was measured on a five-point Likert scale with (1= strongly disagree; 2 = mainly disagree; 3 = undecided; 4 = mainly agree; 5 = fully agree), made up of three latent factors. The Basic Computer Skills factor contained five manifest statements, the second factor, Media-Related Skills contained four manifest statements, and the Web-Based Skills factor contained three manifest statements. The instrument was constructed in such a way that it was decontextualised with regard to any individual digital device. An explanatory factor analysis of principal components was carried out, with saturation points exceeding 0.3, and by using the oblim rotation, with the aim of assessing the construct validity. Bartlett's test of sphericity amounted to 0.000, and KMO = 0.915. Three factors emerged as in the original structure of the instrument, which jointly explain 72.62% of the total variance. The Basic Computer Skills factor explains 49.27%, the Media-Related Skills factor 18.39%, and the Web-Based Skills factor 4.95% of the total variance. One statement from the Basic Computer Skills factor had a significant saturation in the Media-Related Skills factor. This shows that the instrument replicates the original factor structure on the sample of Croatian respondents in a satisfactory manner, although the original structure was used in the order and with a number of manifest statements concerning some factors according to Teo and Ling Koh (2010). Satisfactory reliability was achieved in all the factors. The Basic Computer Skills factor shows a reliability of α = 0.883 (M = 4.294; Sd = 0.900; min = 1; max = 5); the Media-Related Skills factor α = 0.880 (M = 3.011; Sd = 1.194; min = 1; max = 5); and the Web-Based Skills factor α = 0.779 (M = 3.143; Sd = 1.201; min = 1; max = 5).

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Procedure

The research was carried out from February to April 2013. Both subsamples filled in the survey questionnaire by using the paper-pencil method. The completion of the questionnaire was fully voluntary and anonymous.

Results

In view of the aim of the research and the structure of the applied instrument, the results are analysed in two steps. The first step consists of an analysis of the difference related to the overall concept of computer self-efficacy. The second step, with a view to obtaining results that are as detailed as possible, consists of an analysis of differences by each separate factor of computer self-efficacy. By applying the Mann-Whitney U test, a level of significance of $p < 0.01$ showed that there is a statistically significant small difference in computer self-efficacy (on the entire instrument) between pupils and teachers (U = 20318.50; p = 0.00, Z = -5.927; effect size r = 0.263). In other words, the pupils (M = 3.744; Sd = 0.916; Mean Rank = 283.1; Md = 3.91) perceive a higher level of computer self-efficacy than the teachers do (M = 3.287; Sd = 0.806; Mean Rank = 202.9; Md = 3.33). Descriptively analysed, although pupils assess their computer self-efficacy higher than the teachers, the arithmetic means show that both subsamples assess it as mediocre in general. With a further analysis of differences with regard to any latent dimension of computer self-efficacy, the following results were achieved. There is no statistically significant difference in the dimension of Basic Computer Skills (U = 27586.0; p = 0.169, Z = -1.374; effect size r = 0.061), i.e., pupils (M = 4.224; Sd = 0.954; Mean Rank = 247.4; Md = 4.6) and teachers (M = 4.409; Sd = 0.789; Mean Rank = 265.6; Md = 4.8) assess their own self-efficacy in Basic Computer Skills equally. Although there is no difference, the arithmetic means show that both samples assess their Basic Computer Skills as above average. A further result is that there is a statistically significant difference in the medium effect size in Media-Related Skills (U = 16013.0; p = 0.00, Z = -8659; effect size r = 0,384), i.e., pupils (M = 3.362; Sd = 1.129; Mean Rank = 296.4; Md = 3.5) assess their self-efficacy in this dimension higher than the teachers (M = 2.406; Sd = 1.043; Mean Rank = 179.5; Md = 2.25). The arithmetic means show that pupils assess their Media-Related Skills as average, while teachers assess themselves as below average. It also resulted that there is a statistically significant difference in the medium effect size with regard to the Web-Based Skills dimension (U = 17693.50; p = 0.00, Z = -7.610; effect size r = 0.337), i.e., pupils (M = 3.744; Sd = 0.916; Mean Rank = 291.2; Md = 3.67) see their self-efficacy in using the internet as higher than the teachers (M = 2.590; Sd = 0.806; Mean Rank = 188.7; Md = 2.67). The arithmetic means show a tendency for pupils to consider their Web-Based Skills as above average, while teachers consider their own Web-Based Skills as below average or average.

Discussion

The results show that in general pupils assess their computer self-efficacy more highly than the teachers, which can be explained precisely by the fact that these pupils are digital natives, also identified as the Net Generation, while teachers are what Prensky (2001) calls digital

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immigrants. These results are in line with the results of Whitley's (1997) meta-analysis, which indicate that younger generations, or pupils, show a higher level of computer self-efficacy than the older generations, or teachers. Therefore, this result is a fair one, especially since these pupils were born in a multimedia digital environment and have not experienced (lived through) the development and transformation of ICT and the multimedia environment in general. This transformation and the associated sudden changes may be stressful, which can explain the lower computer self-efficacy of teachers.

Naturally, these results must be interpreted cautiously, especially with regard to further analyses related to each specific dimension of computer self-efficacy. Thus, it shows that there is no difference between pupils and teachers in basic computer skills, such as searching for information on the web, using writing programs (e.g. Microsoft Word), using spreadsheets and displaying data (e.g. Microsoft Excel) and in using email. This result is justified by the fact that these abilities have become necessary for everyday life. The probable reason for both subsamples to assess these skills as average is precisely because these are regular (basic) computer skills.

On the other hand, the results show that pupils express a higher level of computer self-efficacy in the skills of using various types of computer software (Media-Related Skills), such as editing programs for designing websites, programs to make video and audio recordings, graphic design and animation programs. They also show that pupils have a higher level of computer self-efficacy than their teachers when it comes to Web-Based Skills, such as blogs and personal profiles on social networks (e.g. Facebook, Twitter), using video conferencing online programs (e.g. Skype) and online learning platforms (e.g. Moodle). Although account must be taken that these differences are not large, which is shown by the effects size, they are moderate. These results are explained by the fact that these are skills inherent to today's children in their everyday social communication and socialisation, which, to a large extent, takes place through new media. These skills are essential for the needs of today's children, and skills that Ito et al. (2010) consider "normal" for the children of today in their needs, such as friendship, play, work, family, intimacy and creativity. In other words, in order for today's children to satisfy their social needs, they also need these abilities. These arguments, as well as the complexity of use of computer programs and the internet, are possible reasons for pupils to consider that their Media-Related Skills and Web-Based Skills are higher than the same skills of the teachers, since they assess their skills as average, as opposed to the teachers who assess them as below average. These abilities are also used by pupils in the context of social media, which include activities such as playing, showing, simulating, multitasking, negotiating, networking, evaluating, etc., which are some of the features of the participating culture mentioned by Jenkins (2006), and it is precisely this participating culture, according to Lave and Wenger (1996), that is one of the key elements of situated learning.

A comment must be made about these results in that it should be taken into consideration that both pupils and teachers show a higher level of computer self-efficacy in Basic Computer Skills in comparison to Media-Related Skills and Web-Based Skills, which is shown by the arithmetic means of all subsamples. This can be explained by the fast development and changes of computer software and social media, which always require new and different user skills. These computer abilities have not been acquired by pupils in formal education, but rather by informal social participation in the multimedia environment, or situated learning. Therefore, in view of these results, it is justified to consider that today's pupils, as opposed to their teachers, generally show better abilities in situated learning with the new media, which is one of the key characteristics of the teacher's workplace (class).

Conclusion

The research shows that pupils in general express a higher degree of computer self-efficacy than their teachers. Teachers and pupils assess their self-efficacy in basic computer skills equally, since these skills have become essential in everyday life. Pupils show a higher level of self-efficacy in using special computer software and higher skills in using the web, since these skills allow pupils today to engage in social communication and socialisation, and they meet their social needs, which confirms they have the characteristics of the Net Generation. It follows that the teacher's workplace (class) in terms of the multimedia (learning) environment includes the organisation of the learning experience for pupils who have identified themselves with the digital multimedia environment. Therefore, modern pupil-centred teaching also implies the organisation of teaching with new media. Since teachers in general show a lower level of computer self-efficacy, which according to today's research is significant for this workplace, the quality of teaching is brought into question. This sets certain challenges before teachers and their workplace in the form of lifelong learning and professional development. Teachers can achieve a high quality of teaching with new media by simultaneously learning how to use and by applying new media in organising classes, which takes place in the context of situated learning. These results also show that future teachers in initial training in teacher education studies have to be prepared to organise pupil-centred classes with new media based on the theory offered by multimedia didactics.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE USE OF A VIRTUAL LABORATORY AMONG SLOVENIAN PRIMARY SCHOOL CHEMISTRY TEACHERS

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Introduction

Teaching and learning chemistry is a demanding process because it includes abstract concepts and notions which cannot be seen or touched. The use of modern technologies offers assistance in overcoming this kind of difficulties since it enables visualisation of science phenomena which are too small (atoms), fast (electrons), abstract (forces) or immense (solar systems) for direct observation. Many studies show that the use of visualisation materials (physical models, analogies, animations, simulations, sub-micro presentations) enhances the understanding of chemical concepts. Chemical contents can be visualized by using a virtual laboratory which also enables the visualisation of the sub-microscopic world.

Slovenian primary and high school teachers are well aware of the importance of ICT use in their classes also due to the project Computer Literacy which brought computers much closer to students and teachers. However, the actual execution of ICT supported classes and their efficiency have not been studied jet.

A conceptual approach to teaching chemistry combines experimental work, problem oriented teaching methods and the use of the information communication technology with the goal to facilitate efficient learning and students' motivation on all levels of the learning and teaching processes. Visualisation of abstract concepts and a safe experimental environment are only two reasons which points in favour of the use of a virtual laboratory in chemistry classes. The goals of this contribution are (1) to analyze the use of a virtual laboratory in chemistry classes among Slovenian primary school chemistry teachers and (2) to identify potential limits and obstacles in its use. This kind of research has not been carried out in Slovenia yet.

New media and technologies are changing education

Information communication technology, multimedia and interactive elements of virtual simulation bring new possibilities and capacities for teaching by opening a new creative education world for students and teachers, and thus effect the transformation of education. The traditional educational framework which was limited by the size of the classrooms, laboratories and availability of the study materials in the past changed substantially in the last years. In a current dynamic social, production and service environment, traditional education methods are not sufficient anymore and, therefore, they are transforming into technologically supported methods (Balram & Dragićević, 2008; Špernjak & Šorgo, 2009). ICT supported instruction can be more motivating and enables the introduction of "animators" which contribute to more efficient and easier learning process. Instruction can be adapted to students' learning styles, and therefore maximise the students' abilities. The use of ICT enables inquiry-based learning and constructivist approach.

By using ICT, some educational goals are achieved faster and with higher quality which has a significant influence on long term knowledge (Rebolj, 2008). In the past, independent learning applications were used by teachers, whereas today the use of learning environments is increasing (Edwards et al., 2011). Besides general computer presentations, Mayer (2013) highlights five advanced learning concepts. These are: (1) animated pedagogical agents, (2) virtual reality, (3) games, simulations and microworlds, (4) hypermedia and (5) e-courses.

The use of experiment in education

One of the most important visualisation elements in chemistry instruction is certainly experiment. Experiment allows visualisation of abstract concepts, and therefore helps overcoming the gap between abstract basis of chemical knowledge and the ability of perception. The advantages of the real-world practical work are the development and training of experimental research skills and acquisition of practical knowledge about science or chemical concepts. Experimental and problem-based research instruction enables students to acquire the principles of experimental work: from planning experiments, collection, presentation and analysis of data to assessment of results and their integration with theory. Experimental work allows students to acquaint themselves with the properties of substances, develop safety measures related to hazardous substances and gain basic experimental skills. As a rule, experimental work should be included in every lesson (Glažar, 2006).

As experiment is an economic category, it should be performed with minimal costs and maximum effect. To achieve that, modern information technology (IT) can be of assistance by allowing the dynamic presentation of chemical concepts and phenomena in 2D or 3D environment with animation, simulation or interactively by using the combination of videos and symbols. The number of experiments carried out at schools is usually limited due to safety reasons, lack of adequate infrastructure and equipment, time and space limitations, and also due to the poor precision in the implementation of experimental exercises (Sokoutis, 2003).

Virtual laboratory

By introducing computers in schools, a useful tool for educational purposes and also laboratory work was acquired. In a laboratory, a computer equipped with interface and measure instruments is used as a tool for acquiring results. These working methods are called a computer-based laboratory. A computer-based chemistry laboratory enables easier data recording, analysis and tabular and graphical presentation of data.

ISBN 978-963-89559-7-5

Virtual reality technology represents an important technological progress which offers new forms of education. Its primary goal is to enable realistic simulations of chemical phenomena in completely immersive, interactive and three-dimensional virtual world. Simulation-based learning is an important learning strategy which adapts to the needs of modern students who have grown up in the digital world and are accustomed to visual learning. Simulations play an important role in education not only because they provide realistic models which allow students to gain experiences from the real world through interaction, but also because they provide safe environments where students are able to repeat procedures without any safety hazards.

The use of virtual laboratories in chemistry classes can facilitate the learning process and overcomes limitations that are typical for real-world experiments. A virtual laboratory enables observation, experimentation and also cooperation between students carrying out experiments. A virtual laboratory uses IT to presents the reality and copy the homonymous environment of the material world. Execution of expensive and dangerous experiments and observation of experiments that occur too fast or too slow in physical environment are the advantages of a virtual laboratory. Didactically efficient virtual laboratories allow for collaborative work. Students are able to affect the process of experiments, individually or in groups. They can render their parameters. Students should be offered the chance to discuss the results with each other and with the teacher. Experiments are an integral part of chemistry; however, the use of virtual laboratories offers an alternative educational approach which provides a valuable supplementary tool for distance teaching and learning (Georgiou et al., 2008).

Methodology

The purpose of the study was to describe the existing practice of Slovenian science and chemistry teachers with the focus on the use of a virtual laboratory in chemistry instruction. The study is based on a descriptive and causal non-experimental method of empirical pedagogical research. Questionnaires were submitted to primary school teachers who thought chemistry in the school year 2012/2013. The research is based on convenience non-random sample of 48 teachers from various parts of Slovenia.

The data was collected by online questionnaires. The online questionnaire links (https://www.1ka.si/a/25361) were emailed to science and chemistry teachers. The email also contained all the important information regarding the purposes of the study. The questionnaire was created using the free online survey tool 1KA. The data was collected in the period from May 2013 to August 2013.

The online questionnaire was created in accordance with the purposes of the study. It consisted of open-ended and close-ended questions; however, close-ended questions with verbal answers and answers by degrees were prevailing. The reliability of the questionnaire was ensured by the exact nature of the questionnaire instructions. The reliability of the

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questionnaire was determined by using Cronbach's reliability coefficient which confirmed the reliability of the instrument ($\alpha = 0,707$).

By conducting the questionnaire, we wanted to answer the following questions:

- What limitations teachers encounter when carrying out real experiments?
- How do they facilitate visualization, if real experimenting is not available?
- Do they use virtual experiments instead of real experiments?
- What limitations teachers encounter when carrying out virtual experiments?
- How many teachers included in the survey use the virtual laboratory Crocodile Clips Chemistry?
- Would teachers use virtual laboratory if there were no limitations?
- How often do teachers encourage students to use e-materials for studying at home?

The data was processed in accordance with the purposes and expectations of the study using the SPSS 17.0 for Windows. Tabular and graphical presentations of absolute (f) and percentage (f%) frequencies were used.

Results

As a rule, experimental work should be included in each lesson (Glažar, 2006). Our research focused on the reasons and factors which prevent teachers to carry out experimental work in each lesson. Figure 1 presents the factors which limits the execution of experimental work. It shows that the most frequent reasons are large departments, time consumption of experiments, lack of chemicals and inadequate experimental infrastructure.

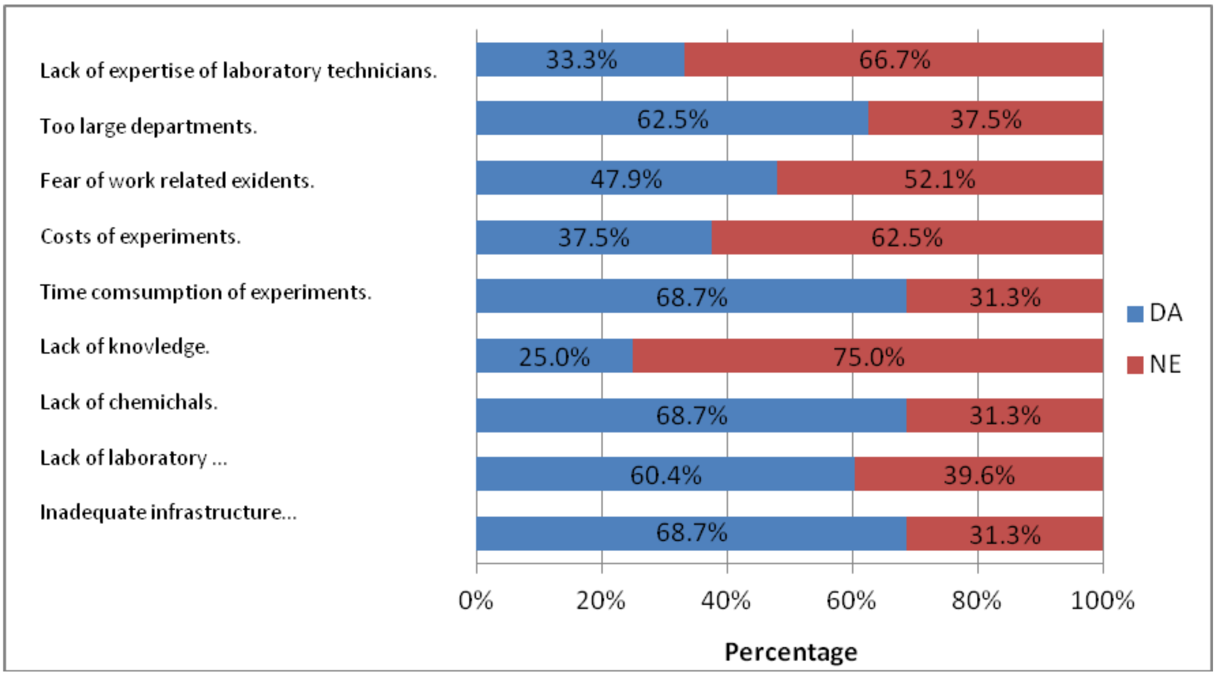

Figure 1. Factors that limit the execution of experimental work

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Inadequate infrastructure, lack of chemicals, the size of departments and time consumption of the experiments were the factors that limited the execution of experimental work the most. All these factors can be nullified by using a virtual chemistry laboratory. Therefore, we were interested if the teachers who participated in our survey use virtual laboratories instead of real laboratories? Table 1 shows that only one-fourth of teachers who participated in our survey (27.1%) used virtual laboratories in their classes. 72.9% of teachers who participated in the survey did not use virtual laboratory.

Table 8: Number (f) and structural percentage (f%) of the use of a virtual laboratory in classes.

The use of a virtual laboratory	**f**	**f%**
Yes	13	27.1
No	35	72.9
Total	48	100

Figure 2 shows the percentage of the factors that limited the use of a virtual laboratory. Most of the teachers (68.8%) were not familiar enough with virtual laboratories to use them for instruction, 41.7 of the teacher who participated in the survey did not possess the virtual laboratory software. 10.4% of the teachers stated that they did not have the required equipment, such as computers, projectors and interactive whiteboards, at their disposal. Their classrooms were not equipped with modern ICT. In this kind of schools, the alternative is the use of computer classrooms; however, one-fourth of the teachers (25%) stated that the computer classrooms were occupied and not at their disposal.

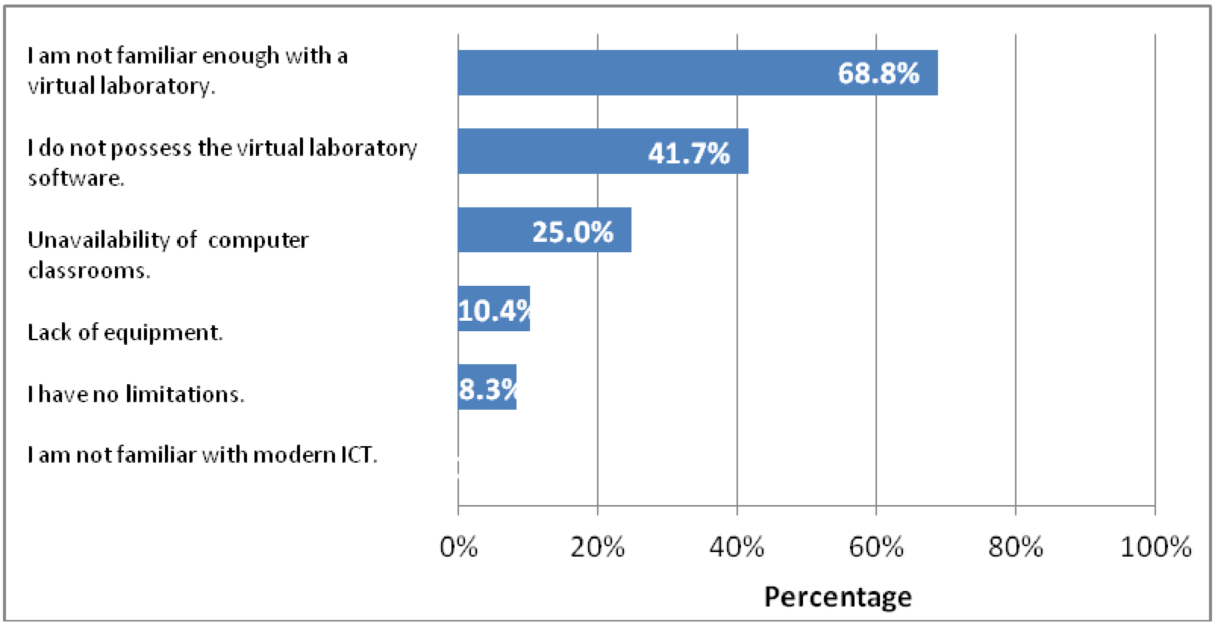

Figure 2. Factors that limit the use of a virtual laboratory

Figure 3 presents the methods teachers used instead of experiments which they were not able to carry out. Most of the teachers included in our survey (91.7%) used online videos instead of experiments. The second most frequent answer (62.5%) was the use of a picture, sketch, outline or photograph from textbooks or other sources. 56.3 % of teachers used CDs with videos of experiments. One-third of teachers used virtual interactive chemistry laboratory.

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14.6% of teachers who participated in our survey carried out an experiment in a virtual world by using a virtual laboratory.

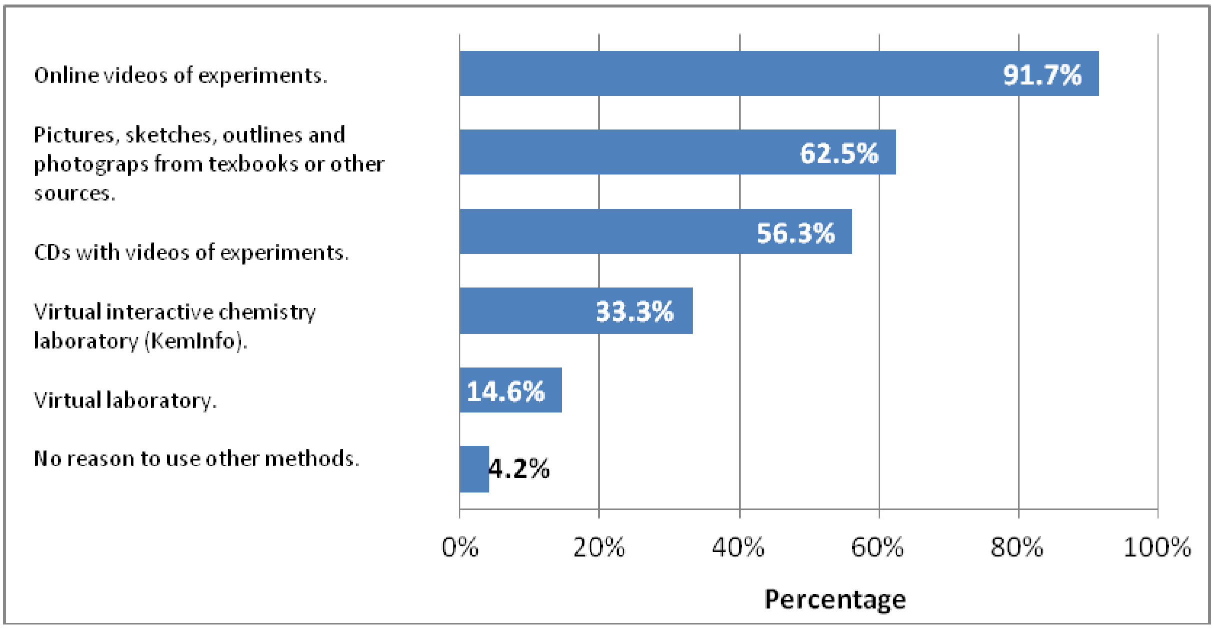

Figure 3. Methods used instead of experiments

To the question about hypothetical use of a virtual laboratory, if the before mentioned factors that limit the use of a virtual laboratory were absent, 81.3% of the teachers answered positively – that they would use it.

Crocodile Clips Chemistry is the software that enables virtual experimentation. If schools purchase the licence, it is also available in Slovenian language. In Table 2 we present the use of the virtual chemistry laboratory by teachers included in our survey. The results reveals that only one-fifth (20.8%) of the teachers used it.

Table 2: Number (f) and structural percentage (f%) of the use of Crocodile Clips Chemistry

Hypothetical use of a virtual laboratory	f	f%
Yes	10	20.8
No	38	79.2
Total	48	100

Virtual laboratories are a useful supplementary tool for distance teaching and learning. There are a number of educational websites available to teachers and students which allow for independent e-learning. However, our study reveals that more than a half of teachers included in our survey (54.2%) rarely instructed students to use the above mentioned educational websites at home. 31.3% of the teachers often instructed students to use e-materials at home, one teacher always instructed students to do so and 12.5% of the teachers included in our survey did not recommend the use of online sources to students.

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Discussion

Experimental and problem-based research instruction represents the basis for achieving the goals of chemistry education. Inadequate infrastructure, lack of chemicals, large departments and time consumption of experiments are the main factors that limited the use of real experiments according to our survey. These factors can be nullified by the use of a virtual chemistry laboratory which allows students to work independently or in groups. By experimenting with virtual laboratories, students have a wide range of chemicals and tools at their disposal. Execution of experiments by using virtual laboratories is safe and fast, because we can omit the uninteresting parts of real experiments. Besides other educational goals, a virtual chemistry laboratory contributes to the understanding of chemistry concepts and phenomena, drawing logical conclusions and explaining the experimental results by using theory. For chemistry teachers, it is important that some virtual laboratories enable the presentation of chemistry concepts on all three levels, also the sub-microscopic level of particles, which enables students' conceptual understanding. Interactive simulations and virtual reality provide learning environments that encourage active learning. Studies have shown that the inclusion of visualisation and animation in learning process is one of the most efficient ways to motivate students to learn science (Barak et al. 2011; Barak & Dori 2005). Studies also suggest that the use of a virtual laboratory in chemistry instruction can lead to better learning achievements (Sun et al., 2008; Abdulwahed & Nagy, 2009; Rizman Herga & Dinevski, 2012). However, we would like to highlight that a virtual laboratory should be used as an additional teaching strategy only, and not as a replacement for real experimentation.

If teachers were not able to execute real experiments due to the above mentioned reasons, only 4.6% of them carried out an experiment by using a virtual laboratory. Over 90% of teachers in this case used online videos of experiments which allow students to visualise the phenomenon; however, they were not actively involved. Only one-quarter of Slovenian teachers used virtual laboratory in chemistry instruction. Software in Slovenian language was available for most of these teachers at their schools. They used virtual laboratory Crocodile Clips Chemistry. The rest of the teachers included in our survey did not use a virtual laboratory because they did not have the required software. 60.6% of Slovenian schools believe that the responsible ministry is not stimulating individuals and companies enough to create Slovenian education software (Gerlič, 2010). More than 80% of the teachers would use virtual laboratories, if they were available to them.

The use of virtual laboratories is mostly limited by the fact that teachers are not familiar with the software. Nearly 70% of teachers stated that they did not possess the required knowledge about virtual laboratories. However, it is important to stress the fact that science teachers are willing to improve their methodological knowledge for the use of information communication technology (Ferk Savec & Vrtačnik, 2007).) In the article "Stanje in Trendi Uporabe Informacijsko Komunikacijske Tehnologije v Slovenskem Izobraževalnem Sistemu", Gerlič (2010) states that teachers still lack subject-related didactical knowledge for computer use in instruction.

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Slovenian primary schools use mostly free software (Gerlič, 2010). There are a number of educational websites available to teachers and students which allow for independent e-learning. Free chemistry e-materials are available also in Slovenian language. Over a half of chemistry teachers included in our survey rarely instructed students to use e-materials, although e-materials enhance the efficiency of instruction and independent learning, especially through motivation. Students are motivated by media which they are familiar with and techniques which are proven to enhance memory and comprehension.

Conclusion

Information technology, multimedia and interactive elements of virtual simulation offer new forms of education. A virtual laboratory is a tool that enables independent learning, improved individualisation, differentiation and acquisition of generic and specific competences of subjects. The use of a virtual laboratory as an additional teaching and learning method allows for better acquisition of some education goals like (1) understanding of science concepts and phenomena, (2) derivation of logical conclusions based on the results of experimentation and (3) explanation of conclusions by connecting the experimental results with theory and integrating the three levels of science concepts.

The primary aim of the research was to determine the extent of the use of a virtual laboratory as an additional modern teaching strategy among Slovenian primary school chemistry teachers and which factors limited their use of a virtual laboratory. Online survey revealed that only one-third of teachers who participated in our survey used a virtual laboratory for instruction. However, when it was not possible to carry out real experiments, only a few teachers decided to use virtual experiments instead of real experiments. In this case, teachers preferred online videos of experiments.

We discovered that there are mostly two reasons for the lack of use of a virtual laboratory as an additional modern teaching strategy in chemistry instruction; firstly, the unavailability of free experimental software in Slovenian language (only a few teachers did not have hardware at their disposal) and secondly, according to teachers that were included in our survey, the lack of knowledge of virtual laboratories. Teachers feel they are not familiarised enough with virtual laboratories to be able to use them. Therefore we conclude that chemistry teachers still lack subject-related didactical knowledge for the use of virtual reality technology.

Teachers that participated in our survey are well aware of the fact that the use of a virtual laboratory brings new capabilities and capacities for chemistry instruction. They expressed interest and desire to use virtual laboratories. A successful instruction depends on teachers' personal willingness to use virtual laboratories; however, it will take time to achieve the level of the use of a virtual laboratory as an additional tool for everyday chemistry instruction comparable to the use of smart phones, tablets and similar technology by students. Students are more capable to use the IT then teachers; therefore, it is important to enable teachers to use the IT and allow them to acquire, upgrade and develop the required subject-related didactical knowledge.

ISBN 978-963-89559-7-5

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

THE CONSTRUCTION AND MANAGEMENT OF THE DISTANCE EDUCATION TEACHING PLATFORM SUPPORTED BY THE MOBILE TECHNOLOGY

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Desmond Keegan, distance education expert, introduced the concept of mobile learning to China in his lecture at the 40th anniversary of Shanghai TV University in 2000. Being the new stage of modern distance education, mobile learning is now transforming from theoretical research to practice. In the field of mobile learning, the development of the client application is gaining more and more importance now. According to the statistics in 2012, downloads and clicks of free Chinese educational applications in App Store were increasing, of which the year-on-year increase was higher than the game applications. It can be seen that the non-entertaining applications, like education and study, tend to be the mainstream of the Internet applications.

The definition of mobile learning

Mobile learning is usually translated as “yi dong xue xi” in China. Different researchers have different definitions for mobile learning and those definitions can be generalized as following,

1. Mobile learning is the extension and expansion of E-learning. Besides the features of E-learning, mobile learning also possesses the features of mobility, portability and has close relevance to learning situations. Learning will not be confined to the desk because teachers, students and devices are moveable.
2. The devices used for mobile learning are wireless devices (e.g. wap phone, smart phone, PDA, etc.). Usually, portable computer and desktop computer are not included.
3. Mobile learning allows mutual communication. Teachers and students can teach and learn at any time and place without the restrictions of time and space.

The construction of mobile learning platform

In order to learn about how the current learners understand the various media for mobile learning, how they use them and how they evaluate them, the author had chosen 100 students randomly in a university and asked them to fill in a questionnaire titled on how the learners use the mobile learning media.

The construction of network platform has become the tendency of development and the key point of initiatives in the coming years. The mobile learning network platform, based on the 3G technology, has become the platform with Chinese style in a broad sense after it integrated with the fully developed radio and TV network platform and Internet learning platform. This new platform is called *Three-Network-in-One* Platform.

1. The first network: radio and TV network platform. The upgrade of the digital TV has perfectly solved the problem of the follow-up of digital TV learning and the technical problem of quality assessment. The upgrade also fully manifests digital TV's advantages as following: large screen, no need to pay for the data traffic, and high popularity, thus promoting the development of on-demand channels of TV universities' learning resources. Learners can demand the video which they would like to learn on the exclusive channel set up by the cable digital TV network. The devices used for mobile learning are wireless devices (e.g. wap phone, smart phone, PDA, etc.). Usually, portable computer and desktop computer are not included.
2. The second network: Internet learning platform. The optimization of the Internet fully demonstrates its advantages as following, the reliability and availability of the Internet learning platform, the accessibility and traceability of resources, the wide coverage of the services, and the support of multiple terminals, thus improving the development of the education service platform which supports multiple terminals and many interactive modes. Through the Internet learning platform, learners can browse all kinds of teaching resources; teachers can supervise learner's learning progress, the number of on-line users and the login time; administrators can lead the teaching activities conducted by street-level schools and optimize the teaching, consequently obtaining the development as a whole.
3. The third network: the mobile learning network platform based on the 3G technology. The innovation of the mobile learning network platform exploits its following advantages to the full, i.e. the diversity of learning methods, the novelty of learning forms, the integrity of independent learning periods, the flexibility of learning place. The innovation helps to improve the mobile learning network platform which is based on 3G technology and features smart phone + tablet computer. Within the mobile learning network platform, learners can accomplish any study programs at any time and place by means of mobile phone terminal or tablet computer.

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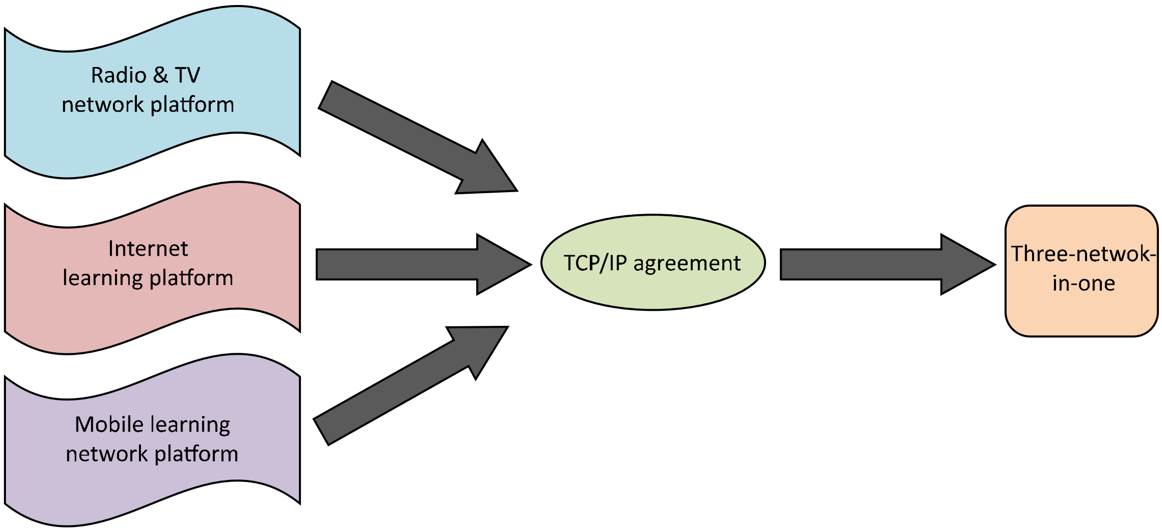

Figure 1. *Three-Network-in-One* Platform

The teaching management of mobile learning

The questionnaire mentioned above also enquires the teaching management. Presently, learners believe that the teaching management needs to be improved. The teaching management, Simultaneous Development of Seven Aspects, is different from traditional ones. The traditional teaching management mainly refers to the Three-Section, i.e. the face-to-face coaching which takes up one third of the planned hours of teaching, the multiple learning guidance which takes another one third and the self-study time which takes the last one third. The Three-Section teaching works at some time for it guarantees the smooth development of distance learning at its preliminary stage. However, this teaching management is still the one-way teaching method by which the teacher only imparts knowledge. The Three-Section is not the teaching which is individualized and independent in a real sense. The Simultaneous Development of Seven Aspects teaching management will replace the Three-Section because the former allows the interaction between learners and teachers and promotes the integration of teaching in a real sense.

Below is what consists of the *Simultaneous Development of Seven Aspects*,

1. The optimization of courses. The on-line courses for trial achieve most the highest click-through rate on the mobile learning platform. Therefore, the optimization of the courses is necessary, which means that we must develop the teaching resources in multiple ways on the basis of current digitalization and provide the most individualized and typical courses for the learners to download in multiple channels.
2. The streamlining of the instructional design. The design of the teaching procedure needs to be done according to the characteristics of the course. That is say, the teaching procedure needs to be modularized and the teaching activities within each module need to be specified. Learners can get to know about what they will learn, how long

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they will learn, in what order they will learn and what goal they will achieve once they login the Three-Network-in-One Platform. To make sure that the learners will accomplish their program in a more efficient way, they will not be able to study the next module until they finish the previous one.

