
DESIGNING AN ASSESSMENT MODEL OF ENTREPRENEURSHIP COMPETENCE FOR THE PROMOTION OF SUSTAINABILITY IN COMPULSORY AND POST-COMPULSORY EDUCATION

PALOMA CISA, ESTEL, UOC; GUÀRDIA ORTIZ, LOURDES, UOC; BUIL FABREGÀ, MÀRIAN, TECNOCAMPUS-UPF

Abstract

The development of cross-curricular or generic competences for lifelong learning is especially relevant in compulsory and post-compulsory education, among which entrepreneurship competence is included as one of the competences that will enhance essential skills for the development of sustainability. In order to successfully implement it, it is essential to have a learning and assessment model that allows the educational community to adequately guide the development and acknowledgment of this competence. This article presents the first necessary results for the design and anchoring of the model for its implementation in the Escola Pia de Mataró. These results are the outcome of the work carried out with 200 students of 5th and 6th year of Primary School (compulsory education) who were surveyed, as well as with the workshop carried out with 15 teachers. They have provided relevant information on their knowledge and awareness of entrepreneurship competence, that offers a better understanding of the context of application regarding how to establish the basic pillars for the design of an appropriate assessment model.

Keywords:

entrepreneurship competence, assessment model, primary education, competency-based assessment, cross-curricular competencies, assessment by competences,

Introduction

The aim of this article is to present the first results of the research of the doctoral thesis project "*Model for the evaluation of the development of entrepreneurship competence for the promotion of sustainability in compulsory and post-compulsory education*". This project is being developed within the framework of the industrial doctoral program¹ funded by the Government of Catalonia, and its object of study is to propose a model for the evaluation of the development of entrepreneurship competence that facilitates the promotion of sustainability in primary and secondary school students.

Entrepreneurship competence is one of the eight key competences defined since 2006² by the European Parliament and the Council of the European Union, in its resolution of 2018³. It is also in this last resolution that a new competence appears, which highlights the importance of sustainability: "Citizenship competence". Entrepreneurship competence is also defined as a key competence in the different Spanish regulations (LOE 2006, LOMCE 2014 and LOMLOE 2020). However, although the aspiration of the Spanish Ministry and also of the Generalitat de Catalunya is to introduce them in their curricula, the fact of considering entrepreneurship competence as a transversal, makes its evaluation more difficult, since it does not belong to any specific subject, so it is the responsibility of the whole teachers' staff to decide how to proceed with its assessment.

Theoretical background

¹ The objective of the Industrial Doctorates Plan is to contribute to the competitiveness and internationalisation of the Catalan industry, strengthen the tools to attract the talent generated by the country and place future doctors in a position to develop R&D&I projects in a company. <https://doctoratsindustrials.gencat.cat/en/els-doctorats-industrials/que-es-un-di/>

² RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 on key competences for lifelong learning (2006/962/EC) <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>

³ COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01): [32018H0604\(01\) - EN - EUR-Lex](https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2018:189:0001:0001:en:PDF)

The assessment of learning through competences is one of the great challenges of education. This requires the gathering of evidence of such learning, and in the case of transversal competences, it is not possible to do so with a simple exam, but it also requires other instruments and methodologies that allow the tracking and support of the student's learning process (Gipps, 1994; Mislevy, 1994) and (Rosales López, C., 2010), becoming a more reflexive process at the same time (Monereo, C., & Pozo, J. I. , 2007).

In this context of competence assessment, the fact of having a reference framework where the entrepreneurship competence is defined, makes it possible to create its own model for its assessment. This framework is EntreComp (Bacigalupo et al., 2016), where such competence is defined as the ability to convert ideas into actions that generate value for someone other than oneself. EntreComp (Bacigalupo et al., 2016) was born with the aim of giving European citizens, whether individuals, teams or organisations, the knowledge, skills, and attitudes to face the fast-paced social changes in all areas of life. The framework is divided into three areas (in this research we will call them dimensions to be able to match the Spanish and Catalan regulations), 15 sub-competences, 15 descriptors and 442 learning outcomes. All this unfolding facilitates the development of assessment and learning activities within a curricular framework that will give an answer to a specific assessment model of the entrepreneurship competence. And beyond assessing entrepreneurship competence, this research intends to show the interrelationship between entrepreneurship competence and sustainability, as already has been demonstrated by Berglund et al., 2014; Corney & Reid, 2007; Firth & Winter, 2007; Hassan et al., 2010; Zupan et al., 2018.

