Electronic, didactic and innovative platform for learning based on multimedia assets

e-DIPLOMA

Funded by the European Union

D5.3 Roadmap and training for teachers
Version No. V1.3
16 October 2025

HISTORY OF CHANGES			
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V1.0	23.09.2025	UJI	▪ Initial version of Deliverable Owner
V1.1	28.09.2025 30.09.2025	BRA TLU	▪ Version including suggestions of WP Contributors
V1.2	16.10.2025	UJI TLU	▪ Pre-final version reviewed by Internal Reviewers
V1.3	16.10.2025	UJI	▪ Final version approved by Project Coordinator

(*) According to the section “Review and Submission of Deliverables” of the Project Handbook

1. Technical References

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2. Table of Contents

3. Introduction

3.1. Executive Summary

This document supports Deliverable 5.6, which corresponds to an open-access online course developed to help educators become familiar with key emerging technologies addressed in e-DIPLOMA. The course introduces Extended Reality (XR), Artificial Intelligence (AI), and gamification through clear explanations, visual resources, and interactive activities hosted on the e-DIPLOMA platform.

The training is structured into four sections that combine conceptual introductions with practical examples and multimedia resources, such as interactive tools, images, videos, and quizzes. Its design encourages exploration and self-paced learning, allowing teachers to gradually understand how these technologies can be applied in real educational contexts. Beyond basic technological knowledge, the course also promotes critical reflection on ethical and pedagogical aspects, helping teachers to consider both the opportunities and limitations of innovation in education.

By completing the course, teachers are expected to acquire a set of competences that enable them to identify and select appropriate XR tools for specific pedagogical purposes, use AI to support personalized learning and interpret educational data, and design gamified learning activities that foster student engagement. They also develop the ability to reflect critically on the ethical, pedagogical, and policy implications of technology adoption. In addition, the course includes a set of best practices for immersive learning derived from the project's piloting activities, providing teachers with concrete guidance to design and implement technology-enhanced lessons effectively and responsibly.

3.2. Relation to Other Project Documents

This document is related to Deliverable 3.1 *Guidelines and best practices extracted from piloting monitorization* of the project.

3.3. Abbreviation List

AI: Artificial Intelligence

iVR: Immersive Virtual Reality

XR: Extended Reality

3.4. Reference Documents

See Section *References* at the end of this document.

4. Objective and Rationale of the Course

The online course titled *Teaching with Emerging Technologies* has been designed to provide teachers with a clear and accessible introduction to three key technologies explored in the e-DIPLOMA project: XR, AI, and gamification.

Its main objective is to familiarise educators with these technologies through short, structured modules that combine conceptual explanations with interactive, practice-oriented activities. The course encourages teachers to experiment with the technologies while reflecting on their pedagogical relevance and ethical implications.

The necessity of this training is dictated by the urgent need to integrate emerging technologies to transform teaching and learning processes (Lucero Baldevenites, 2024; Cabrera Félix & Román Santana, 2025). This course is essential as many studies highlight the persistent challenge of a lack of specialized preparation (Carvajal Chávez, 2024; Paredes Rosado, 2025), which remains a major barrier to the effective adoption of technological innovation by educators (Paredes Rosado, 2025).

Specifically, XR technologies create immersive and interactive environments that strengthen teachers' pedagogical skills and make learning experience more authentic (Abramenka-Lachheb et al., 2024; Lucero Baldevenites, 2024; Paredes Rosado, 2025). AI supports personalized learning, adaptive feedback, and more efficient course management (Carvajal Chávez, 2024; Román Santana & Cabrera Félix, 2025), while gamification enhances motivation, active participation, and collaborative problem-solving (Villafuerte et al., 2023; Román Santana & Cabrera Félix, 2025).

Therefore, offering this introductory course is crucial to close the technological gap (Paredes Rosado, 2025) and ensure that teachers receive the necessary support and preparation to implement these tools successfully in their classrooms (Carvajal Chávez, 2024; Paredes Rosado, 2025), thereby meeting the complex demands of contemporary education (European Commission, 2025).

5. Course Description

The course is hosted on the e-DIPLOMA platform and is openly accessible to anyone through guest login at the following link: https://cg.iit.bme.hu:3004/course/view.php?id=17 .