3. The order-oriented management. The order management aims at the loose management of students. Based on the order management, we can supervise the students by dividing them into different sections and stages accordingly. The order platform can be used to supervise the teaching management in a comprehensive way and to implement the standard management, thus ensuring the carry-out of teaching procedures, promoting the cognitive activities for the students. Meanwhile, the teaching management will become more innovative, time-efficient, complementary to other teaching methods, and more adaptable. Consequently, a scientific quality system of open universities is established.
4. The customization of service. Education cannot be generalized due to the different knowledge of different learners, their study requirement, ability to accept new knowledge, and their goals. The Simultaneous Development of Seven Aspects requires the customization of service. Specifically, learners will be offered optional course guidance at different levels in a menu style, including the introduction of the course, the goals, learning materials, examinations and learning advice. This menu meets the need of the teaching management which is customized, diversified and aims at providing the learners with individualized service.
5. The independence of study. In consideration of the features of modern distance education, the way of learning is moveable, which indicates that there are no restrictions of time and place of study. Learners can handle their study on their own and teaching management will need to be done accordingly. The measures, i.e. the streamlining of instructional design, order-oriented management and customized service, prevent students from playing a passive role in self-instruction, self-supervision and self-evaluation. Meanwhile, they can help the students to supervise and evaluate their own study according to their own needs. Eventually, students will find out their own way to study.
6. The improvement of the teaching skills. What result will the learners achieve after they accomplish their study task depends on the teacher's instructions. Nowadays, distance education requires teachers to have more restricted control over the distance supervision. The teachers are required not only to be knowledgeable, but also be capable of helping the learners to supervise and evaluate themselves. Only when the teachers are qualified in every aspect can we build up an excellent teaching faculty.
7. The socialization of the teaching assessment. Teaching assessment is the comprehensive assessment on all aspects of teaching and it is the standard for evaluating the mobile learning network platform and teaching management. Therefore, it needs to be socialized. That means to build up an external quality control system

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where all the opinions and advice on the teaching quality are gathered and this system will be seen as the standard for teaching assessment.

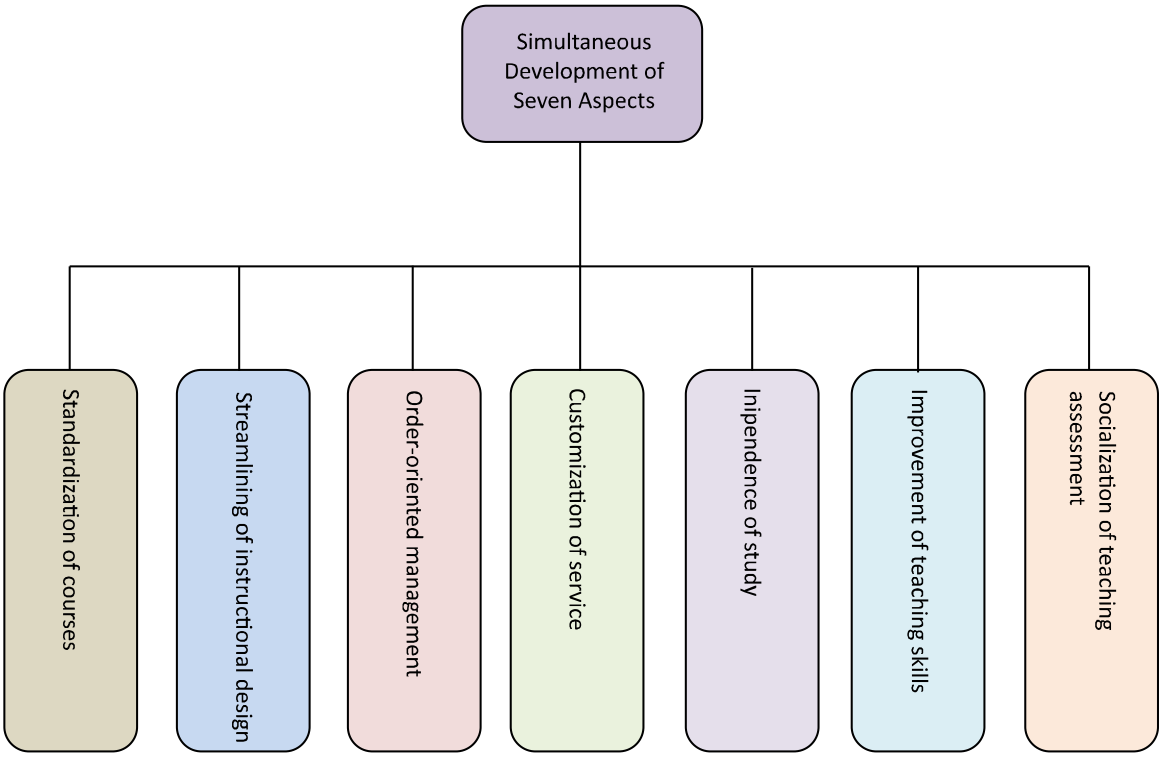

Figure 2. Simultaneous Development of Seven Aspects

Conclusion

The Three-Network-in-One has been flourishing in Western countries for over ten years, promoting the information industry significantly. Being at the preliminary stage of mobile learning, China still has some technical problems to be solved. For example, learners have some problems concerning the download of teaching videos on their mobile phones or PADs: large file sizes, long downloading time and inappropriate file format. The network condition and network fees are also the problems. Mobile learning cannot be done without good network condition or wifi. The learners, who have downloaded too many teaching videos or be on-line for a long time, will be charged large amount of fees because the charges are calculated by reference to data flow or on-line time. In addition to the technical problems, another reason for the slow development is the conflict of the interests of different industries. Both the telecommunication industry and radio and television industry have their own industry chains, including the Internet terminal devices and business modes. This conflict prevents people from taking real actions to construct the Three-Network-in-One platform.

Certainly, mobile learning has many advantages. The integration of the Internet business and the fierce competition within the industry have reduced the educational costs. The ways of study become more diverse and flexible and learning becomes more convenient and express. The construction of mobile learning platform and the teaching management that we discuss

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here are only the two branches within the mobile learning and further discussion is needed. As a way of learning, mobile learning will affect the modern distance education tremendously with its distinguishing features. With the constant improvement and application of 3G technology, mobile learning will play a more important role in its field.

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
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ISBN 978-963-89559-7-5

AN INTEGRATIVE QUALITY ASSURANCE FRAMEWORK FOR E-LEARNING CONTENTS AT THE NATIONAL LEVEL IN KOREA

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Introduction

Over the past decade, much has been studied about the content development of e-learning, and we are seeing various efforts to develop evaluation criteria that assure the quality of that content (Kim & Lee, 2010; Kim, Kim, & Lee, 2010). E-learning has become increasingly important in schools, universities, and work places in terms of rapidly spreading new technologies. The success of e-learning through Internet and Web technology has had tremendous influence all over the world. To create effective and successful e-learning, educators and e-learning designers must construct products and services with well-designed procedures and techniques under an educational and technological infrastructure (Colette, 2001). With the spread of e-learning markets and needs, educators and designers are concerned with assuring quality in e-learning contents before the products or services are adopted by learners, who expect a positive experience and results.

As of recently, guidance on assuring the quality of contents of e-learning is provided by the Korea Education & Research Information Service (KERIS), a national research institution supported by the government, who is taking a responsible role as a leading educational service provider regarding the use of information and communication technology in primary and secondary education. Since 1998, KERIS has developed various quality assurance systems for different services and contents, such as digital textbooks, open courseware (KOCW), a content sharing service in higher education, a cyber home learning system, EDUNET, and a distance training support system (KERIS, 2012). However, there has been an awareness of the necessity of an integrated and flexible quality assurance system that addresses the following issues: the need for different assurance programs for each service provided by the institution; the emergence and growth of new e-learning paradigms and technologies such as Web 2.0, Internet protocol television, and smartphones; complaints from small businesses who must develop contents based on the inflexible and restrictive criteria in the quality assurance process; and so on (Kang et al., 2008; Kim et al., 2010).

In this paper, we discuss our research framework of a quality assurance framework that is centred on the learners and developers. This work has given rise to the belief that an integrative framework for quality assurance is an influential and flexible means for examining the quality of various educational contents and services. It is in this way that an integrative framework can be used to deal with the issues above by providing prompt and plausible reflections on the change of content development and delivery technologies. The plausibility of the quality assurance framework can make it possible to contend with various conditions and circumstances in e-learning contexts.

Quality Assurance for Educational Contents

The definition of quality has evolved over time to address the nature of the term quality with a given product and with given circumstances (Hoyle, 2007). Recently, ISO 9000:2000 defined quality as "the degree to which a set of inherent characteristics fulfils a need or expectation that is stated, generally implied or obligatory" (Hoyle, 2007). If the product or service is not meeting a requirement to specific degree, it can be presented as having "poor quality." On the other hand, when a product or service meets the given criteria, it can be described as having "excellent quality" or "good quality" (Hoyle, 2007). So, how can we meet and maintain a certain quality in educational resources? How can we approach quality assurance in products or services with complex characteristics? The quality of educational products or services, as defined by KERIS, can be determined as follows: (a) there is a detailed criteria to evaluate the product or service; (b) the organization performs learner-centred activities; (c) the policies and systems of the institution are evaluated in terms of whether they can improve the quality of education; and (d) activities and efforts to improve the quality of education via the product or services are included. Quality assurance for educational contents can be divided into the categories of process-centred and outcome-focused. Process-centred quality assurance means that the whole process of content development is guided by improving the quality. Outcome-centred quality assurance means that a quality evaluation system is established in order to ensure that a product or service meets a satisfactory level before it is put into circulation in the domestic market.

User and Provider-centred Approach in Quality Assurance

With regard to the quality assurance of e-learning contents and services, the standards guide for quality assurance in terms of describing in detail the minimal and essential set of processes necessary for the delivery of quality products and services to users in terms of document the quality system elements to be implemented in order to maintain an efficient quality system (ISO 9000-2008). The recent trends in e-learning services and policies tend to pursue the user-centred design and development, which considers the target audience and its goals during the development of e-learning contents (Cho, 2009). This leads to greater satisfaction with the technologies, contents, and services (Cho, 2009). In many foreign countries, there is a global learning consortium – ISO/IEC JTC1 SC36, CEN, IEEE LTSC, ADL, ISO – that set specific standards. Within the organization, people can develop standards for both private and public sectors. According to KERIS, its members actively develop e-learning contents and services with a focus on enhancing the quality through a variety of criteria components, specifically needs analysis, instructional design, learning content development, teaching-learning

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strategies, interactions, evaluation, feedback, shared exchange, ethics, and copyright (Kang, 2009).

Study Phases

To develop an integrative quality assurance system for major educational contents, we followed a three-stage approach. First, we defined a possible research framework for the present study to integrate each quality assurance process and component in order to evaluate educational contents. In this stage, we conducted literature reviews for each service by KERIS as well as other possible technology services. In the process, we found common components and characteristics for each service. Second, we discussed and extracted core components to establish a standard for quality assurance; we allocated each component into a specific domain (including usability assurance, quality assurance, and technical assurance); and then we specified the comprehensive and relevant components. Third, we developed an integrative framework using the core components and examined how the framework can create a comprehensive understanding in most quality assurance processes in domestic and foreign countries with regard to e-learning services and educational contents.

Result of Study

We defined three dimensions to evaluate the e-learning contents in an integrative framework: usability assurance, quality assurance, and technical assurance.

Usability Assurance

One of the compelling paradigm shifts in quality assurance processes is to examine a product from the learner's perspective. Usability assurance is a key dimension in ensuring a learner's success. To examine the usability assurance, one should ask how much the content in the service can support the user's learning. In addition, usability assurance includes the satisfaction level of the user with the contents. Particularly, the user can participate in the usability assurance process along with content evaluators.

- Learning plan: identifying whether or not the service provides core components in learners' whole learning processes, such as needs analysis, or appropriate learning hours.
- Learning efficiency: identifying the moderating components toward learners' immersion in their learning, such as learning materials, learners' reflective activities, and learners' internal and external motivations.
- Learning convenience: identifying helpful items in the service system that facilitate learners, such as learning tools (dictionary, notepad, learning guidance, etc.).
- Learning satisfaction: identifying whether or not learners are satisfied with the tools during or after the learning process (includes needs analysis of learning activities, accessibility, and follow-up management, post satisfaction, and so on).

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- Learning outcomes: identifying how learners perceive the effect of the course after performing learning processes (expectation vs. satisfaction).
- Learning accessibility: identifying how well the learner can physically access learning contents, as well as how quickly the learner can access supporting tools (includes examining user interface, readability on images or texts, and content loading speeds).
- Learning communications: identifying components that allow for the exchange of opinions regarding learning activities between learners to contribute to the learning effects (i.e., person-to-person conversation tools, video chatting tools, bulletin board systems, resource boards, and so on).

Quality Assurance

Quality assurance is another key dimension in the integrative quality assurance framework; it focuses on securing minimum quality of a system's contents for educational purposes.

- Content development: examining any errors in the content, such as with content selection, content descriptions, the amount of content, and evaluation methods.
- Content development method: judging whether the developer for the content is using appropriate instructional design strategies, such as learning evaluation methods and specific development processes.
- Copyright: identifying appropriate copyright statements for the copyrighted works based on international standards.
- Ethicality: identifying ethnical biases or violent expressions, or identity theft including religion, location, ideology, gender, social class, and multicultural background.

Technical Assurance

This dimension encompass the standardized components for contents (e.g., metadata), and examines whether systems minimize errors when executing the contents.

- Metadata: identifying methods for providing metadata when the content is developed to increase usability with convenient content searching, such as through Sharable Content Object Reference Model (SCORM) and Korea Education Metadata (KEM2.0) standard.
- e-Portfolio: examining how instructors or learners can save their activities as well as system compatibility.
- General Web service specification: determining interactive Web services to enhance the interactive operations with different software and service providers.
- Learning tools interoperability: determining the possibility of interactive operations among different learning tools.
- Question and test interoperability: judging the interoperability and sharing between different evaluation systems.
- Integrity: judging whether or not the content is working well without errors.

ISBN 978-963-89559-7-5

Educational Implications

In this paper, we will present the reasons for the development of a quality assurance framework at the national level. There are various educational media systems within the learning management systems, which means that there is a tremendous amount of learning content. Based on the experts' opinions and literature review, we saw the necessity for an integrative quality assurance at the national level in Korea. The framework developed in this study is focused on the contents in the Korean education system and is based on a new information technology context. We believe that this paper will contribute to the design of a plan for e-learning quality assurance at the national level by presenting the following: (a) how to cope with quality assurance despite multiple assurance criteria and contexts, (b) the essential components to assure quality of e-learning and educational resources, and (c) how to design the framework in a way that integrates various quality assurance criteria and processes. This study will provide knowledge to educational decision makers, instructional designers, and other relevant individuals who want to design educational quality assurance systems in K-12 e-learning programs.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

QUALITY ASSURANCE FOR OPEN E-TEXTBOOKS – CASE OF "OPEN AGH E-TEXTBOOKS" PROJECT

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Abstract

The article presents the results of a survey measuring awareness of the academic teachers about Open Educational Resources in the context of the quality assurance. Authors present the assumptions for the open e-textbooks and their quality assurance mechanisms that have been planned and implemented based on the results of research in the project "Open AGH e-textbooks", launched in May 2013.

Openness in HE

The openness is an important feature of contemporary universities. Open Educational Resources (OER) allow universities to increase their potential for innovation that goes beyond the community of academics. Open education can decrease costs and makes knowledge truly accessible for all.

Open AGH: description of the case

Since 2010, when *Open AGH*, the first repository of academic OER in Poland was launched by AGH-UST, aforementioned benefits have been the driving force for development of the strategy towards opening up STEM resources in a more holistic way. Currently the successful project is coming to a second iteration – *Open AGH e-textbook* project.

The motivation for starting work on *Open AGH e-textbook* was twofold: on the one hand the growing number of visitors of *Open AGH* repository in the 2010-2012 period (more than 84,000 in 2010, and 494,000 visitors in 2012), on the other hand decline in the number of visits by 20% observed in 2012-2013. The reasons for the decrease, although not formally diagnosed but confirmed in non-formal observations, can be identified as the limited inflow of new content to the repository and the lack of support for mobile devices. Further analysis showed that the coherent structure of resources, ensuring the ability to use materials in different formats and flexibility in re-using of the content would be a desired direction of development.

Study of the academic community: a starting point

Designing phrase of the functional requirements for openness was predated by the survey of the academic community AGH. The study aimed to diagnose the state of awareness of the Open Educational Resources among the academics. The results would indicate the attitudes towards openness and thus the scope for the developments. Based on the results of the research, the assumptions of the *Open AGH e-textbooks* were developed. The priority was given to the quality assurance mechanisms for open e-textbooks, understood as the adjustments of the form and scope to meet the needs of staff and students at the technically-oriented university.

2682 academic teachers were invited to take part in the online survey, with the complete response rate of 25%. Respondents were interviewed about the notion of openness and their practice with Open Educational Resources. 46% declared recognition of the idea of OER. 35% presented fully formed attitude towards OER as they knew both the notion of open resources and examples of their implementation. 5 % of academic teachers were not able to assess their knowledge on this subject. It should be recognised that the three years that have passed since the launch of *Open AGH* repository and the development at this time other OER initiatives contributed to the increased knowledge of academic community at AGH about this trend in education.

AGH teachers were also asked about their knowledge on *Open AGH* repository. 40% of respondents recognised it, 21% had browsed materials published there, but only 4% of respondents confirmed using the materials for educational purposes. 13% respondents had experience in publishing and sharing their educational resources on the Internet. That is a group of potential ambassadors of openness at AGH who can promote the creation and use of open e-textbooks in the community. However, only 2% of respondents declared that they have published their own materials in *Open AGH* repository.

Relatively high percentages of people negatively evaluate their ability to interpret copyright law in the context of online environment (joint percent of 45% responses with "definitely" and "rather difficult"). Respondents declared many uncertainties about interpretation of Creative Commons license, especially about the use of resources for commercial purposes[1]. Such an attitude can affect the willingness to use and share digital OER.

A similar effect could be observed in opinion declared by 50% of respondents who believed that sharing own work on the Internet leads to reaping undeserved benefits (also financial) for individuals and institutions that have not taken such efforts. At the same time there is a strong belief (67%) that OER can increase the visibility of teaching. The contradiction of both opinions may be due to the lack of immediate benefits for academic teachers.

A key aspect of the study is the quality of open resources. The results of the survey showed that over 60% respondents recognise the potential of the quality of OER in three aspects:

[1] Open AGH is published on Creative Common Attribution – Non commercial – Share alike licence

ISBN 978-963-89559-7-5

improving the quality of teaching materials, improving the quality of classes and development of better curricula. Correlation of data to the level of OER usage in teaching (23% of respondents) and a very low percentage of use of the materials published in *Open AGH*, we can assume that the current materials are not fully adjusted to the needs of this academic community. In addition, closed formats prevent the free use of existing resources and their adaptation. It is more time-efficient to create material from scratch rather than take an attempt to adapt the existing resources.

There is a slight increase (about 5%) of the number of teachers declaring the use of OER in 2013/2014 (28% of respondents expect such actions) as compared to the last year (Kulpa, 2013). This indicates that attitudes toward open resources are established and embedded into teaching practice.

OPEN AGH – current development

The results discussed above become a point of reference for the design of the objectives for a new internal project *Open AGH e-textbooks*. The priority was to provide open formats and licenses, which would facilitate the adaptation of e-textbooks, and in turn contribute to their development.

The philosophy of open e-textbooks at AGH-US is based on the concept of the *flexbook* initiated by CK-12 Foundation (ck12.org). Textbooks and resources available on CK-12.org platform can be freely modified, merged and adapted to the new educational content. In a similar way a user will benefit from the Open e-textbooks AGH. A modular structure of the content allows connecting any modules in a learning/teaching path to fit the university's curriculum, consistent with the National Qualifications Framework.

Each academic teacher can develop an individual textbook corresponding to the programme/ a subject taught. The e-textbook can be shared online as a link or file, it can be also treasured online for further amendments. The content can be exported for adaptation (LaTeX formats ODF) to maximise the openness and re-use. Flexible creation of e-textbooks provides students with access to complete materials adapted to the scope of the subject. What is more, each student is be able to build own resource based on the available modules. This can be particularly useful for students from other HE where the curricula are different. Therefore the flexibility and modularity ensures widespread expansion of the content.

It is assumed that the development of *Open AGH e-textbooks* project will have a long-term impact on the target group. The university's authorities are willing to meet the expectations of the prospective students who are digital natives already and use digital content in a non-linear and interactive way.

An open licensing model was selected to put aforementioned assumptions into practice. *OpenAGH e-textbooks* are available without any restrictions under Creative Commons Attribution – Share alike license that guarantees an opportunity to adapt resources in order to

ISBN 978-963-89559-7-5

fit them to the local context (language, learning/teaching needs, culture etc.). The openness of high quality content would lead to the development of new resources available in an open way as well.

The open licence makes it possible to update and improve materials, allowing high quality e-learning components to evolve as users improve content and offer it back to the OER community. As there are still not enough of localised STEM-related digital resources this is an important asset.

Quality assurance of open resources

The results of the aforementioned survey showed that teachers at AGH-UST have high expectations for open resources, which can be considered as a prediction of a positive reaction for open e-textbooks. It can also be an indicator of how teachers understand its quality. With a large freedom of the use of modular e-textbooks AGH, it was crucial to work out the mechanisms that would guarantee not only the quality of the modules supplied by the authors (academic teachers), but also to ensure the maintenance of high-level content after adaptation as OER publicly available online.

The process of reviewing and editorial correction of e-textbooks is inevitably included in the project *Open AGH e-textbooks* as a well-established quality assurance practice. However, when planning the qualitative mechanisms it was required to focus on the development a framework for creation digital content, which would always be tailored to the curriculum. This assumption was considered as crucial for both teachers and students as opened e-textbooks AGH are and will be based on AGH's Syllabus, consistent with the National Qualifications Framework. Such a solution will always ensure the state-of the-art of the textbooks.

The implementation of this assumption involves the implementation of such a system functionality that would provide each academic teacher with a flexible creation of e-books from ready-made modules. AGH's Syllabus was integrated with the construction of e-textbooks. As a result, the teacher would be able to create his/her own e-textbook with existing modular content, reviewed already and approved by the subject's coordinator. Embedding e-textbooks AGH in the context of the broader university's teaching framework provides students with updated high-quality resources tailored to their needs.

According to Davis et al. (2010) inclusion of the target group in the process of creating resources translates into a higher level of trust and evaluation of the quality of resources. Engagement of the academic teachers in *Open AGH e-textbook* project may be expressed at two levels:

1. basic: it encompasses creating own e-textbook from modular components and sharing them online with students. In this case, the authors' e-textbook is published at *Open AGH e-textbook* platform and is licensed under the Creative Commons Attribution –

ISBN 978-963-89559-7-5

Share alike license as a valid teaching material for the selected faculty and a semester of study;

2. advanced: it involves downloading an e-textbook in open format (LaTeX, ODF) and re-use its content. In this case the content adapted is not published at *Open AGH e-textbook* platform. However, it has to retain the same license so as a result the pool of open educational content is growing constantly.

Teachers are addressed with open approach in both cases. They can choose the e-textbook mode for either already completed product or individual selection from pre-defined building blocks. They decide to what extent they want to get involved.

The target group of open e-textbooks AGH, in parallel to teachers, are students. The results of an American research in Tomorrow Project (edition 2010 and 2011) shows that students are willing to use e-textbooks that allow interactivity, are adjusted to curricular content, and allow for personalisation of the learning content. These features were included in e-textbooks AGH. Students as well as teachers can creatively adapt existing materials, create modules along such a learning path that will help them achieve the learning outcomes.

The release of the first trial e-textbooks in physics and mathematics is planned for March 2014. Whether qualitative mechanisms fulfil their task it will be visible in the next academic year. Full academic year is the optimal time to get teachers and students acquainted with the innovation. The impact of open e-textbooks will be the subject of further studies planned for AGH community in terms of attitudes and awareness about OER.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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ISBN 978-963-89559-7-5

COLLABORATIVE WORKPLACE: A CASE STUDY OF A HIGHER EDUCATION INSTITUTION

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Introduction

Creating, using, organising and sharing knowledge is the very foundation of any form of organisation – it has kept researchers and practitioners busy for hundreds of years and it will continue to be like this as long as there is organised work (Lelic, 2002). Many of us are now familiar with phrases like knowledge economy and knowledge workers. While the key to wealth creation was once ownership or access to capital or natural resources, this has now been joined by access to or the creation of information and ultimately – knowledge. Knowledge in any type of organisation takes different forms and, most commonly, one regroups these forms into three categories of knowledge (Baets, 2005, p.11): tacit knowledge is mainly based on lived experiences, explicit knowledge refers to the rules and procedures, and cultural knowledge is the environment in which the organisation and the individual (within the organisation) operate. More specifically, explicit knowledge is "formal, systematic language, the rules and procedures that an organisation follows" (ibid., p.59). This kind of knowledge can be transferred and therefore can be a subject of education and socialization. Knowledge Management Systems (KMS) deal efficiently with explicit knowledge. But, tacit knowledge is difficult to identify and to transfer. Deeply rooted in action, commitment and involvement in a specific context, it refers to personal qualities such as cognitive and technical elements inherent to the individual. Therefore, the experience and a good technical solution are key in acquiring tacit knowledge allowing an organisation (or an individual) to leverage its information resources and knowledge assets by remembering and applying experience (Watson, 2003). Constituent to knowledge management, collaboration is a key ingredient in enabling knowledge and learning, including informal learning and learning-while-doing, both taking place outside of formal settings like classrooms (Richman, 2001). This paper deals with collaboration and knowledge sharing tools in a specific working environment such as a higher education institution (HEI). After elaborating on needs for collaboration within HEIs in the second part of the paper, the third section deliberates on higher education processes that can benefit from comprehensive knowledge management solution, more specifically its collaboration functionalities. Fourth section presents Microsoft SharePoint as a very strong collaboration platform and details an ongoing effort of one higher education institution to make use of collaboration platform features in the form of a case study.

Collaboration and collaborative learning

Collaboration in the workplace

Learning and creating knowledge are both human and social activities that "cannot be separated from the people, groups and communities who, through conversation, continually re-create meaning and knowledge" (Richman, 2001, p.4). People, groups, communities or teams are a key aspect of collaboration and are just as important, if not more important, than technological solutions and underlying business processes. Workplace learning is not an alternative to knowledge management, but rather a composing part, or a complement. As argued in the conceptual chapters, knowledge management and learning go hand in hand and are in fact two sides of the same coin (Koopmans, 2005). Particularly workplace learning could be a good reinforcement of a more structured knowledge management approach. Often supported and promoted in organisational and educational settings, collaboration may entail a "series of behaviours, attitudes and results, including communication, information sharing, coordination, cooperation, problem solving, and negotiation" (Richman, 2001). Collaboration can result in three types of values Allee (2008).

1. Goods and services i.e. traditional value. Collaboration generates a traditional economic value by enabling new processes that lead to saving money. It is particularly important for the traditional value chain in industries that rely on (i) cooperation in R&D (e.g. pharmaceuticals) or (ii) creativity where product quality can only come from common efforts (e.g. design industry).
2. Knowledge. Collaboration may result in exchange of information of strategic importance, knowledge planning, design of cooperation, policy development etc. Knowledge is a social activity, and 90% of knowledge is "in our heads" while the only way to "get it out" is through cooperation with others.
3. Intangible benefits. Another outcome of collaboration (with a client, partner, student, etc.) may be some benefit that transcends the actual products and services – such as a sense of belonging to a community, customer loyalty, brand creation and social capital development.

Collaboration techniques combine different communication mechanisms and make good use of ICT preferably through well-organised, single interface. Consequently, they can also contribute significantly to knowledge transfer and knowledge creation activities (Bomemann et al., 2003).

Collaboration in educational settings

In educational settings, management i.e. integration of the learning resources and information becomes an even important task for the purpose of promoting learners' decision making activities and teachers' mentoring activities. Collaborative environment is expected to "facilitate learning activities for knowledge building and meta cognition through mutual understanding among learners" (Okamoto & Kayama, 2005, p.162). Educators are well aware that learning can be more effective if students activate and encourage one another in learning

ISBN 978-963-89559-7-5

activities. The creation of knowledge can be viewed as a social process. Sharing ideas and negotiating meanings affects not only the cognitive aspects of individual students but also the common cognitive aspects of the whole group that contributes to the transfer, negotiation and transformation of ideas (Solomon, 1993). That is how the new knowledge of the participants is created. Swift development of e-learning environments contributed to the renewed interest in understanding the process and nature of learning and redefining the objectives of education and assessment. A solid theoretical foundation for collaborative learning based on the description of cognitive development theory is described in Johnson and Johnson (1996) in particular from the Vygotsky's (1978) perspective. Notably, Vygotsky takes a behavioural approach to learning thus inspiring the most research in social interdependence theory. Positive social interdependence and collaborative learning include behaviours such as giving and receiving help, sharing resources and information, giving and receiving feedback, inciting and encouraging the participants, and sharing reflections on progress and learning process. Another, advanced level of collaboration in educational settings is collaborative review and assessment involving students, peers and tutors in thoughtful and critical examination of student's course work (McConnell, 2002, p.73). The effects of collaborative learning and assessment usually affect the increase in motivation and satisfaction with the learning process and are often promoted by today's technology enhanced learning environments of HEIs in particular.

Collaboration platforms for HEIs

New technologies can "upgrade" real-life situations where collaborative learning can occur. There are many motivators pushing collaboration technology development like distributed workforces, information overload, and getting products to market as quickly as possible, to name just a few (TRAINMOR-KNOWMORE, 2006, p.55). Collaboration tools (sometimes referred to as groupware) are an effective tool for knowledge dissemination because they allow employees to have access to all current as well as past information, regardless of their physical location (Tan et al., 2003). Collaboration technologies combine different communication technologies with other tools. Besides knowledge dissemination, they can contribute significantly to knowledge transfer and knowledge creation activities (especially in educational institutions!). Present-day workflow management systems support structured forms of collaboration, in particular knowledge maintenance while document management and content management systems play a major role in integrating content, since they act as a collecting point for all documented knowledge (Bomemann et al., 2003, p.22). Classification schemes are one way of organising this content while native search mechanisms facilitate knowledge transfer. In that sense information technology is an enabler of corporate/institutional knowledge. Knowledge-based companies such as HEIs depend on a good ICT infrastructure that acts as an effective channel for communication and collaboration. Knowledge management tools can be classified according to how they contribute to knowledge management models such as capturing and codifying knowledge; collaborative tools; creating knowledge; and sharing knowledge (Tan et al., 2003, pp.13-14). In order to support collaborative activities, the following functions are required (Okamoto &

ISBN 978-963-89559-7-5

Kayama, 2005, p.165): (i) offering the workspace of an individual and the workspace of a group, (ii) supporting mutual transfer data, information and knowledge in the workspaces, (iii) including various information media (libraries, applications, tools and so on) to the platform, and (iv) shared screen image / shared operation. Figure 1 gives a brief overview of the support that technologies can provide for knowledge management activities. It is clear that knowledge planning activities benefit least from ICT whereas ICT is particularly affective in knowledge transfer activities. ICT also provides sound support for knowledge integration and organisation. Collaboration technologies can make a major contribution to knowledge creation and knowledge transfer, in line with what has been presented earlier.

	Planning knowledge	Creating knowledge	Integrating knowledge	Organising knowledge	Transfering knowledge	Maintaining knowledge	Assessing knowledge
Communication technologies	1	3	2	1	3	1	1
Collaboration technologies	1	3	2	1	3	2	1
Document management	1	1	3	3	3	3	2
Adaptation and presentation technologies	1	2	1	3	3	2	2
E-learning environments	1	1	3	2	3	1	2
Content generation tools	1	3	3	3	1	3	2
Personal KM tools	1	3	2	3	1	2	1

Key:	
1	technology makes little contribution to this activity
2	technology can often support this activity
3	technology can make major contribution to this activity

Figure 1. Extent of support provided by IT for knowledge management activities (adapted from Bomemann et al., 2003)

Knowledge and intangible benefits are especially important in sectors like higher education where these are the only output from education-related processes. Students perform better on several dimensions when provided with online learning, collaboration and support (Clevenger & Santos, 2009). In terms of internal processes of schools and universities, in an ideal situation each employee would know which activities and tasks all the other members of the organisation were involved in and could align his/her own activities appropriately to meet common requirements (Bomemann et al., 2003, p.34). However, the larger the organisation, the more complex this process becomes. Maximum number of people with whom a person is able to cooperate directly lies between five and nine people (ibid). HEIs should cover at least three different levels of collaboration. According to experiences from American universities (such as Washington State University, St. John's University, etc.) it is possible to implemented three standalone instantiations of the same platform to cover the three levels respectively. For example, Red River College (2010) implemented: (i) CONNECT.RRC.CA, a collaboration platform for communication and collaboration with students where users can publish and share documents among students, publish schedules and assignments to students, facilitate and encourage discussion among students in one place etc., (ii) STAFFSHARE, a platform for

ISBN 978-963-89559-7-5

communication and collaboration of university's staff, work on projects, reporting etc., and (iii) AIRWEB, a platform for communication and collaboration with partner institutions and other stakeholders. Such a solution would have dual benefits: those that relate to teachers and other staff, and those that relate to students. A collaboration platform should provide students, parents, teachers, staff, and administrators with a single point of access to information and to technology resources. Based on examples of collaboration platforms in HEIs, it seems that a good fit to meet the collaborative needs of a school or a university would be a platform that empowers all types of users. *Teachers* should be able to store and collaborate on documents with other teachers and students; create classroom sites to provide students with access to instructional materials, activities, video resources, and more; view, update, and share student performance information; and view and update personal information. *Students* should be able to view class assignments, grades, or learning resources available on a classroom site; upload assignments and collaborate with classmates on projects; and access online educational resources and tools that may be available on the portal. Connection with *parents and the community* can be established through branded websites of the school or university; publishing and sharing information quickly and consistently from one place to multiple sites; and providing parents with passwords that they can use to sign in and view their child's class list, grades, or assignments or access guidelines, policies, and other important information. *Management and administrators* should be able to provide staff with a single point of access to commonly used applications; eliminate paper-based administrative processes by using the collaboration features and automated workflows to manage review or approval processes currently managed with paper-based systems; and improve collaboration and communication among teachers and administrators. With these functionalities as a sort of "wish list" for a full-featured HEI's collaborative platform we end the nonspecific presentation and continue with a showcase of well-known Microsoft's packaged product Office SharePoint Server that can be used in higher educational settings.

Microsoft Office SharePoint as a collaboration platform in higher education institutions

Microsoft Office SharePoint functionalities

Microsoft Office SharePoint suite is an integrated collection of server capabilities that can improve organizational effectiveness by providing comprehensive content management and enterprise search, accelerating shared business processes and facilitating information sharing. It supports six functional areas: collaboration, internal portal, enterprise-wide search, enterprise content management, forms driven business processes and business intelligence (Microsoft SharePoint website, 2013). As collaboration platform SharePoint provides a familiar and consistent user experience enabling a simplified approach to structured and unstructured information of an organisation and presents business-critical data in one place helping people make more informed decisions (Tisseghem, 2007). The solution helps teams (or workforces, departments) stay connected and productive by providing (Microsoft Corporation, 2008): collaboration and community; alerts, notifications, and RSS support;

ISBN 978-963-89559-7-5

integration with familiar Office applications; user interface and navigation; and collaboration application templates (e.g. Team site, Document workspace, Blank site, Blog, Wiki, different Meeting workspaces etc.). By far the most common usage of SharePoint in UK HEIs is for team collaboration (Lappin & McLeod, 2010). This sees SharePoint team sites replacing, or supplementing, network shared drives as the area in which staff collaborate on documents and share information with each other. In most of these implementations it is left up to each team or department to decide whether or not they wish to have a SharePoint team site, and to apply to the IT department to get one. This makes an interesting contrast with the standard implementation method for enterprise content management systems (ECM) and electronic document and records management systems (EDRMS). Most institutions rely heavily on shared drives and e-mail as the primary mechanisms for storing and sharing documents. While these solutions work somewhat effectively when dealing with moderate volumes of documents, they cannot scale to meet the evolving needs. On the other hand, SharePoint as a document repository can provide the required scalability in addition to document-level security, monitoring and reporting. SharePoint's rapid rise in HE sector can be attributed to several factors (ibid):

- The ease with which SharePoint can be procured: it is included in HEI Campus Agreement with Microsoft.
- Its provision of a wide variety of functionality including: content management for intranets and websites; collaboration sites for workgroups; workflow capability; and portal capability with single sign on and the ability to provide personalised content.
- The gap in the HE information environment: most HEIs have had content management systems in place for their teaching and learning functions (in the form of a Virtual Learning Environment – VLE) but did not have any such systems in place for their administrative functions, service functions or research work.
- Its empowerment of local users: this suits the federal culture of HEIs, where there is a greater degree of autonomy in faculties and departments than in the divisions of organisations in other sectors.

Implementing SharePoint in HEIs

There are many success stories related to implementation of the SharePoint platform in educational settings. Here, we present two quite different ones in terms of core functionalities implemented. The University of California at San Francisco (2010) needed an unusually large and sophisticated technology platform to support hundreds of researchers at more than 26 centres around the world. Project directors chose to base their public website, intranet portal, applications, and databases on Microsoft technologies from end to end. After eight months of implementation, final solution consisted of six applications accessed through a secure intranet portal. All components of the solution were web-based consisting of: (i) a public website to provide information about the project and to solicit volunteer participation as research subjects; (ii) a private intranet portal for researchers, which provided access to the applications, to the study's documents, and to collaboration tools; (iii) participant activity tracker applications that made it possible for each clinical site to track its participants' visits,

ISBN 978-963-89559-7-5

manage events and issues; (iv) a specimen-tracking system; (v) case-report form designer and data-collection tools; (vi) applications for EEG data collection and reviews by experts; (vii) central database repository providing data storage, validation and integration, and robust security; and (viii) a data warehouse through which researchers query the data. The University of Tennessee (2011) operates through four campuses and two state-wide institutes. Its IT environment was decentralized and diverse – the university was running its own systems for enterprise resource planning (ERP), as well as ERP systems from Oracle, SAP, and education-market providers such as Banner and Blackboard. It also hosted a variety of user directory systems. The variety of systems and services made it difficult to provide students with a single snapshot of relevant data. The SharePoint solution aggregates information and applications from back-end systems into a one-stop portal, and gives students, faculty, and staff single sign-on access to it all. Integrated actions ranging from settling accounts to registering for classes are all performed using the portal. Building on good practices and success stories similar to ones presented here, three important business triggers set off the implementation of the collaboration platform at one of the local institutions – Faculty of Economics, University of Split. These are:

- Need for a structured and automated workflow for collaborative preparation, publishing, approval and archiving the material for Faculty's Council (paperless) meetings. Workflow entails the approval process for publishing documents that improves efficiency by managing and tracking all tasks and recording process after its completion. It keeps people productive by providing easy access to shared documents and information to users who need them.
- Need for a comprehensive system for tracking career development of the staff. With the agreement on the new scientific strategy of the University of Split, the need for monitoring a range of information related to employee performance, specifically on their scientific work has been imposed to related HEIs. Except for purposes of reporting to the University, Faculty has to track professional development of staff primarily for the purpose of two constitute centres - the Centre for Scientific Research and Development and the Centre for Continuing Education, all in accordance with the quality policy.
- Need for teamwork support. Working on projects demands strong IT support in terms of allowing people to work together effectively, collaborate on and publish documents, maintain task lists, implement workflows, and share information through the use of various tools.

