
# Emerging digital technologies for supporting sustainable models of DT in education

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Exten DT²

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ETL Educational Technology Lab NKUA

# Using Emerging Digital Technologies for DT

Combine

**Emerging Technologies** with

already *institutionalized* and *pedagogically grounded*

**web-based digital expressive media**

Didactical integration
in DT activities

Increase the *scope*, educational *potential* and *sustainability*

of **Design Thinking** in mainstream schooling

# Emerging Technologies (ET)

**New** and **innovative** technologies that are currently in the process of **development**, **testing**, and **implementation**

- Artificial Intelligence - Learning Analytics
- Augmented Reality
- 3D printing & 3D scanning
- Virtual Robotics

# Questions to be answered

Can Emerging Digital Technologies support sustainable DT activities in **physical**, **virtual** and **mixed learning** contexts ?

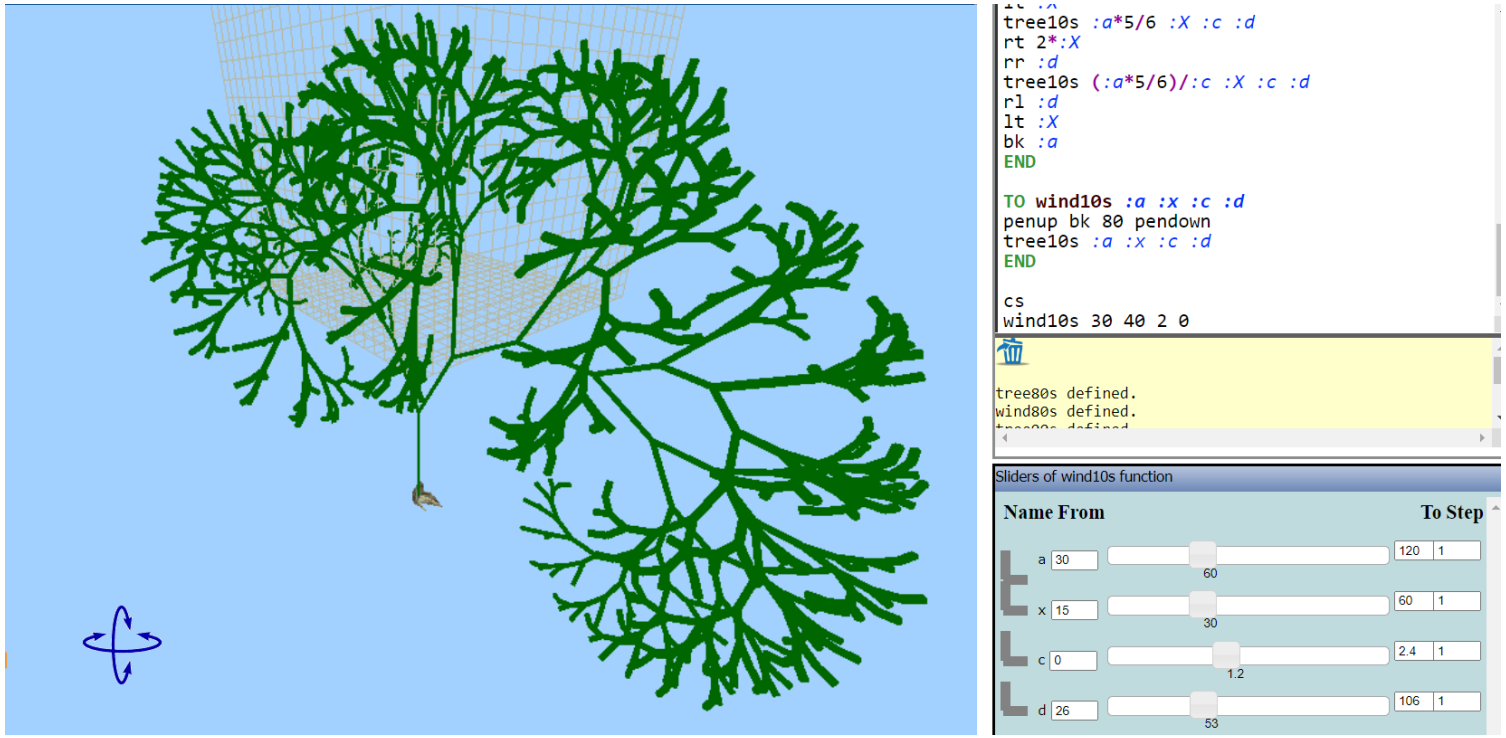
What are the **barriers**, **opportunities** and **enablers** of the Emerging Technologies for supporting sustainable teaching & learning of DT?

