

Extending Design Thinking with Emerging Digital Technologies

Newsletter

October, 2025

The Exten.(D.T.)² project concludes after 3 years of work

After a three-year journey, the Extent2 project has successfully developed innovative interactive technologies and pedagogical approaches for digitising design thinking and delivering it in K-12, bringing positive impact on students' development of 21st century skills. The consortium, led by the Linnaeus University concluded its work with two policy events (see below) translating research findings to tangible policy recommendations for innovating teaching and learning in K-12. The project's impact is evidenced in the number of stakeholders reached and the outcomes produced as follows:

- 👤 2136 Students took part in teaching activities
- 🏫 64 Schools joined the project
- 👩 104 Teachers from 61 schools delivered the Exten.(D.T.)² intervention to their students
- 📄 5 Journal publications
- 🗣️ 3 Symposiums
- 🎤 37 Conference presentations
- 📄 19 Conference papers
- 🔧 9 Workshops for teachers
- 💡 6 Innovative technologies extended to meet the needs of K-12 students
- 📋 1 Model and activity plan template for guiding DT teaching with ET
- 📄 1 Set of guidelines for planning DT lessons with digital technologies
- 👤 6 Master dissertations and 1 PhD thesis
- 📄 7 Newsletters
- 👤 1 Course on 'Teaching design thinking with digital technologies' on the OpenLearn Create Platform

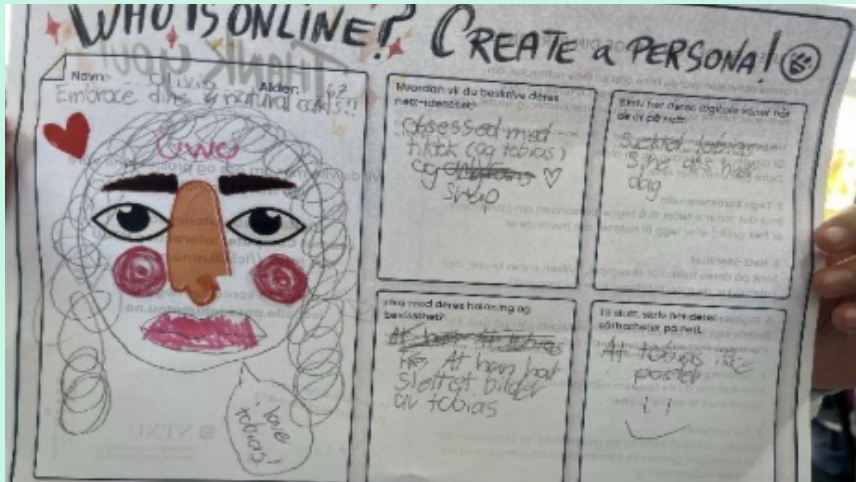
Horizon-Europe sister project policy event

A Cluster Policy event took place on the 29th September in Brussels and brought together representatives from five Horizon funded projects including academics, teachers and EC members. Over an intense full day, discussions featured a rich exchange of successful case studies about teaching and learning across research projects, critical engagement with best practices, and lessons learned from projects' implementation. The event was attended by 40+ people and a key message from it was the need to produce evidence-based policy recommendations through more and larger research cluster policy events. Feedback from the event informed iterations of the evidence-based policy brief of the Exten.(D.T.)² project.



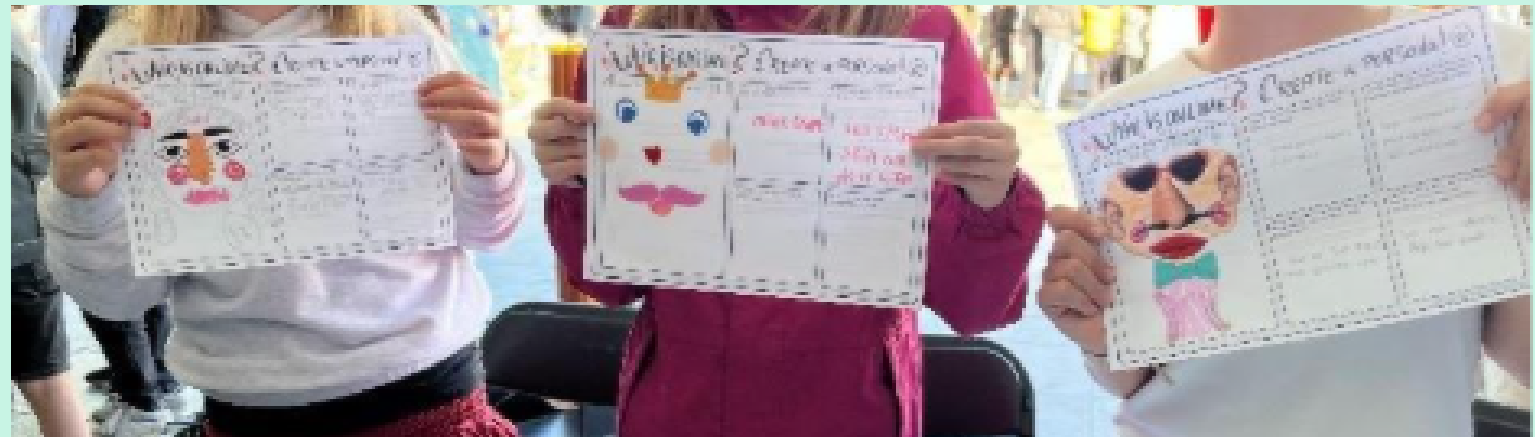
Participants in Horizon-Europe sister project policy event in Brussel