Upon decision that platform for internal collaboration should be set up and short evaluation period, the choice regarding the technical solution was to go with Microsoft Office SharePoint Server. The three business cases formed a good starting point for test implementation of the complex collaboration platform. Once the cases proved feasible, the implementation of other business process could be planned. At the moment the business cases served the proof-of-concept purposes and user testing is finalised. The implementation of full business scenarios is planned in the weeks to come. Several screen prints of the test environment are shown in Figure 2. Clockwise from top left arts of the platform are illustrated: workspace entry page

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with links to document and form libraries; adding an item to a library – tracking conference attendance; form in InfoPath for tracking a new publication in forms library; adding an item to a library – tracking lectures on other institutions.

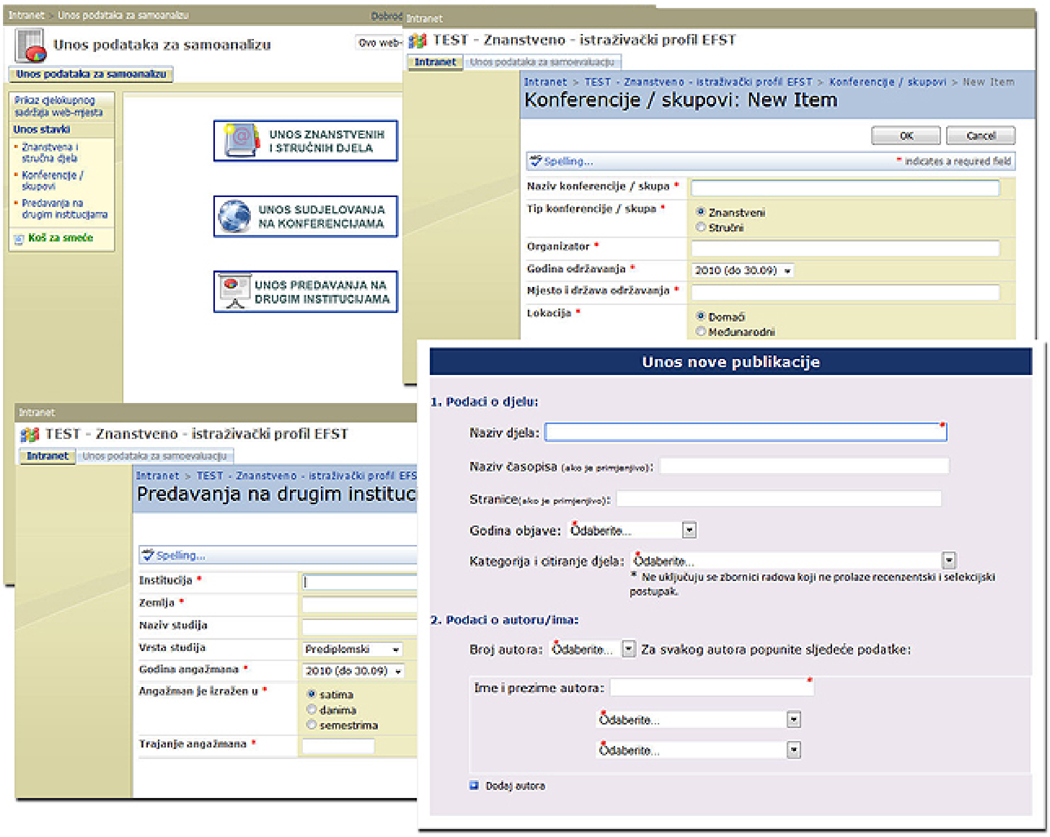

Figure 2. Screen prints of the Faculty of Economics' SharePoint test portal environment

Conclusion

With the increasing importance of social networking and e-learning in particular large number of community members build relationships both in person and electronically. This has a positive impact on the awareness of the collaboration and willingness to participate and share. Although collaboration takes time and effort it is a great opportunity that enables reaching "common goals" like pursuit or creation of new knowledge in a research setting or a team project in a classroom. Grasping from that, this paper dealt with collaboration and knowledge sharing tools in a specific environment, higher education institutions. The paper emphasized the need for knowledge management and collaboration within HEIs and proposed a framework for implementation of a successful HEI collaboration platform illustrated by international examples. SharePoint solution for HEI should typically organize site hierarchy by departmental structure and then departmental functionality. A standardized hierarchy such as this provides not only a logical approach for users (teachers, students, administrators) when browsing the portal site for content, but most likely mirrors existing security groups within the organization. Investments in collaboration platforms, especially in the knowledge-based organisations like HEIs, are not just about the technological solution but about implementing organisational change as well. Putting the teachers in the spot by

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providing strong bottom-up elements supported by IT enabling individual, team and departmental knowledge sharing and collaboration should result in behavioural change and increase in motivation and satisfaction. The value of university is generated by what they do with IT rather than by the technology itself. In the abundance of IT services available to students and teachers within and outside of the HE institutions, a one-stop-shop to in-house communities, ad-hoc projects, team workplaces and social networking provided by a complete and stable IT platform is especially important.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DREAM OF AND FOR SUCCESS – POSITIVE CONSTRUCTIVE DAYDREAMING AS INTEGRAL PART OF THE MINDWISE EDU-ENGAGEMENT TEACHING AND LEARNING PROGRAM AT THE UNIVERSITY OF SOUTH AFRICA

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Executive summary

The workplace needs a workforce with the necessary knowledge, skills, understanding and attitudes to perform, excel, adapt and innovate at their jobs and professions in an ever changing world and marketplace. The question is – do educational institutions deliver students with these abilities?

In theory, they should. According to Bloom's revised taxonomy good teaching includes Remembering, Understanding, Applying, Analyzing, Evaluating and Creating. If courses are being presented and taught while touching upon all of these aspects, it should prepare learners adequately for the needs of the real world. Sadly, it seems in practice, it does not always happen. Reasons for this may be many, but one is that teachers and lecturers do not know how to touch all bases. They may be good at presenting facts and even getting students to memorise the facts themselves. They may be good at analysing and applying facts and theories. They may be good at evaluation, and even excellent in creating new knowledge and insights. The reality is that it is difficult to be all of this or to find all of this in one person. Added to this is that it also takes a lot to actually teach in ways that reflects all of these aspects. The knowledge explosion is leading to overfull syllabi and not enough time to cover all the necessary basic facts. For this reason many courses get to cover the bottom part of Bloom's taxonomy such as remembering, understanding and applying, but not so much evaluating and least of all creating. That is left to the learner to develop when faced by the reality of the workplace, and that is what the workplace might feel is lacking in the learners.

In order to address these kinds of issues, a program is being developed by the author whereby lecturers can aim to foster all of the skills necessary for adequate and lifelong learning, also touching all the bases of Bloom's taxonomy. The program is called "The MindWise Edu-Engagement Program" and entails training in six aspects, namely Self-knowledge, Listening Skills, Reading Skills, Study Skills, Performance Skills and Dreaming Skills.

In this paper the theory underpinning each of the aspects of the MindWise Edu-Engagement Program is being discussed, with more extensive attention given to the aspect of Positive Constructive Daydreaming as a technique to foster the skill of creating in Bloom's taxonomy.

The study problem

The throughput rate at South African Universities is not good, and at Unisa, an ODeL institution, it is even worse. There are many reasons for this, such as socioeconomic realities, disadvantaged backgrounds and a struggling schooling system. One set of factors linked to all of this and that needs to be taken into account is the learning skills of students. It is a known fact that students worldwide do not come well prepared to tertiary institutions, often only with rote learning as their way of mastering course content. Research has shown that the same is true about South African students.

Student learning skills support programmes are needed. Many kinds of programmes are being established at Unisa, such as online tutors and support teams at regional offices. A student support program called "MindWise" has been provisionally developed on the basis of research in the fields of the cognitive sciences, metacognition and educational neuroscience. It entails 5 aspects, namely:

1. Self-knowledge;
2. Listening Skills;
3. Reading Skills;
4. Study Skills;
5. Performance Skills;
6. Dreaming Skills.

This program needs to be evaluated and refined before implementation. To this end, and to provide effective support, three things need to be done:

1. Establish a baseline of how Unisa ODL students actually learn and study;
2. Based on the findings, develop support programmes for students taking into account the newest cognitive and metacognitive research; and
3. Develop training programmes for Unisa lecturers on how they can incorporate cutting edge study skills strategies as an integral part of their course delivery.

Literature review

How do students actually learn?

Many students underperform or even fail, not because they lack the ability, but because they lack the skills necessary for successful study. It is therefore an educational and pedagogical

ISBN 978-963-89559-7-5

responsible imperative to not only teach course content expertly, but to include in the teaching critical skills necessary to master the content.

The above statements are the results of cognitive and metacognitive research at international academic institutions. They stress the need for the teaching of metacognitive strategies to students. This is also a need for students studying at the University of South Africa, firstly because distance education requires students to work on their own, but secondly because many students in South Africa are ill prepared for autonomous study as the result of a compromised school system. In short, students do not have adequate self-knowledge, and they do not know how to listen, the do not know how to read properly, they do not know how to study effectively, and they do not know how to perform in assessment.

In a document published by the Commonwealth of Learning titled CREATING LEARNING MATERIALS FOR OPEN AND DISTANCE LEARNING: A Handbook for Authors and Instructional Designers (2005) the authors discuss instructional design, learning theories and how adults learn, but then add the following:

> *"Whilst the above principles are widely quoted and followed in designing post-school courses, it has to be admitted that our knowledge of how people learn is very patchy. Much of the research on adult learning has been conducted on very small groups, often of middle-class learners in the developed world. The limitations of our knowledge are discussed further by Brookfield (1995)."*

Most of us have heard and agree with the age-old and well-known proverb of Chinese origin: "*Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime*." Having heard that, do we listen to this advice when teaching? Often in teaching and learning the focus seems to be on mastering course content. Knowledge expands at such a pace, however, that qualifications have a limited life span before they become outdated. Hence the need for students to become life-long learners, in order to initially master prescribed content, but then also to keep up to date by learning and re-learning. Successful life-long learners display certain characteristics, with certain meta-skills part and parcel thereof. Meta-cognition is the ability to plan, monitor and evaluate self, tasks and strategies in pursuit of meaningful goals (Flavell, 1976). Strategies crucial for successfully completing learning tasks are listening, reading, writing and study skills. The reality is that **these skills are seldom taught or being taught continuously**, with listening being taught the least of all (Coakley & Wolvin, 1997, Wacker & Hawkins, 1995, Janusik, 2002; Janusik & Wolvin, 2002). Listening, for example, is experienced as being so natural that people take it for granted that they are good listeners. When hearing is compromised it receives attention, but listening as a communication skill in general and specifically as a teaching and learning skill is seldom addressed or taught. Reading is taught at primary school level, but after students have mastered the deciphering process, readers are left to fend for themselves. Students are expected to study the subject matter and course content, but how they are supposed to do it, is not attended to systematically or even not at all. It is for this reason that students often arrive

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at college or university as rote learners, as well as poor readers and listeners. In similar vein, good writing seems to be an endangered skill.

Support programmes for students

Anderson and Dron (2011, p.80) state "It is clear that whether the learner is at the centre or part of a learning community or learning network, learning effectiveness can be greatly enhanced by applying, at a detailed level, an understanding of how people can learn more effectively: Cognitive, behaviourist, constructivist and connectivist theories each play an important role."

One way to empower students is to focus on learning strategies which can be defined as thoughts and behaviours intended to influence the learner's ability to select, acquire, organize, and integrate new knowledge (Weinstein & Mayer, 1986). Learning strategies are designed to teach learners how to learn (Jonassen, 1985). Effective learning involves knowing when to use a specific strategy, how to access that particular strategy, as well as when to abandon an ineffective strategy (Jones et al., 1987). In 1986, McKeachie, Pintrich, Lin & Smith incorporated elements of several learning models, including the cognitive approach established by Weinstein and Mayer (1986), into a taxonomy of learning strategies. The taxonomy proposed by McKeachie and others encompasses the cognitive, metacognitive, and resource management aspects of learning.

According to McKeachie et al. (1986) and Weinstein and Mayer (1986), cognitive strategies are important for understanding how information is processed and encoded in a learning environment, while metacognitive strategies allow a student to monitor his/her performance through planning, monitoring, and self-regulation. Resource management strategies assist the student in managing the learning environment and available resources (McKeachie et al., 1986). McKeachie et al.'s (1986) taxonomy is a clear, concise, and comprehensive model that identifies general learning strategies and specific learning tactics that may be examined in a distance education environment. The cognitive component of McKeachie's taxonomy focuses on the methods by which students actively process information and structure this information into memory (Weinstein & Mayer, 1986). Reading and comprehension skills are required in all three learning processes proposed by McKeachie et al. (1996) i.e. cognitive strategies, which include rehearsal, elaboration, and organization, rehearsal strategies which are employed by learners to remember material using repetition (Olgren, 1998) and in elaboration by which the learner builds an internal connection between what is being learned and previous knowledge.

Some educators and educational institutions are aware of this. Many colleges and universities have tips for studying, reading, listening and note taking available on their web sites (several websites are mentioned in the references). Study skills courses are available in abundance in books, on the web and in face-to-face extra classes. Reading and speed reading courses are even beginning to become available as applications on smartphones and tablets. These are

ISBN 978-963-89559-7-5

positive developments and necessary rectifications, with many students benefiting from attending to them. As add-ons and loose-standing interventions, however, they actually function on the same level as "giving a man a fish to eat", with students being presented these meta-skills in a stand-alone fashion with the expectation that they are able to transfer these skills to subjects and apply them to the mastering of specific course content all by themselves. In order to be really effective and to transform students into life-long learners who are able to fend for themselves, the subject-specific intelligence and skills necessary for mastering the course material should be provided as an integral part of the course content.

Training lecturers in metacognitive teaching skills

Both lecturers and students need to be made aware how to incorporate meta-skills such as listening, reading, writing and studying in teaching and learning. Lecturers might be experts in their fields and are usually aware of their students' lack of academic skills, but they often do not know how to remedy the situation. According to Berrett,

> *"A growing body of evidence from the classroom, coupled with emerging research in cognitive psychology and neuroscience, is* ***lending insight into how people learn****, but* ***teaching on most college campuses has not changed much****, several speakers said here at Harvard University at a daylong conference dedicated to teaching and learning.*
>
> *Too often, faculty members* ***teach according to habits and hunches****, said Carl E. Wieman, a Nobel Prize-winning physicist and associate director of the White House Office of Science and Technology Policy, who has extensively studied how to improve science education. In large part, the problem is that graduate students pursuing their* ***doctorates get little or no training in how students learn****. When these graduate students become faculty members, he said, they might think about the* ***content*** *they want students to learn, but* ***not the cognitive capabilities*** *they want them to develop." (Berrett, 2012)*

What is needed, are programs to inform staff about the skills necessary for academic performance and success, and to expose students to these skills through stand-alone programs as well as programs that are part-and-parcel of the course content.

The proposed Mind-Wise Student Support Program grew out of research on metacognitive skills in an ODeL context. Originally the skills were researched separately, but soon it became clear that they constitute a coherent whole, and are interdependent and mutually supportive. They belong together and should be presented and acquired as a **suite of skills**.

Colleagues took note of the research, especially colleagues involved in student support at the regional offices. They requested that the program be presented to staff and students.

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In order to fulfil the need, a project is necessary where research and service go hand in hand. Students need to be taught these skills, and staff needs to be informed how to do it. Both students and staff need to be made meta-cognitively aware.

Metacognition is about knowledge of person, task and strategy in the context of meaningful goals.

- Person: people need to know themselves, and need to be aware of their strengths, weaknesses, preferences and avoidances as related to learning, studying and teaching. For this we have AwE's (Awareness Exercises) available.
- Task: People need to be able to assess and evaluate learning and teaching tasks and know what is being expected of them and what needs to be done to complete the tasks satisfactorily and preferably expertly.
- Strategy: In the light of self-knowledge and task assessment, people need to be aware of various learning, study and teaching strategies, and then choose a strategy or strategies that are appropriate to completing the task satisfactorily.
- Meaningful goals: Relevance is important to student motivation. Lecturers should always indicate why something is relevant, because it is not necessarily immediately apparent.

With this in mind, the proposed program focuses on critical skills necessary for academic success. The MindWise program is well-founded and based on the newest research on brains and minds. It is equally practical and applicable in everyday work and life. The program focuses on MindWise Self, MindWise Learning, MindWise Listening, MindWise Reading, and MindWise Performing.

MindWise program

MindWise Self

The MindWise Self module will keep you in AwE – the Prism Break Awareness Exercise (AwE) helps you understand how your mind works in terms of assessing tasks, choosing strategies and setting goals. It also assist in understanding the dynamics of working on your own and working in a team, as well as study and work preferences.

MindWise Learning

Children just love to learn something new. They play, experiment, and try things out. Why then do most students and adults hate learning? The reason is that we do not learn the way minds want to learn. MindWise Learning is based on neuro- and cognitive research on how the mind learns – from guiding and harvesting our emotions while learning, setting meaningful learning goals, the importance of novelty, how to memorise and master, and how to apply and evaluate learning and what has been learnt. MindWise Learning aims to develop lifelong learning, with a memory to match.

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MindWise Listening

Listening is an inborn ability, and we listen about 50% of our life. It starts before birth, and often is the last sense to go when we are dying. However, being so part of everyday life, it is often a neglected skill. MindWise Listening introduces you to listening styles as well as to strategies to become an effective listener at work and at home. This is a must for life, learning and relationships.

MindWise Reading

Reading is a skill only about 4000 years old, and is therefore not an inborn ability. All of us have to learn to read. In this process our brains are physically changed. According to research, South Africans are not good readers and we compare very poorly to readers in other countries. Many people therefore do not like reading, although it is a crucial skill in life and work.

According to Dreyer and Nel (2003), research conducted in South Africa indicates that many South African students who register for undergraduate study each year are under-prepared for university education and that many of these students also have low levels of reading ability. This has an adverse effect on their chances of academic success. In order to meet the reading needs of students in the 21st century, educators are pressed to develop effective instructional means for teaching reading comprehension and reading strategy use.

They go on further to state that one of the most serious problems in higher education, but one which is often not recognized by either students or lecturers until some way into academic courses, is the problem of reading, perhaps because reading *per se* is not assessed. However, the results or outputs from reading are what is being assessed.

It is the contention of the authors that the poor quality of reading and comprehension skills, particularly in the South African context, is partly responsible for the low rate of academic success among distance education students.

The MindWise Reading program explains the act and art of reading, helping students to understand why they read the way they do, how to make reading fun, how to become an effective reader, how it is possible to read at 400 up to 1500 words per minute (really!), what the difference is between reading on paper and reading on-screen, and how to guide the reading process depending on the medium from which is being read. If students want to be lifelong learners, they will have to become MindWise Readers.

MindWise Performing in Assessment

Many people underperform in evaluations, tests and exams. Some do because they are not properly prepared or do not know how to prepare for the exams. Some know much more than they are able to reflect in evaluations and exams, but fail to perform or are not given the

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opportunity to shine. With MindWise Performance a bridge is built between knowing and showing.

MindWise Dreaming

Jerome singer initiated groundbreaking research into daydreaming, which is currently being continued in research into mind wandering. Mind wandering seems to occupy as much as 50% of our waking time, and it is often seen as wasted time. Positive Constructive Daydreaming, however, seems to be an indispensable tool of learning and especially using what we have learnt in creating new insights and knowledge, and as such should be stimulated, guided, utilised and developed through specific activities and assignments.

According to Singer (1966) and Antrobus (1999) daydreaming, imagination and fantasy are essential elements of a healthy, satisfying mental life. Schooler et al. (2011) avers that positive constructive daydreaming serves four broad adaptive functions: *Future planning* which is increased by a period of self-reflection and attenuated by an unhappy mood; *creativity*, especially creative incubation and problem solving; *attentional cycling* which allows individuals to rotate through different information streams to advance personally meaningful and external goals; and *dishabituation* which enhances learning by providing short breaks from external tasks, thereby achieving distributed rather than massed practice.

Conclusion

The MindWise Edu-Engagement Program is geared towards engendering crucial skills necessary for life-long learning, providing the underpinning for touching all bases of Bloom's Revised Taxonomy of Learning. As such it will satisfy the goals of teaching of students and address the needs of the workplace for workers.

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Additional resources

- http://academic.cuesta.edu/acasupp/as/206.htm
- http://owll.massey.ac.nz/esol-study/esol-listening-strategies.php
- http://www.csus.edu/sswd/services/studyskillsresources.html
- http://www.deakin.edu.au/current-students/study-support/study-skills/handouts/notetaking.php
- http://www.educationcorner.com/listening-skills.html

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- http://www.educationcorner.com/study-skills.html
- http://www.educationcorner.com/textbook-strategies.html
- http://www.musiccog.ohio-state.edu/Huron/Talks/SMT.2002/handout.html
- http://www.slideshare.net/akor0003/three-generations-of-distance-education-pedagogies

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E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

SUPPORTING ENTREPRENEURSHIP AT THE BOTTOM OF THE PYRAMID USING MOBILE EDUCATION SERVICES

Isabella Chinelato Sacramento, Universidade Federal Fluminense, Mauro de Freitas Rebelo, Universidade Federal do Rio de Janeiro, Sandra Regina Holanda Mariano, Universidade Federal Fluminense, Brazil

Introduction

In this paper we will share the experiences of the implementation of a mobile learning program aimed at poor Brazilian entrepreneurs with no access to smartphones. This may offer potentially valuable contributions to the development of other learning programs aimed at the bottom of the pyramid. We will address the following conference theme: mobile learning solutions at the workplace.

Background

"Low-income markets present a prodigious opportunity for the world's wealthiest companies to seek their fortunes and bring prosperity to the aspiring poor" (Prahalad & Hart, 2002). In their article "The Fortune at the Bottom of the Pyramid" the authors have challenged multinational enterprises worldwide to offer products in accordance to the new middle-class consumers from developing countries. To reach this goal new business models needed to be fostered to enable products aimed at the so-called base of the pyramid. Karnani (2007) pointed out some weaknesses in Prahalad and Hart (2002) assumptions. The proposition sustained by the authors that selling to the poor can simultaneously be profitable and eradicate poverty would be "appealing, but riddled with fallacies" (Karnani, 2007, p.91). Karnani proposes an alternative perspective focusing on the poor, or the developing countries middle-class, as goods and services producers, not just consumers, concentrating efforts to buy from them in order to raise their real income.

According to The Boston Consulting Group (Cunha et al., 2013), Brazil "will be characterized by a massive shift into the ranks of middle class and affluent. Some 5.3 million households will rise from the restricted to the emergent middle-class segment (...)" in this decade. Market growth at the bottom of the pyramid opens new business opportunities which can be seized by entrepreneurs from the base of the pyramid itself. Karnani (2007, p.97) points out that the less privileged are "vulnerable by virtue of lack of education". Therefore, supporting entrepreneurship at the base of pyramid using education services adequate to them can be an important factor to nurture development and alleviate poverty. Governments from developing countries have the challenge of giving access disseminating all the necessary knowledge to entrepreneurs at the bottom of the pyramid. Of course governmental investments alone have a hard time achieving it all. Private sector initiatives are welcome and can be a great help and new technologies, in particular those that are already accessible to them, such as mobile service systems, can play a decisive role in filling the gaps.

In Brazil mobile phones reach virtually the entire population. Data from the Brazilian National Telecom Agency show that 271.10 million mobile phone lines were already active in 2013 with 136.45 accesses per 100 inhabitants. Prepaid services amount to 78.05% of this total reaching 211.58 million phone lines. Mobile broadband had 103.11 million accesses, 1.31 million of them from 4G terminals. (ANATEL, 2014)

Entrepreneurship education courses and programs contribute to generate perceptions of the desirability and feasibility of starting a business and gives practical knowledge as how to conduct all main business operations. In Brazil, studies by Sebrae (Serviço Brasileiro de Apoio às Micro e Pequenas Empresas – Regional São Paulo Brazilian service of assistance to micro and small enterprises – Regional São Paulo), an institution supporting the development of small and micro companies in Brazil, show that the absence of previous planning and inadequate business processes are one of the main bankruptcy causes among micro and small enterprises (Sebrae, 2008).

The initiative

Abril Educação, one of the largest Brazilian education companies, which belongs to the same holding as Abril Publishing, Brazilian leader in the publishing segment of textbooks, launched a new company, Edumobi, with the mission to democratize education, bringing knowledge to people through the cell phone.

The courses were designed to comprise a set of questions and answers, based on Willingham (2012), who suggested that in order to learn it was necessary to chew things over, giving thought to what need to be absorbed. According to Levy and Lameras (2011) Inquiry Learning is applicable at all levels of formal education and has its philosophical and theoretical roots in the work of theorists including John Dewey and Jean Piaget and in the constructivist educational paradigm.

This learning system could be used within private or corporative environments as an app, where quizzes are sent through push notifications, however for this service to be really democratic and bring education to the base of the pyramid, clients should reach the content with any feature phone, most importantly those without Internet access. Edumobi has developed a learning platform using a Telekom Value-added service to be able to send the quizzes as SMS. This way the clients can use any of their “stolen moments” to learn. The physical limits of SMS (the amount of characters), became then the template to design the quizzes, allowing the instructional designer two teaching moments: the question SMS, and the answer feedback moment.

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The limits of characters and having to use a totally inquiry-based education posed unique and complex challenges for the content writers, even the ones accustomed to online courses. The writing process was mainly transforming already written context to questions or writing the question and the answers from scratch.

Student costs to be enrolled in the program were around one dollar a week. This price comprised 7 classes. Each class developed along a whole day including 10 SMSs (5 questions and 5 answers sent to the student), two free calls to listen to an opening-course and a closing-course voice message at the "voice portal", and, in case he did have internet access, any time consultation on a mobile site. The student was allowed to switch courses at any time enrolling in a new one and when he came back to the same course the technology allowed him to continue from where he stopped. When he successfully concluded a course he was granted a printed certificate sent to him by post to any address he has chosen.

The first invitation was for the student to listen to the voice portal and visit the mobile site of his chosen course. The opening message at the voice portal presented the specialist who had developed the course and gave a brief overview from what to expect. Then the first question SMS was sent. As soon as the apprentice answered one question, the feedback and a new quiz were sent. As soon as the student completed his whole class, answering the 5 SMSs, he received an invitation to listen the closing of class at the voice portal and, on the next day, all the process for a new class started again. There was no penalty if he decided to take two or more days to complete the 5-SMS-question lesson, as soon as he finished the fifth he would get the invitation to listen to the closing message at the voice portal and his new lesson would begin the following day.

Students were attracted to the program by magazine ads and messages from the associated telecom company. Any participant was allowed two free days of class as soon as he joined the platform. At the time of the subscription he agreed that he would be automatically billed from the third day on unless he sent an SMS cancelling his subscription.

The courses were arranged by category. Within the range of Entrepreneurship, under the category "Money, work and business" were placed courses such as Communication, Negotiation, How to start a business, How to write a CV and Teleworking (written by Domenico the Masi).

Findings

Edumobi platform has reached over 500 thousand registered students since its launch at the beginning of 2013. General themes such as Photography and Dating are among the most popular. Business themes were introduced later in the same year. Numbers are still raw, but the company intends to expand and to make its content available through all major Telecom players. Figures 1 and 2 show the evolution of registered students in two from the business programs, respectively Communication and Negotiation, just as an example.

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The vast majority of people at the bottom of the pyramid had pre-paid services contracted. They charged their cell phones a certain amount of money from time to time. If the student had no money when a new week was due, he could not start the lesson and no message was sent. One main reason that caused discontinuity of access was their running-out-of-credit situation. When this happened, the system tried the billing process again and again until it can charge it or until the enrolment is cancelled after a certain amount of days trying unsuccessfully to bill. Billing can be hard to get, considering the same client can have various value-added services contracted at the same time.

There was a need to classify the clients regarding their account situation. Students considered 'registered' were the one enrolled in the program, but not having access to the system for running out of credit in their telecom account. 'Active' students were the ones actually receiving SMS. The students were considered 'cancelled' when they either sent a message to the administrator to exit the program or it was impossible to bill the over a certain amount of time.

Regarding negotiation (Figure 2), the number of enrolled students grew consistently in four months. Cancelling by the student was lower than 10%. The course was considered to have a good appeal and aimed at daily business situations, with very accessible language.

Communication reached over 1300 students trials. Cancelling was lower than 1%. Figure 1 allowed seeing the impact of the course being included at the telecom marketing channel.

Results from both courses can hardly be compared not only because of the difference in content, but also because the population of student vary a lot between them.

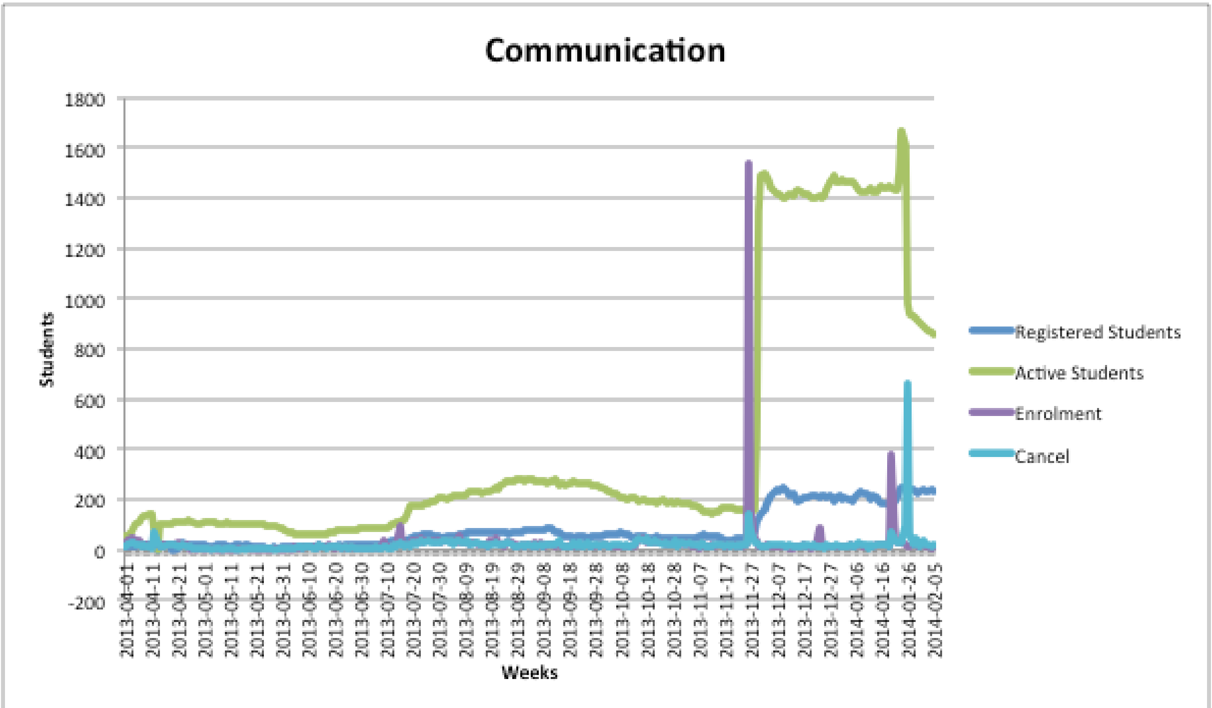

Figure 1. Students in Edumobi Communication Program

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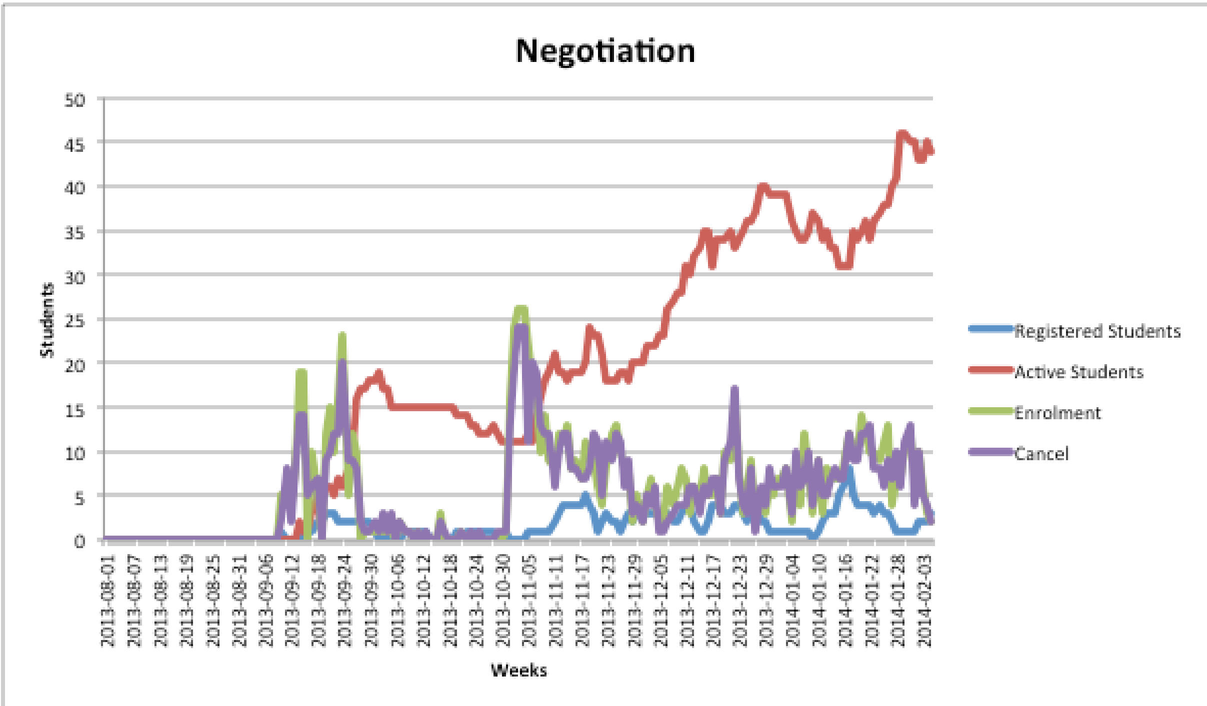

Figure 2. Students in Edumobi Negotiation Program

This experience of a mobile learning program aimed at poor Brazilian entrepreneurs with no access to smartphones has suggested that it is possible, through applied content design, to reach bottom-of-the-pyramid clients, in this case, entrepreneurs. The described initiative has only been applied in Brazil and in a limited batch of students. It would be interesting to test this model in a larger student group, trying to reach poor entrepreneurs from different developing countries all over the world.

Future programs are suggested to take into account discontinuity issues, developing methods for evaluating learning effectiveness, new marketing tools. Stimulation mechanisms could also be considered, such as rewarding good students or recognizing consistent ones.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

A DYNAMICS LEARNING SYSTEM BASED ON SCAFFOLDING APPROACH

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Introduction

In school science, physics is perceived to be a difficult and unattractive subject for students (Taconis & Kessels, 2009). The difficulty comes from the abstractness many students experience when they attempt to understand theoretical concepts such as force, acceleration, and voltage (Kock et al., 2013). The students simply cannot understand the concepts in physics (Carnap, 1966).

Science education is seen as a process where students gradually acquire scientific norms and cultures (Brown et al., 1989; Duit & Treagust, 1998; Lemke, 2011). In a traditional teacher-centred classroom, students are listeners and the teacher presents the facts and defines important ideas. Student participation is often limited to listening to the teacher and perhaps raising their hands to ask or answer questions (Muir-Herzig, 2004). As a result, traditional teaching methods, when used in teaching science, lead students to understanding the subject only at a "knowledge level" that involves memorizing concepts without achieving in-depth understanding (Ozmen, 2008). Highly teacher-centred methods of instruction may negatively affect student beliefs regarding science, causing them to view learning science as a simple accumulation of facts, and therefore concluding that science is not interesting (Kiboss, 2002; Kiboss et al., 2004). Moreover, such teaching requires students to sit passively and does not engage them actively in learning (Moegil et al., 2003).

Based on the problems above, many researchers have discussed learner-centred science education. For instance, learning science through inquiry methods incorporating ICT tools and scientific practices may be a desired pedagogical approach for learning science (Sun & Looi, 2013). Many ICT-supported science learning environments have been studied (White & Frederiksen, 1998; Avouris et al., 2004; van Joolingen et al., 2005). The study has produced considerable evidence, which demonstrates that such environments have great potential in facilitating the development of cognitive and metacognitive strategies in students. Moreover, such environments help improve the conceptual understanding as well as aspects of motivation, collaborative competence, critical thinking skills, and self-regulated learning skills (Oshima et al., 2003; Schwarz & White, 2005; Cepni et al., 2006; Minocha & Thomas, 2007).

In this research, we focused on dynamics in physics education. Its purpose is to enhance understanding of learners about connection between a state of an object and derivation of an equation in the process of solving a problem. The system we have developed for this purpose has a learning function of relationship between visualized forces and derivation of an equation and a diagnosis function in the learning process. In addition, the learner is asked to draw a figure to visualize forces, and by using the figure in the process of deriving an equation he/she acquires usage of visualized information. In this research, the system gives feedbacks of diagnoses in the processes of visualization of forces and equation derivation from the state of an object given in a problem so that it works as a learning material, which supports visualization and equation derivation.

Related works and related systems

Environment for externalization of Physics by Shinohara et al.

Externalization is an activity of learners to express their understanding, cognition, knowledge, and so on, and an environment for externalization is an environment for these activities (Learning Engineering, 2014; Shinohara et al., 2013). Shinohara et al. have developed a learning support system based on a computer of dynamics by an environment for externalization (Learning Engineering, 2014). The system helps a learner to derive an equation of force balance as follows:

1. Select forces and conditions related to an object;
2. Eliminate forces and conditions which are unnecessary for deriving an equation;
3. By using the remaining forces and conditions, derive a motion equation.

The feature of this system by an externalization environment is that it can express processes of problem solving and concepts. If the learner fails to solve the problem, his/her solution process may include some errors. By judging the correctness in the solution process, the system can figure out the errors of the learner. A hierarchical structure of 'phrase expression' leads to the effects such as scaffolding for learners who cannot step forward with problem solving, correction for learners who can solve the problem without understanding the correct solution, and promotion of learners' understanding of the reason of application of the solution.

In the system by an externalization environment, the learner just constructs a data structure called a surface structure by connecting the nodes each including a phrase related to an object by using edges, and then makes a tree structure by the nodes that are used to derive an equation and puts operators at their appropriate positions. Hence, the system cannot support the learner to imagine the forces acting on objects. Therefore, the learner cannot acquire the modelling operation to draw correct figures. In physics learning, the starting point on which a force is exerted and its direction are also important factors. However, this system expresses the motion equation by using phrases only. Hence, a large number of nodes are introduced, and

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the learner may be more confused compared to the case where a figure is used with arrows representing the strengths and the directions of forces.