Which **lifelong skills** students develop when they are engaged in Digital DT activities with emerging technologies?

What **ethical aspects** are involved in the design and use of LA and analytics dashboards for open-ended, creative activities?

# 3D printing of Graphical Models

**MaLT2**: create and share animated **3D figural models** with **text-based programming** and **dynamic manipulation**




Extend with

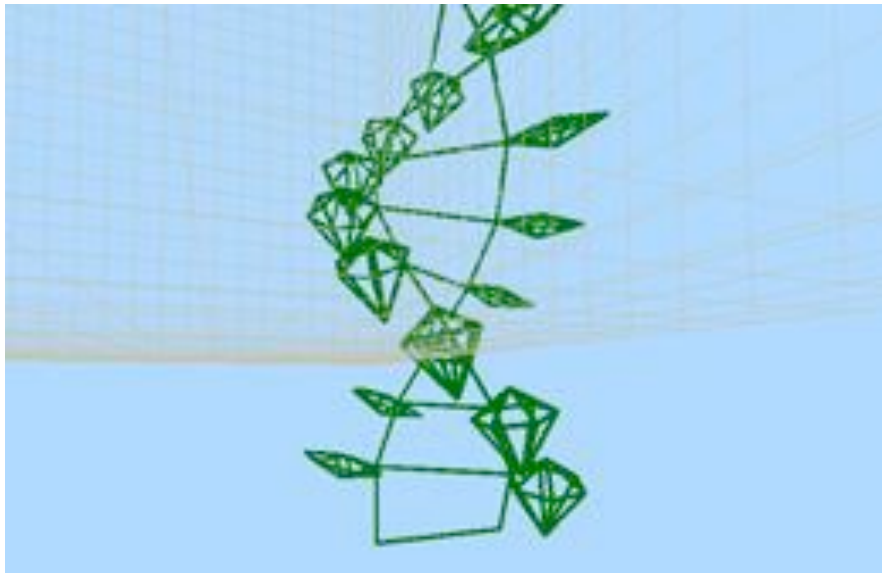
**3D printing**

- Connect **digital** with **physical** artifacts → enhance creativity
- **Tangible** and **meaningful** creations
- **Programming** and **STEAM**
- **Multidisciplinary** issues

**http://etl.ppp.uoa.gr/malt2**

# The Biodegradable Jewelry example

A Design Thinking School Project
with MaLT2 and 3D printing



| | |
|---|---|
| **Participants** | 15-16 yrs old students |
| **Topic** | Material sustainability & recycling |
| **Final product** | The digital 3D jewel model & printed jewel |
| **Target audience** | Teens & young adults who wear jewels |