ExtenDT2 in the festival of innovations



In Norway, NTNU conducted a short, hands-on activity designed for both teachers and learners that applies design thinking to cybersecurity in Skaperfest (a festival about innovations, creativity and making, strongly connected with scientific education) on 29-30 August 2025. The activity template used in the session introduced cybersecurity and emerging technologies in a classroom-friendly way, demonstrating its feasibility for teaching and learning. A total of 25 students and teachers attended the session, while nearly 10,000 others were informed about the project's scope.

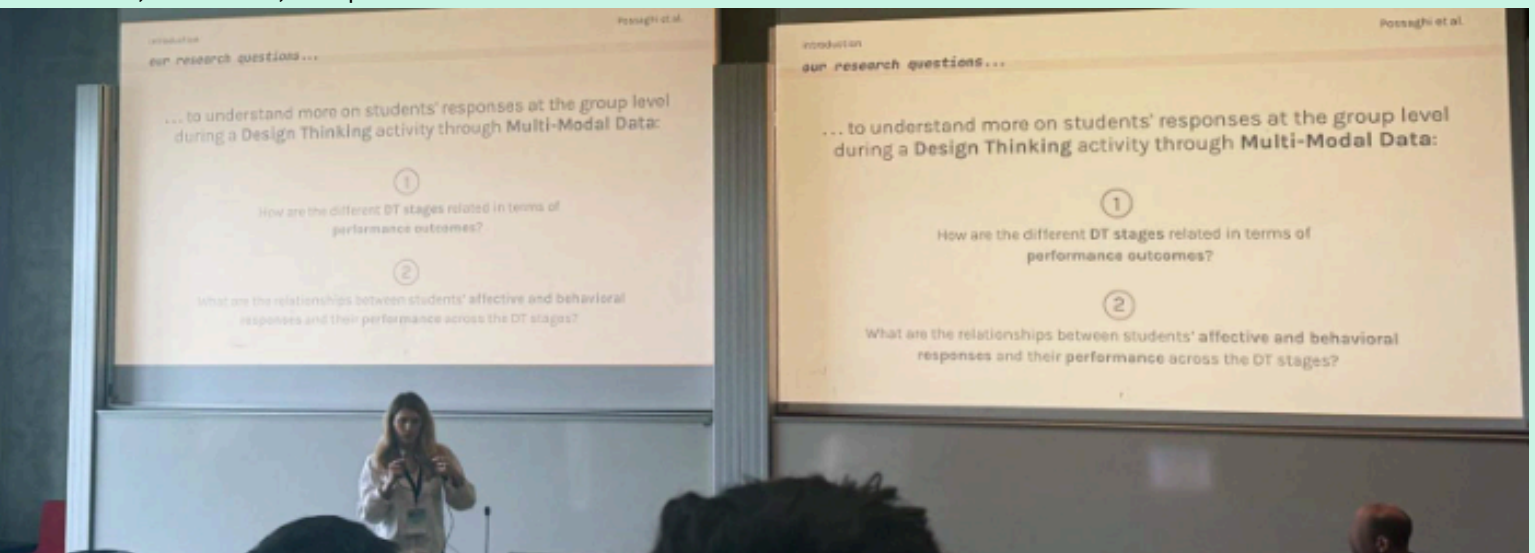
Activity template used in the session



Pictures drawn by students during the session

Conference presentations

NTNU presented their paper “Behind the Scenes: Unpacking Students’ Experience during a Collaborative AI Workshop using Multi-Modal Data” at IDC 2025 conference in Iceland (June 2025). The team presented their research aimed to better understand students’ responses at the group level during a DT activity on the topic of AI & Machine Learning, and with coding modules by analyzing Multi-Modal Data. They explored how the different DT stages are related as performance outcomes and how students’ affective and behavioral responses are connected to their performance across these stages. The exploration looked not only into the process flow of DT but also the interplay between emotions, behaviors, and performance within an authentic classroom context.