Diagnosis system of figure drawing by Koide et al.

Koide et al. have developed a learning support system based on a computer (Koide et al., 1997), which diagnoses a drawn figure and a derived equation by a learner as follows:

1. The learner first selects the formula to use for the equation;
2. Next, the learner selects forces and draws the corresponding arrows. Finally, he/she specifies the corresponding symbols and/or numerical values;
3. The system substitutes the symbols and/or values into the formula to derive the equation.

At the ends of Steps (2) and (3), the system diagnoses the correctness of the figure and the correctness of the equation, respectively. If they are correct, diagnosis and instruction will terminate. Otherwise, the learner is asked to repeat the operation from the beginning of Step (2).

The feature of this system is that the derived equation is diagnosed based on the drawn arrows and the selected symbols and/or values in the figure. The system is well-designed so that it can absorb the variability of the drawn arrows by judging their starting points and directions.

The system does not take the lengths of the drawn arrows into consideration. As a result, an arrow may be decomposed into two unnatural arrows by the vector decomposition operation. In addition, because the system requires the learners to select the formula before drawing the figure, the learner must guess the correct one in advance. Hence, this system has a drawback that it cannot diagnose the stumbles of the learner in a stepwise manner to provide scaffolding support.

Proposed system

The system we propose in this study will solve the drawbacks of the systems by Shinohara et al. and Koide et al. That is, we restrict the lengths of the arrows drawn by a learner and give appropriate feedbacks so that the learner can acquire proper images of corresponding forces. Also, we have designed the system so that it diagnoses the process of equation derivation in a stepwise manner. From this, the system can easily detect the learner's stumbles. Figure 1 shows the user interface of the proposed system.

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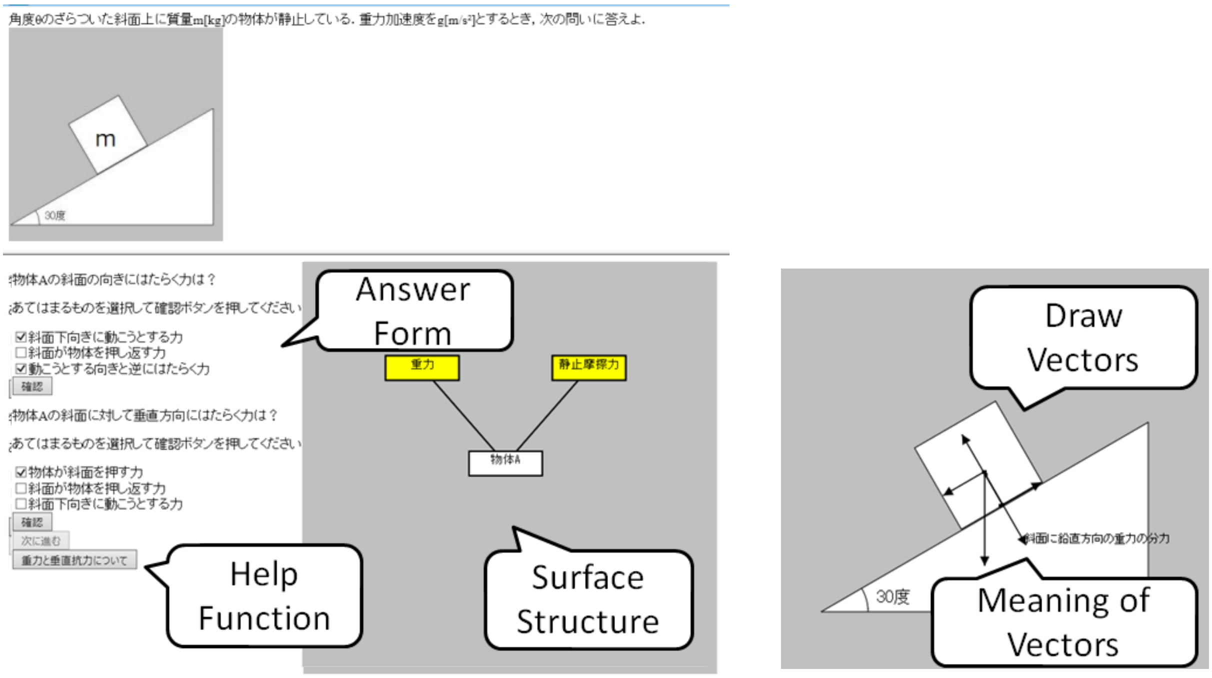

Figure 1. User interface of our system (left) and user interface for drawing a figure (right)

1. For a problem, the learner first selects forces acting on an object, and then connects the nodes corresponding to the forces to the node representing the object to construct a surface structure in a similar way to the system by Shinohara et al. The learner must make a choice on the forces and the conditions in the system by Shinohara et al. while in our system the learner dispenses with this choice because he/she derives an equation based on the drawn arrows. When the learner clicks the acknowledge button, the system gives a pop-up message to tell if the surface structure is correct or not a pop-up. If it is correct, the system allows the learner to proceed to the next step. Otherwise, our system provides feedbacks and theorems according to the learner's answer.
2. In the next step, the learner draws the figure about the forces selected in Step (1). First, the learner clicks the starting point of each arrow, and then clicks its end point. Until the learner clicks the end point, the system will draw an arrow from the starting point to the mouse pointer, that is, the arrow follows the mouse pointer. When the learner clicks to decide the end point, the system judges the correctness of the drawn arrow. In a similar way to the system by Koide et al., our system judges the correctness of the arrow by its starting point and direction. Our system is designed to adjust the lengths of the drawn arrows so that the learner can acquire their adequate lengths. That is, we have set the maximum and minimum lengths of arrows. If the length of an arrow is too short, the system adjusts its length and shows it on the figure (Figure 1 right). In a similar way in Step (1), the system gives a pop-up message to tell if the drawn figure is correct or not. If the figure is incorrect, the message will explain either or both of the starting and end points are wrong. Since drawn arrows include individual differences, the system is designed to judge the correctness of an arrow based on the starting point and direction of the arrow so that it can absorb the individual differences. However, in spite of the feedbacks based on the judgement, the learner has possibility that he/she is

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stuck to a certain place and cannot proceed further. Therefore, if the learner makes mistakes three times with one arrow, our system is designed to offer the correct example.

3. Finally, the learner derives the equation of equilibrium based on the arrows drawn in Step (2) in a stepwise manner similarly to that in the system by Shinohara et al. The learner selects answers from the candidates in selection boxes as shown in Figure 2. The learner constructs the expression of phrases step by step and finally substitutes the parameters to the expression to complete the derivation of equation. When the learner puts the mouse pointer on one of the arrows drawn in Step (2), our system displays the name of the corresponding force as shown in Figure 1 right. The learner uses the figure he/she drew like this. Hence, he/she is urged by the system to utilize the figure for equation derivation.

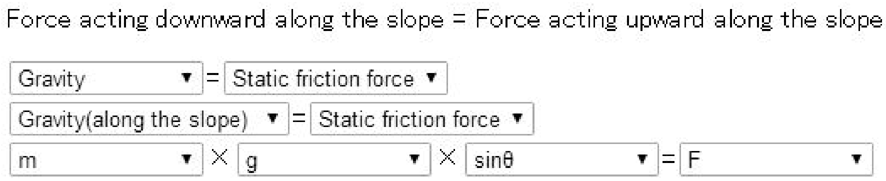

Figure 2. Equation derivation

System evaluation

Outline of evaluation experiment

We carried out an evaluation experiment with 11 participants to verify effectiveness of our system regarding the learners' understanding for problems of force equilibrium. For comparison, we used the system by an environment of externalization developed by Shinohara et al. (2013). However, since the system by Shinohara et al. is not open, we have developed a system that has similar features. In the rest of this paper, we call this system a replicate system. In this experiment, the participants learn based on the steps for the system by Shinohara et al. (2013). However, in the learning process, participants who use our system draw figures so that we can measure the difference between the participants who use these two systems.

Details of evaluation experiment

We conducted an evaluation experiment with 11 liberal arts college students as participants. First, the participants answered a pre-test for 20 minutes. Based on the scores of the pre-test, we divided the participants into two Groups A and B so that their averages and variances of the scores become as equal as possible. The participants in Group A learned by using our system while those in Group B learned by using the replicate system. We spent 5 minutes for explanation of the systems, and 20 minutes for learning. After the learning activities, we conducted a post-test with all of the participants for 20 minutes.

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The pre-test and the post-test both consist of the problems that are similar to the problems that the participants learned by the systems in their learning activities. The numbers of the problems in the pre-test and the post-test are both 4 and the full marks of the tests are both 7. The problems related to the force equilibrium were picked up from the commercially available workbooks (Daiichigakusyusya, 2008; Research Group of Qualifying Examination, 2011). Two of them ask the participants to drive equations of force equilibrium while the remaining two ask the participants to draw the figures of force equilibrium and vector decompositions.

Experimental results

Tables 1 and 2 show the scores for equation derivation problems and those for figure-drawing problems, respectively. These tables include the individual scores and average scores of Groups A and B. We assigned ID's from ID01 to ID11 on the participants.

Table 1: Scores for equation derivation problems of Group A (left) and Group B (right)

Group A			Group B		
Participant	**Pre-test**	**Post-test**	**Participant**	**Pre-test**	**Post-test**
ID01	1.00	4.00	ID07	1.00	0.00
ID02	0.00	5.00	ID08	2.00	2.00
ID03	1.00	3.50	ID09	1.00	3.00
ID04	2.00	2.00	ID10	0.00	2.00
ID05	1.00	5.00	ID11	1.00	1.00
ID06	2.00	4.00			
Average	**1.17**	**3.92**	**Average**	**1.00**	**1.60**

Table 2: Scores for figure-drawing problems of Group A (left) and Group B (right)

Group A			Group B		
Participant	**Pre-test**	**Post-test**	**Participant**	**Pre-test**	**Post-test**
ID01	0.00	1.00	ID07	1.20	1.75
ID02	0.40	1.50	ID08	0.70	1.25
ID03	1.50	1.75	ID09	0.75	1.25
ID04	0.75	1.75	ID10	0.00	1.25
ID05	0.25	2.00	ID11	0.40	0.50
ID06	0.50	2.00			
Average	**0.57**	**1.67**	**Average**	**0.61**	**1.20**

From Table 1, we can observe that the average scores for the equation derivation problems of the post-test of Groups A and B increased from those of the pre-test of the groups. Moreover, the average score of the post-test of Group A is higher than that of Group B. We conducted a Mann–Whitney U test at significance level 5% to check the existence of significant difference in the growth from the score of the pre-test to that of the post-test. As a result, there was a significant difference ($p = 0.04$).

From Table 2, we can also observe that the average scores for the figure-drawing problems of the post-test of Group A and Group B increased from those of the pre-test. Similarly, we conducted a Mann-Whitney U test at significance level 5%. However, there was no significant difference ($p = 0.14$). Although there is no significant difference in the growth, with the

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average scores of the post-test and the growths of the average scores from the pre-test to the post-test, Group A showed better performance than Group B. From this, we can conclude that our system has learning effect with respect to drawing figures. In addition, with Group B who used the replicate system the average score of the post-test increased from that of the pre-test. Because the system provides supporting information available for drawing figures such as 'upward force' by a surface structure, the learners could use it for the problems of drawing figures.

From these results, we can conclude that by using our learning system we could visualize forces acting on an object and enhance learners' understanding about figures and equations with respect to force equilibrium. The difference of learning effects regarding equation derivation by our system and the replicate system was statistically significant. However, we could not prove that the difference was caused by the learning activities including the figure drawing. For the reasons, we have two hypotheses as follows:

1. Let Subgroups AH and BH be the participants who obtained the higher scores in Groups A and B, respectively. Also, let Subgroups AL and BL be the participants who obtained the lower scores in Groups A and B, respectively. The differences of growths of the scores between Subgroups AH and BH from the pre-test to the post-test were smaller than those between Subgroups AL and BL. We have checked the answer sheets of the participants who scored no less than 0.70 in the pre-test, and found they made same mistakes in the post-test as in the pre-test. Hence, we have the first hypothesis that the effect of our system about modification of learners' wrong knowledge with respect to the figure drawing does not have significant difference from the effect of the replicate system.
2. We have checked the answer sheets of the participants in Group A for the figure-drawing problems. Compared to the answers by the participants in Group B, starting and end points of forces were correctly specified while the names of the forces were not correctly answered. From this, we have the second hypothesis that the participants in Group A could understand the starting points and directions of the forces, but they could not understand the meanings and the names of the forces. We should inspect the learners' stumbles in detail to check whether they understand the meanings and the names of the forces.

To verify these hypotheses, it is necessary to prepare the problems by which we can specify the cause of the growth of scores with respect to figure drawing and equation derivation, and to carry out an evaluation experiment with enough number of participants.

Conclusion

In this study, we have designed and developed a system for learning dynamics. The objective of the system is to enhance understanding of learners about connection between a state of an object and derivation of an equation in the process of solving a problem. For this purpose, we have designed the system so that it is equipped with the learning function of relationship

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between visualized forces and derivation of an equation and the diagnosis function in the learning process.

We have implemented a replicate system which has similar features to the system by Shinohara et al. and conducted an evaluation experiment with 11 participants. The difference between the scores for equation derivation problems of the pre-test and the post-test has significant difference by a Mann-Whitney U test. Hence, it is proved that our system has learning effect when a learner solves the problems for equation derivation.

Though the growth of the scores with equation derivation has significant difference, there is no significant difference in those with figure drawing. Therefore, we could not conclude that the significant difference is caused by the learning function of figure drawing. However, the participants who used our system could achieve a better understanding of the figure drawing.

Future works include improvement of scaffolding feedbacks by the system, improvement of user interface, increase of variety of problems, and so on. An additional evaluation experiment with a larger number of participants and a wide range of well-designed problems is also included in the future works.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

AGRICULTURAL ALLIANCE FOR COMPETENCE AND SKILLS BASED TRAINING – THE ACT APPROACH

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Background

Agriculture is suffering from a lack in qualified employees as well as appropriate, tailored-made and modularised VET opportunities. The demand for qualified farm workers and managers is not satisfied by an adequate supply of properly trained staff or training opportunities, especially in the light of environmental (climate change and biodiversity loss), economic and territorial challenges, as well as EU directive reforms (Common Agricultural Policy (CAP)).

In particular Competence Modelling is raising the awareness and interest of all stakeholders in lifelong learning in the agricultural sector: It is gaining importance for organisations and their human resource development, for employees and individual learners, for education and training providers as well as for political decision maker. In previous projects like WACOM[1], eCOTOOL[2] and AGRICOM[3], many users have asked how to implement the competence model provided by the projects. Even though these projects also include clear instructions on how to use the competence model in the pilot testing, the users expressed their need and their ideas for an enhanced communication between employers and training providers with the help of the competence model. In essence these three projects showed that a concept like the planned Pathways for Agricultural Competence and skills based Trainings (PACT) are in demand and needed both by the employers, the employees as well as by the training providers. Many employers which have contributed to WACOM, eCOTOOL and AGRICOM stated that a PACT Framework would definitely have a great value for them: The facilitated description of job profiles and the mapped training opportunities would help to decide on personal development faster and more economically. Furthermore many training providers stated that such a structure would allow them to describe their training offers more precisely and that they would be able to adapt their training programmes more to the needs of the users. After considering this feedback preliminary surveys have been implemented. The interviews with experts from main agricultural fields indicated again the need and demand for such a development in the whole agricultural sector.

[1] WAter COmpetences Model Transfer – WACOM, http://www.wacom-project.eu
[2] e-competences tools – ecoTool, http://www.competencetools.eu
[3] Transfer of the Water Competences Model to AGRIcultural COMpetences – AGRICOM, http://www.agriculture-competence.eu

Agricultural VET providers, labour market and VET policy makers often use different terminologies and concepts in order to approach training, and a common sector-specific approach with shared definitions among the different actors involved is necessary to create a stronger link between emerging job profiles and training opportunities. Launching ECVET and EQAVET has been a major achievement in Europe, which can ease these processes, but adoption in agricultural E&T is moving slowly.

However, we observe the following:

- Many VET providers offer trainings for the agricultural sectors, which do already address the needs of a changing agricultural labour market or current EU/national policies, training opportunities of the ACT consortium members;
- Some VET providers have modularised their trainings, introduced the learning outcomes approach which in fact facilitates the update with units from "peer institutions" which address labour market needs to a certain extend.

Furthermore, there is no central multilingual database of trainings for the agricultural sector in Europe, less so a portal which directly addresses current skills gaps.

The project

The ACT project[4] focuses on the development of Pathways for Agricultural Competence and skills based Training (PACT) to reduce the mismatch between new jobs and existing skills in the agricultural sector and to improve the agricultural curriculum design and delivery by innovative VET services and broad dissemination throughout whole Europe.

It will contribute to making definitions of competences reusable and accessible across learning and recruitment systems, thus facilitating the development of additional services related to the generation of personal profiles, achieved learning outcomes and competences, etc. In essence, the outcomes of this effort will facilitate the bond for the actual building of effective pathways between learning and employment through the planned PACT Framework based on EQF and ECVET for the better integration of competence and skills modelling and with clear relevance for the current agricultural labour market as well as technology based solutions and services.

The PACT Framework matching emerging job profiles and existing training opportunities will be a valuable approach such as the linking of training opportunities and units of training to learning outcomes, the expression of job profiles through the use of competence descriptions and the generation of personal profiles of achieved learning outcomes and competences.

During the development of competence models in the field, the consortium members as well as external experts and users detected the lack of tailored, modularised VET opportunities integrating ECVET and EQF. The ACT project foresees to tackle this deficit via the innovative

[4] Agricultural Alliance for Competence and Skills based Training – ACT, http://www.act-now.eu

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"Pathways for Agricultural Competence and skills based Training" (PACT) Framework based on EQF and ECVET.

The PACT Framework will give instructions for the matching of training needs and training opportunities. The identification of the training needs will be facilitated through the job profiles population online services. With these services it will be possible to compare the requirements of a specific workplace to the competence profile of a specific employee.

Before the development of the whole concept of ACT several experts have been interviewed concerning the idea. The consistently feedback was that such a PACT Framework together with guidelines, instruments and online services would give an additional value to the European VET landscape.

The project will act towards the following new situation:

- VET providers are offering modularised, tailor-made trainings based on the validated PACT curriculum and framework integrating ECVET and EQF;
- Agricultural VET trainers are successfully applying the PACT framework for their trainings;
- Employees of the agricultural sector are gaining the specific skills and knowledge via reformed trainings and workers have opportunities to complete and enlarge their competences;
- Other E&T sector are adapting the innovative ACT results for their training provision.
- The agricultural business and organisations are able to recruit appropriate skilled personnel and thus, can offer qualitatively excellent products responding to EU consumers' needs and in line with environmental and sustainable goals of the EU directives.

The project will result in a common European-wide innovative VET Training framework for the agricultural sector, implemented and validated by each participating country (Germany, Greece, Italy, Netherlands). The Pathways for Agricultural Competence and skills based Training (PACT) Framework based on EQF and ECVET will be translated in the 4 partner languages of the 4 participating countries.

The consortium brings together organisations that have already been working in agricultural VET provision in Europe for several years. In addition, the partners were selected to represent and cover the three major target groups:

1. The world of vocational education and training,
2. The agricultural labour market,
3. The VET policy makers,

complemented by skills modelling, EQF, ECVET and educational experts to form a strong Agricultural Alliance for Competence and Skills based Training.

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Aims and objectives

The "Agricultural Alliance for Competence and Skills based Training" project (ACT) aims to facilitate and accelerate a better match between the needs of the agricultural labour market and the vocational educational training opportunities

ACT will reach this aim by engaging core actors from the complementary fields (VET, labour market and policy) in a constant and constitutive dialogue with the following more specific objectives:

1. To create a shared awareness of emerging job profiles and existing gaps of skills and competences in the current work force.
2. To create and improve a framework "Pathways for Agricultural Competence and skills based Training" (PACT) based on EQF and ECVET, which will allow to share definitions among the different actors involved, i.e. agricultural VET providers, representatives of the labour market and VET policy makers, and serve as a tool to modularise future training and make it more adaptable to the needs of the agricultural labour market.
3. Third, to build a European PACT online service which will serve as a common entry point for:
   - VET providers to describe their training solutions targeted towards skills gaps (as previously determined) and get inspired to adapt and reuse by browsing solutions of their "peer institutions"
   - Agricultural businesses and membership organisations to become aware of existing training opportunities (information pool) but also indicate further emerging training needs (communication and dialogue tool)
     The portal will be built with extended search functionality and scalable manner in order to account for an ever developing labour market.
4. To better recognize existing training opportunities which already address existing skills gaps in the agricultural sector, and make them more visible on a European level as well as to show-case and encourage VET providers who have already modularised their agricultural trainings to integrate elements new training units.
5. To organize four trainings on PACT according to a well-designed up-to-date curriculum which will bring together different multipliers from complementary fields (following the concept of an alliance) and which will make them sustainable through an online training module with successful elements and materials of the face-to-face interventions.
6. To facilitate the transfer of the PACT Framework including its underlying concepts (e.g. learning outcomes approach, modularisation into units, etc.) to more sectors by providing concise, tools such as a multilingual handbook, and a white paper with policy recommendations.

ISBN 978-963-89559-7-5

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ENHANCING 21ST CENTURY SKILLS IN A REGULAR UNIVERSITY COLLEGE SETTING THROUGH BLENDED LEARNING

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Introduction

During the academic year 2010-11, VIVES University College Roeselare Campus has temporarily closed down its PDCA operation – 'We stopped the line, 'cause it was important' – to consider in depth our view of the future of higher education in Roeselare.

During the current academic year (2013-14), our new view of education has led to the start of a new (blended) educational concept in the bachelor's nursing course, which has been revamped to reflect a fresh view of teaching and studying in the 21st century. This is how we aim to meet the fundamentally different demands made on employees and thereby on higher education by today's knowledge and innovation society.

We hope to present this new educational concept at the EDEN congress in Zagreb. On the one hand, we want to inspire other institutions in their quest for modern and effective higher education, whilst on the other hand we are looking for the necessary feedback to help us refine and optimise this concept even more.

Theoretical framework

> *"I'm calling on our nation… to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st century skills like problem-solving and critical thinking and entrepreneurship and creativity" U.S. President Barack Obama, March 2009*

To say that society is developing and innovating like an express train is merely stating the obvious. The classical-methodical education model dates from the industrial age when there was a need for a lot of people who possessed the same standard skills so that they could all do the same work. In today's complex society, professions are changing faster and faster, the range of profiles/positions within a profession is increasing all the time, and we are also seeing the emergence of more new professions and positions. Virtually all repetitive processes are being replaced by ICT based applications. Employees are expected to continue working on their professional development and learn to cope proactively with change. They are expected to make knowledge their own and be able to apply this knowledge autonomously in new situations.

Jef Staes (2008) described the motor behind this process of change as a 'passionate tango of information and innovation'. In his view, what is happening all over the world is that people powered by Internet and ICT are using information wholesale for innovation. These innovations have led to a considerable increase in information. In turn, the new information is applied again for the purposes of further innovation, and so on. This ever faster cycle leads to a constantly growing flow of knowledge. Whereas, in 1900, we still needed 100 more years to double all common knowledge, researchers estimate that this figure was still 25 years up to World War II, five years in 1998, and just one year in 2013 AD. According to IBM, our knowledge in the near future will double within 12 hours (Fuller, 1982; Schilling, 2013).

Dealing with complexity

New research insights, innovative nursing procedures and operations, and changes in the organisational structures in the sphere of work are some of the items covered in the course material. Lecturers, rightly, want to update their lessons as much as possible. However, this leads to a considerable increase in the course material. Enquiries in the VIVES Roeselare Campus copying service have shown that on average the courses are becoming 10% more extensive *each year*.

The constant expansion of the course material means that timetables are full to overflowing. More and more classes have to be given, and this puts even more pressure on both students and lecturers. However, it also means that students have to process more knowledge so that their essential basic knowledge becomes increasingly snowed under.

The endless growth in knowledge in the curricula is *not a good way* of dealing with the growing complexity.

Where is education going?

More than ever before, people are scrutinising higher education to see how students are equipped with a tool box to meet the demands of the sphere of work. The sphere of work is crying out for employees who can adapt properly to the rapidly changing working environment and have mastered competencies instead of falling back on isolated knowledge and skills.

Instead of an arsenal of ready knowledge (which can be acquired simply via Google) we particularly want to develop applied knowledge and the students' meta-cognitive skills, thereby concentrating on a smaller, yet more effective body of knowledge: investigative learning, active learning, critical reflection, creative thinking, self-discipline, and problem-solving teaching are skills which are absolutely essential to today's students if they are going to achieve much in the present innovation economy. Terms such as '21st century skills', 'lifelong

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learning competencies', or 'core competencies' are largely comparable to each other in this respect and are largely interchangeable.

This is how we teach students to develop their own systems of knowledge so that, armed with a sound basic knowledge, they themselves learn to deal with the complex knowledge society in which we live. In this respect our approach is closely related to the constructivist learning theory.

Constructivism and blended learning

Over the last decade, educational neuroscience has provided a lot of empirical support for the constructivist educational model. It has emerged from brain research that the brain is capable of adapting to changing circumstances time and time again. This means that the brain (influenced by the environment) can learn new things again and again and therefore become more intelligent. Neuroscience has shown that brains do not so much 'store' knowledge as 'construct' it (Crone, 2012; Jolles, 2012).

Although traditional classical-methodical education does not meet the demand for proactive and versatile employees, this does not mean that this model is no longer valuable. A sound body of knowledge is still vitally important, but the traditional monolithic approach to education needs to be broadened from a simple (classical) didactic approach to a combination of various didactic strategies i.e. a mix of methodologies (blended learning).

The term 'blended learning' is a container concept and covers a loose range of different connotations. The question of definition is expressed most clearly by Oliver and Trigwell (2005), who state that in many cases the concept of 'blended learning' can be defined as a 'mix' of learning with and without technology, in which a more precise demarcation and expression is not given. Furthermore, they also encounter other definitions. As part of their analysis, they consider the three most common definitions of 'blended learning':

1. The integrated combination of traditional education and 'online' education.
2. The combination of tools and media in an e-learning environment.
3. The combination of didactic strategies, irrespective of the use of technology.

The authors point out that it always involves the combination of all sorts of items (technology, types of instruction, basic principles of learning theory, or didactic strategies). At the same time, they also find that 'blended learning' means different things to different people and is interpreted differently.

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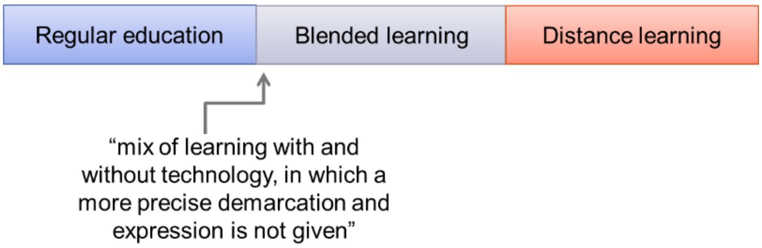

Figure 1. Spectrum of blended learning versus regular education and distance learning

Most forms of blended learning are associated with distance learning. The interpretation at VIVES Roeselare lies on the other side of the spectrum and closely resembles regular education (Figure 1). As a definition, our interpretation most closely resembles 'the combination of didactic strategies, irrespective of the use of technology'. This mix of didactic strategies consists of lectures, (inter-)active lectures, and guided private study through e-learning.

Blended learning

During the academic year 2013-14, after years of intensive preparation, we made a start on blended learning in the initial phase of the bachelor's nursing course at VIVES Roeselare. This meant a radical didactical change for the lecturers. Whereas tuition had previously consisted entirely of lectures, the number of lectures has been halved. The remaining number of contact hours has been restructured into 25% (inter-)active lectures and 25% guided private study through e-learning.

Lectures

As in the past, lectures serve to build up the students' body of knowledge. A sound body of knowledge and skills training still constitute the foundation for training students to become competent professionals.

According to Mink (2008), a lecture has three inextricably linked objectives:

1. A conditional function: A lecture motivates students and stimulates their interest in the teaching content.
2. An orientational function: A lecture informs students about the teaching content, outlines the main points, gives examples and clarification, increases student insight into the teaching content, and structures the teaching material.
3. A practical function: A lecture provides an opportunity for the lecturer to ask questions, give assignments, and improve assignments.

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Guided private study through e-learning

After a lecture in which the lecturer has applied the necessary attention to an item of teaching matter, the students prepare themselves independently for the (inter-)active lecture. The preparation often consists of studying an item of teaching content independently, but it can take on a different form as well, such as reading a foreign language scholarly article, interpreting research results, or watching a film.

Students are provided with all the learning material (documents, power points, and photographic and video material) through the VIVES Learning Management System (Toledo/blackboard). They are free to prepare for a (inter-)active session individually or in groups. The university college provides the necessary rooms for group preparation, but remote teamwork via the social media (synchronously or asynchronously) is equally possible.

After having studied an item of teaching material or having completed an assignment, students can use the Edumatic programme to do a personal test to see if they are ready to go to the (inter-)active lecture. Edumatic is a web-based application which is used to generate personal tests with automatic feedback.

(Inter-)active lectures

In a lecture the lecturer is the instructor and the role of the student is usually limited to passive listening and taking notes (Thomas & Bellis, 2008). The focus is mainly on increasing the student's theoretical body of knowledge.

In a (inter-)active lecture the focus is on the student to learn and the lecturer is there mainly to supervise the process. The focus is on processing knowledge and how to apply it in practice. The working forms are chosen in accordance with the meta-cognitive skills at the heart of the (inter-)active lecture.

The students work on authentic practical situations in which they are stimulated to develop their own lines of reasoning, try things out, and experiment. It doesn't matter if they make mistakes, provided that they learn from their mistakes.

The working sphere in the school

To make these authentic practical situations even more real, the students work with HFPS models (High Fidelity Patient Simulators). In a purpose-built hospital room, students come into contact with lifelike situations to which they have to react. This teaches them to deal with problems, reflect on their own actions, work together with colleagues, and other disciplines. After having completed the scenario, the group of students dwell upon their own actions and those of others, thereby guided by a facilitator. The scenarios become more involved with each new training phase.

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Evaluation

Sergiovanni and Starratt (2007) have stated that evaluation is often viewed as 'the tail that wags the dog'. What they meant was that 'what is assessed is what gets taught, which becomes or defines the curriculum'. Evaluation should never be something that takes place after the instruction with a view to obtaining a certain grade, but should be a relevant part of the teaching process.

In lectures the (main) focus is on the development of the body of knowledge and thereby the more basic cognitive skills (remembering, understanding, and applying). In (inter-)active lectures the (main) focus is on the development of the more advanced cognitive skills (analysing, evaluating, and creating). For this purpose we have used the taxonomy of Bloom, revised by Krathwohl and Anderson (2001).

Depending on the proportion of lectures and (inter-)active lectures, a testing matrix is drawn up for each subject in which the more basic cognitive skills versus the more advanced cognitive skills are reflected in the examination questions.

Quality assurance

The time which students spend on guided private study is monitored via a registration system. This data is passed on to the lecturers so that they can intervene, if necessary. There are also focus discussions each month with a small group of students in which the students' experiences, concerns, and comments regarding the blended learning concept are considered in depth. Finally, the director of training regularly attends the lecturers' (inter-)active lectures.

We are well satisfied with the initial results. The students are extremely enthusiastic about the methodology and they themselves have said that they are able to process the teaching content more thoroughly. They are the ones who have asked for major challenges in the (inter-)active lectures, although they do also ask for the pressure of work (private study) to be monitored properly.

The lecturers find it more pleasant to work in the (inter-)active lectures with a group of 'prepared' students, who give more abundant answers. They do comment that giving and preparing (inter-)active lectures demands all of their didactic competencies.

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E-Learning at Work and the Workplace
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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

LIBE PROJECT – SUPPORTING LIFELONG LEARNING WITH INQUIRY-BASED EDUCATION

Francesco Agrusti, Francesca Corradi, Valeria Damiani, Roma Tre University, Italy

The theoretical background of LIBE project

It is arguably that the surplus of information available in the knowledge society, on a variety of devices and in multimedia formats, can have per se an immediate positive impact on learning. Other than basic ICT skills, the digital competence, intended primarily as the ability to retrieve information and to assess its suitability to learner's needs, can make the difference in learning outcomes.

A learner-focused approach devoted to develop, consolidate and secure transversal competences in retrieving and selecting the text to read and/or data to analyze is the strategic element that can foster the passage between school and university, reducing drop-out rates, modifying the style of learning and nurturing an independent study through ICT in a lifelong perspective.

Typically young face higher unemployment rates than older workers. Unemployment rates for 16-24 year olds are particularly high in Italy and in Portugal. In Norway, despite scoring high among the countries who participated in the latest OECD Survey on adult literacy, the Programme for the International Assessment of Adult Competencies (PIAAC), one in three adults' literacy skills do not meet the needs of the labour market. At individual level, not finding a job in the few years immediately after education may entail a disadvantage for the rest of the career.

In addition to this, low achievers aged 16-24 represent an ideal target group for courses enhancing digital competence for two reasons:

- ICT represents for them one of the best motivators to learn, because it can free them from prejudices linked to their own gaps in preparation and, even if almost completely only for social and leisure reasons, it is pervasive in young peoples' daily experiences
- compared to the other age groups, young people are less frequently developing their skills through systematic self-study or formal e-learning training courses, and almost never with specific reference to digital competence, as the key information processing competence.

Contrary to the picture for the other key competences, almost all European countries have a specific national strategy related to digital literacy. These strategies may be wide-reaching, encompassing several areas such as e-Government, infrastructure and broadband connectivity, ICT security and e-skills development along with ICT in schools. But they are only implicitly related to the development of literacy, numeracy and problem solving skills, even though they are tightly intertwined. Moreover, ICT requires a proactive learner's involvement and it can be boosted with an inquiry-based learning approach starting from actual learners' needs and real-life open source materials. With regard to this, LIBE project will foster the comprehensive achievement of key competencies and digital skills.

The aims and development phases of LIBE project

The project LIBE, funded with support of the EACEA in the LLPKA3P programme (Project Ref. No. 543058-LLP-1-2013-1-IT-KA3-KA3MP), aims at designing, developing and try out, in 3 different countries in Europe (Italy, Portugal, Norway), an innovative e-learning management system devoted:

1. To develop key information processing skills for ICT (literacy, numeracy and problem solving), with an inquiry-based approach to learning, in low educational achievers aged 16-24 (Comenius, Erasmus, Leonardo da Vinci);
2. To produce a high level of personalization in learning based on:
   - automated computer-based assessment (CBA) and computer adaptive testing (CAT),
   - an innovative way of delivering learning materials, through automated texts modulation, to reduce reading comprehension difficulties.

The project will provide a learning content management system in 4 languages (English, Italian, Portuguese, Norwegian) devoted to information-centred courses to upper-secondary school, undergraduate students and unemployed young people. The innovative educational platform will use automated adapted algorithms in order to modify learning object contents according to learner's lexical profile. The course will offer a full learning experience to improve learner skills into retrieve effectively specialized information on the internet. The inquiry-based learning will be the theoretical model in the design of courses in order to achieve an effective individualization of the path of acquisition of knowledge and to motivate learners.

The LIBE project has a 2-year duration (Figure 1). In the first year, the work will be focused on the production of a Framework for ICT key information processing competences and on the analysis of current OERs and MOOC existing repository in order to propose a sounded solution for an innovative inquiry-based learning approach into the development of the digital competence in low education achievers aged 16-24.

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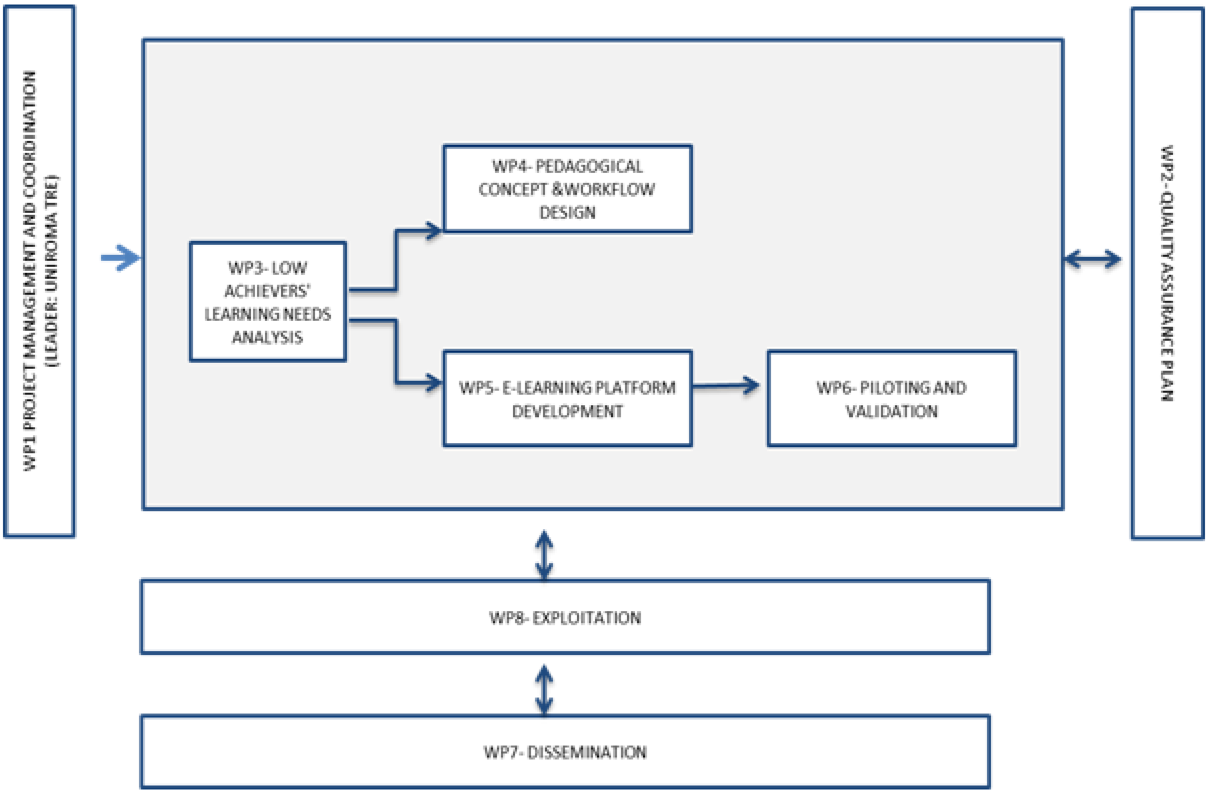

Figure 1. LIBE project PERT diagram

Features of the LIBE courses

The courses will offer a full learning experience with the main aim of improving learners' skills to retrieve effectively specialized information on the internet. In detail, the learning management system (LMS) will assure:

- an easy and open access to learning resources for critical ICT-related skills development;
- a student-centred learning approach fostering independent learning and motivation to learn;
- a robust, accessible, up-to-date technology with technical support;
- a flexible delivery e-learning solution cost-free for end-users and stakeholders;
- a complete integration between course-subjects and the way to deliver these to the students, enhancing learning in a lifelong perspective.