# Augmented Reality Games

**ChoiCo**: Design and play choice-driven **simulation games** about **socio-scientific issues** and **wicked problems**


http://etl.ppp.uoa.gr/choico

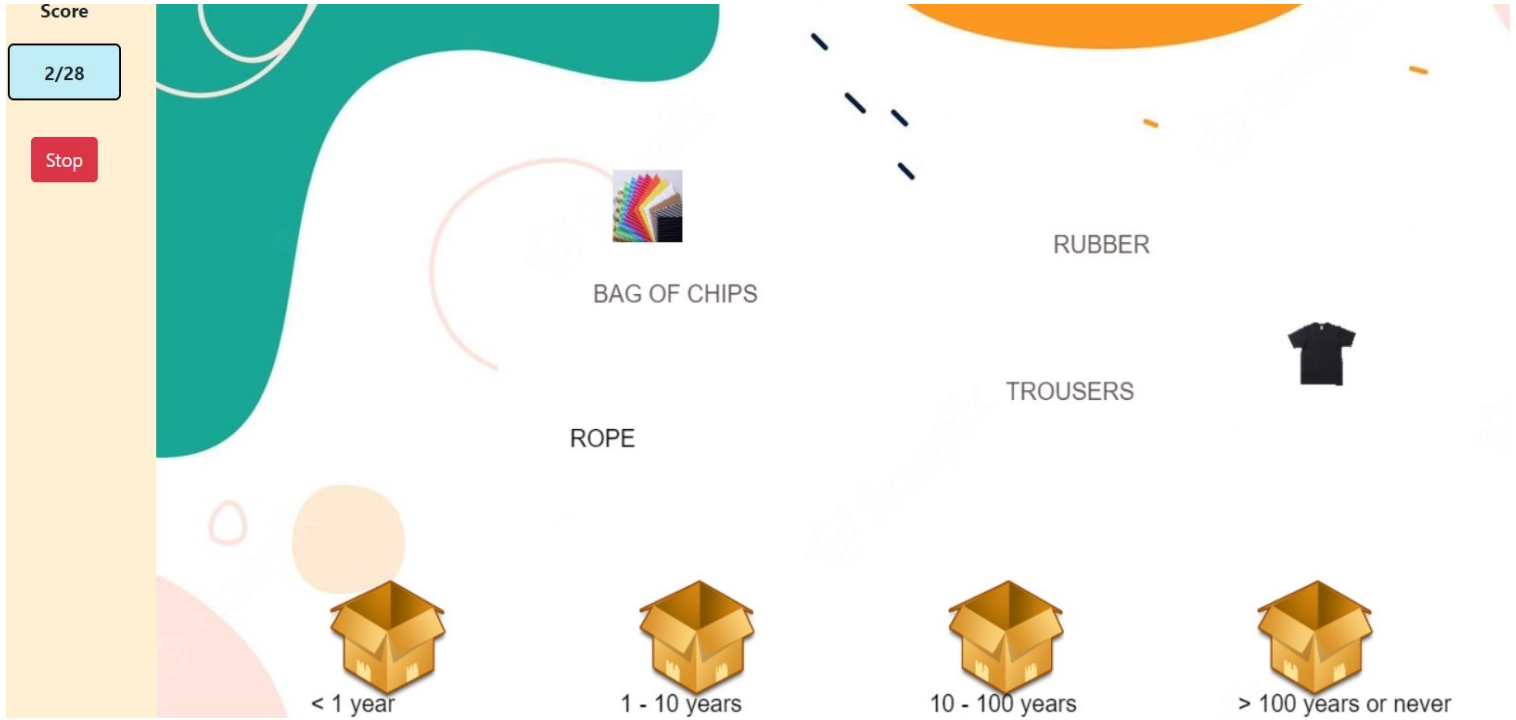
Extend with

**Geolocation & Geocoding**

- Embed **GIS design**, **programming** and **real-time data** (traffic, temperature) in game design activities
- Deal with **current**, **real-life situations** → Increase **empathy** and **immersion**
- Tackle **local** or **global** issues

# Augmented Reality Games

**SorBET**: Design, modify and play Tetris-like classification games




Extend with

**Gesture & Body Recognition**

- **Embodied Learning**
- **Collaboration** & communication
- **Critical Thinking** & **Quick Decision** making
- **Digital** & **Physical** activity

**http://etl.ppp.uoa.gr/sorbet**

# AI in the form Learning Analytics

## Learning Analytics

the **measurement**, **collection**, **analysis** and **reporting** of data about learner

for purposes of understanding and optimizing learning and the environments in which it occurs

# Learning Analytics for DT

So far:

- Mainly used in closed activities
- Lack of LA for **open-ended** and **creative** activities

LA could help educators:

- Develop a better understanding of the **learning process** that takes place is such activities
- **Monitor** the different groups in both physical and distant learning
- Provide personalized **support** and **feedback** to students, event from a distance
- Support individual and group level **assessment**
- Provide valuable data to researchers and teachers for **reflection**

# Learning Analytics in ExtenDT2

- Extend the learning tools to capture and export user interaction data (*e.g. add a new point to the map or use a slider to modify a 3D model*)
- **Authorable Learning Analytics** (ALA) system to provide feedback to students while working with the ET for their DT project
- **Customizable Dashboard** → Visualize the collected data for researchers and teachers

# Future Steps

- Co-design DT activities with teachers and researchers with a focus on the Digital Technologies
- Pilot cycle of School Interventions (Year 1)
  - ~100 students in 5 EU countries
  - Students will work on DT projects with Digital Technologies
  - Qualitative data collection and analysis of learning process
- Extension of DT with ET → Main cycle of interventions (Year 2 & 3)
- Framework of ET for DT

# Conclusions & Thoughts

- Always accessible **web-based technologies** → support DT in different settings
- 3 **authoring systems** → continuous experimentation, design and testing of ideas, without any physical restrictions
- **AR & 3D printing** technologies → from subject-specific to transdisciplinary activities on real challenges and wicked problems
- **Learning Analytics** → Monitor student progress in real-time & provide feedback
- **Teacher Dashboard** → Reflect on and analyze the learning process

# Thank you for your attention!

ExtenDT2 project

https://extendt2.eu/

Educational Technology Lab

http://en.etl.eds.uoa.gr/

http://etl.ppp.uoa.gr/malt2

http://etl.ppp.uoa.gr/choico

http://etl.ppp.uoa.gr/sorbet