NTNU representative presenting at IDC 2025 conference

In September 2025, the **NKUA team** presented the paper “Playing, Moving and Designing with Data: Exploring Young Students’ Data Literacy Skills in Embodied Classification Games” at the 3rd International ACM CHIGreece Conference in Syros, Greece. The presentation, attended by around 50 participants, was well received by the Human–Computer Interaction community. The paper and presentation showcased the extended version of SorBET, an educational digital tool whose new multimodal affordances: gesture- and voice-based interaction, were developed within the Exten(D.T.)² project. The conference also provided an excellent opportunity for the team to connect, engage, and exchange ideas with researchers and practitioners working at the intersection of HCI, learning design, and educational innovation.

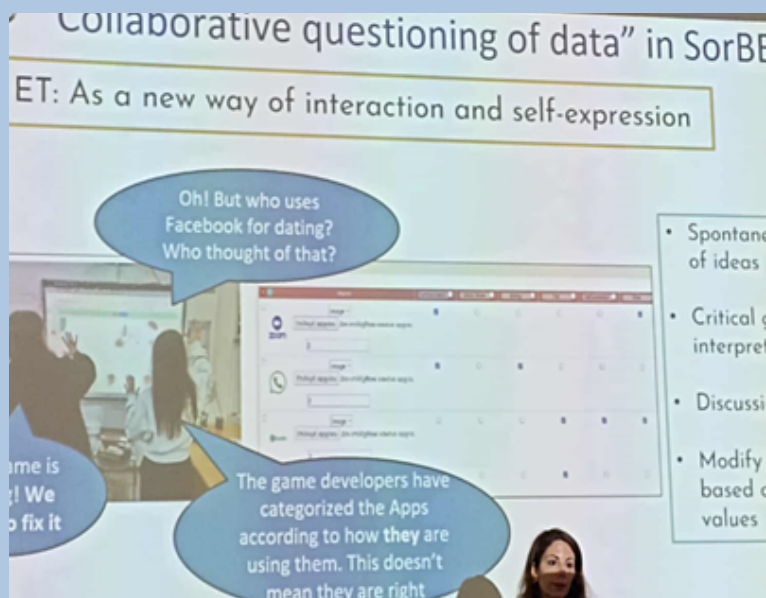


NKUA representative presenting at conference

Additionally, the Educational Technology Lab from NKUA participated in the Constructionism 2025 Conference held in Zurich (June 24–27, 2025), presenting three papers that reflected ongoing research within the Exten(D.T.)² project. Those included:

- *Constructionism Meets Design Thinking: Reflection-in-Action During Digital Game Design Reflective Practices During Design Thinking Projects*
- *Extending Constructionist Media With Emerging Digital Technologies for Critical Computational Thinking*
- *From Novice Players to Creative Designers: A Constructionist Attempt with SorBET: From Players to Designers with SorBET.*

Together, these works showcased how emerging technologies and design thinking methodologies can extend constructionist learning environments and advance new perspectives on critical computational thinking and creative student engagement.



Team representatives' photos from their presentations in the conference

Participation in EU policy event

Prof Marcelo Milrad and Prof Manolis Mavrikis participated in an EU organised policy event on the 13th of October 2025 in Brussels. The event was attended by around 40 people. Participating projects presented evidence-based policy insights e.g. results from studies in relation to interventions for SEN students. Amongst the points raised were the need for ongoing teacher training and the barrier to sustaining digital platforms beyond the funding period. Compared to other countries such as the US, in the UK funding typically ends with the project and there is no sustainability mechanism to ensure long-term impact in a sector that is considered 'public good'.