In order to boost LIBE project results visibility, the existing networks and projects on Open Educational Resources (OER) standards in e-learning courses will be accomplished in order to include LIBE materials in their online database and/or meta-search engines (OER Commons, POERUP).

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Foreseen impact

Expected changes deriving from project outcomes are:

- attract social groups that do not traditionally engage in formal training, such as the 80 million low-skilled in Europe;
- contribute significantly to reaching the Five EU benchmarks for 2020,
  - reducing the percentage of young low achievers in Europe below the 15%,
  - increasing the percentage of young adults participating in lifelong learning initiatives;
- supporting informal, self-learning as the most important mechanism for obtaining skills and competences for young and adult people;
- helping the most disadvantaged groups with ICT tools to reach the right levels of skills needed for employability, personal development, and civic participation;
- reducing gender gap in reading comprehension skills across Europe for the age considered.

The consortium

The international consortium of LIBE project is formed by Roma Tre University (Italy – coordinator), Twente University (The Netherlands), Lillehammer University College (Norway), Birkbeck University College (United Kingdom), Porto University (Portugal).

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

PROFESSIONAL EXPECTATIONS OF GRADUATED STUDENTS FROM THE GRADUATE COURSE PLANNING, IMPLEMENTATION AND MANAGEMENT OF DISTANCE EDUCATION (PIGEAD)

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Introduction

The distance education courses started in Brazil with activities from the Instituto Monitor (1939) and the Instituto Universal Brasileiro (1941) which developed courses nationwide using the post office services to send and receive materials and evaluations from students.

In the 90's with the broadening access to Information and Communication Technology, the Law which regulates formal education recognizes the internet as a tool for developing education. In the 2000's this modality expanded significantly, increasing from 5359 registrations in 2001 to 1,113,850 registrations in 2012 in Higher Education. 932,226 of these registrations are in the private sector (INEP, 2013).

The growth of this educational modality create new activities, for example:

1. tutor – responsible for monitoring distance students;
2. pole coordinator – responsible for face-to-face monitoring;
3. producer of educational materials – create didactic materials for the course;
4. materials designer– work on revision and presentation of the material;
5. tutor coordinator - responsible to supervise and follow the course; and
6. distance education manager – responsible for the course management.

As a contribution for the training of professionals to work with distance education modality, the Universidade Federal Fluminense created, in 2008, the course of Planning, Implementation and Management of Distance Education (PIGEAD). This course is a *lato sensu* postgraduate course in the modality of distance education designed for public school teachers, working professionals at the Open University of Brazil (UAB) and professionals seeking training in this area of knowledge. The course has 420 workload hours and focuses on the following contents: production of teaching materials, tutoring in distance courses, virtual learning environments and media communication, management of distance education courses, learning and institutional evaluation.

This course offers 2500 places per year and has already graduated four classes with approximately 1000 students each. Despite all investments in training and the growth of interest in the course, few things are still unknown about the professional expectations of the students and its graduated students. Therefore, the main purpose of this work is to analyze the contribution of the course for the graduated students' career and also to analyze their professional expectations for the next 5 years. An online questionnaire was built and sent to the graduated students of 2012. In a population of 1000 students, 92 answers were obtained.

Preliminary results

The profile of the respondents:

- Mostly female (63%), with an average of the age of 41 years.
- 40% graduated in Languages and Pedagogy.
- 95.7% of the respondents were working, 75.6% of those in the public and 24.4% in the private sector.
- 59.3% were married and 22% single.
- 38% of the respondents had never worked with distance education activities before PIGEAD and among those who had worked or were working, the majority (48.9%) works with distance education as a part-time activity.
- Monitoring corresponds to 54% of responses, while the total management activities (coordination of courses, coordination of tutoring, course manager at an institution with distance education) corresponds to only 7.2%.

The analysis of the parents education (Table 1) provides an important element to the profile of the respondents, as 81.5% of the fathers and 79.3% of the mothers didn't go to college. This data brings a relevant point about the social transformation in Brazil in the last decades, the growth of people in Higher Education, which goes from 4% of the population in 1990 to 14% in 2013. This Table 1 shows how this change has been reflected in the profile of the present generation, better educated than the previous one.

Table 9: Parents Education

	Father	**Mother**
None	4	8
Elementary school	36	30
Secondary school	16	16
High school	19	19
Higher Education	14	17
Master/ Doctorate	0	0
Don't know	3	2
Total	92	92

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In the questions about motivations the participants could choose up to 3 options, and the search for deepening knowledge in distance education was the most indicated. The alternatives related to performing activities in distance education, show that only 21.7% looked for the course because had previous experience in the area, but opportunities in the area (46.7%) and willing to develop activities in distance education (45.7%) highlighted the interest in working in the future in the area. However these opportunities would not be a change to a different area of interest (9.8%) highlighting a character of secondary activity that has marked the achievement in distance education activities in Brazil.

Table 2: Main motivations for doing the course

Motivations	Answers
Have a graduate degree	34.8%
Employment opportunities in the area	46.7%
Previous experience in the area	21.7%
Employment opportunities in the area of distance education	81.5%
Media influence	1.1%
Recognition of the quality of the institution	37.0%
The course is in distance education modality	22.8%
Willing to develop activities in distance education	45.7%
Expand income	16.3%
Willing to change area of interest	9.8%
Curiosity about the theme	12.0%
Large number of vacancies offered	1.1%
Other	6.5%

The search for deepening knowledge highlighted among the motivations is confirmed in the analysis of the course contributions from the graduated students. Having a standard scale from 1 to 5, being 1 the lowest and 5 the highest in agreement, deepening knowledge and the improvement of the public opinion on distance education have achieved the highest scores, 4.86 and 4.38 respectively. In the same way, they recognize that it was very positive to do the course, as it is observed in the lowest average in Table 3.

Items related to career change had lower averages, with the highest average as the employment opportunities. Affirmatives presenting specific items of professional experience in distance education have significantly lower averages (i.e. the course helps to find a new occupation and encourages a career change).The job change emerges as the second lowest average, which can be explained by the large number of professionals in the public sector.

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Table 3: Course contributions for the learning and career

	Media
The course expand my knowledge on elements that go beyond PIGEAD	4.86
Improve my opinion on distance education with PIGEAD	4.38
PIGEAD expand job opportunities	3.95
Start to spend more time on professional activities in distance education because of the course.	3.84
PIGEAD helps finding a new professional activity.	3.28
The course stimulate a career change.	3.16
Start to develop activities in distance learning during the course.	3.14
Complimentary activity because of the course.	2.87
Change job because of the course.	2.13
Lost time doing the course.	1.07

When analyzing the expectations, we observe that the search for training and the interest in part time activities emerge as the items with the highest average. The search for continuous training comes with an interest in doing a Master degree and another graduate course. But the will to do other courses about distance education shows lower average what could be a sign that the course met the expectations of the training the students wanted and that it stops being a training interest. This issue should be explored in the following stages of the research.

Regarding performance in the area of distance education, it is emphasized the interest of working in the area, but as part time. The full dedication to this area, as well as job changes show significantly lower averages. Among the areas they intend to work (Table 5), mentoring appears as an activity of greater interest, which confirms the expectation to engage in part time activities in distance education, because tutoring allows a greater flexibility of time to monitor the students. Management activities, which require greater commitment, arise as interest of 16.5% of the respondents.

Development activities, content review and pole coordination are among the ones with less interest. Perhaps the first ones for the specificity or the predominance of technical skills, or maybe because it is more restricted to professionals who already work in universities as professors and technical. The coordination pole may have received a low average because of the distance between the residence of the respondents and the poles.

Table 4: Expectations for the next 5 years

Expectations	**Media**
Do a Master Degree.	4.66
Develop part time activity in distance education.	4.35
Do another graduate course in the modality distance learning.	4.3
Do another graduate course about distance education.	3.81
Act with distance education but there’s no offers where I live.	3.42
Work full time on distance education activities.	3.4
Change job to dedicate myself on distance education.	2.4
Change address to dedicate myself on distance education.	2.03

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Among the sectors with the highest interest of acting, Higher Education and Graduate course are highlighted, as shown on Table 5.

Table 5: Sectors with interest of acting

Sectors	Answer
1. Basic Education	2.2%
2. Education for Youths and Adults	9.8%
3. Undergraduate course	43.5%
4. Technological undergraduate course	3.3%
5. Graduate course	27.2%
6. Corporative Education	4.3%
7. Do not want to act	0.0%
8. Other	9.8%

Discussion and final considerations

- The results presented here are preliminary data from a larger study on the influence of the graduate course PIGEAD for professional careers of its graduated students. Among the respondents were women, white, married with children.
- Both motivations for conducting the course as the professional expectations highlighted the interest in broadening knowledge on distance education and the interest in developing part time activities in this modality, especially in tutoring.
- The results show that there are few people interested in working full time in distance education courses, directing their career to this professional area.

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ISBN 978-963-89559-7-5

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INNOVATIVE DEVELOPMENT OF THE UNIVERSITY THROUGH UNIVERSITY-ENTERPRISE PROGRAMME

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In today's world higher education has become almost a must for a person to be successfully employed. But pure academic knowledge though still in high demand cannot fully satisfy the needs of a rapidly growing and changing business in a highly developed technological environment. To provide a high rate of employability of their graduates universities themselves need to innovate. The most obvious way to do so is to cooperate with potential graduate employers – big and small public and private enterprises. Such cooperation can be highly beneficial to both parties in many ways: not only will educational process become more practice oriented but the enterprises will be able to retrain their employees or apply for scientific expertise. This in its turn will trigger the development of science and technology.

The idea of 'University – Enterprise' cooperation fully complies with the government's concept of innovative development of the economy of the Russian Federation till 2020. The concept has been supported by V.V. Putin, former Prime-Minister and now President of the RF, who believes that universities should 'become an important element in the national innovation system' (Putin, 2012). The government has elaborated special programmes to encourage innovative development of higher schools and plans to subsidise their transformations. The Universities may also present their programmes to the open contest for the status of National Research University and get additional support if they win. The transformation of universities into big centres combining education, research and innovation is of more importance as the system of scientific-research institutes successfully functioning in the Soviet time nearly collapsed during the perestroika years and has not been restored so far.

Background

The Plekhanov Russian University of Economics, one of the biggest and oldest in Russia, is undergoing dramatic changes in trying to modernize its educational processes. Different forms of innovative development have been selected in order to participate more actively in the economic growth and make its students more adaptive towards the needs of the present day labour market. Several years ago a centre of innovations was created, concentrating on business planning, project expertise and consulting. It helps the authors to register patents and inventions, industrial samples and software. It organizes conferences and workshops, conducts seminars and delivers lectures in the field of intellectual capital management.

Another important step was the setting up of a business incubator to encourage students' entrepreneurship, research and innovative activity.

But the core element of the University modernization process is the establishment of University-Enterprise cooperation. As a partner the State Corporation Rostec (full name: State Corporation for Assistance to Development, Production and Export of Advanced Technology Industrial Product "Russian Technologies" Rostec) has been selected.

Rostec Corporation was founded in 2007 to elaborate, produce, promote and export high-tech industrial products for military and non-military purposes. It comprises 663 enterprises that have been united into 13 holding companies, 8 of them operating in the military-industrial complex and 5 in civilian sectors. It includes such giants as OBORONPROM, the United Industrial Defense Corporation, AVTOVAZ, the largest automobile manufacturer in Russia and Eastern Europe, KAMAZ Russia's largest manufacturer of cargo vehicles, etc.

Rostec has been chosen as a partner because its strategic goals, its innovative approaches, its qualified staff and its size are supportive of the idea of innovative development. Meanwhile its state of the art equipment and lavish government financial support adds attractiveness.

Project

From the very beginning it was very important for the partners to define the areas of common interest and to elaborate the strategy of joint work. For Plekhanov University such cooperation means better preparing of students (graduates and post-graduates) for their future employment by considering the requirements of companies. Rostec's priority is to retrain its employees, initially to provide its top-level staff with up-to-date managerial skills. Both companies expressed their readiness to conduct joint research and look for ways to commercialize the results.

So the step-by-step plan of cooperation has been developed with the idea that if the initial stages prove to be successful other spheres of joint work will be considered.

The first stage foresaw the programmes for retraining of Rostec managerial staff on the one hand and using Rostec companies as the base for Plekhanov students' internship with possible future employment on the other.

As Rostec companies are situated all over Russia the format of the modular MBA programme was chosen, which combined face-to-face learning with distance and e-learning.

So two groups of top managers: one from Rostec and another one from Uralvagonzavod, Rostec's strategic partner #1 were formed. Uralvagonzavod, Research and Production Corporation, is Russia's biggest military equipment manufacturer, leading domestic designer and manufacturer of freight railway cars and the Avant guard of Russian heavy machine building.

ISBN 978-963-89559-7-5

The groups consisted of 6-8 people and included deputy directors and chief accountants of the enterprises of both corporations who had chosen the 'Strategic management' programme. As all these people lived and worked quite far away from Moscow it was agreed that they would attend face-to-face classes only once a month from Thursday to Sunday, which still comprised 48 academic hours per month, typical for part time MBA programmes. The rest of the time the learners were supposed to be involved in a self-study process supported by distance learning. The most important point was to engage the participants in the creation of the curriculum, negotiating schedules and forms of delivery of necessary information, and giving feedback on different stages of the learning process. The students could select from the readymade but constantly updated courses for distance learning, including electronic manuals, tests, lectures and simulators, but if they wished to have some specific knowledge it could be provided by a live lecturer online or face-to-face, and discussed at the seminars and webinars. Constant quality control was conducted with the help of the questionnaires sent to the students. On the basis of their feedback improvements to the learning process were made. The result of the programme demonstrated a high degree of student satisfaction and proved the necessity for further cooperation in this field.

In the meantime six 4^{th} year students of Plekhanov University took their internship in the enterprises of Rostec which served as the basis for their graduation paper.

The successful beginning identified the necessity for closer cooperation. To make joint work more profound a base department, 'The Department of Economic Analysis and Corporative Management of Rostec's, a State-owned Corporation, High tech Production and Exports', uniting University professors and Rostec managers and researchers has been founded at the University. It is headed by Dr. N. Volobuev, Deputy CEO of Rostec. Dr. Volobuev, and other professors of the department conduct lectures and workshops for the programmes of additional education, concentrating on the MBA. Prof. Chemezov, CEO of Rostec, also actively participates in the educational process. The specialists of Rostec's legal department have created and are running the whole course: 'Legal aspects of military – technical cooperation'.

In December 2013 80 top managers of Rostec companies took a short term module 'Innovation development management of companies with government participation', organized by the base department together with Integral, Plekhanov Business school. In their feedback the participants expressed their satisfaction with the course, professors and learning materials and identified the need for future training programs.

Rostec's scientists participate in curriculum planning and course design not only for MBA students but for full-time graduate students of the University, insisting on practical orientation of the learning process. Students participate in scientific conferences, round-table meetings and exhibitions of Rostec companies.

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To satisfy Rostec's need for 'fresh blood' and to help Plekhanov full-time students with their future employment a long term strategic plan has been developed. The core point of the plan is the multi-level training programme for students, consisting of two stages:

1. Familiarization for the 2-3 year students. The students get to know the production process and do their research in the spheres of their interest in Rostec companies.
2. Internship for the 4-year students in the departments where they are planned to be employed.

Another very important point of the plan is the development of the contract between a student, the University and Rostec. At first Rostec pays for student's education at the University and after graduation the student will work for 5 years for the company.

The next step planned for the near future is the creation of a network of base departments, branches of the above-mentioned one, in the biggest cities of the Russian Federation, where Rostec companies are. That means that students while conducting their internships far away from Moscow can still be consulted by professors and researchers of Rostec and Plekhanov University. But the main thing is that it supports the idea of life-long learning – the specialists of Rostec can have their re-training without the necessity to get away from their city and come to Moscow. Our carefully developed scheme of blended learning will be applied here: students can chose from blocks of electronic educational courses and get online classes but some of the specialized courses especially those concerning local needs will be provided face-to-face.

Also a lot of emphasis at the base department has been put on joint Rostec-Plekhanov scientific research. Scientists from both Plekhanov and Rostec are working on a financial and economic feasibility study of the government industrial and technical military policy. Another group is investigating the ways to raise production effectiveness and export of high-tech products, innovations development and commercializing of its results.

So far most of the initiatives in the framework of the Rostec-Plekhanov Cooperation have proved to be successful adding value both to the University and the Corporation. The short term goals have been achieved and the participants of different programmes satisfied, which proved the necessity to move further in this direction. Specialists at both the University and Rostec are constantly exploring the ways to widen the spheres of collaboration.

ISBN 978-963-89559-7-5

Conclusion

University-Enterprise cooperation can be very beneficial to both sides, helping Universities to increase the employability of their students by taking into account the needs of companies while companies will get highly qualified specialists who are always ready to upgrade their knowledge and skills at their alma mater thus supporting the idea of life-long learning. The collaboration of experts from companies and universities can result in creation of new technologies optimising manufacturing and management processes in the companies and lead to their productivity growth and bringing extra funding to the universities.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

PARADIGM SHIFT IN HIGHER EDUCATION COLLABORATION: COOPERATION INSTEAD OF COMPETITION

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The MELLearN Network

The MELLearN Network was the first and only higher education network in Hungary in the topic of lifelong learning and adult education with national coverage. The Network formed a community of experts for the common activities, and provides opportunities for professional collaboration in the preparation of documents, projects, research, organising events (altogether 18 conferences, workshops). MELLearN means „collaboration instead of competition" for the member institutes who were able to learn about each other while cooperating in different topics and during the conferences, thus fostering the synergy between members. The network has the mission of expanding the idea of lifelong learning, as formulated in its Memorandum: "Higher education institutions must play a significant role in the renewal of the national lifelong learning strategy with their specialised field-related association (MELLearN)." (Besenyei, 2008)

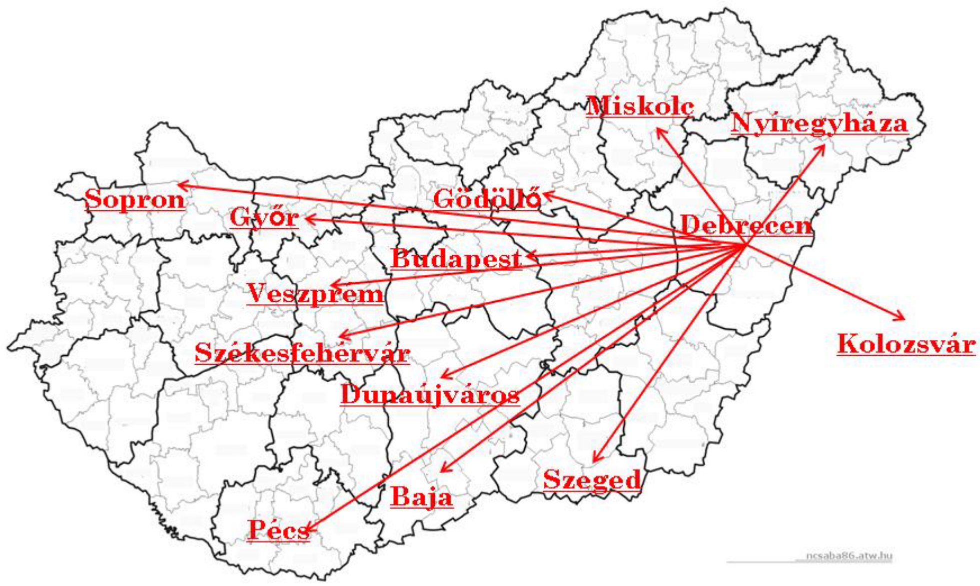

Figure 1. Geographical coverage

Functional disciplines and mission

In October 2002 twelve Hungarian Higher Educational institutions founded *MELLearN – the Hungarian Higher Education Lifelong Learning Network* – with the support of the European Commission and THENUCE European Socrates LLL Network. The Association operates as a non-profit organisation and has currently 18 higher educational institution members. MELLearN works for the public benefit, initiating and coordinating educational, training, research and other academic and scientific activities. During the period of its existence, MELLearN has achieved the implementation of good inter-institutional cooperation between the member universities and represented in unison the importance of lifelong learning.

The incomes of the organization come from membership fees, the organized events, the support of sponsoring members, from projects and from economic ventures.

In course of reformulation of the Network's strategy in 2009, MELLearN managed to realize principles declared in the European memorandum in its local, regional, national and international activities alike. Based on the recommendations for the universities by the EUA's Charter on LLL, MELLearN revised its strategy due to the changing circumstances in society and in higher education. It was recognised that higher education institutions have to change their approach to lifelong learning and that it should become one of the major fields of university education (Besenyei, 2008).

The Network operates an advisory and training system with the involvement of partners for helping the higher education institutions in the implementation of adult education and in the permanent development of organizational, methodological and human resources that are important in formulating the higher education strategy. The Network organizes conferences for the discussion of the current issues of lifelong learning with the participation of the representatives of higher education institutions. It cooperates with the Hungarian Rectors' Conference on elaborating the development concepts for the national lifelong learning strategy. MELLearN intends to cooperate with the Danube Rectors' Conference for learning the best practices the HEIs in the region have in the field of lifelong learning. MELLearN operates as a network for realizing its aims. The management of the Association reports to the General Assembly on the achievements of the strategy and the yearly action plan (MELLearN, 2003).

The activities of the MELLearN Network

Organising conferences

The Hungarian National and International Lifelong Learning Conferences have been organized annually from 2005 onwards and the event is hosted by a different institution every year. The topics of the conferences are strongly connected to the concepts of learning and continuing education. The annual events attract more and more participants, from Hungary and abroad.

ISBN 978-963-89559-7-5

The topics of the conferences were:

- "The notion of Lifelong Learning in today's Europe";
- Higher Education and the LLL Strategy;
- The LLL Networking Co-operation of HE Institutions as Regional Knowledge Centres;
- Adult Education Experiences and Opportunities for the Renewal of Higher Education;
- Strategies for the Learning and Knowledge Society, Networking in Higher Education;
- Lifelong Learning, Innovation and the Creation of Values;
- The Role of Hungarian Higher Education in Achieving the Knowledge Triangle (Education-Research-Innovation). The Europe 2020 and the Education-Training 2020 Strategies;
- Competition and Co-operation: The Innovative Higher Education;
- The Social Engagement of Higher Education in Lifelong Learning: Responsibility and Opportunity for Breaking Out. Quality, Financing and Openness.

MELLearN applies innovative approach towards the main questions of higher and adult education. In fact, when it was founded, Hungary did not have an Adult Education Act. The network was among the first actors in dealing with new subjects like recognition of prior learning (2005); provided a platform for discussing training of trainers, new learning environments, ICT use in learning, etc. In adult education MELLerN emphasises the multidisciplinary approach, promoted the inclusion of lifelong learning in the institutional development plans. The Network provides dissemination possibility for the member institutions, and propagates national and international good practices. It has serious potential in conducting national research activities issues relevant publications: the majority in English-Hungarian (altogether 39).

MELLearN has the mission of presenting the situation of the Hungarian higher education system on international forums: e.g. the 7th National and International Lifelong Learning Conference was part of the Hungarian EU Presidency's programmes. In 2011 the Network introduced its publications at the EU's LLL Conference in Budapest.

Organising workshops and trainings

The topics of the MELLearN workshops have been:

- Training of trainers in Lifelong Learning;
- Lifelong Learning and the Changing Labour Market;
- The Role of Higher Education in Adult Education;
- How are Higher Education institutions implementing LLL?;
- The Methods of Measuring Prior Knowledge and Competence in Adult Education;
- Employing Atypical Learning Styles in Higher Education;
- Vocational Training and Higher Education – the Adult Education Aspect;
- Recognizing Prior Learning in Higher Education;
- New Challenges in Adult Education.

ISBN 978-963-89559-7-5

Research

By now, the Network conducted five research projects. In 2012 the Network celebrated its 10th year anniversary, and for this occasion the School of Educational Science of the University of Debrecen and the University of Szeged summarized activities and achievements of the last decade in a comprehensive essay. In 2004, research was conducted with the support of the Ministry of Education on the adult education practice of higher education. In 2006 the Network prepared a survey on the topic "Adult trainers' competences in higher education". The survey looked into the Hungarian situation in three themes: the training of adult educators in Hungary; the overview of the institutional cases and the summary of training programmes for adult educators. In spring 2013 the Network investigated the training needs of instructors and workers via online survey in order to establish a training database. The research helped to reveal the use of different teaching methods and ways of organizing education among participants.

National and international projects

MELLearN finds it vital to have good collaboration with European organisations and to be involved in projects. In 2010 we represented Hungary on the EU Peer Learning Forum on LLL in Malta from among the ten international and national projects. International projects worth of mention are ALPINE (2001-2004), TEACh (2004-2006), NETTLE (2004-2007) and EUGENE (2009-2012), which all dealt with adult education, knowledge society and lifelong learning. As national projects, most significant was "Developing Service and Research Networks for Supporting Professional Educator Training" (2009-2011).

Summary

The MELLearN Higher Education Lifelong Learning Network fosters and supports the professional activities of higher education institutions, informs them about the latest issues and practices in the field of lifelong learning. It is an open and collaborative circle group where international and national practices can spread effectively, the institutions join to R&D projects and international professional activities.

> *"The whole MELLearN movement is not only formulating thesis, definitions and doctrines, but wants to make us think, urges us to proceed, induces forces to create modern learning plans. MELLearN, and the European movement behind it, which concentrates on the same intellectual field, does not force us, but recognizes and unifies, supports and tries to control an existing and undeniable process present in the world and in Hungary. Serving is its most important role in improving the conditions and methods of learning in the third millennium. (Prof. Zoltán Jánosi)"*

ISBN 978-963-89559-7-5

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THE SELECTION AND TRAINING FRAMEWORK FOR MANAGERS IN BUSINESS INNOVATION AND TRANSFORMATION PROJECTS – THE EDUCATIONAL PATTERN AND RECOMMENDATIONS

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Abstract

The riskiest factor in transforming a traditional business environment (BE) into a lean and automated BE is the role of profile and education of business and (e-)business transformation managers (BTM); the influence they have on the concrete implementation part of business transformation projects (BTP). The basic profile and educational prerequisites of such a business transformation manager has not been sufficiently investigated in a holistic manner in order to design the *BTM's profile and its educational prerequisites*; and that is the main goal of the authors' research (Trad & Kalpić, 2013a; Trad & Kalpić, 2014a). In fact actually, there is no concrete educational curriculum for such BTM profiles. This research paper deals with the optimal profile and educational prerequisites of the BTM who has to manage the technical implementation phase of complex business transformation projects; knowing that the BTPs' implementation phase is the major cause of very high failure rates (CapGemini Consulting, 2009). The implementations of such business transformation projects require a specific set of business architecture and implementation educational and training techniques. The authors have based their research on the main fact that only about 12% of business organizations successfully terminate innovation-related business transformations projects (Tidd & Bessant, 2009); therefore, there is an essential need for more research on the BTMs' profiles and educational prerequisites. "We know that those organizations that are consistently successful at managing innovation-related changes, outperform their peers in terms of growth and financial performance" (Tidd, 2006).

Introduction

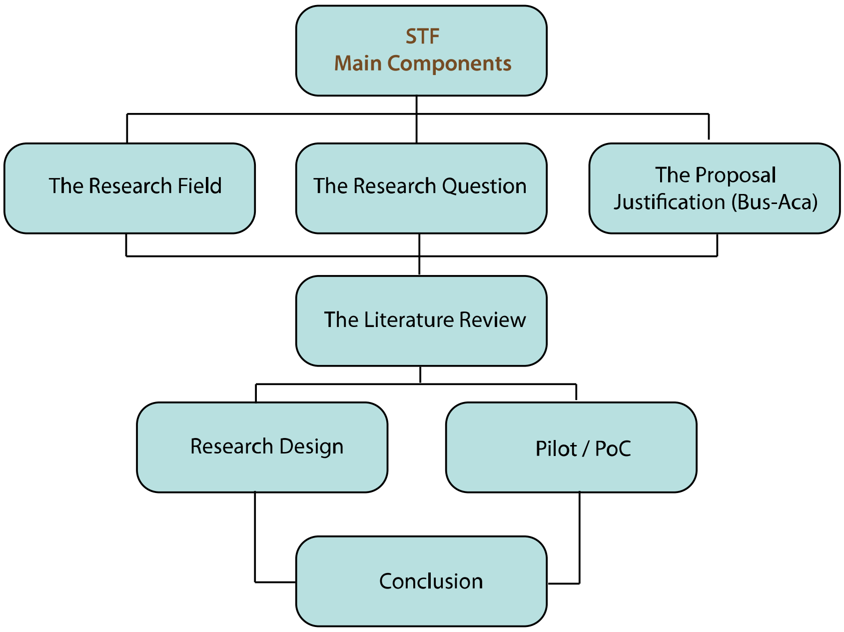

Figure 17. The Proof of Concept (PoC) development is the current research phase (Trad & Kalpić, 2013b).

The characteristics of a suitable BTM profile and his or her (for simplicity, in further text "his") corresponding educational background, is the main goal of the authors' selection and training framework (STF) research project, which started in year 2010. In this research paper, the authors will try to present the educational prerequisites for such a BTM and make a summary of the research's managerial recommendations & benefits. This research's final phase uses a theory- based hyper-heuristics reasoning model (Birudavolu & Nag, 2011). This reasoning model offers the optimal BTM profile and educational characteristics that are adapted to complex BTPs. These skills and educational perquisites are fed in the form of factors into the reasoning model, which will deliver the most important BTM characteristics (Trad, 2013a). The actual research results show that a BTM is an "architect of adaptive business information systems" (AofABIS) (Trad, 2014). The BTP's implementation phase is the main cause of high failure rates in BTPs; that is why BTMs need hands-on skills and educational requirements that encompasses the following set of skills:

1. knowledge of business architectures (BA) and business processes (BP),
2. automated business environments (Willaert, 2001),
3. agile project management,
4. knowledge management & integration,
5. organizational concepts,
6. management sciences methodologies,

7. enterprise architecture and other concrete BTP implementation artefacts (The Open Group, 2014).

Therefore, the researchers recommend the technocrat profile (Farhoomand, 2004) as a management profile for such BTPs and the corresponding educational curriculum (Trad, 2013b).

Research methodology and design

The research question and knowledge gap

The work's research question, is: "Which business transformation managers' characteristics are optimal for the implementation phase of (e-)business transformation projects?" (Trad, 2011a; Trad & Kalpić, 2011a). The knowledge gap was acknowledged, due to the fact that the existing literature and various methodologies, treating business transformations offer practically no insight into the profile of the BTM as an architect of adaptive business information systems (AofABIS), managing the implementation phase of BTPs (SAP, 2013).

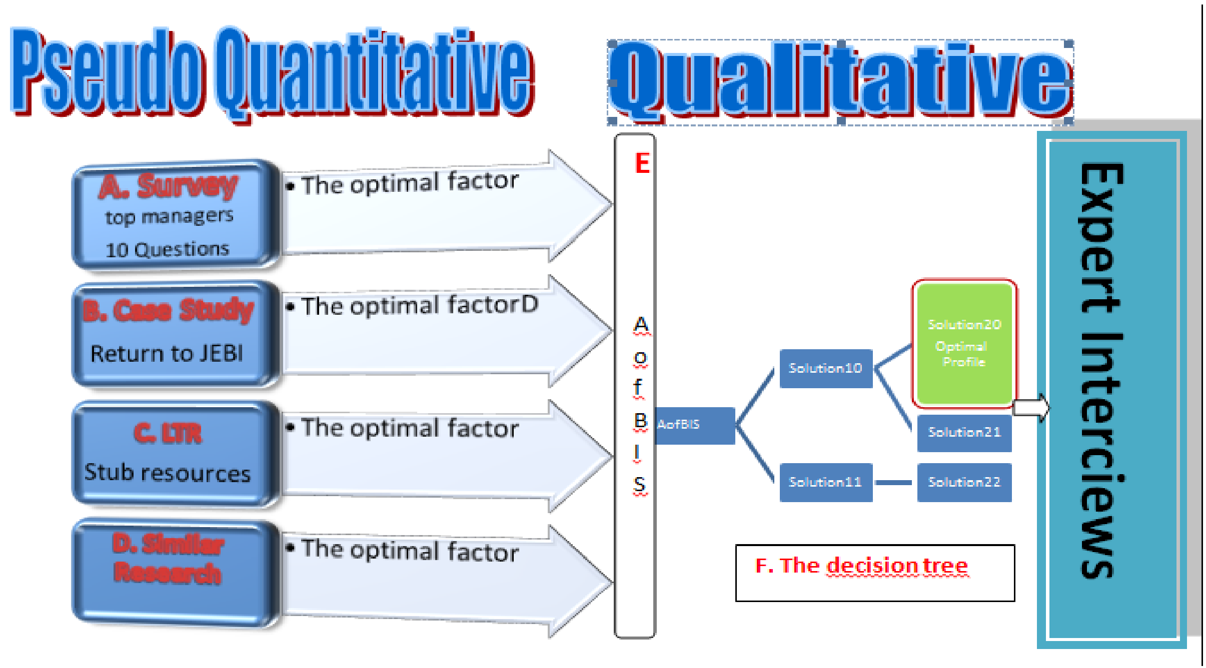

Figure 2. The mixed method flow diagram Interviews

The literature review

The literature review has shown that the BTM's optimal characteristic is to be an AofABIS; and an important part of that phase was dedicated to the education of BTMs (Trad, 2013c; Trad & Kalpić, 2014a).

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The research methodology

The authors have implemented the STF research methodology, design and prototype (Trad, 2013d), to support the selection of the optimal BTM profile. Such selections can be only evaluated with the help of mixed-models that are very similar to the (re)-scheduling of activities techniques. These mixed models are based on: i) quantitative based survey analysis and ii) qualitative beam search and grounded hyper-heuristics; that are in fact a dual-objective decision-making process (McMullen & Tarasewich, 2005; Wes, 2001). This mixed hyper-heuristics-based reasoning model, shortly labelled STF_MHM, is a qualitative reasoning tree. The tree factors are fundamental at the future selection of the BTMs for the transformed business environment within the globally transformed (e-)enterprise. BTMs who are basically technocrats, proactive project managers and advanced knowledge workers should be capable of supporting and designing the transformation of the (e-)business environment in a proactive manner (Walsh et al., 2010; Trad & Kalpić, 2013a). Accordingly, this research project unifies resources from two distinct but related areas: i) avant-garde business management and ii) enterprise business processes-based information technologies (ABPMP, 2014). It develops a concept for the BTM's selection and proposes a method to ponder and inter-relate the BTM's various skills through the use of tuneable factors (Trad & Kalpić, 2014b). BTM selectors, professional analysts, project managers, auditors and advanced computer science students might benefit from this research project and methodology, which delivers major managerial recommendations and benefits. The authors have decided to select Analytical Applicative Research (AAR) methodology, for the selection and training framework (STF) research project (Chanaron, 2010) because it is compatible with the research heuristics model based on categories of factors; and is optimal for educational-based research. This research that is conducted in the context of a doctorate in business administration was validated by the researcher's supervisor (BSI, 2013).

Holistics

Transformed organizations and BTMs need more than basic Business Information Systems (BIS) knowledge and educational techniques to exploit the avant-garde technologies in order to successfully conduct BTPs. Holistics, managing complexity skills and educational concepts, require a mixed method that is mainly based on action research; a hyper-heuristics model. Such BTPs and organizations need holistic just-in-time (JIT) methodologies and educational concepts, similar to the SAP's BTM2; that encompasses TOGAF (The Open Group, 2014; Uhl & Gollenia, 2012). This research shows that the BTM is an AofABIS with holistic cross-functional skills (The Economist, 2000); with a business engineering education (HEC, 2014).

The survey and proof of concept

The survey is the quantitative part of the mixed method that is made up of the set of resulting factors and questions (Trad & Kalpić, 2013a). The surveyed types of specialists and managers (limited to 20 members) were: i) business and information technology school professors and directors, ii) managers of information systems, iii) project managers, iv) human resources, v)

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educational professionals and transformation managers. The surveys confirmed the research project's hypothesis. The research shows that the BTM is an AofABIS (Trad, 2014). Therefore, a concrete STF environment was built; this STF PoC and the final interviews should deliver the research's final recommendations on how to select and train the right BTM profiles and to define his educational curriculum (Trad & Kalpić, 2013c; SAP, 2012).

Table 10: The STF research survey results, showing the "best" factor (question)

Factor in the form of question	Label	Answers
AofABIS characteristics	The BTM must an AofABIS	7
…	…	…

Managerial educational benefits and recommendations

The STF research offers a set of BTM profile and education recommendations & benefits. The STF's qualitative reasoning process model uses the recommendations to give the BTP to tune the details of the BTM's profile (Vella et al., 2009).

Table 2: The STF research list of recommendations

By Importance	Label	…
1	The TBM must be an excellent architect of adaptive BISs (AofABIS)	
2	The TBM must have extensive experience in business transformation projects	
3	The TBM must be an excellent agile project manager	
4	Implement a light version of TOGAF/SOA/BPM	
5	BM selection depends on the project/company and BIS context	
6	Education and training - bachelor of business engineering	
7	Basic profile a flexible and intelligence based person	
8	The BTM should be supported with a configurable decision making system.	

The profile, curriculum and pattern

The authors based their research on an AAR mixed method that is mainly based on a hyper-heuristics approach. Such BTMs selection and education need holistic JIT methodologies, similar to BTM2 (Uhl & Gollenia, 2012). The BTMs' educational curriculum must comprise the knowledge of: business and enterprise architecture (TOGAF), automated real-time business process environments, agile project management, organizational behaviour, management sciences methodologies and concrete BISs implementation phase know-how. The researchers recommend the profile of an AofABIS and a syllabus that is adapted to such a profile (Trad & Kalpić, 2014a). The profile and educational curriculum round up the STF's business transformation managers' pattern (STFBTMP). The authors' aim is to convert their relevant research outcomes into a managerially useful framework and pattern (Markides, 2011), and its hyper-heuristics tree that is suitable for a wide class of problem instances. *The authors regard this as a major business and educational benefit* (Vella et al., 2009).