The assessment of this competence, as with the rest of the cross-curricular competencies, must be integrated into the curriculum by defining tasks (Domingo Segovia, J., & Barrero Fernández, B., 2010), (Torres, 2010, Alonso, J.R.V., 2010) and non-conventional activities (Marco Stiefel, 2008, pp. 52-52, J.R.V., 2010) such as project work, role-playing, solving real challenges, among other active methodologies. In order to design the appropriate assessment model, a pedagogical approach based on the pedagogy of integration (Roegiers, 2010) will allow us to incorporate the competence in a disciplinary or interdisciplinary way, and to promote, at the same time, an assessment of the process in more meaningful learning contexts (Guàrdia, L. et al., 2018) (Maina, M. et al, 2020)..

Research context

The model is implemented at Escola Pia de Mataró, where the researcher is working as a teacher. The school, which has about 2500 students and all educational levels, is part of a wider institution that includes 19 schools throughout Catalonia: Escola Pia de Catalunya. Since 2015-16, an innovative project called SUMMEM⁴ began to be implemented in all schools, where at least 50% of the learning time in the classroom had to be project work in an interdisciplinary approach and in teams using the concept of learning itineraries. The project is currently consolidated in all schools at the compulsory education level and is being piloted in post-compulsory education. It is in this project where it makes all the sense to evaluate, and thus, to collect evidence of learning for the entrepreneurship competence, but also for the rest of the transversal competences. The assessment model will be proposed in the context of the learning itineraries mentioned under the umbrella of project-based learning methodology.

The design of an assessment model for entrepreneurship competence proposed in this research is composed of different phases. The first one required the adaptation and validation of EntreComp (Bacigalupo et al., 2016) as a reference framework with entrepreneurship experts at Escola Pia de Catalunya. Then, and from the itineraries of the SUMMEM⁴ project that were carried out in the courses to pilot the model, the tasks and evidence that should show the learning outcomes of the itineraries were identified. Also, the EntreComp Performance Criteria (Bacigalupo et al., 2016) that would allow us to assess the entrepreneurial competence were identified. To disseminate this work, interviews were conducted with the pedagogical heads and coordinators of the educational levels of Primary and Secondary Education, and it was at this point when I was aware that the lack of knowledge of entrepreneurship competence among the teaching staff was important and if it had not been taken into account, the model that I wanted to implement with this research would fail or not been really successfully implemented at the end. The paradox is the meaning of the word entrepreneurship, since it is usually used for a start-up company or initiative, and therefore in the educational world, especially in the compulsory one, it is not well accepted. There are authors who have already sufficiently differentiated the concepts of business and entrepreneurship (Alemany & Urriolagoitia, 2014; Marina, 2009) where it is defined from the attitude: resilience to failure, communication,

⁴ SUMMEM: Projecte per la interdisciplinarietat a l'aula: <https://www.escolapia.cat/summeme/>

creativity, and therefore from a competence view. This conceptualization of entrepreneurship competence has been the first challenge to be solved before implementing the competence assessment model.

This conceptualization of competence was carried out with three groups involved:

- School management team: with whom a general workshop was held on the research to be carried out at the school.
- Teams of coordinators and tutors of the levels to be implemented: with whom a workshop was held in which these points were announced:
 - the doctoral thesis project
 - the concept of entrepreneurship competence (EntreComp)
 - the concept of sustainability
 - the relation of the SUMMEM⁴ project itineraries with these two concepts (the need to expand the view of the usual classroom activities).
 - the process for collecting information from the students, in order to know the starting point on competence
 - the use of the information from the questionnaire as another instrument for the evaluation of the autonomy, personal initiative and entrepreneurship competence of these students.
- Students: for them a questionnaire was designed, based on the study conducted in the Community of Extremadura (Sánchez-Hernández and Maldonado-Briegas, 2019) where the objective included the following :
 - to understand the meaning of entrepreneurial competence.
 - to know if, after working in an itinerary in which the entrepreneurial competence is implicitly being developed, their understanding had improved

Methodology

This research is carried out within an industrial doctorate program, so it is a research applied to the context of the Escola Pia de Mataró. The research is framed within an action-research model (Lewin, 1973; López Górriz, 1993)), where the researcher takes an active part in the process, integrating reflection and intellectual work in the analysis of the experiences that are carried out, as an essential element of what constitutes the educational activity itself.

The objective of the research is to answer the following questions:

1. What are the direct relationships, in terms of learning outcomes established, between the EntreComp framework (Bacigalupo et al., 2016) and sustainability?
2. What characteristics of the proposed entrepreneurship competence assessment model will cause teachers to take it and see it as an opportunity to improve the teaching-learning process?
3. What learning methodologies will facilitate the generation of evidence showing the development of entrepreneurship competence?
4. What methodological and student performance changes have been produced in the educational practices of teachers who have implemented the model?
5. What is the perception of the actors involved in relation to the implementation of the assessment model of entrepreneurship competence, and specially in relation to the improvement of the promotion of sustainability in students? In relation to the ease of adoption and implementation by teachers, of learning support by students and by the institution?