Participants in EU policy event

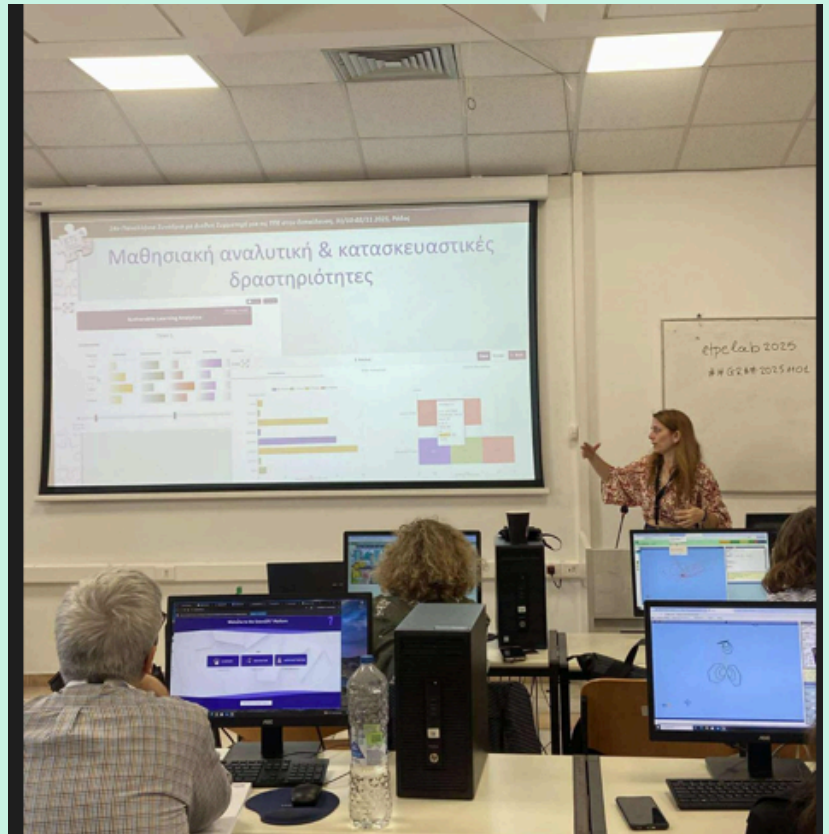
Workshops

NKUA ran a workshop with the aim of sharing research findings and bringing impact on research communities. The workshop on 'Building Computational Thinking Experiences With Digital Authoring Tools in Interdisciplinary Contexts (ChoiCo, MaLT2 & SorBET)' was run in Constructionism 2025 Conference in Zurich, on 24th of June 2025. The workshop was attended by 25 participants.



The NKUA team running a workshop at the Constructionism 2025 Conference in Zurich

The **NKUA** team conducted another workshop on ‘Emerging technologies and digital tools based on Constructivist Learning Theory’ at the 14th Panhellenic and International Conference ‘ICT in Education’ in Greece on 31st of October 2025. This workshop presented the extension of three open-source authoring educational tools (MaLT2, SorBET, and ChoiCo) through the integration of technologies such as gesture recognition, augmented reality, 3D printing, voice control, and geolocation. These extensions enhance embodied, collaborative, and experiential learning, expanding the capabilities of the tools and their pedagogical impact in the field of digital constructivism. During the workshop, participants were engaged in hands-on activities that involved creating and modifying embodied digital categorization games, geolocation activities, and digital models. They also explored pedagogical approaches that support collaborative learning, creativity, and the development of 21st-century skills. The aim of the workshop was not only to familiarize participants with the technological affordances of these tools but also to foster a shared reflective discussion on their teaching and research implications in education.



The NKUA team running a workshop at the 14th Panhellenic and International Conference

New publications

The Exten.(D.T.)² team has published a paper entitled ‘Integrating multi-modal learning analytics dashboard in K-12 education: insights for enhancing orchestration and teacher decision-making’ in the Journal ‘Smart Learning Environments’. The paper presents key findings from a study that engaged end users (e.g., educational researchers) with a Multi-modal Learning Analytics Dashboard (LAD) in the process of the tool’s design from the early stages and investigated the feasibility of the LAD when used in the wild. Multi-modal Learning Analytics Dashboards (LADs) are tools that facilitate smart classroom orchestration by aggregating and analyzing students’ responses through sensors, such as facial expressions and heart rate, for real-time insights into student engagement and emotional states. The results showed how affective data support greater awareness of students’ experiences, improving teachers’ orchestration through better decision-making and agency. Roadblocks were also identified regarding data interpretability, students’ privacy, and additional teacher workload, which can limit adoption and should be carefully addressed in future implementations. Further research should investigate students’ responses more closely and develop strategies for the responsible, explainable, and unbiased use of student affective data in real classrooms.

Upcoming publications

A paper entitled “Preparing future designers for their role in co-design: Student insights on learning co-design” has been accepted by Wiley. The paper is co-authored by Melis Örnekoğlu Selçuk (UGent), Marina Emmanouil (UGent), Deniz Hasirci (NKUA), Marianthi Grizioti (NKUA) and Lieva Van Langenhove (UGent). The project team is currently working on a paper ‘Developing students’ 21st century skills through design thinking and digital technologies.’ The paper aims to share key findings around the impacts of the project intervention (Design Thinking) on students’ 21 century skills development. Findings from pre-survey and post-survey, including qualitative responses, collected through focus group discussions will be used in this paper. Overall, the team is planning to produce four more journal papers based on learnings from the project intervention.