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Conclusion

This is another article in a long series of research articles related to the STF research, which is based on the action research mixed method; the STF factors are the result of the literature review and the surveys outputs. These factors are the base of the STF's based hyper-heuristics research model. In this article, the focus is on the STF's mixed model's reasoning engine, which is specialized in finding the optimal BTMs' capabilities and educational prerequisites, through factors. These BTM's characteristics and educational prerequisites are needed to holistically manage the design and implementation of a BTP. The research will try to define the optimal BTM's profile and his educational curriculum, which should be adequate for the finalization of the implementation phase of BTPs. There has been a lot developed and written on enabling success in transformation projects, but the authors propose to inspect why BTMs fail in the implementation phase of BTPs. That is mainly due to the BTMs' lack of knowledge in managing business integration and implementation and the non-existence of an adequate educational curriculum. The most important findings in this phase are:

- ***Knowledge gap***: The literature review proved the existence of a knowledge gap between the traditional management skills and educational prerequisites for BTPs (Trad & Kalpić, 2013d).
- ***Evolutionary Mixed Method***: This research uses an evolutionary research model in order to create the initial BTM profile and educational prerequisites (Trad.& Kalpić, 2013a).
- ***The STF proof of concept (PoC):*** The PoC and interviews delivered the research's recommendations on how to select and educate BTMs' (Trad & Kalpić, 2014c).
- ***Managerial recommendations, benefits and framework***: The qualitative hyper-heuristics model confirmed the survey outcomes; and delivered the managerial recommendations and benefits. The STF research project proposes a concrete framework on how to select, train and evaluate a BTM.
- ***BTM Profile and educational prerequisites***: Actual environments produce general profiles that can hardly cope with heterogeneous complexity and fast changes. These high frequency changes are mainly due to the hyper-evolution of technology. The research confirms the role of BTM as an AofABIS.
- ***The STF BTM pattern (STFBTMP)***: The STF's research defines the BTM profile and educational prerequisites that round up a selection and educational pattern, on how to select and train a BTM.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

EXPOSING COMPUTER SCIENCE PROSPECTIVE TEACHERS TO ACADEMIC RESEARCH

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Abstract

The Computer Science Teaching Certificate Program was first offered at the Open University of Israel in 1997. We describe the Teaching Certificate Program and elaborate on the seminar: Topics in Computer Science Education which is one of the courses in this program. We briefly describe the seminar's methodology and present the results of a questionnaire which was conducted among the seminar students in order to evaluate students' views and attitudes towards the seminar and its contribution to their teaching career. We were very satisfied to find that most of the respondents claimed that the seminar contributed or contributed significantly to their teaching career. But we were disappointed to find that a relatively small percentage claimed that they keep current with Computer Science education research.

Computer Science Teaching Certificate Program at the Open University of Israel

The Open University of Israel

The Open University of Israel (OUI) is a distance learning university which offers a variety of undergraduate programs and several graduate programs (http://www-e.openu.ac.il). The OUI is similar to other universities in its pursuit of excellence and its commitment to superior scientific and scholastic standards. However, it differs in that it is open to all those who wish to study a single course or a number of courses, or to pursue a full program of study.

Distance learning and self-study practiced at the OUI provide conditions that meet the constraints of individuals who work, raise a family or manage a household. The method is not space or time dependent as it is not based on a central campus where lecturers and students gather. Each course also includes a face-to-face component in the form of small group tutorials. At tutorial meetings, the tutors provide additional examples; answer the students' questions, etc. Attending the tutorial sessions is not mandatory, but is highly recommended. To improve its distance teaching, the OUI also makes use of web-based technologies, which provide a wealth of learning materials and continuous contact with faculty and other students in the course. The course websites provide an interactive learning environment (Benaya & Zur, 2007).

The Computer Science Teaching Certificate Program

The Computer Science (CS) Teaching Certificate offered at the OUI is unique in that it enables studying towards the certificate in a distance learning environment and it is especially suited for students who want to pursue the program in parallel with their current employment and other responsibilities.

The program is intended for CS graduates who wish to teach CS in high school. The program consists of two components: courses and practical training. Some of the courses are in CS and others in education and pedagogy. The required courses include: “Algorithmics: The Foundations of Computer Science”, “Seminar: Topics in Computer Science Education”, “Critical Thinking: Statistical and Intuitive Considerations” and “Curriculum Design, Development and Implementation”. Students are also required to select one of the two electives: “Educational Psychology” and “Individualized Instruction”. A detailed description of the courses can be found in Zur and Vilner (2004) and Gal-Ezer and Zur (2007) and in the OUI course catalogue (http://www-e.openu.ac.il/catalog/).

As part of their practical training, each student must observe a number of classroom lessons and practice-teach about five lessons in a designated school. Due to our commitment to distance learning methodologies, we enable for each student to perform their practical training in a school located in their vicinity. We have selected excellent experienced teaching mentors around the country who perform the practical training.

Students must also take the “Methodology of Computer Science Teaching” workshop, which was expressly developed for the program by the OUI. The workshop aims to impart a didactic approach to CS teaching, while focusing on the following topics: basic topics in CS, problem-solving methods, misconceptions, teaching and learning strategies, and more. As this workshop deals in didactics, written material is not sufficient since it is very important for students to observe a teacher in action. Thus, we decided to base the workshop on videotaped lectures given to a student audience by Dr. David Ginat, an expert in CS education. These lectures are available through the course website. The workshop also includes several mandatory face-to-face sessions lasting several hours. At these sessions students drill the various topics viewed on the videotape. Each student prepares a mini-lesson based on a topic learned, and the other students, observe the lesson and provide feedback. At the end of the course, students submit a final assignment which includes the preparation of lesson plans for a specific topic within the high school CS curriculum (Zur & Vilner, 2004; Gal-Ezer & Zur, 2007).

Natural Sciences or Engineering graduates who wish to join the program must complete basic knowledge in CS which is composed of theoretical and practical undergraduate CS courses. The courses include: Introduction to Computer Science, Data Structures and Introduction to Algorithms, Automata Theory and Formal Languages, System Programming Laboratory, Computer Organization, Advanced Programming with Java. These courses were selected because they are considered to be a significant part of the CS curriculum (Atchinson et al.,

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1968; Tucker et al., 1991; IEEE & ACM, 2001; IEEE & ACM, 2008) and their topics are included in Israeli CS high school curriculum (Gal-Ezer et al., 1995; Gal-Ezer & Harel, 1999; Armoni et al., 2010; Averbuch et al., 2011). Students in the program, who took CS courses in their undergraduate studies, may be granted accreditation for those courses.

In our previous paper we presented some statistics regarding the CS Teaching Certificate program, such as: the number of students enrolled in the program, age and gender distribution. We also conducted a study including a questionnaire which was emailed to all past and present students in the program. The questionnaire included questions involving reasons for selecting to study towards the CS Teaching certificate, current teaching positions, attitudes toward the program, etc. (Zur et al., 2012).

In the following section, we briefly describe the seminar Topics in Computer Science Education included in the certification program.

Topics in Computer Science Education Seminar

The seminar is based on a reader of articles edited by Judith Gal-Ezer. The reader includes several topics that educators should study and become familiar with. In previous studies, researchers found that all CS teacher preparation programs emphasize the importance of reading professional research papers (both in CS and in CS education research) by prospective CS teachers (Ragonis et al., 2010; Hazzan et al., 2010). The seminar presents several research papers in each of the topics and discusses each of the topics separately. The topics are:

- History of CS, that of the theory as well as that of the machines themselves;
- The nature of the field and its relationship with other disciplines;
- The details of various CS curricula and study programs on both high school and college levels;
- A variety of issues concerning problems of teaching programming;
- The use of tools and aids in CS teaching.

The reader is constantly updated, with obsolete articles replaced with new ones. This is usually done through the course website. A full description of this course is given by Gal-Ezer and Harel (1998).

Students are required to participate in tutorials, submit a seminar paper and present it orally. The pedagogy of the course was designed to combine several academic skills to which educators (Ragonis et al., 2010; Hazzan et al., 2010) believe teachers in their pre-service studies must be exposed. These skills include:

- Self-study of advanced material – This is achieved through required reading of professional papers, some are in the reader, some are assigned by the instructor, and others, the students have to find by searching the library databases.
- Preparing and delivering a lecture to fellow students – Each student is assigned one of the course topics and is required to prepare a twenty minute presentation to be

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delivered in class. The presentation is based on one of the articles in the reader or on one of the articles assigned by the instructor. The purpose of this presentation is to acquaint the students with the different topics of the seminar, and it also serves as preparation for the presentation of the final seminar paper.

- Submitting a seminar paper – The seminar paper is much larger than any other exercise the students handed in throughout their certification studies. It requires academic research abilities and writing skills. The students select the seminar topic from a list of topics presented in Table 1. Each topic references several up to date research papers which appear in different CS Education publications (conferences and journals) such as: Journal of Computer Science Education, Inroads – SIGCSE Bulletin, Proceedings of the Annual Conference on Innovation and Technology in Computer Science Education, etc. Students must also select an additional paper relevant to their selected topic. They must read the papers and prepare a detailed table of contents for their seminar paper. After approval the students submit to the supervisor a preliminary draft which is followed by several rounds of corrections and refinements.
- Presenting the seminar paper – The students are required to present their seminar work to the course staff and other faculty members. The presentation lasts 45 to 60 minutes. They must defend their work and demonstrate knowledge on all the topics covered in the course.

Table 1: Seminar paper topics

Topic	**Detailed description**
History of CS	Historical development of programming languages; Historical development of computers.
Nature of CS	The relationship of the field with other disciplines.
CS curricula	CS curricula in high school and colleges/universities in different countries; Gender issues in CS.
CS teaching issues	The first programming language and its influence; Problems in teaching programming; Misconceptions in CS; Problems in teaching recursion and pedagogical ways to prevent them; Problems in teaching efficiency and pedagogical ways to prevent them; Teaching different paradigms; Problems in teaching the CS1 course.
Tools in CS teaching	Visual tools; Games and aids in teaching CS topics such as: Programming, Data structures and algorithms, Turing machines and Complexity.

Each student is assigned a supervisor who guides the student in all stages of writing the seminar paper. Due to distance teaching at the OUI, most of the supervision is via the course website, discussion groups and e-mail. The course website includes links to supplementary learning materials such as links to articles relevant to the seminar paper, links to major websites dealing with CS education, seminar papers written by graduates of the course and students' presentations of their lectures.

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Students' Views and Attitudes towards the Seminar

This section presents the results of a questionnaire conducted among the seminar students in order to evaluate students' views and attitudes towards the seminar and its contribution to their teaching career. The questionnaire was sent to all students who completed the seminar: Topics in Computer Science Education since 2003. We first present the study's methodology followed by some statistics regarding the seminar and then we display and discuss the answers to the questionnaire which was sent to the seminar students.

Methodology

Tools

- The university database, which includes the students' demographic data and course of study.
- A specially designed anonymous questionnaire. The questionnaire included twelve questions involving students' views and attitudes towards the seminar and its contribution to their teaching career. All questions provided several options followed by space for additional comments and explanations. The questionnaire was designed using special custom written software which administers web-based questionnaires and collects the results. A link to the questionnaire was emailed to the students.

Population

The data presented in this section is based on the data of 58 past students who completed the seminar: Topics in Computer Science Education since 2003.

Questionnaire Results

The questionnaire was sent to all 58 students who completed the seminar. We present below each of the twelve question followed by a summary of 14 responses (24%) of students.

Are you employed as a CS teacher?

- Half of the respondents indicated that they are currently employed as CS teachers.
- Two of them teach Introductory to CS in 10th grade, one of them teaches more advanced topics in the curriculum in 12th grade, three of them teach IT topics in secondary school and one of them teaches IT topics in high school.
- Three of the teachers have been teaching for more than eight years and the rest for one or two years.

Was the seminar the first time in which you encountered the seminar's topics?

Half of the respondents indicated that it was the first time in which they encountered the seminar's topics.

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Did you find the seminar topics interesting?

All respondents but one claimed the seminar topics were interesting.

Which topics do you recommend to add to the seminar?

Some of the topics suggested by the respondents were: advanced OOP topics, innovative teaching technologies for CS teaching and teaching via programming projects.

Have you written in your undergraduate degree studies a seminar paper similar in its extent to the paper which you were required to write in this seminar?

About eighty percent of the respondents indicated that this was the first time they were required to prepare a seminar paper similar in its extent to the one required in the seminar.

Did the fifteen minute student presentations of the articles assigned to the students help in getting acquainted with the seminar topics and in selecting the topic of your seminar paper?

- Eight respondents (57%) claimed that the student presentations were helpful or very helpful. Some of their comments were: "The presentations presented the different topics for the seminar paper"; "The presentations helped me to decide which topic I want to study in depth"; "The fifteen minute limitation for each presentation helped me to stick to a well defined schedule and to concentrate on the main issues in the article. I found this limitation helpful when preparing class materials"; "I had a general direction and the presentations helped me to decide which topic to study in depth".
- Five respondents (36%) claimed the student presentations were of little help. Some of their comments were: "There were too many presentations in one meeting and the presentations were too short".
- One respondent claimed that the student presentations were not helpful. This student indicated that the topics were publicized in the course web-site and in the course material and therefore the student presentations were superfluous.

Did the topic which you presented in class affect the decision on which topic you selected to write your seminar paper?

Four respondents (31%) claimed that the article they presented in class affected their choice of topic for the seminar paper.

Did you succeed to write your seminar paper according to the schedule provided in the seminar course?

Ten respondents (77%) claimed that they wrote their seminar paper according to the provided schedule.

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Which stages in the preparation of the seminar paper did you find difficult?

- Two respondents claimed that the topic selection stage was difficult.
- Two respondents claimed that locating relevant bibliography was difficult. One respondent commented that she was unfamiliar with searching electronic databases and journals. Another respondent suggested that the instructor provide more professional guidance regarding locating relevant bibliography.
- Three respondents claimed that reading the articles was difficult. One of the comments was that "the articles were long and hard to understand".
- Four respondents claimed that "preparing the paper outline was difficult".
- Five respondents claimed that writing the first draft was difficult. The comments were: "It was difficult to identify which topics in the article to focus on"; "It was hard to perform the integration of several articles into a coherent paper".
- One respondent claimed that the presentation preparation was difficult. She claimed that it was difficult to summarize the entire paper into a 45 to 60 minute presentation.

Which topic did you select for the seminar work?

The seminar topics were pretty much evenly distributed among the students, except for the topics: Visual tools and games and aids in teaching CS, which was more popular.

If you are currently employed as a teacher, how do you evaluate the contribution of the seminar as a whole to your teaching?

- Nine respondents (81%) claimed that the seminar contributed or contributed significantly to their teaching career. Some of their comments were: *"Preparation of the presentation helped me to focus and summarize the topic of my seminar and this skill is important in preparing lessons"; "Preparation of the presentation contributed because most of the hardships that I experience are related to lesson preparation"; "New teaching methodologies are helpful to students in understanding programming and algorithms"; "All topics in the seminar deal with practical issues and therefore are relevant to my teaching career"; "My exposure to gender issues raised my awareness to this problem and motivated me to prepare lessons which address this issue"; "I became more aware of the advantages of using games as a teaching aid"; "I became more aware that problem solving is a central subject in CS".*
- Two respondents claimed that the seminar hardly contributed or did not contribute at all. One respondent said: *"I don't see the relevance of the articles to my teaching career".*

Do you keep current with CS education research?

Only 3 respondents (21%) claimed that they keep current with CS education research.

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Discussion and Recommendations

In this paper we briefly describe the CS Teaching Certificate Program and focus on the seminar: Topics in Computer Science Education. We describe the seminar's pedagogy followed by the results of a questionnaire conducted among the seminar students in order to evaluate students' views and attitudes towards the seminar and its contribution to their teaching career. The questionnaire was sent to all 58 students who completed the seminar since 2003. Twenty four percent of the students responded to the questionnaire. We attribute this low response rate to the impersonal approach to the students via the questionnaire web software. Half of the respondents indicated that they are currently employed as CS teachers.

The seminar is based on a reader of articles that includes several topics that educators should study and become familiar with. Half of the respondents indicated that the seminar was the first time in which they encountered the seminar's topics and all respondents but one claimed that the seminar topics were interesting. The field of CS education research is continuously being updated with new researches and therefore it is very important to keep the reader and the seminar topics up to date with new papers. More than half of the respondents claimed that the student presentations were helpful or very helpful in getting acquainted with the seminar topics.

The pedagogy of the course combines several academic skills to which we believe teachers in their pre-service studies must be exposed. These skills include: self-study of advanced material; preparing and delivering a lecture to fellow students; submitting a seminar paper and presenting the seminar paper. From the answers to the questionnaire, we found that for about 80% of the respondents this was the first time that they were required to prepare a paper similar in its extent to the one required in the seminar. Some students claimed that the 15 minute presentation delivered to fellow students helped them to stick to a well defined schedule and to concentrate on the main issues in the article. They also mentioned that this limitation was helpful when preparing class materials.

Writing the seminar paper is the highlight of this seminar. The students claimed that the stages of reading the articles, preparing the paper outline and writing the first draft were the most difficult stages in the process.

The distance learning, self-study and flexible study load practiced at the OUI is especially suited for students who want to pursue the CS Teaching Certificate Program in parallel with their current employment and other responsibilities. We found that 77% of the respondents to the questionnaire wrote their seminar paper according to the provided schedule. This may not seem to be a good result, but we think that in light of the profile of our students who combine their studies with career development, the result is remarkably impressive. We take a flexible stand towards the rest of the students who find it difficult to meet the required schedule.

We were very satisfied to find that 81% of the respondents claimed that the seminar contributed or contributed significantly to their teaching career. But we were disappointed to

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find that only 21% claimed that they keep current with CS education research. We assume that this low figure is due to the fact that many schools have only one CS teacher who works in isolation. For these teachers we recommend the use of the Israel National Center for Computer Science Teachers Website (http://cse.proj.ac.il) in order to interact with their colleagues. One of the main goals of the teachers' centre is to promote pedagogical objectives, inspire colleagues and help them adjust to new courses and topics (Israel National Center for Computer Science Teachers, 2002). We recommend that the centre will conduct workshops which will expose teachers to current CS education research. To conclude, we found that most students were satisfied with the seminar and felt that it contributed to their teaching career.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

TOWARDS AN OPTIMAL BLENDED TEACHING AND LEARNING ENVIRONMENT: CREATING POWERFUL BLENDED LEARNING ENVIRONMENTS BASED ON THE POWER AND MOTIVATION OF TEACHERS

Demedts Lore, Raes Frederic, Spittaels Olaf, Sierens Eline, Artevelde University College, Belgium

Questions and rationale

> *"The importance of a blended approach to learning is that it ensures the widest possible impact of a learning experience and thus ensures… that the organization optimizes productivity and delivers value to its customers" (Carman, 2005)*

Artevelde University College Ghent has a long tradition of organizing its curricula of professional bachelor programs in a student- and competence based manner. Integration of knowledge, skills and attitudes in an 'optimal blend' framework challenged our attention.

Blended learning is a frequently used strategy – especially if the target group mainly consists of students with a (part-time) job – as it combines the advantages of classroom learning and distance learning. Although the concept of 'blended learning' is the main vision of Artevelde University College, it appears that many teachers don't know how to start implementing blended learning in their teaching activities, for several reasons: fear for technology, not having a clear view of the (didactical and technological) possibilities, lack of qualitative good motivation, etc.

Therefore, we started looking for an answer to these research questions:

- How can we offer teachers an individually customized blend for their teaching activities?
- Which are the crucial environmental factors that lead to a successful implementation of blended learning?

Based on those two questions we started looking for different types of teachers, based on their ICT-empowerment, motivation, coping strategy and fields of interest. Moreover, we wonder how the learning environment (i.e. the educational system, the institution of higher education and the department within that institution), the target group (e.g. students with a (part-time) job, full-time students, …) and the position of the course unit within the curriculum are affecting the use of blended learning. This unique combination of personal and environmental factors could offer a customized blend for teachers, taking into account their skills, their personality and their working context.

This research project was initiated in collaboration with the bachelor of primary education department and the bachelor of early childhood education department of Artevelde University College.

Model

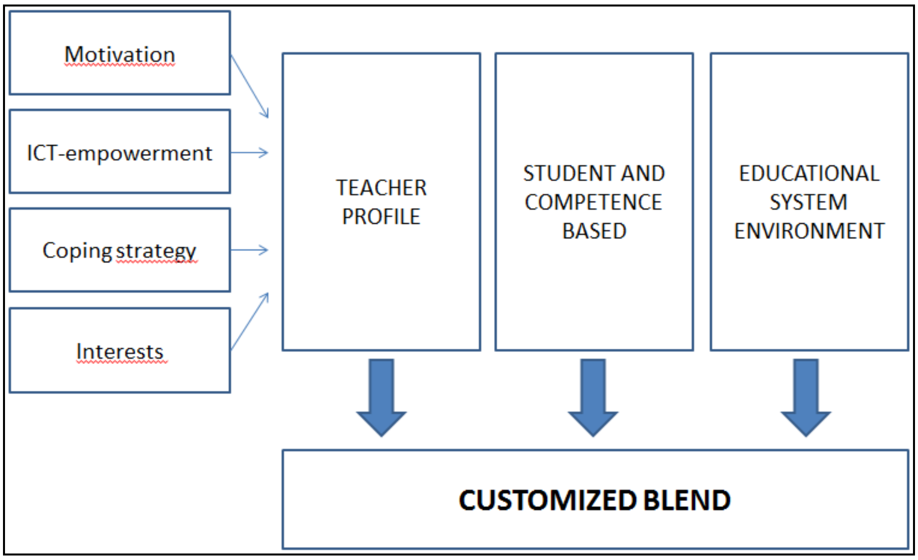

Figure 18. Defining the teacher profile and the working context in order to offer a customized blend

Outcomes

Research outcomes to be reached: understanding and development of a customized blend for teachers to implement ICT in an efficient and effective way. Goals of blended learning environments, including pedagogical richness, access to knowledge, social interaction, etc.

We propose a **poster session** at the EDEN conference. We want to present the clustered model and illustrate criteria for an optimal blend with inspiring ideas. We also want to share suggestions with the network on how to systematically predict which could be the optimal blend for teachers in the curriculum they work in, and invite them to activate themselves to be part of an inspiring blended learning environment.

Reflective critique

It is not about creating the 'perfect ICT teacher' nor the 'optimal blended learning theory'. It is about activating teachers towards a better learning environment. Crucial questions are: "What is within their reach, personal interest and power, and what is required by the educational

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system? How to support differences between teachers and develop competencies among the teacher's professional career?"

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

BRIDGING TEACHERS AND TECHNOLOGY: DEVELOPING A TRAINING IN DIGITAL DIDACTICS

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Bert Coolen, BE-ODL and ESF project-coordinator, Belgium

Introduction

Today's higher education is characterized by an increasing integration of e-technologies. The rising popularity of these technologies is driven by the well-presumed claims in terms of better, faster and more affordable learning for the 21st century (Salomon, 2002). Evidence, nevertheless, indicates that e-technologies have actually a marginal impact on students' learning (Kolb, 1981) and teachers' teaching (Hamuy & Galaz, 2010). Critics ascribe this marginal impact to the fact that research and practice have a wrong focus i.e., they focus on the technology as such and the possibilities for learning assuming that the technology's demonstration is enough to guarantee that teachers will use them accordingly (Salomon, 2002). Already in the 80s Clark (1983) stressed that educational technologies create interesting conditions for learning only when these media are integrated into an instructional method. It seems however that teachers are unsure about the pedagogical implementation of e-technologies and the way these technologies can assist the instructional design of the learning environment.

The current ESF (Flemish European Social Fund) project aims at addressing this issue by developing a training programme that explicitly focuses on the development of digital pedagogical skills within teachers. The training aims at being evidence-based although it will be hands-on. The following two objectives are guiding the training development.

- Develop a training *based on scientific insights* regarding technology-integration in education and principles of multimedia learning.
- *A hands-on approach* that focuses on different instruments that teachers can use to select, implement and evaluate e-technologies in line with their teaching method.

The following section elaborates on the methodology that was used in order to develop the training. The final section will focus on our future plans i.e., the pilot and research.

Methodology

Objective 1: Develop a scientific grounded training

The training is developed starting from scientific insights regarding (a) teacher knowledge for effective technology integration i.e., the TPACK model, and (b) students' multimedia learning. The two frameworks and the way they were applied in the training will be briefly presented.

Technological pedagogical content knowledge (TPACK) model

The TPACK framework (Koehler et al., 2013) identifies the kind of knowledge that is required for technology integration in teaching, acknowledging the complex, multifaceted and situated nature of teacher's knowledge. Figure 1 illustrates three primary forms of knowledge: content (related to the domain related expertise), pedagogical (related to learning and instruction) and technological (related to technological tools). Technology-integration, according to TPACK, is at the intersection between those three kinds of knowledge. In particular, technology-integration is about a particular educational goal that is supported by technological tools (Koehler et al., 2013).

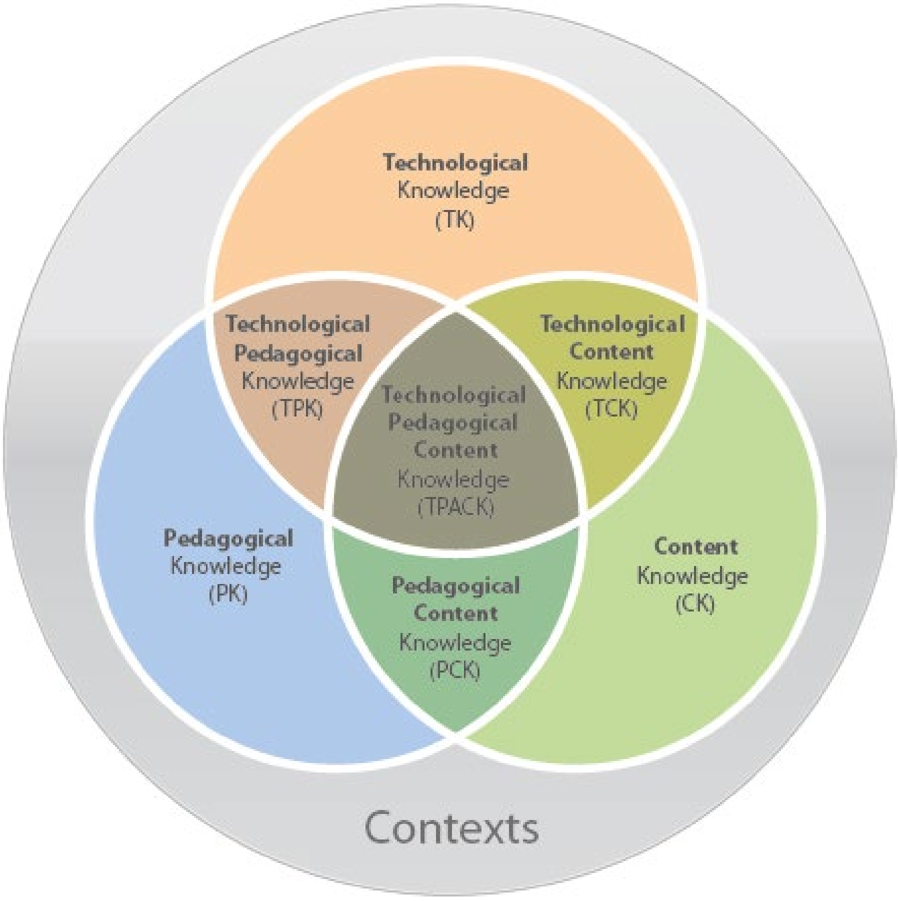

Figure 1. TPACK model

ISBN 978-963-89559-7-5

The TPACK model is widely-accepted as a conceptual framework for understanding teacher's knowledge regarding technology-integration. Nevertheless, there is neither empirical support nor advice regarding the most optimal way of developing TPACK in teachers (Koehler et al., 2013).

Given the diversity of teacher's content and pedagogical knowledge, the training used the 'technology mapping' technique in order to develop TPACK throughout the training (Koehler et al., 2013). Basically, this technique maps technological tools to instructional methods based on the learning functionality of the tool. The training however does not focus on particular tools but aims at providing instruments so that teachers are able to select and use tools themselves. Therefore, a tool classification scheme was used as depicted in Table 1. The scheme categorizes technological tools dependent on their learning affordances i.e., how they theoretically support the learning process. The table merges two existing tool-classifications (Hamuy & Galaz, 2010; Lust et al., 2013). The TPACK model in general and the tool-classification scheme in particular is applied throughout the whole training program.

Table 1: Tool classification

Tool-type	**Learning affordance**	**Examples**	**Receptive or interactive**
Information tools	Providing (basic or elaborated) information in order to support students' information processing.	Slides, weblectures, animation, graphics, audio, etc.	Receptive
Cognitive representation tools	Allow knowledge construction by providing means in order to organize and visualize information.	Mindmap, blog, wiki	Interactive
Cognitive supportive tools	Support problem solving by providing means for basic algorithmic tasks.	Calculator, simulation	
Cognitive knowledge modelling tools	Support reflection and practice by providing means to test or practice the knowledge.	Exercises, games, quizzes	
Cognitive collaborative tools	Support collaboration by providing means to collaborate.	Chat, discussion board	

Multimedia learning

As mentioned previously, the training does not focus on cutting-edge tools but more on instruments that teachers can use in order to select, to implement and to evaluate technologies into their teaching method. The goal of technology-integration is however to enhance

ISBN 978-963-89559-7-5

students' learning. Therefore, the way students learn within an e-course is a second important pillar in developing the training. In this respect, the theory of multimedia learning was used. The theory of multimedia learning as introduced by Mayer (2009) is based on the assumptions that humans possess separate channels for receiving and processing pictorial and verbal material (dual-channel assumption) and each channel is limited in the amount of material that can be processed at one time (limited-capacity assumption). Meaningful learning occurs when people engage in appropriate cognitive processing such as (a) attending to the relevant material, (b) building connections between pictorial and verbal representations into a coherent structure and (c) integrate it with what is already known (Mayer, 2009).

As a consequence, e-material needs to be responsive to these learning principles. Different instructional design principles were derived from the theory of multimedia learning and have been validated throughout multiple research studies (for an overview see Clark & Mayer, 2011). The following principles pertain to the development of technology-supported learning material and are applied in the training as well.

1. Multimedia principle. People learn more from pictures/animations and text/words than from text alone. Multimedia learning material forces people to make connections between the pictorial and the verbal representations in memory which enhances active processing. This principle was applied throughout the training by adding figures, animations, videos.
2. Contiguity principle. People learn better when words/texts are aligned to the corresponding graphics/pictures. Graphics that are separated from corresponding text induce 'cognitive load' since people have to look themselves for the link between the graphics and the text. This hampers learning since our memory is limited in capacity.
3. Modality principle. People learn better when graphics are explained by audio narration than on-screen text. When the graphic is the focus, on-screen text is less favourable since it overloads the pictorial channel.
4. Coherence principle. People learn better when 'motivating' but irrelevant pictures, animations and text are not included in the learning environment. Although these elements seem motivating, they are merely distractive and they rather hamper learning.
5. Segmenting principle. People learn better when course content is segmented in bite-size parts due to their limited processing-channels.

The above principles were applied throughout the whole training. Furthermore, teachers were introduced into this manner as well. Particularly, an instrument was provided that supported them in developing multimedia material or selecting existing multimedia material based on the multimedia design principles.

Objective 2: A hands-on approach

Although the training is based on the above scientific frameworks, it aims to be hands-on. This hands-on approach is realized throughout the training's content and the training's structure.

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The content of the training

The training is mainly focused on the design, the development and the implementation of technology-integrated learning environments. Particularly, the training's content is divided into different segments as depicted in Table 2. Each segment deals with a particular issue regarding technology-enhanced learning environments and aims at delivering instruments that teachers can use for their own instructional method. The different parts are not chronologically ordered hence teachers can decide how they will go through the training in line with their particular needs and interests.

Table 2: Content

Segment	Main content	Instrument
Basis	TPACK model	Tool-classification scheme in relation to course goals.
Design	Analysis of the learning environment	A step-by-step approach to analyse the learning environment
	Multimedia learning	Kijkwijzer
Development	Development or selection of technology-enhanced learning material	A step-by-step approach – Overview over different websites that provide authoring-tools for free.
Implementation		
E-coaching	E-coaching and the e-learner	A typology of coaching styles.
Collaborative learning	Computer supported collaborative learning	Different ways of structuring the online collaboration.

The structure of the training: adaptive to individual's needs

The different segments of the training will be provided through an online learning environment. In this way, teachers can experience an e-course and its' effectiveness. In addition to this online component, face-to-face exercises are also incorporated. The training will hence be a blended learning environment. Each segment will have a similar structure so that teachers can easily navigate throughout the content. Particularly, each segment contains theory, examples of good practice and exercises.

In this way, the training will be adaptive to the individual's needs. First of all, the different (independent) online segments allow teachers to navigate throughout the training in line with their own interests and needs. Secondly, the different parts within the segment allow teachers to approach the content in line with their learning style (Kolb, 1981). Particularly, teachers who are more abstract thinkers will possibly prefer the theory-part within each segment before going to the good practices and the exercises. Teachers who are more focused on the experiences of others and themselves will possibly prefer the good practices before thinking about the theoretical basis and the exercises. Teachers who are more focused towards active experimentation have the opportunity to start with particular exercises before going to the theory and the good practices.

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Pilot phase and Planned research

The training is currently being developed. At the beginning of September 2014 it will be launched for a selected group of teachers as try-out. During this try-out, a small research study will be planned to monitor the training's quality. Participants will be surveyed regarding their level of TPACK knowledge and skills in a pre-and post- research design i.e., before and after the training. In this respect, the TPACK questionnaire will be translated to Dutch. Moreover, participants will be interviewed regarding their experience with the different segments of the training and the training's structure.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
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Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

WORK TRAINING: UNAM'S CONTRIBUTION TO THE MEXICAN SOCIETY

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Introduction

Globalization, which currently plays a crucial role in most organizations, compels public institutions to design and implement policies that favour the development of competences among citizens so they can be better prepared to perform at a professional level. Globalization also requires that organizations make an investment in their most valuable asset: human resources." The ability to hire, develop, and retain qualified workers within the framework of a global economy" (Spiegel, 2006) is essential to guarantee growth by offering high-quality products and services, which result in profits and benefits to both workers and employers and society in general.

Theoretical Framework

Adult learning

According to Ludojoski (1972), andragogy is "the use of all means and forms of personality formation at the service of all adults with indistinctively, regardless of their formal education. Andragogy deals with educating a population in its entirety, considering the needs and possibilities of its individuals and providing all the support required for the improvement of their personality within the area of their relationships." (LIdojoski, 1972). Ubaldo (2009) declares that learning in adulthood is second-level learning based on skills and procedures, among which learning to learn and choosing to learn are the two most important. Ubaldo also points out that the aspects of adult learning which are deemed fundamental by androgogy are the following: the specific condition and relevance of learning, acceptance of adults' ability to learning, adults' confidence in their own ability to learn, activity and learning, motivation for learning, learning and organizing information, experience as a source of learning and knowledge, learning through problems, times for learning, dialogic learning and self-learning. Tynjälä and Païvi points that adult learning "is based on – or at least resorts to – learners' experience. It involves the learner in a reflective process and in social processes. It is problem-oriented and aims to benefit both personal development and organisational learning processes, and it is organized in flexible ways" (Tynjälä & Païvi, 2005).

Higher Education Institutions and work training

Taking into account the trends in higher education, the way in which the means of production and changing around the world (and therefore the requirements of the job market and the ways of learning in a globalized world, it is evident that citizens have new educational demands. Nowadays, they are required to develop new skills and acquire knowledge in order to perform satisfactorily in their work life. Those demands require a new model of training and education. Such a model should be based on lifelong training which incorporate formal learning (in schools, universities and training institutions that issue degrees and diplomas), non-formal learning (which consists in structured training generally associated to the workplace) and informal learning (skills learnt from family members or people in the community). This model allows people to gain access to learning opportunities as these are necessary instead of getting them once a defined age has been reached (ANUIES, 2010). As an institutional response to this need, UNAM implements a number of actions towards updating and training Mexicans by means of different strategies that range from the production of a robust and continuous educational offer to the creation of online free-access spaces for informal learning.

Workplace learning

Tynjälä and Païvi (2005) argue that learning at work includes both formal and informal aspects weighted differently, that it is not a single unified phenomenon; and that it may take place in different ways and itake different forms depending on the individual's position at the workplace and on many other contextual factors related to the workplace environment.

The authors distinguished three basic modes of workplace learning: Incidental and informal learning which takes place as a side effect of work; Intentional non-formal learning activities related to work (such as mentoring, intentional practice of certain skills or the use of particular tools); and formal on-the-job and off-the-job training. While discussing formal on-the-job and off-the-job training, the authors state that this kind of workplace learning is necessary because informal learning may result in undesirable outcomes (such as bad habits or dysfunctional practices). It is also necessary because "new work-life knowledge is being produced at so rapidly that informal learning cannot guarantee that the knowledge and skills of organizations and people will keep up with it." Finally, it is necessary because "formal education and planned learning situations make it possible to exploit informal learning effectively, to turn tacit knowledge into explicit knowledge and to integrate conceptual knowledge and practical experience, the foundation for the development of expertise" (Tynjälä & Païvi, 2005).

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e-Learning for work

Tynjälä and Païvi (2005) point out that, in order to enhance both individual and organizational learning and development, e-learning solutions should include the following features: "Support of both individual reflection and collaborative knowledge building or epistemic social practices; integration of theoretical knowledge and participants' practical experience; learning tasks that lead learners to examine their work under the light of the provided conceptual tools; learning tasks that help learners conceptualize their practical experiences; support for the invention and use of boundary objects; support for the explication of implicit knowledge; encouragement of collaboration and knowledge exchange between different groups of people (for instance: different professional groups, people from different areas, experts and novices); real dialogue; a progressive problem-solving orientation; integration of different forms of representation and different forms of learning activities (reading, writing, discussing, using metaphors, audio, visual, etc); structured support and guidance for learning in all phases of the learning process; and integration of e-learning with face-to-face situations whenever possible". (Tynjälä & Païvi, 2005).

Development

UNAM process for developing work-oriented training programs

UNAM's training programs to develop skills for work are generated follow a development methodology established in the Coordination of Open University and Distance Education (Coordinación de Universidad Abierta y Educación a Distancia CUAED). This methodology establishes the following stages in development: project profile definition, content analysis, pedagogical consultation and copy editing, Visual communication and integration and Implementation, evaluation and updating. During the *project profile definition* stage we define two aspects of the program: first the administrative aspect which defines the project data, the participants and the scheduling, and, secondly, the educational model that will support the proposal as well as the navigation diagram (navigation levels). These are the two main elements to define the instructional script, which is the basic tool for this methodology. Also at this stage begins we begin to draft the script with the general information and components for the program. In the *Content Analysis*, participants provide the content to be presented. The Pedagogical advice and style correction stage comprises two major activities: pedagogical advice consisting in the development of learning and assessment activities and the proposal's general organization; style correction consisting both checking spelling and uniformity of what is wrote in the instructional script and consulting doubts about the wording or some terms used. At the Visual communication and integration stage, images are plotted, activities are included in the platform, contents are integrated, templates for presenting contents and activities are modified, custom resources are created, etc. Finally, in the Implementation, evaluation and updating stage piloting, the proposal is piloted in order to evaluate and make obvious problem that will be resolved by updating.