Application of the model at Escola Pia de Mataró is established for the courses listed in the following table 1:

Course	Students	Teachers
5º Primaria	100	8
6º Primaria	100	7
1º ESO	150	5

2º ESO	150	5
GM1	34	9
TOTALS	534	34

Table 1: Group sample Escola Pia de Mataró (Own elaboration)

As the research is still in progress, at the moment, this publication will only report on the research carried out in primary school, developed with a quasi-experimental methodology with a pre-post design for the students and a qualitative analysis of the workshops with the teachers.

The first data collection was carried out in the third term of the 20-21 academic year, in the midst of the Covid-19 pandemic, using the survey form based on the Extremadura Regional Government's study (Sánchez-Hernández & Maldonado-Briegas, 2019). Two rounds were passed, a first one at the beginning of the SUMMEM project itinerary and the second one at the end of the same. It was carried out with the CoRubrics tool⁵, since it allows self-evaluation and co-evaluation by students, as well as sending students the results and feedback, either the one they have done themselves or the one from the other evaluators. The survey is a Likert scale 4 options questionnaire, as this is the usual way of assessment in Compulsory Education.

This form was validated by the coordinators of the upper primary cycle, and also teachers in the workshop were able to make contributions. The form was divided into 3 subforms, one for each of the areas or dimensions of EntreComp (Bacigalupo et al., 2016) and the software to perform the analysis has been SPSS

1. Dimension 1 [Ideas and Opportunities](#) (with 7 items).
2. Dimension 2 [Resources](#) (with 10 items)
3. Dimension 3 [Into Action](#) (with 9 items)

Table 2 quantifies the evaluators (self- and co-) for each dimension and each round:

COURSE	Dimension 1		Dimension 2		Dimension 3	
	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
5è primària	397	451	396	336	382	352
6è primària	385	251	397	251	385	244
Totals	782	702	793	587	767	596

Table 2: Self and co-evaluators of the students' participation (Own elaboration).

Different numbers of evaluators can be observed. There were basically two reasons for it:

1. The school is a dynamic system and, therefore, the data collection was carried out at different times when possibly not all students were always in a class (due to illness, especially because of the Covid 19 pandemic, absenteeism, medical visits, or other reasons).
2. Not all teachers collected the co-assessment, some because they did not know they had to do it or because they did not sufficiently use CoRubrics.

Analysis of results

In this section, we will analyse both the results of the qualitative analysis of the teachers' workshop and the quantitative analysis of the students' forms.

⁵ *CoRubrics*, an add-on for Google Sheets, helps teachers in the assessment process. It is used to assess students (or groups of students) with a rubric designed by the teacher and also allows students to assess other students (coevaluation). <https://www.corubrics.org/> Author: Jaume Feliu, ITC teacher

Analysing the first results obtained from the forms submitted to the students in November 2021, in order to see how the variables behaved, statistical analysis was carried out. According to the Kolmogorov-Smirnov Test, it was observed that they did not fit a normality pattern, so non-parametric tests were used.

Results can be observed in Table 3 and Figure 1, in terms of the mean of averages as a measure to explain the variations of each dimension in each round for the analysed students:

		N	Mean of averages
Round 1	Dimension 1 (mean of averages)	211	2,8711
	Dimension 2 (mean of averages)	211	3,0036
	Dimension 3 (mean of averages)	211	2,9872
Ronda 2	Dimension 1 (mean of averages)	200	2,9621
	Dimension 2 (mean of averages)	200	3,0465
	Dimension 3 (mean of averages)	200	3,0786

Table 3: Mean of averages of dimensions and rounds (Own elaboration)

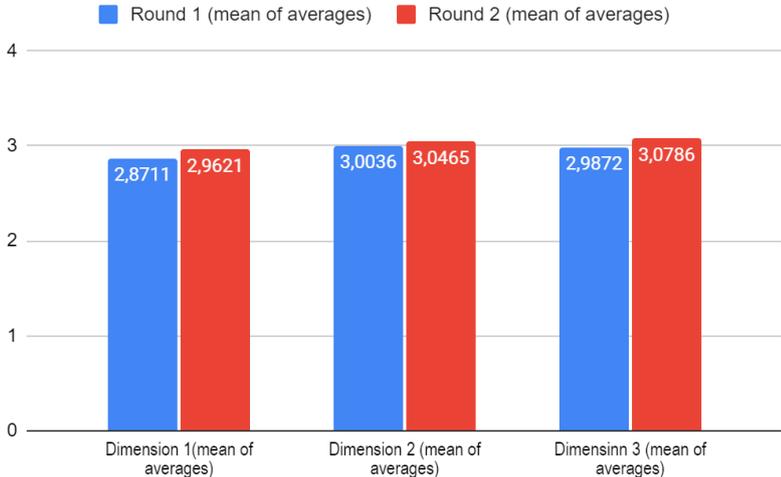


Figure 1:Mean of averages of dimensions and rounds (Own elaboration)