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Training proposals for work developed at UNAM

Following the methodology described, the UNAM have developed the following proposals:

UNAM RETo Portal (Recursos Educativos para Todos – Educational Resources for All)

According to the National Autonomous University of Mexico 2011-2015 Development Plan, one of the objectives of the Teaching Program is "to expand and diversify its educational offer, by means of both vocational training programs and continuing education fields, professional update and work training by promoting and implementing online and distance education. In response to this, it was proposed to create a website called UNAM RETo (Educative Resources for Everyone), the target of which is everyone interested in updating their knowledge in their preferred area by means of information technologies. The site features different areas to explore and allows browsing the resources by either subject or discipline. It also includes a space for news and tips as well as instructions on how to use it.

Seminar on Budget based on results

This program in a joint effort between two institutions: the Secretariat of Finance and Public Credit and UNAM. Its goal is "to support the implementation of a model of management for Results in the Federal Public Administration, using the tools of a Budget based on results with Result indicators which could be measured in defined periods of time with a Logical Frame methodology, and which improve the assignment and reassignment of expenditures by the means of the Performance Evaluation System (which evaluates the indicators and execution of public expenditure)". The program is directed to people who hold public office in the area of budget management at all government levels (federal, state, and municipal). It is organized in six modules which are to be concluded within a six-month period. The seminar is taken on line with the assistance of a counsellor, who is an expert in the subject, throughout the course. The structure of the seminar within the Virtual Classroom is divided into two main sections: Home and Units. In the Home section, students can find the overview of the course (Introduction, Objective, Counselors, Content scheduling, Bibliography and External links). In the Units section, they can find the subjects included in each module, within which there is a small explanation that will guide them through the mandatory reading. They can also find the following sections: Objective, Introduction, Subjects, Activities, Bibliography.

Health Promotion and Addictive Behaviour Prevention Specialty

This program is an inter-institutional effort between UNAM's Faculty of Psychology and the Gonzalo Rio Arronte Foundation, and its objective is the "training of the health professional to assist and prevent the setting and development of the addictive behaviour through the management of scientific methodology and avant-garde prevention techniques for the early detection of population in risk of developing addictive behaviour patterns" (check the program's website). The program is intended for health professionals in the areas of psychology, medicine and social work. It's scheduled for 816 hours that are divided in 12 subjects contained in 3 semesters. When entering the program one can distinguish the

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following elements: Welcoming, Objective, Student's Guide, Working Methodology, Academic Activities and Academic History. It's in the Academic Activities section where one can access to the main subject sections, which are organized according to semester and topic. Topic wise, one can observe elements such as Introduction, General Objective, Units, Working Path, Accreditation Criteria and Bibliography. The next level corresponds to a Unit, where one can find an Introduction, Objectives and Topics. Finally, the topics are developed by means of HTML pages where the topic's particular objective is presented, as well as the topic's content, the learning activities, the self-evaluation and the sources of information. This program has been given in 3 occasions, forming a total of 2,700 health professionals as a result.

Training program for the Energy Control National Center

This program took place at the request of the Energy Control National Center (CENACE) (institution in charge of making sure the energy demand is covered considering the established parameters of voltage and frequency, providing real time information about the generation, frequency and specific parameters in generator factories), organization that is dependent on the Electricity Federal Commission (a non-profit decentralized public organization which aims to organize and direct a national system of generation, transmission and distribution of electric energy, based on technical and economical principles and with the objective of obtaining the best possible performance at a minimum cost for the general interest). The program's objective is the permanent training of its staff so they are in conditions to give a safe, continuous, qualitative and economical energy service to the Mexican public, taking into account that the organization ought to be prepared to keep its staff well-trained despite mobility, retirement, reassignment, etc. In order to allow the participants take the course without overlooking their work environment, the program was planned to be online. When entering the program one can observe the following elements: Welcoming, CENACE Student, Guides, Courses, My Profile, News and Virtual Classroom. It's in the Courses section where one can access to the following sections: Electric Potential Energy Systems I, Electric Equipment, Protections I, and Protections II. Entering each course one can find the following information: Introduction, General Objective, Working Path, Accreditation Criteria and Units Access. In each unit of each course the following elements have been specified: Introduction, Objectives, Diagnostic Activity, Chapters, Case Study. In both levels the participants can use such tools as: Desktop, Start, My Profile, Facilitator, Group, Messages, Forum, Glossary, Evaluation and Log Out.

Conclusions

The employer institutions, educational institutions and people themselves are responsible of continuing education. In this paper we have provided some examples of different kinds of training from the point of view of Universities.

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Continuing education based on technologies is vital for workers of the different economic segments of society. This kind of education saves time because people do not need to spend it in transportation and organizations can use it in a more productive way.

It is very important to note that eLearning options for work, should consider andragogical elements such as specific condition and relevance of learning, activity and learning, motivation to learn, learning and organizing information, experience as source of learning and knowledge , problem-based learning , dialogic learning and self learning; to achieve the goal of training people who are already labouring or are looking for work, in a meaningful and comprehensive way, so that the productive activities of the country is rich.

With the examples presented, it is proven once again, that the job training allows people to get better jobs within and outside their organizations, thus achieving higher pay, stability, prosperity and social recognition.

By creating the Portal UNAM RETo, UNAM seeks not only to provide knowledge, but also to develop in people the basic skills of knowing, living, doing and being; necessary for good performance in hi life, thus fulfilling the institution with its social commitment.

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E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

BUILDING AN ENTREPRENEURIAL THINKING WITHIN AN UNIVERSITY

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Universidade Federal Fluminense, Brazil

Introduction

According to Katz (2003), the teaching of entrepreneurship began in the United States in 1947 as from the need to qualify the men who participated in the Second World War for the labour Market and mainly to develop new business.

Throughout the history of entrepreneurship as a field of knowledge, it is notorious its influence and socioeconomic impact. Within the European Union (EU) "there is a consensus that the future wealth depends on creating businesses that are deeply rooted in the local economy." (Henrique & Cunha, 2006).

Since the process of industrialization in Brazil occurred later, in the 50s, the area of Entrepreneurship appears only in business schools in the 80s, with the expansion of the course of Administration for Creating New Business - Entrepreneur Training in the School of Business and Administration from Fundação Getúlio Vargas – São Paulo, in 1984 (Henrique & Cunha, 2006).

Among the characteristics of entrepreneurial activity in Brazil, it is highlighted that the lack of national policies, investments in research and development and issues in education are the main problems for the development of the area, which in turn is encouraged by the internal market, the culture and the Brazilian social standards (GEM, 2012).

It is also worth noting that, when analysing the reasons for undertaking it is possible to divide the entrepreneurial activities that begin motivated by the identification of an opportunity and the activities that started from the need of income and employment. According to studies by the Global Entrepreneurship Monitor (GEM, 2012), countries with an entrepreneurial activity originated from the identification of an opportunity have a greater economic contribution. Brazil already has most of its entrepreneurial activities originated from the need to create income. This reality could be changed with an entrepreneurial university, which forms and prepare entrepreneurs to the market and to identify needs and social demands.

As part of the role of the university, this identification takes place with the dialogue between the university and the society. It brings to the entrepreneurship education relevance and power of impact, as it is built and validated from the teaching, research and extension activities, a scientific methodology for its evolution as an area of knowledge.

Entrepreneurship at Universidade Federal Fluminense

The Graduate Program in Management and Entrepreneurship at Universidade Federal Fluminense (PPGE-UFF) was created in 2009. Its goal is to provide to the University additional and multidisciplinary training in the area of entrepreneurship and it started with a complementary training course in Entrepreneurship and Innovation, in the blended modality, with a workload of 270 hours.

The program has also begun the training of head teachers of public schools in the city of Rio de Janeiro. It started an MBA in Entrepreneurial Management, emphasis on Education, blended modality and workload of 360 hours. The success and effectiveness of the results of the MBA has expanded the project to train head teachers in the rest of the state of Rio de Janeiro and in the city and in the state of São Paulo. By 2013 the Program offered a complementary and a graduate course of entrepreneurship.

As part of the mission of PPGE-UFF is to:

> *"Integrate research, education and extension in the area of entrepreneurship in its business case, which involves the creation and the management of businesses; in the social areal is the creation and development of social businesses, and within organizations where corporate entrepreneurship takes place. Integrating many approaches in entrepreneurship, the Universidade Federal Fluminense aims be a reference in this area."*

The implementation of entrepreneurship in different areas and the deepening of research for the methodological construction of the courses reinforced the Program towards designing and building a technological undergraduate degree in Managerial Process, emphasis in Entrepreneurship. The course was born from identifying a lack of active managers in small and medium businesses and the action of the University regarding the entrepreneurial intention of the students. At this stage, the research activities proved essential in the understanding and narrowing of the relationship between society, university and the labour market.

According to Bellas (2012) the curriculum of the course in Business Administration and Accounting from Universidade Federal Fluminense, discourages students to create business and to have an entrepreneurial action, as this intention is identified when they enter the course. More comprehensively, the creation of a graduate course arises to prepare professionals to act innovatively and creatively in both society and in the organizations and also to be able to offer disciplines to students of different courses of the University, which can prepare and encourage students who have an interest in this area.

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In accordance with the Yearbook of labour in the Micro and Small Businesses, conducted in 2012 by SEBRAE (Serviço Brasileiro de Apoio às Micro e Pequenas Empresas), 99% of establishments, 51.6% of (non-agricultural) formal private employment in the country and almost 40% of salaries were created by small and medium businesses. To Colbari (2008) entrepreneurship education is a social tool, and in this sense the course contributes to the creation of self-employment, and form professionals to work with high socioeconomic impact on this market.

Pragmatic approach to management concepts is inevitable and totally required in the teaching of entrepreneurship and the relationship of teaching and learning must have as its foundation the principles of attitude and activity. In this sense, the educational plan of the course was structured to align the main theoretical concepts of entrepreneurship and management with practical application and knowledge construction activities from the action.

Vesper (1987) *apud* Henrique and Cunha (2006) claim that a model for teaching entrepreneurship should contain some points like:

1. act as a learning experience beyond the speaking, reading and writing;
2. contact with entrepreneurs;
3. mediation of results linked to projects that result in new business;
4. creation of an entrepreneurial school;
5. does not limit the entrepreneurial experience to the school calendar;
6. to review the educational institution contemplating production projects and sub-projects of creating business.

Figure 1 shows the flowchart of the disciplines of the technological undergraduate course Managerial Process, emphasis in Entrepreneurship in Universidade Federal Fluminense. It is important to highlight that the course requires as completion of the course a Corporate Business Plan, allowing the evaluation of the technical and intellectual skills of the student, and could be a start towards a possible creation of a business.

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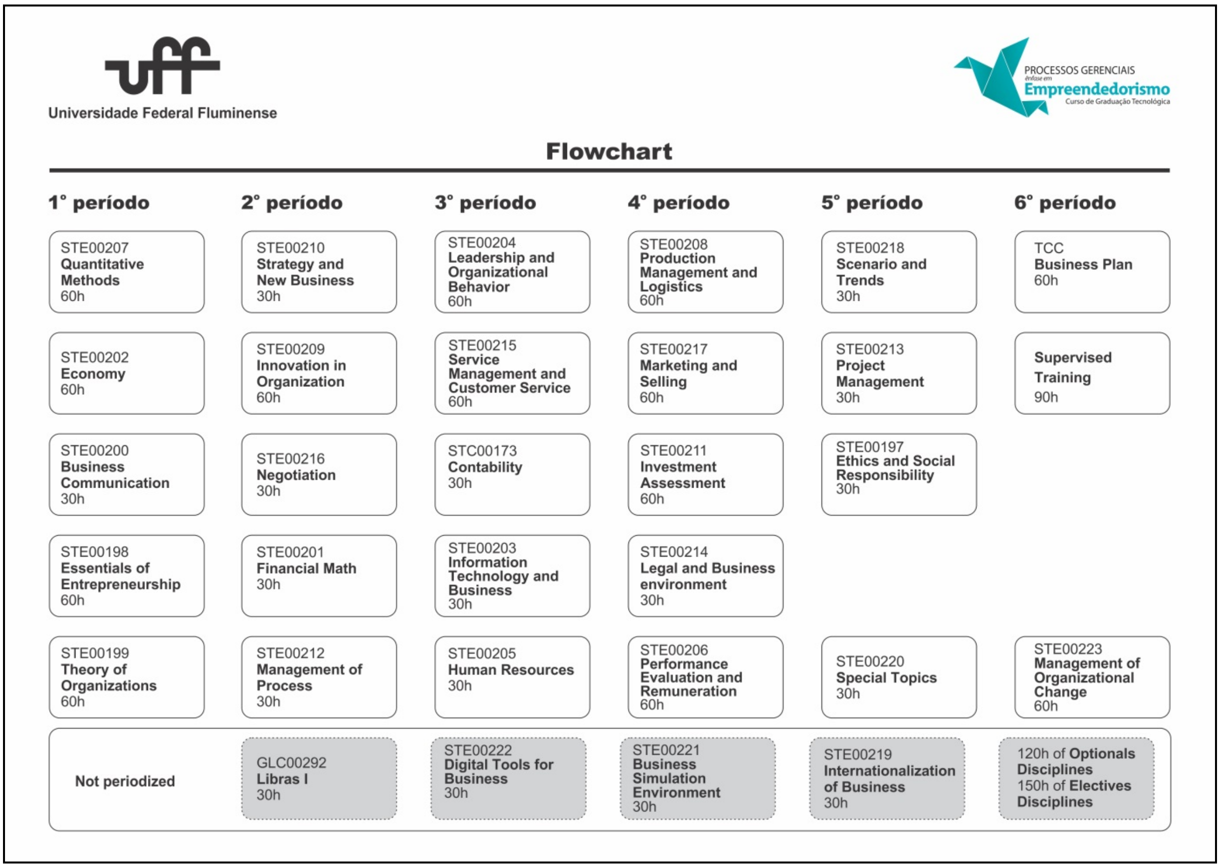

Figure 1. Flowchart of the disciplines of the technological undergraduate course Managerial Process, emphasis in Entrepreneurship

Other points highlighted by the authors are also covered in the course, since the ability of negotiation, communication, risk analysis, strategic management, and an innovation management enable students to build successful businesses or act as entrepreneurs in small and midsize organizations.

Classes are in the evening shift, which enables and encourages students to work during the day. This activity is fundamental for the development of the course, because it allows the student to develop, apply theoretical knowledge in the practical reality of a business and stimulate the exchange of experience in the classroom.

Another important tool in a course which educates in entrepreneurship, and was thought in this undergraduate course at Universidade Federal Fluminense, is the possibility of having 20% of the workload/hours of discipline in distance modality, in accordance with Ordinance No. 4.059, of December 10, 2004, Ministry of Education (MEC, 2004). This resolution brings the possibility of the use of the practical activities be in distance modality and breaks with many paradigms in Higher Education in Brazil, being innovative which in itself has an innovative character.

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Conclusion

In Brazil the entrepreneurial activities occurred late, but as in Europe and in the United States, with great socioeconomic impact. Social demands highlight the importance of the area which showed to be very fragile and without theoretical and methodological consensus for its education.

The Graduate Program in Management and Entrepreneurship was created in 2009 at Universidade Federal Fluminense seeking to structure and develop the area of entrepreneurship as a field of knowledge through teaching, research and extension. In this sense, a sequential and multidisciplinary Entrepreneurship and Innovation course was created, for students of all degrees, an MBA in Entrepreneurial Management, emphasis on Education, aiming to prepare and develop head teachers of public school for an effective public management, and finally, as a result of research, the watchful eye economic demands of the region and the lack of training in entrepreneurship in the third largest university in the country in number of students, the undergraduate course Managerial Process, emphasis in Entrepreneurship was created.

These results show the path followed by the Universidade Federal Fluminense in building an entrepreneurial university that is ready to impact the society economically, politically and socially, through the development of the field of entrepreneurship in education, as teaching, research and extension.

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E-Learning at Work and the Workplace
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PRE-CALC STUDENTS FROM DIGITAL ONLINE COURSES, PERFORMANCE ON CALCULUS COURSES AT UNIVERSITY LEVEL

Morten Brekke, University of Agder, Norway

Introduction

For the past 15 years e-Learning and computer technology has been an important part of my work as a teacher in engineering education at University of Agder. I have been a project leader of several different projects in information and communications technology (ICT) in education over these years. Throughout this period student's performance and results has increased significantly in all my courses. My recent works (Brekke, 2009; Brekke & Hogstad, 2010) gives an overview of how I brought ICT into my teaching. Use of ICT in teaching is an ongoing process. The constant development of new applications and new versions of existing tools makes it challenging to keep up to date for a teacher. But it also makes it very exciting. New applications and tools create new and different opportunities that teachers can implement in the classroom. Sometimes good ideas pop up a bit at random. With an open mind and always looking to improve teaching coincidences can create good ideas. In 2009 I took over the MA-128 (now MA-154) calculus course for engineering. The first two years approximately 300 students were registered on my course. This was my first experience with that many students. There were 7 mandatory written submissions in addition to the written exam trough out the semester. It was clear to me that with this amount of paperwork I would spend more time correcting submission than actually giving lectures and tutoring students. I thought this could be done a lot easier. With my experience with ICT-tools I knew there were assessment tools that should be able to handle this for me. With the selection of MyMathLab Global from Pearson Education, I found a tool that satisfied my requirements for digital assessments. Here you can give students assignments like tests, quizzes and exams. Questions can be randomized and with algorithmic numbers in them, students can get a new similar question if they want to practice more. The test module allows testing with immediate feedback of scores to the students. How I used this tool was presented at the Eden Conference, "Joy of Learning" in Oslo 2013 (Brekke, 2013). Then in 2011 the MA-128 expanded to include students that we call 'Y-vei' and then changed the course name to MA-154. 'Y-vei' is students with vocational certificates in areas like carpentry, electronics and maintenance technology. This meant that my total number of student reached about 500. At the start of the semester we had some chaotic first weeks. The auditorium had only 350 seats, so it was packed with students sitting in stairs and standing at the back. Then during one of my lectures the fire department came in and stopped us and threw all students not sitting in seats out. We needed some quick thinking. Doubling or parallel lectures was out of the question, due to schedule problems and lack of staff. The only possibility left was to "live stream" my lectures to a vacant smaller auditorium. At first I thought this was not optimal for my course, but we had to do the best out of the situation. Then after just a few weeks, students saw new possibilities with the "live-streaming". Students could see my lectures from home, in the cantina or wherever they were. But most important, they could see my lectures as repetition whenever they wanted to. They could go back and see difficult topics and problems again and again. The statistics for "live streaming" of my lectures shows that they are always among the Universities top visited websites when broadcast live. It also shows that there are over 8000 hits outside the live broadcasting time. And taking into account that at that time it was only my own 500 students who have access to them, this is a high number. Feedback from student clearly says that they simply love the opportunity to see parts of my lectures again as part of the exams preparation. Since 2011 our Faculty has created a website where all courses that involves in "live streaming" are presented (Kaltura, 2011). These pages are now open the public so anyone can access all of these courses. So with the digital assessment tool in place and the "live streaming" up and running I saw an opportunity to develop online courses in mathematics and physics. As a former coordinator of Science courses at our Faculty which also included pre-qualifying courses, I knew that a lot of students did not get in to our pre-courses. About half of our students on our Master- and Bachelor-programs in engineering come from pre-qualifying courses. At our Faculty we have a maximum of 260 students at these pre-courses. Each year we have about 830 qualified students who want to attend these pre-courses. And if we look into the rest of Norway there are about 7500 qualified students applying for 3200 pre-course places. So there is a market for these online courses. We applied for some funding to start up two online courses, one in pre-Calculus and one in pre-Physics. Soon funding was in place and we started up our first courses in mathematics and physics January 2013. One full time study course (one semester) and one part time study course (two semesters). Feedback and performance from students participating has been excellent so far. But to see how successful it has been we need to see how they performed on my MA-154 calculus course at campus. Even though it was only 7 students from the first full time online course of spring 2013 who attended MA-154, it should still give us an indication of whether the level of these students is good enough. This paper will explain how the online courses were conducted and how students performed online and on the campus course MA-154. This work is also an important part of our new Centre of Excellence in Higher Education, appointed in November 2013 to our University by NOKUT – the Norwegian Agency for Quality Assurance in Education (NOKUT, 2013). The declared aim of the Centre is to lead innovation and research in university mathematics teaching and learning within the programs of other subjects such as engineering, natural sciences, economics and teacher education. We are now in the process of establishing the centre under the name Centre for Research, Innovation and Coordination of Mathematics Teaching, MatRIC (http://matric.no).

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Innovation and relevance

Before starting developing these online courses we tried to get an overview over other suppliers of online mathematics and physics courses. This was to set the right price for our courses in the market. All pre-Calculus courses provided by universities or university colleges are non-cost studies for students in Norway, so we were anxious to see if students was willing to pay 1000 Euros for each course. Before we set up the academic content and schedules for the courses, we were determined that there not should be any physical meetings on campus during courses. All tasks should be done online. Mandatory tests and exams should be done on their own computers at home. These assumptions seem to be right, according to a large survey done in Norway early 2013. Interviews with 1300 online students give some interesting information (Rønning, 2013). A similar survey was done eight years ago, and a very interesting difference is that all online courses at that time were based on campus meetings. In 2013 only 20% of courses were done like that. And even more interesting is that online students of today have more contact and get more help from their teachers and supervisors than before. It seems like they now have a more distant relationship with the institution and are more “connected” to their computer. Flexibility and good feedback from teachers makes online students confident. They are also very satisfied with their own working effort. All of this was confirmed by our student’s feedback finishing the first online course. We also got some useful ideas of how adult students approach flexible study programs from research done by Rønning (2009). All courses are under the name ‘Realfagskurset.no’, and we have set up a new webpage (http://old.uia.no/div/prosjekt/realfagskurset) where students can register. We have still not yet advertised these courses outside of the University, but we are going to promote this nationally this spring.

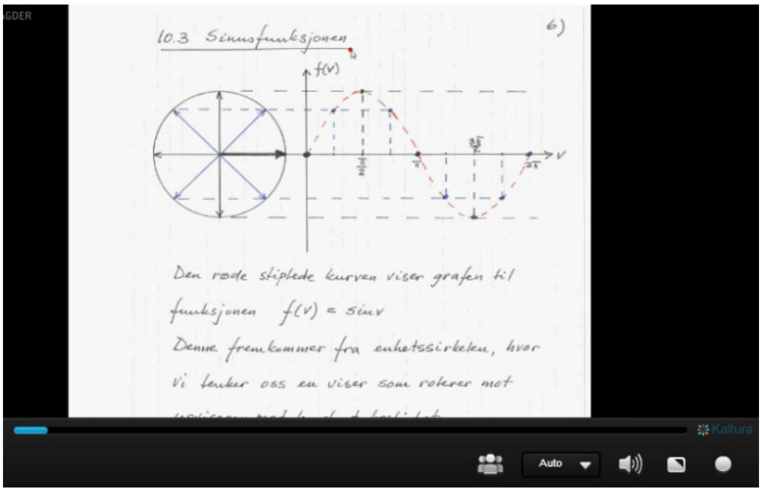

Figure 1. Lecture in mathematics (Camtasia recorded)

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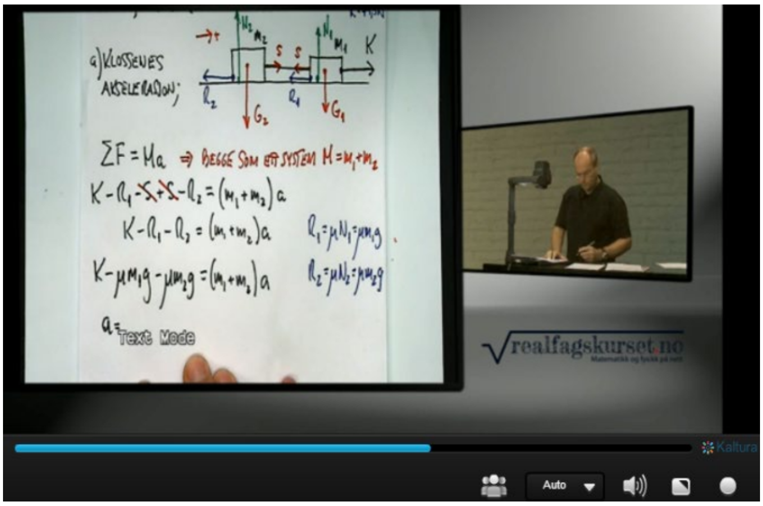

Figure 2. Lecture in physics (Studio recorded)

Then it was time to set up the academic content of the courses. At our University we use Fronter as the LMS (Learning Management System). This is our course classroom. Here we give students study plans, weekly tasks, academic content such as slides from lectures, written notes from examples in video-lectures, links to lectures and link to the test module in MyMathLab. The most demanding and time-consuming work was to establish the video lectures. We wanted short lectures 5 to 15 minutes on each topic. We already had recorded all lectures in mathematics but none in physics. The lectures in mathematics were recorded using Camtasia in our own office. This was done with just scrolling down prewritten lecture notes and talking into a microphone at the same time. Figure 1 shows how these lectures appear online. This is not optimal and we are now recording them in our new video studio at campus. We did get additional funding for about 90,000 Euros to expand our existing video studio. The lectures in physics have now been recorded in our brand new studio. For me this is much easier and saves a lot of time recording. I just book a time and go to the studio and do my lecture, just as I normally would do in my campus course, but instead there is only me and the video camera present. The studio technician does all the editing needed and puts the videos up at the website. Figure 2 shows how these lectures appear online.

Feedback from students shows that they prefer the studio recorded lectures. It is more personal to see the teacher face and livelier using document camera and handwriting. Studio recording makes it a lot easier to change between document camera, simulation on computers and other devices. We had already used MyMathLab Global for several years in calculus, so this time we only needed a suitable textbook with corresponding problems and exercises that suited the Norwegian curriculum. I chose Mathematics for Engineers Pack 3/E, by Croft and Davidson. With this choice we got a large number of exercises and problems that we could use in tests and exams. We translated them into Norwegian and I have also produced a large number of my own exercises. To set the grade in each course we ended up with 8 mandatory tests, one midterm exam and one final exam for the pre-Calculus course. In the pre-Physic we only had 7 mandatory tests throughout the course. Figure 3 shows how tests and exams looks like in MyMathLab. Duration of tests was 3 hours on tests and 5 hours on exams. On all tests and exams exercises were randomized and values in them algorithmic. This meant that no

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students could compare answers with another. This was quit important; we did not want students to help each other by sharing results. We have had a lot of discussion over security. Do we really know who is taking the tests? At this point we trust our students that they do not get help or "hire" someone to do the tests for them. But we cannot at this point be really sure. This is also one of the reasons that it is interesting to see how these students perform on campus. Here they need to identify themselves at exam. Using MyMathLab makes it easy to set up tests and exams and gives us full control over how students perform. Figure 4 shows progress for one student in MyMathLab. We get reports in excel-documents for all students, making it very easy to set grades.

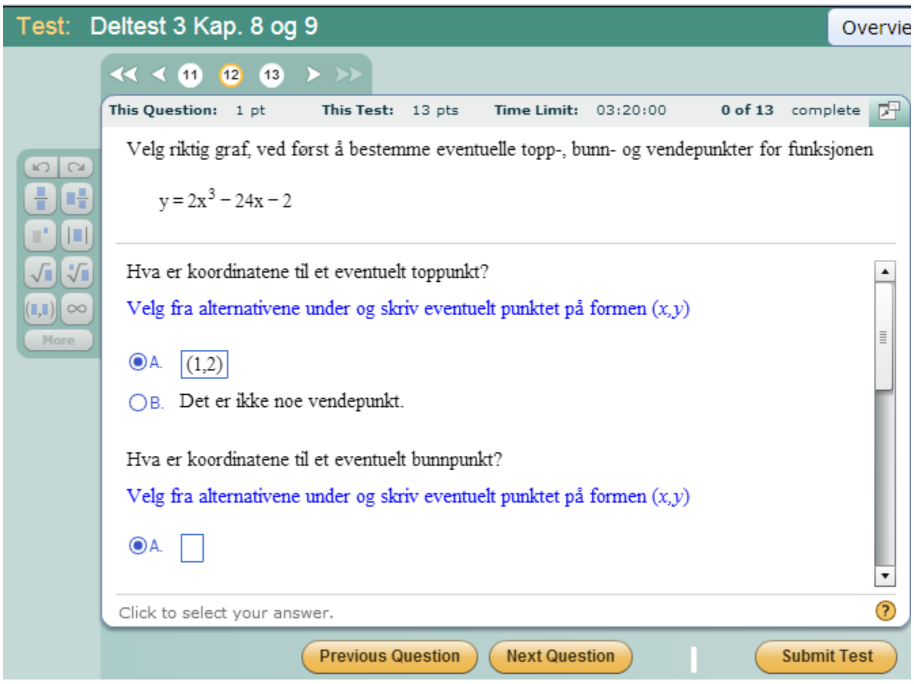

Figure 3. Mandatory test

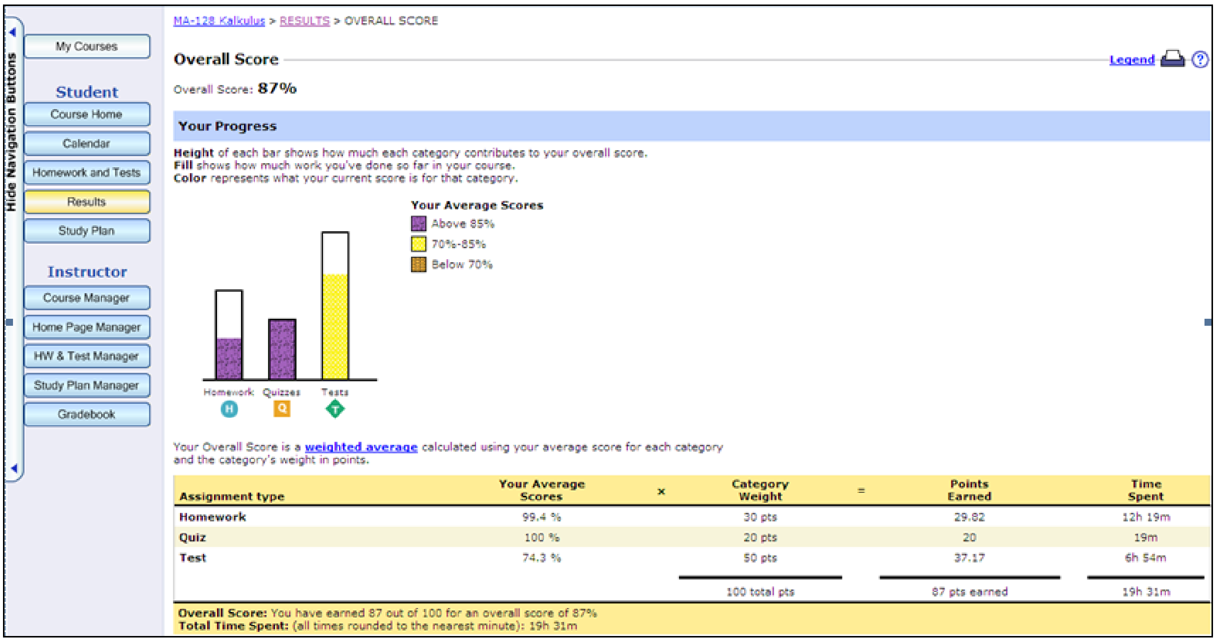

Figure 4. Student progress in MyMathLab

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Results

The online courses start up every half year. Statistics for the number of student participating on these courses can be seen in Table 1. Students from the semester of spring 2013 are the first and only ones to attend our Bachelor program in engineering. From this group only 7 students completed my calculus course on campus. The rest of them attended other Bachelor programs in Norway. Unfortunately I have no records of how these students performed on their calculus courses.

Table 1: Statistics Realfagskurset.no

Statistics Realflagskurset.no				
Course Start	**Fulltime courses**		**Part time courses**	
	Participants	**Completed**	**Participants**	**Completed**
Spring 2013	54	40	10	7
Autumn 2013	36	25	71	End June 14
Spring 2014	64	End June 14	12	End Dec. 14

As you can see from the statistics there is some drop-out especially at the fulltime courses. Most of these drop-outs were in the first two or three weeks. The fulltime courses require a lot of hard work and only the best motivated students seem to cope with it. But the ones who completed performed very well. So let us see how we set grades on the online courses. Throughout the courses students need to conduct the following to get a grade:

- 8 (7 in physics) mandatory online tests where 6 (5 in physics) of them counted in the semester grade;
- 1 midterm online exam counting in the semester grade;
- Semester grade given by the average of the 6 (5 in physics) best tests and the midterm exam;
- 1 final exam with grading;
- Final grade is given by the average of the semester grade and the final exam grade.

In Table 2 you can see how grades for all students who completed an online course. As you can see grades are very good and only two students failed. In Table 3 you can see the compared grades for the 7 online students that completed my campus calculus course MA-154.

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Table 2: Final grades online courses

Final grades for students completing courses	
A	35
B	19
C	14
D	1
E	1
F	2
Sum	72

Table 3: Compared grades of online course and MA-154

Grades for selected students		
	Online grade	**MA-154 grade**
Candidate 1	A	D
Candidate 2	A	C
Candidate 3	A	E
Candidate 4	B	E
Candidate 5	A	A
Candidate 6	B	F
Candidate 7	A	C

For the 7 selected students you see that on the online course there where only A's and B's. We did expect grades to drop a bit on the campus course MA-154, but not to such an extent that we see here. To drop one or at most two grades are not unusual, but to drop from A to E and certainly not a drop from B to F, was not expected. How can this be? Maybe one simple answer is that we need to tighten the requirements when grading on the online courses. But then again this is something that we have experienced for the last decades in Norway, students from upper secondary schools starting at Science programs at universities struggles with mathematics. Even though they haves fine grades from these schools we see that some of them actually fail in mathematics and physics courses at our Bachelor programs. If we look at the grades for the selected students on MA-154 it fits the general distribution of all grades at my campus course, so they do not stick out in any way compared to other students. We also experience that many students struggles the first semester at the University. I think many of them are not used to the academic freedom that they experience. I believe another and important aspect is that in Norway, Universities are historically very exam oriented. Students follow lectures and have some voluntary scheduled tutor aided hours each week, and then meet up to a three to five hours written exam at the end of the semester. This is quite different from what they are used to do in their previous school career.

We did expect that our online students experienced some of the same problems. When attending the online course they had tests almost every week, all of them important since they counted in the grade setting. There was a strong focus on progression and doing tests within deadlines all through the online course. In the MA-154 campus course there were only 3

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mandatory submissions not to count in the final grade. In this course the final grade come from a five hour long written exam. All tests and final exam on the online course could be done at home in familiar surroundings. Students could by themselves choose when they wanted to take a test or exam within a timeframe of 5 days. But once starting the test they had to complete at that time. Of course this is more optimal than meeting at campus with all the nerves you will have there. At home they feel safe and I would guess that makes them perform better. Of course this is too few results to draw any certain conclusion, and we will keep monitoring how these students perform in other science courses at campus. We will also do the same next years with our new Bachelor students of 2015.

To further try to understand how online students perform we did a small survey on the 7 selected students. They were all male aged from 21 to 29 years old. Most of the question was asked so that it can be used to improve the online courses. And they answered the survey before they got the result for their exam at MA-154. After reading the results of this survey it occurred to us that maybe there was an explanation for those students that dropped performance on MA-154. At home they have access to all thinkable written and online aids. 3 of the students said they used Wolfram (http://www.wolframalpha.com/). Wolfram is a website that can give you solutions for mathematical problems. I know some of the problems given on the online courses could be solved here. On the MA-154 campus exam they have the same aids as the online students but we close the Wolfram website access. I know from the replies on the survey that those 3 students with the largest drop in grades, actually was indeed those 3 using Wolfram at the online exam. If the 3 students uncritically relied on Wolfram at the online exam and expected the same at the MA-154 campus exam, they would of course have a serious problem. The Wolfram website does provide a challenge on how questions should be set at online courses in mathematics in the future. We are continuality working on this matter and it is solvable. As mentioned in the introduction one other explanation for the drop in grade, is that they got help from others during online tests and exam. But we think this is not the case. In the survey we gave them 16 questions. A summary of the most relevant questions and answers for this paper can be seen in Table 4.

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Table 4: Selection of the most relevant questions and answers to the survey

Question:	**Answers:**
Why did you choose an online course?	Great to combine with other job Saved me a year at school to do the course this spring Simply I did not have to move from home It was great to combine with my apprentice work To be best possible prepared for bachelor studies Sounded exiting and the freedom to study at times that suited me.
Did you have any other job at the same time?	4 worked in 100% position – 3 did not work at all.
How many hours per week did you work during the course?	They averaged 37 hours a week in mathematics and physics
Did you experience MyMathLab as difficult to use?	All answered no. Some of them said that it is kind of «square headed» when answers are graded.
How did you experience the tests and exam?	All of them were satisfied. Tests were relevant and difficulty level was ok. Some problems with notation in writing answers at the beginning.
Did you use Homework in MyMathLab or did you solve problems from the textbook?	2 answered textbook only. 1 used both. The rest was very satisfied with «Homework» in MyMathLab since they could get step by step help to solve problems.
During tests and exam, all possible aids were available. Which aids did you use?	Some used the textbook, one used video-lectures and lecture notes, One used his own notes and 3 answered internet (Wolfram).
Was the number of tests sufficient?	All said yes, but one put on «a bit too much» after the yes. One said that one test a week kept him going.
What did you use the most? Video lectures or reading in textbook?	4 of them used only video lectures and lecture-notes, but 3 of them preferred reading in the textbook.
How did you experience the transition from the online course to the campus course MA-154, and did the online course give you a good foundation?	For most of them the transition was ok. Though several of them says that just one semester might be too short to let math sink in. The online course ends in early June and MA-154 starts up in the middle of August. That's too long. But they concluded that the online course gave a good foundation.
What was the best about the online course?	Good communication with the teacher and straightforward implementation. Easy, excellent short video-lectures with good explanations on difficult topics. Can be combined with ordinary work. You don't need to attend campus. A lot of tests throughout make it easy to know your performance. You can see lectures over again and when it suits you. I could work when I had time and when I wanted to. Excellent for freshen up math's. The structure and set up of course was excellent, made it motivating to study A very educational and fun course.
What could have been done better?	Maybe find a way so that calculations also appear in tests. Possibility to download video-lectures so you can watch them when travelling or in places with no internet connections. More contact with teacher.