After the first round, dimension 2 was the highest scoring one, followed by dimension 3 and dimension 1. On the second round, dimension 3 was the highest scoring dimension, followed by dimension 2 and finally dimension 1. Although the differences in terms of the mean of average scores are small, the Friedman test of difference of variables was performed to examine if the differences are significant and the result was that they are significant, which means that the different scores of the students are significantly different.

If we compare the results of round 1 with those in round 2, we see that they have increased between rounds. We have performed a Wilcoxon test to see if these differences are significant and the result is also positive. In other words, the difference is significant, that is, it has not happened by chance, but there is a causal effect between the beginning of the itinerary and the end of the itinerary. The fact of knowing the assessment criteria makes the students aware of what they should focus on, so that in the second round, they can be more precise when filling in the survey and, therefore, understand what the entrepreneurship competence is. Another result is the positive value of this knowledge in terms of their perception of improvement.

It was not possible to carry out this statistical analysis until November 2021, however, in June 2021 a report on the individual results of the class was sent to each tutor in order to be able to use it if necessary at the time of the final assessment of the student in relation to the competence of autonomy, personal initiative and entrepreneurship.

Regarding the qualitative analysis of the workshops performed with the teachers, the following results emerged through observation:

- The words assessment evidence were very often repeated, indicating the need to find them in order to assess a competence such as the entrepreneurship one.
- When showing the relationships between the tasks of the itineraries and EntreComp (Bacigalupo et al., 2016) and therefore the evaluation evidence, the word confidence appeared, since they were made participants that were already aligned with the entrepreneurship competence.
- They were surprised to know about EntreComp (Bacigalupo et al., 2016) and the concept of entrepreneurship competence, as it was not a concept that was within their mindset.
- The introduction of co-evaluation and student self-evaluation represented a relief for the teachers' work (the third term is very stressful for them, and introducing another element in which they had to be in charge did not seem like a good idea).
- Most of them found the use of CoRubrics very interesting for their teaching practice.
- When showing the student survey, there were some remarks on some items regarding ambiguity, however they were committed to help students' understanding.

Conclusions

To conclude on this first part of the research that is still in process, some contributions resulting from the analysis of the form data and also from the teachers' comments in the workshop can already be described. These first conclusions are particularly relevant to anchor the research on how the model of entrepreneurship competence assessment should be implemented. Let us see, then, what these conclusions are in relation to some research questions:

Regarding question 2, we highlight four aspects:

1. The need to show what is the concept of entrepreneurship competence in the context of the research in order to avoid generating doubts in this regard for both teachers and students.
2. It is important to use tasks that are currently being developed in the classroom, especially in the learning itineraries of the SUMMEM project or another project-based learning approach, but changing the focus from the entrepreneurship competence in order to observe, obtain evidence and, finally, assess it.
3. Distributing the assessment among the different agents, especially students, reduces the pressure on teachers to assess cross-curricular competence.
4. Emphasizing that it is essential for teachers to have acquired the digital competence, as the lack of knowledge of CoRubrics made it difficult to follow up on it.

Regarding question 3, we highlight one aspect:

1. Active learning methodologies generate the evidence to be able to develop cross-curricular competencies. Showing teachers the interaction between learning itineraries and EntreComp (Bacigalupo et al., 2016) generates confidence in assessing competence.

Regarding question 4, we highlight two aspects:

5. Knowing the criteria has made self-assessment and co-assessment improve the knowledge of the entrepreneurship competency, both for students and teachers, and also the improvement of the development of the competency itself.
6. Empowering students in their evaluation generates a better knowledge of what is being evaluated and therefore an improvement of this observation.

A better understanding of the context of this research has allowed me to design the necessary assessment model of entrepreneurship competence for the primary education level, which will be applied during the 2022-23 school year, as well as the design of a quality survey questionnaire for this model. This survey, adapted and validated, is based on the one that had already been implemented in the CRISS⁶ project in relation to a similar research scenario

⁶ CRISS Project: Demonstration of a scalable and cost-effective cloud-based digital learning infrastructure through the Certification of digital competences in primary and secondary schools (<https://www.crissh2020.eu/>)

in which the assessment model was applied on digital competence (Balaban, I., 2020), and will be the instrument that will allow me to know if the assessment model proposed in this research is adequate for the development of entrepreneurship competence and transferable to the rest of the educational community.

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