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Conclusions

Feedback shows that students from online courses were very satisfied. During courses they experienced few technical problems, it was easy to access and feedback and support was excellent throughout. To be the first group of students from online courses attending our Bachelor program, we must say that the results are not too bad at all. They do not in any way differ much from our other students. Our online students in general seem to be hard working and conscientious. An interesting reflection is that there was considerable variation in how students study and that some still prefer the textbook and written notes, thankfully. Even though I am a major consumer of ICT in education, I am still a big fan of traditional teaching methods. The fact that some students have chosen to use the Wolfram website has done that we have changed how tests and exams appear. Use of this website will now not be such a big help on tests anymore. Students now get informed that the Wolfram website is useful to check whether answers are correct or wrong during problem solving. We also inform them that the website will not be available on future exams in the Bachelor programs. Whether the grades on the online course are at the right level, we are still a little unsure. Therefore, we will continue to compare grades from the online course with grades from mathematic courses at Bachelor programs. We rather not give them to high expectations, because the transition to university mathematics is tough no matter what background students have. The online courses are continually being renewed and upgraded. That is one of the great advantages with online courses. Changes can be made immediately and it is very easy to change academic content. We are currently making new video lectures and do some remake of old lectures. In MyMathLab new and improved tasks and problems are replaced with old constantly. We get more and more experience and get better in every aspect of producing online courses.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

DEVELOPING WRITING ENGLISH SKILLS OF COMMUNICATION SCIENCE STUDENTS

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Introduction

This paper will describe the possibilities of enhancing L2 writing skills through participation in a variety of tasks and activities incorporated in a Moodle-based course, as well as how taking part in such a course can help students improve their ICT skills. The paper will also describe modes of tutor feedback delivery and the extent to which these include corrective feedback.

The author will provide an overview of Moodle activities and other web tools employed to enhance L2 writing skills in *Writing in English*, a course she teaches at the Centre for Croatian Studies of the University of Zagreb. This is a compulsory course for students who will subsequently go on to work in journalism or public relations, fields where sound English writing skills and a basic ICT literacy are vital prerequisites for those who wish to be competitive in the current job market. Furthermore, the course is also an elective for Erasmus exchange students, which means that the participants benefit from an increased awareness of cultural similarities and differences, as well as an insight into how these might influence written communication.

E-learning opportunities for students of social sciences and humanities

The Centre for Croatian Studies offers a range of study programmes for students of social sciences and humanities. Currently the centre offers approximately 20 blended/online courses (taught by 11 instructors) to a student body of around 1,600. While the institution nominally endorses the idea of blended and online learning, the design and delivery of these courses is left up to individual instructors. As the institution also provides only basic IT support, it is perhaps unsurprising that there are comparatively few opportunities for students to take part in non-traditional classroom-based courses.

However, the University of Zagreb Computing Centre (SRCE) does provide support to instructors striving to introduce blended or online learning into their classrooms. This support comes in the form of Merlin, an "e-learning platform based on [the] open-source system Moodle and…developed, maintained and administrated by the E-learning Centre [a component of the University Computing Centre]. It enables a reliable and free of charge e-learning platform for members of the University, teaching staff and students" (Srce, 2010).

The *Regulations on undergraduate and graduate study programmes of the Centre for Croatian Studies* (Science and Education Council, 2013) stipulate that students are guaranteed a level of quality of studying which is in accordance with their chosen study programme. In classroom-based writing courses – the only format in which *Writing in English* was previously offered – "the main audience for student writers is usually their teacher, and…the writing context is too artificial to generate texts which show genuine concern for audience expectations" (Day and Batson, 1995). It was assumed that more authentic communication would occur if learning were based on the social constructionist pedagogy, as this would allow "dialogic interaction in varied discursive or conversational contexts [which] is an ongoing process of meaning construction" (Dinapoli & Algarra, 2001). As Moodle is an e-learning platform based on social constructionist principles (Moodle, 2014), it was believed that offering *Writing in English* in an online format, using Moodle, would enhance the quality of student learning by providing opportunities for them to engage in the construction of meaning through more genuine communication.

Background on the course

Writing in English is a 60-hour compulsory seminar attended by Croatian undergraduate students of Communication Sciences, as well as by Erasmus students majoring in related fields, coming from a range of countries. On average 15 students attend the course in a given semester, all of whom have English as their L2. Although the students are required to be at CEFR[1] level B1, a placement test administered at the beginning of the course usually shows students to have varying levels of proficiency ranging from B1 to C1.

Writing in English has been conducted online for three consecutive semesters now, and during this time the overwhelming majority of students stated at the outset, in their learning journals, that they had no prior experience with e-learning. The course is designed and moderated by the instructor who also previously taught the course in the classroom environment. It is perhaps important to note that prior to transferring the course online the instructor received formal training in the principles of online learning, having completed a course design programme delivered by the Croatian Academic and Research Network (CARNet). As the course content is based on the selected chapters of two print course books[2], combining writing skills and topic-related vocabulary, it was necessary to adapt these classroom materials for use online.

Spanning a period of approximately three and a half months, *Writing in English* has as its main course objectives:

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[1] Common European Framework of Reference for Languages: Learning, Teaching, Assessment
[2] These are: Cory, H. (1999), *Advanced Writing with English in Use CAE*, Oxford: Oxford University Press & Mascull, B. (1995), *Collins Cobuild Key Words in the Media*, London: Harper Collins Publishers

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- exposing students to effective journalistic writing techniques within the topics covered in the required literature (i.e. work, unemployment and welfare; crime and punishment; diplomacy and war; entertainment and arts; sports);
- enabling students to apply acquired writing strategies in independent writing.

Two face-to-face orientation sessions are held at the beginning of the semester in order to familiarise the students with how the course is organised and with the basics of online course participation, such as logging on to the e-learning platform and creating an e-portfolio profile. The remainder of the course is conducted online, with the content divided into nine units each lasting approximately ten days. The final exam is a paper-based one.

Moodle activities and other tools employed in the course

Moodle has a wide range of activities which may be added to a course, many of which may be effectively exploited to practise L2 writing skills. This section will list the Moodle activities used in this particular course, as well as certain other tools which can be used to enhance writing skills, but are currently not available in Moodle. A description of how each activity or tool was used will be given in order to demonstrate how this permitted the students to engage in more authentic written communication than this would be possible in a traditional classroom environment.

Forum

Discussions may be one of the most frequently used online interactive instruction methods. The classroom-based *Writing in English* also made use of discussions, but although students arguably saw such activities as more dynamic than writing-based ones, in oral discussions the majority of students often contribute relatively little (Day & Batson, 1995), and the discussion is frequently teacher-led. The guidelines to the online discussion forums used in the course clearly specify that all students are required to contribute to the discussion, and it may be assumed that since all their peers are able to read and respond to their posts, this highly encourages authentic communication between the students themselves, as well as between the students and the instructor.

Bearing in mind the students' lack of prior experience with online learning environments, as well as the fact that instruction is carried out in the students' L2, two types of forum are used: the *Question and answer* forum and the *Single simple discussion* forum. This ensures that students are not daunted by expectations to initiate or moderate discussions.

Wiki

The wiki is used in two modes in the course. One is the individual wiki mode, which essentially functions as a notebook for shorter tasks, such as punctuation practice. This use of the wiki allows the instructor to view and comment on student wikis, but individual students cannot view each other's wikis. This is perceived as key in the preparatory stages to more

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complex, collaborative tasks, as it allows students to develop their confidence with regard to mechanics of writing, such as, for instance, the use of punctuation.

However, the wiki is a powerful collaborative learning tool and the course also makes use of group wikis. One example of this is a wiki set up to practise narrative writing, incorporating practice on the use of linking words, punctuation and tense usage which may be expected to appear in narrative writing. Students work in smaller groups within the wiki, which by the end of the activity contains several examples of short narratives. As with the forum, all students are able to read the work of each small group, which may be assumed to lead to greater concern for audience expectations.

Another important advantage of the wiki over doing a similar activity in a classroom may be worth noting; the instructor is able to provide feedback (and a judicious amount of error correction) which is visible to all students, thus further encouraging them to monitor their writing for accuracy.

Glossary

A significant course objective is to familiarise students with high-frequency vocabulary in journalistic writing within the topics in the required literature, and a key activity which contributes to this objective in the online course is the glossary activity. Construction of the glossary is largely a collaborative task, as opposed to the introduction and recycling of vocabulary items in the classroom. As students enter target vocabulary items and their definitions into the glossary, these appear at random in the *Word of the day* block at the top of the page each time it is refreshed or a new page is visited. In addition, when students use the target vocabulary items in a forum discussion, these are auto-linked to the previously entered glossary definitions. This means that students can read each other's definitions easily, even without the extra step of looking them up in the glossary, which thus encourages them to take their audience into consideration to a greater extent than is likely when doing classroom-based vocabulary practice.

Workshop

The workshop activity in Moodle is an extremely useful tool in allowing students to experience a non-artificial writing context, since they are writing for an unfamiliar audience, as they presumably will be in the course of their future employment. In the online course, the workshop is used to practise writing descriptions. The task is to rewrite a bland newspaper review employing writing techniques which evoke the reader's curiosity and interest. Particular techniques which are effective for this purpose are introduced prior to the task. The degree to which each student has succeeded is determined by anonymous peer review, as when the students have uploaded their tasks, these are randomly assigned to other students for feedback. It is crucial to provide detailed and unambiguous rubrics for this activity, as well as to draw the students' attention to the usefulness of constructive feedback. It might be advisable to introduce this activity when students have already had the experience of the

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instructor modelling how to give effective feedback. The opportunity to practise this skill is not a specific course objective, but learning to criticise ideas as opposed to people is a significant benefit of collaborative learning (Srinivas, n.d.), and giving effective feedback to colleagues is a skill which is likely to benefit the course participants in eventually securing employment.

E-portfolio

The course makes use of the open-source Mahara e-portfolio system, which is often used in combination with Moodle (Mahara, 2011), and is also supported by SRCE. The primary purpose of using an e-portfolio is to allow students to keep a learning journal or blog in which they may reflect on the work done in each unit in the course. According to Campbell (2003) learner blogs may be particularly appropriate for reading and writing classes, as they can be used for writing practice and the students' writing can immediately be read by others, who are encouraged to comment on the content. Several benefits to keeping a reflective learning journal have been noted in the course; students are exposed to samples of a relatively informal/conversational writing style (which is another course objective), and a stronger sense of community develops as student feedback indicates it is enjoyable to read and comment on other students' entries. Finally, students have more writing opportunities online compared to the classroom-based course, since a reflective learning journal was not a course component in the latter. It is perhaps important to note that the instructor also keeps a journal.

Online notice boards

Online notice boards, also called online whiteboards, are not provided by Moodle, so the course makes use of two tools currently available at no cost, namely *Padlet* and *Lino*. It could be argued that the purpose and functionality of these do not make them significantly different from a wiki, but there is a twofold reason for using online notice boards as well as the Moodle wiki activity in the course. The benefit to the students' writing skills again lies in generating non-contrived texts for a larger audience, but these tools also enable the simple and intuitive addition of various file formats, making it easy to produce a visually appealing collaborative effort and prompting students to question whether, for instance, images and multimedia will add to or detract from the message they wish to convey with their writing. Another reason may be attributed to the students' claim to possess little or no experience with online learning; it is assumed that introducing students to a range of collaborative online tools will contribute to their employability.

Impacting on student ICT skills

A survey taken by Silva, Lourtie and Aires (2013) found that computer literacy ranks high on the list of key employability skills in the view of both online students and teachers. The thirty-seven skills included in the survey are based on the employability dimensions of Knight and Yorke's theoretical model (as cited in Silva et al., 2013). The authors claim that "an important strategy to boost employability skills could include explicit approaches to these skills in online

ISBN 978-963-89559-7-5

higher education", but note that this is currently no more than a tendency since, according to Harvey (as cited in Silva et al., 2013), it is still difficult to decide which employability skills can be learned by means other than being specifically included in the curriculum.

The Centre for Croatian Studies of the University of Zagreb currently requires that Communication Sciences students take a 30-hour compulsory practicum in ICT skills, whose course outcomes focus primarily on enabling students to use word processing, spreadsheet and presentation software, as well as to use online tools (search engines) for research purposes. Whilst it is unquestionably essential that the students acquire these competences, the course outcomes, do not, for instance, address collaboration through the use of online tools, nor effective communication and feedback strategies in an online environment.

Although *Writing in English* course objectives do not include specific references to student ICT skills, it is, I believe, important to note that students are highly likely to acquire some of these simply as a result of taking the course in its online format, particularly those which the ICT skills practicum does not address, i.e. the effective use of online collaboration tools, and effective communication and feedback strategies and techniques. It is assumed that this can only increase the students' ICT literacy overall, adding to their likelihood of securing employment upon completing their study programme.

Corrective feedback and the development of L2 writing skills

Although the principal intent of this paper is to present a range of web-based tools and activities which can be used to enhance L2 writing skills, I would like to examine briefly the focus and the modes of tutor feedback delivery in the course, as feedback is usually considered an indispensable part of any writing course.

Lee (2011) cautions that a "lopsided focus on written errors can easily convey the message that grammatical accuracy is what 'good' writing is all about and cause students to lose sight of other significant dimensions of writing." In an online course, the fact that most of a student's written work may be seen by other students also raises the issue of whether the overall effect will be demotivating if the feedback focuses disproportionately on error correction.

Bearing this in mind, feedback in the course is given in the form of comments on the students' journal entries in the e-portfolio, as well as short personalised podcasts and screencasts in the case of longer pieces of writing. While the comments in the e-portfolio attempt to engage students in further discussion on those aspects of each unit which they have found interesting enough to reflect on, the podcasts and screencasts provide a commentary on features of student writing at the textual level, e.g. cohesion and coherence. Although Lee (2011) claims that there is "an overall lack of comparable research evidence on the effectiveness of error feedback", students generally expect to have their errors pointed out, possibly because they are accustomed to this in L2 classes. Therefore, detailed corrective feedback is provided on three longer writing assignments, which are not part of a collaborative effort, but are rather produced individually by students. It is believed that seeing the errors pointed out,

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accompanied by explanations of applicable rules in the majority of cases, will be useful for students, rather than achieving a demotivating effect.

Conclusions

This paper has described an L2 writing skills course for students of Communication Sciences at the University of Zagreb, and the positive effect of this course in an online format on the students' writing skills. It may be concluded that the students' writing skills and written communicative competence are enhanced through increased opportunities for authentic written communication compared with the classroom environment, as well as through writing for a wider audience than the instructor alone, which creates a less artificial writing context. The paper also looked at how the course contributes to the students' employability skills, specifically their ICT literacy, noting that it is likely to have a particular impact on the students' use of online collaboration tools and effective online communication and feedback skills. Finally, the focus and modes of tutor feedback delivery were described, emphasising that corrective feedback is not the only, nor the most important, type of feedback provided, in line with the attempt to encourage students to see writing as more than simply good grammar.

It is my strong conviction, having taught the same course in both an offline and online format – over several semesters – that a writing skills course lends itself particularly well to instruction in a blended or online environment. I believe that writing tends to have a much clearer purpose when we are writing for an audience, instead of merely one person (the instructor) or possibly two or three other people (in the case of pair work or group work). Student feedback collected at the end of the course indicated that they felt it beneficial to be doing so much writing and to be able to read the writing of their peers, as well as useful to have the experience of taking part in an online course, as they expect to engage in this type of learning increasingly in the future. Further research seems to be necessary regarding which features of writing are most likely to see improvement over the course of a semester, and to what extent feedback has an impact on this.

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E-Learning at Work and the Workplace
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Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

EFFICIENT AND COMPREHENSIVE APPROACH TO THE EMPLOYEE TRAINING

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Introduction

Training a large number of employees in using new versions of desktop programs represents an organizational challenge and exacts huge costs, especially when the staff is scattered across the country. The differences in prior knowledge, personal needs and work post demands cause difficulties in establishing homogeneous groups, reduce the possibility of customized employee training and has an impact on learning outcomes.

Due to organisational issues, time constraints and financial optimisation the facilitated e-learning model was implemented in one of Slovenian companies that has subsidiaries across the country. In the pilot project, the tasks were precisely defined. The implementation was monitored. The final evaluation was also conducted.

Firstly, technological and pedagogical framework of the project was designed. All activities were defined on the basis of chosen LMS system eCampus and pedagogical model.

Technological framework

Companies often use LMS (Learning Management System) to deliver e-learning materials and provide e-courses. LMS system eCampus was chosen because of its modern design and compatibility with all commonly used mobile and web technologies. The user can run it on a PC or a mobile device, various browsers and in different display sizes. The system looks uniform in both types of devices. HTML5 standard (W3C, 2013), CSS and JQuerry technologies are used (B2, 2014).

eCampus enables the implementation of online training and e-testing of employees in organizations (e.g. insurance companies, banks, manufacturing companies etc.) or provides e-courses in academic institutions (B2, 2014). Figures show some e-learning portals powered by eCampus on various devices.

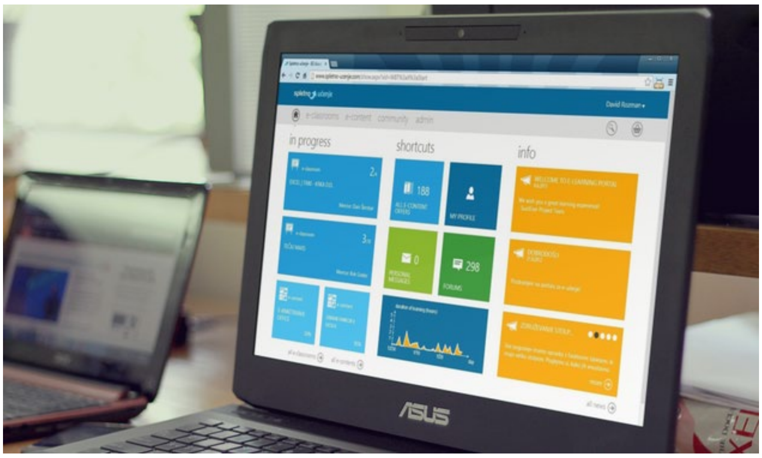

Figure 1. Portal's home page on PC laptop

eCampus is not only an LMS system. It is also an LCMS (Learning Content Management System). CKEditor is included to enable easy e-content development. CKEditor is an open source WYSIWYG text editor (CKEditor, 2013). Some functionalities were added to the editor used in eCampus, such as new styles and context menu. In addition, page preview and multimedia object import was improved (B2, 2014).

Many authors start developing their learning material in MS Word. In order to import the content into eCampus, they have to use styles and export it to XML format. After importing it into eCampus they can edit the content, add multimedia elements, questions for knowledge evaluation with instant feedback, quizzes, etc. (B2, 2014).

eCampus is a contemporarily designed system for e-learning, where learning environment tends to be organized in an intuitive and attractive way. The purpose of visualization of the key information (chart learning time, transparent allocation table of e-learning materials, simple index) is to make learning enjoyable and motivational. The learning environment is personalized. The user's view varies according to the type of the user (author, learner, administrator) and according to the user's previous actions and assigned tools. One can see only one's own data and reports, forums, tests, contents and e-courses assigned to him/her, his/her personal communication and information intended for this individual. Information, forums, contents or e-courses can be assigned to groups as well. The e-content can only be edited by the author who has been assigned the editing rights (B2, 2014).

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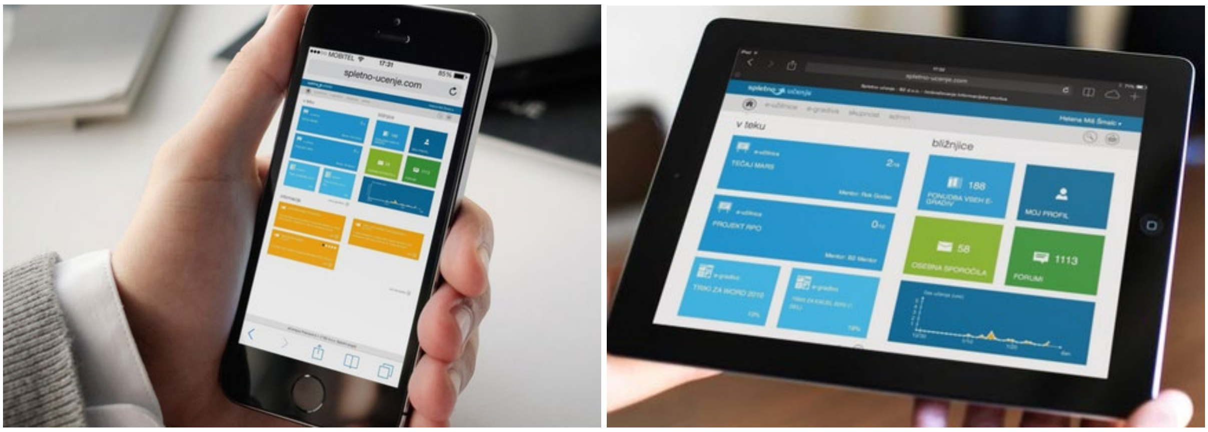

Figure 2. eCampus on a smartphone and tablet

The learner, teacher or administrator, each of them use a different menu. The desktop is divided in three parts: left, middle and right. The most useful links (e.g. e-courses, e-contents) and recently used items are positioned on the left side. Shortcuts and other important links (e.g. forums, personal messages) are gathered in the middle. The information and other important posts can be found on the right. All components are personalized. The visual appearance varies from user to user (B2, 2014).

LMS enables:

- forming groups of participants in online training,
- creating e-courses,
- assigning rights to users for accessing the appropriate e-learning materials,
- communicating through forums, chat rooms and private messages,
- e-learning materials management including time limit, user access and levels of access,
- mentoring, reviewing and monitoring the learning progress of the participants,
- evaluating knowledge (e-testing).

eTesting is a powerful tool which enables:

- preparing and managing the database of questions and answers,
- preparation and management variety of e-tests,
- implementation of e-testing,
- detailed overview and statistics of all test participants.

LCMS – Learning Content Management System offers:

- creating hypermedia e-learning materials,
- importing content from other sources (MS Word, SCORM, Flash, HTML5, MP3 audio, MP4 video etc),
- simple adding of images, tables, movies, animations and interactive elements,
- changing the structure levels and customizing the learning path,
- supporting the production of content online dictionary (glossary)

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The access to the e-learning portal is available from anywhere and at any time, regardless of the type of the device employed (e.g. smartphones, tablets, PCs). eCampus operates independently, irrespective of the operating system (Apple iOS & OS X, Android, Microsoft Windows, Linux). Utilising responsive web technology the user interface is automatically adjusted to the size of the screen (B2, 2014).

Pedagogical framework

E-learning offers several advantages that are meaningful for employed persons: flexibility in time and place of learning, learning at an individual pace and catering for the specific needs of learners. If a company organises trainings for several employees, data analysis and its results can be automatically delivered to the human resources department. Unfortunately, there are also disadvantages, such as lack of motivation and social isolation. Therefore, the program and the pedagogical design of the course should support learners and foster learning.

It is not recommendable to transfer the existing practice in face to face (F2F) learning to e-learning. The use and design of e-learning have to be grounded on a learning theoretical approach (Dalsgaard, 2005) as well as on recent research findings and best practices. Researchers suggest e-learning based on constructivist and socio-constructivist theories of learning. These theories imply a design, which is student-centred, and provokes active and collaborative learning. The focus is on the learner and on the learning process. It is important to know the learner's previous knowledge and experiences as well as his/her needs, motivations and characteristics, such as personal abilities, learning strategies and a learning style (Ardito et al., 2006). Self-paced e-learning is not as effective as learning which is moderated by a skilled mentor (Lapuh Bele et al., 2008).

Facilitated e-learning

The mentor is not the transmitter of knowledge. He/she is the motivator and the facilitator of learning. The mentor and learners discuss the subject, the learners' understandings and their problems in learning. He/she sets learning goals and activities which are essential to be achieved. The learner is guided to find knowledge by himself. The widely adopted implication of constructivist theories is that students should be cognitively active in an online learning environment (Sweller, 2005). Cognitive activity can be achieved using online questions with instance feedback, online tasks, tests, discussions, etc. However, tools integrated in eCampus are needed to facilitate active learning and collaboration.

In e-learning, e-learning course design is as important as in traditional learning. Providing e-content and encouraging employees to read them is not a good strategy to achieve learning objectives. Participating in e-learning course should not be comparable to self-paced e-learning from prepared e-learning contents. It should be facilitated (Lapuh Bele et al., 2008). The mentor's task is to present the course, announce learning goals, learning tasks (e.g. project work, assignments, and assessments), code of behaviour within the course and to give advice on e-learning strategies. Most learning activities run asynchronously. Participants learn from

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e-content and perform learning tasks according to a weekly schedule that determines events (e.g. real-time online meetings organised as videoconferences or chat sessions), readings (learning contents that must be read or viewed) and other activities (discussions, project work, on-line assessments). All activities have deadlines and students can carry them out according to their own schedule. Teachers can use the following activities to facilitate learning (Horton, 2000; Ko & Rossen, 2004):

- follow learners' work and monitor their progress using e-learning platform tools,
- motivate and encourage learners,
- provide clear directions and activities,
- stimulate communication and collaboration among learners,
- actively participate in, promote and lead interactive discussions,
- offer assessments to clarify expectations,
- clarify the purpose of learning,
- point learners to valuable learning sources and therefore help them to save time,
- provide answers to questions, feedback and recommendations on course activities.

Therefore, employing the mentor qualified in pedagogy is recommendable in e-learning settings.

E-learning content that provoke active learning

According to constructivist theories active learning is a key factor of efficient learning. Therefore, e-learning materials should provoke active learning.

The research confirms that students like interactive questions and online assessments as they act as motivators, give instant feedback and strengthen gained knowledge (Lapuh Bele & Rugelj, 2006). There are some other pieces of advice an author of e-learning materials should follow. A good teacher communicates with his or her audience throughout the time in the classroom and this must be in some way (e.g. with the help of communication tools and through the style of writing e-learning materials) transferred onto the e-learning content. The style of writing or narration is also important: emphasis should be made on essential elements, rational expressions and composition of short, clear and understandable sentences (Lapuh Bele & Rugelj, 2006).

Course and content designers should pay considerable attention to scaffolding the student's self-regulated learning processes (e.g. goal setting, self-monitoring, self-evaluating, task strategies, help seeking, time planning and management) to ensure successful learning (Schunk & Zimmerman, 2008).

Efficient e-learning content is interactive and well designed. The appropriate use of multimedia can enhance the learning-process, increase motivation and ensure valuable learning experiences (Ardito et al., 2006; Mayer, 2005; Lapuh Bele & Rugelj, 2009). Visual presentation of learning material is highly important as it can enhance learning or impede it with counterproductive overload of sensory channels (Mayer, 2005). Different presentation

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modes should be used to cater to students' different learning styles, cognitive abilities and to ensure efficient learning (Lapuh Bele & Rugelj, 2006).

Research shows that students dislike reading long texts from the web, long paragraphs and narrations. Learners are particularly inclined towards specially formatted and added comments, such as interesting points, hints and warnings (Lapuh Bele & Rugelj, 2006).

The future of e-learning

Gamification is a great strategy to increase motivation, because people love fun.

Gamification is the process of introducing game mechanics into boring and time-consuming activities (i.e. learning, routine work, tasks) to make them more game-like (i.e. fun, rewarding, desirable, etc.), so that people would want to proactively take part in these tasks (Wu, 2011).

Gamification is a promising way of e-learning. Gameified learning helps employees to learn dull but for company very important content with higher interest and engagement. Employees have to learn compliance, legislation, company policies and other company's curriculum regularly for gaining the appropriate level of competence. Many times this content is not very attractive and we should find different ways to encourage them to learn. Gamification is an interesting solution that many companies already included in their e-learning system.

Learning with the support of eCampus is an active process where the strategy of "learning by doing" and "making learning fun" leads student in cognitive activities and supports him/her to connect experience, existing knowledge and new knowledge (B2, 2014).

Pilot project

The client company (i.e. employer) decided to implement the pilot project first. Further training activities were dependent on the results of the pilot project. As a pilot e-course, advanced Excel training was chosen.

The technology nowadays is very helpful in carrying out the right educational programmes for the employees. It is important that educational programmes are closely linked to the company's strategic goals as well as the right programs are organised for particular workplace and are adjusted to the level of the competence someone already has.

The project was carefully planned in order to achieve its ultimate goals with the following stages of implementation:

1. **E-learning platform implementation.** Platform was visually adjusted to client's corporate design and brand guidelines. For the best e-learning experience it is very important to have employees engaged and that they are aware that this learning portal is the centre of the company's knowledge, where they can find different content for themselves.

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2. **Pre-testing and assessment of needs through innovative e-survey**. The goal of pre-testing was to identify existing knowledge of each participant in order to form homogeneous groups. Test questions were prepared in a practical way, so the participants had to solve practical tasks. The second part of e-testing was the survey of needs. The participants had to answer variety of questions regarding the educational program themes and their specific needs.
3. **Designing customised e-course programme.** Participants were divided into two groups according to their knowledge of the subject and their business needs. It is extremely important that an individual is included in an appropriate group in order to access relevant e-content and to be actively engaged in group discussions. Learning content included following topics in the training of MS Excel for business use:
   - Create and edit (insert/delete columns/rows, set the width, hide/unhide, using different data types);
   - Design (numeric formatting, cell formatting, removal the form and/or content of the cells etc);
   - Formula (creating simple formulas, copying formulas, the use of fixation etc);
   - Functions (use of basic functions);
   - Print (header/footer, change the direction, print preview and the number of printed pages etc);
   - Work with lists (sorting, filtering etc).
4. **E-course delivery for a pilot group of 60 employees**. Participants in both groups learned from provided e-content and performed learning tasks according to a weekly schedule. All learning activities were led by a mentor and had pre-established deadlines. Participants were able to carry them out according to their own schedule. The mentor sent motivational messages, answered the questions, facilitated group discussions and monitored participants' learning activities. In the end the mentor collected data, performed a data analysis using platform's BI (business intelligence) functions and made reports for the client.

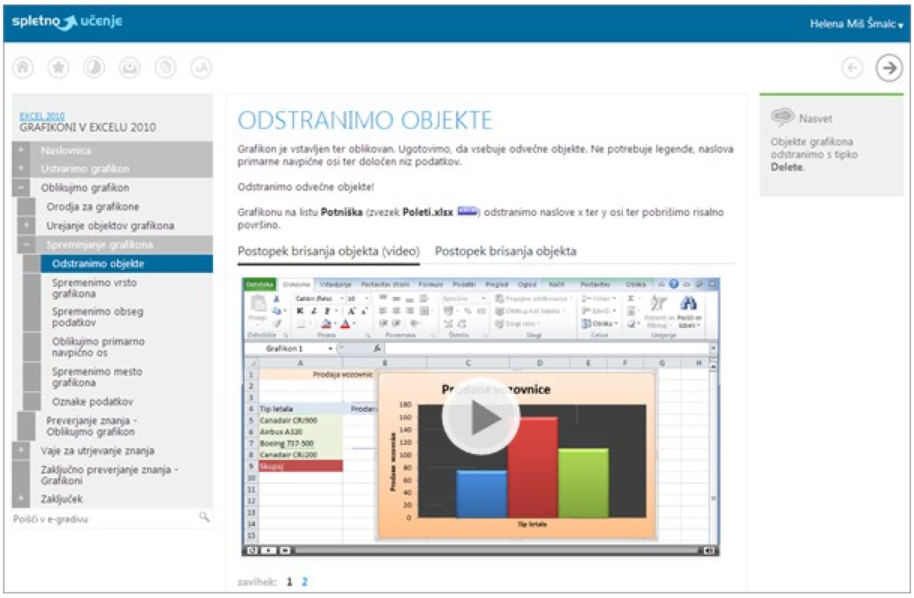

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Figure 3. Multimedia based e-content with interactive elements

5. **E-testing (knowledge evaluation)**. Results of the final knowledge evaluation showed that participants improved their knowledge. The improvement was measured in comparison between the pre-test and the final test. All participants significantly improved their knowledge.

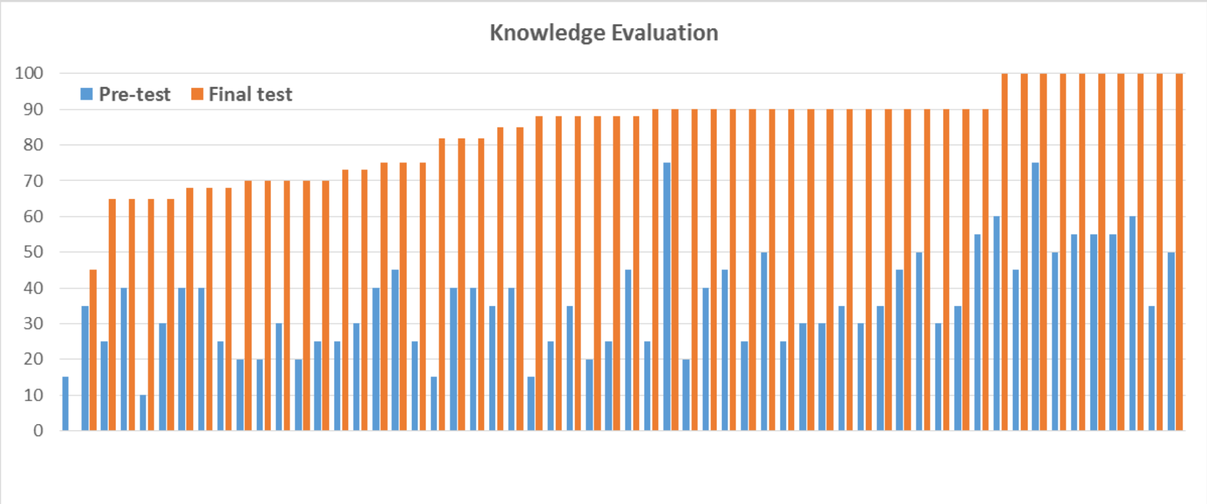

Figure 4. Results of pre-test and final test

6. **Project evaluation and final report.** The final report and results. The time for the final e-testing was maximum 35 minutes and consisted of themes that have been part of the e-course. The test was conducted in a similar manner as the pre-testing (hence solving in practical situations). Most of the questions were posed to work with an Excel file in which the participant had to solve a particular exercise. The test consisted of topics that were related to the training programme.

Conclusion

Using e-learning approach was beneficial in many ways: employees adapted time and place of learning to their obligations, human resources workers spent less time for the organising activities, organisation saved time and cost for the training of dislocated participants, certificates of the successfully finished e-course were automatically produced etc.

As a result, the client organisation decided after the pilot training to continue and expand their e-learning activities.

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ISBN 978-963-89559-7-5

E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5

EMPORT – IMPROVE EMPLOYABILITY AND ENHANCE EUROPEAN COMPETITIVENESS THROUGH THE ACQUISITION OF LANGUAGE AND CULTURAL COMPETENCES IN PORTUGUESE

Amador Ordonez, Dirección General de Educación FP y Innovación Educativa, Spain, Rui Azevedo, Universidade Lusófona de Humanidades e Tecnologias, Portugal

Description

The project aims to improve the employability of European citizens and company competitiveness through the acquisition or improvement of language skills and cultural competences in Portuguese.

The Portuguese language course is based on the real needs of companies and uses ICT based resources: animations, pictures, sound files, etc. It includes the A1 and A2 levels, of the Council of Europe's Common European Framework of Reference for Languages. The course will allow the owner/employee of a company to travel to a Portuguese speaking country to get a taxi, book a hotel or keep simple conversations with the business counterpart. But it also allows tourists to involve themselves more easily with the local people.

Furthermore, it allows European citizens to access the culture of Portuguese speaking countries, with particular attention to Brazil.

Partners: Dirección General de Educación FP y Innovación Educativa, Asesoramiento, Tecnología e Investigación S.L, European Distance and E-Learning Network, Universita Degli Studi di Roma "Tor Vergata", Universidade Lusófona de Humanidades e Tecnologias, Magensinus, Empresa Promotora de Serviços de Ensino, S.A., Euroroc Brussels/Wiesbaden, Universidade de Brasilia.

Summary of its novel characteristics

EMPORT objectives and products

In order to achieve the general aim, particular objectives were established:

- To research about the available multimedia courses and other language opportunities for Portuguese languages, highlighting those resources for Brazilian Portuguese.
- To research about the needs regarding language and cultural competences of staff from companies dealing with Brazil or other Portuguese speaking countries.

- To produce a Web Site about Portuguese language and the culture of Portuguese speaking countries.
- To produce a multimedia and interactive business language course in Portuguese.

Target groups

The target groups are mainly those European citizens interested in enhancing their linguistic and cultural skills and competences by learning Portuguese, together with those organizations which provide courses in Portuguese language and culture. The course is adapted to the particular needs and interests of companies dealing with Portuguese speaking countries and students attending courses in business related areas.

These are professionals who are aware of the increasing importance of Portuguese for international business due to the current economic growth of these countries, particularly Brazil, Angola and Mozambique.

Webpage

A website (http://www.learningportuguese.eu) was launched at the beginning of the project containing information regarding the project, its aims, the expected results and the partners involved. This website also includes the cultural part of the project, including relevant information for company staff dealing with all of these Portuguese speaking countries: Portugal, Brazil, Angola, Mozambique, Cape Verde, Guinea-Bissau, São Tomé e Príncipe and East Timor.

Content

EMPORT's pedagogic perspective is aimed at helping students learn gradually and with little effort, since it is based on the idea of adding new material slowly and always contextualized in the best way.

Materials are focused on a business approach, according to the aims of this project. The course is composed of 10 units, each one based on a particular topic such as fairs, money and banking, negotiation, market research, personal branding, etc. These units also include cultural content related to the topic and the country represented in each of them.

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Figure 1. EMPORT Language Course

Features to be demonstrated

The EMPORT demonstration will be organized into two parts. First of all, the aim and aspirations of the tool will be explained as well as a brief explanation of the previous research and creation process.

Secondly, there will be a showing of the course where the audience attending will get to know how to take full advantage of the tool. We will explain how the course works, its different units (topics) and learning sections contained in each unit, and the characters (coming from all different Portuguese-speaking countries) will also be introduced.

Significance of the contribution and its relevance to the conference themes

Based on the content, target groups and tools implied, we can conclude that the EMPORT course suits the following two EDEN Conference themes:

SCL – Scaling up work based learning by ICTs

The main target group of the EMPORT Course are working people who want to improve their labour skills by the acquisition or improvement of language and cultural competences in Portuguese. The increasing importance of some Portuguese-speaking countries show the relevance of the knowledge acquired. EMPORT suits them as it is a free on-line tool that can be used anywhere and at any time.

DPED – Digital pedagogy in adult and lifelong learning

EMPORT contributes to the inclusion of learning methods through electronic platforms and people with a career in progress who need to improve their competence in Portuguese.

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