It is structured into four thematic blocks, each combining different interactive components. The instructional design ensures that teachers are not only introduced to the basic concepts but also actively engage with digital activities, including quizzes, videos, immersive Virtual Reality (iVR) environments, interactive images, and AI-generated audiovisual resources.

An interactive image (see Image 1) introduces the overall structure of the course and provides a brief explanation of each section. This visual element serves as an orientation resource, offering teachers a clear overview of the course content, which has been designed as a learning path to help them become familiar with the use of new technologies in education.

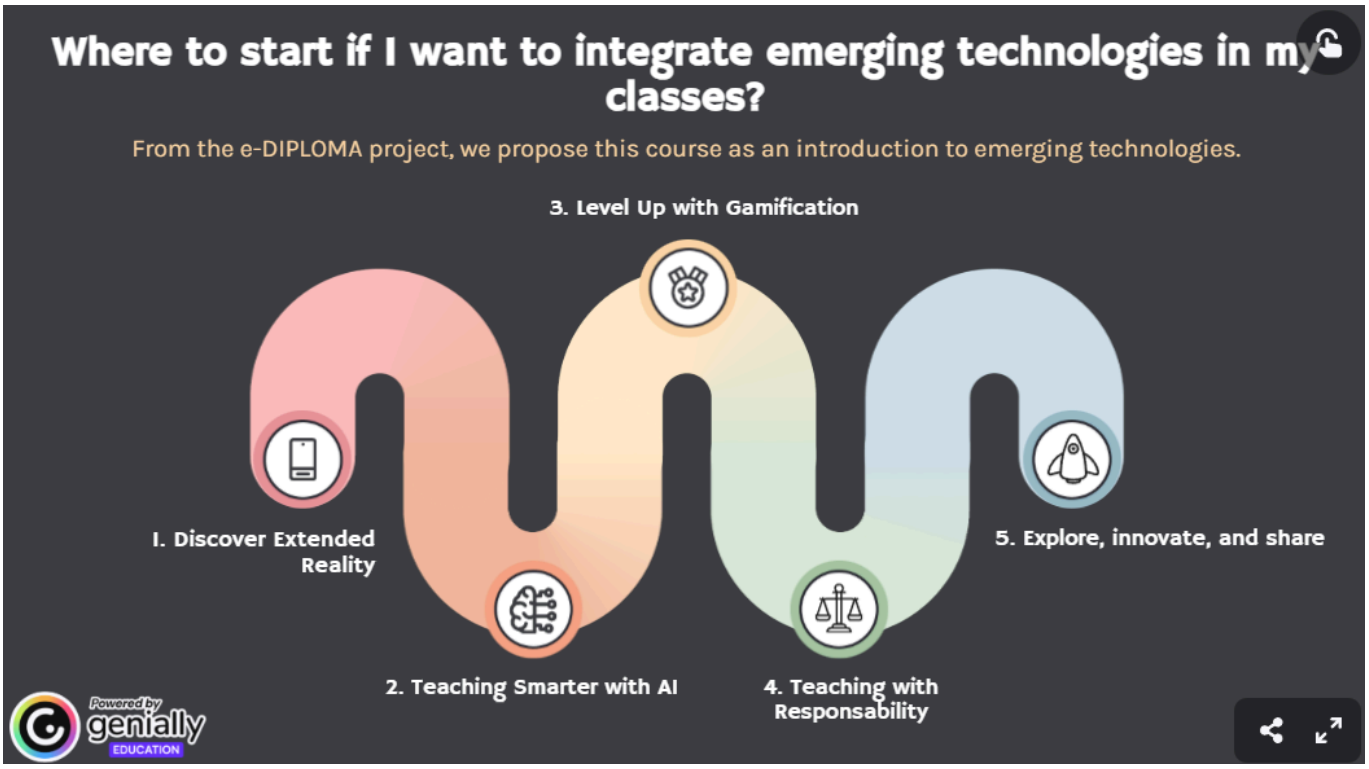

Image 1. Interactive roadmap presenting the overall structure of the course

5.1. Section 1 - Discover Extended Reality

The first section offers a conceptual and practical entry point into immersive technologies. It introduces the Reality-Virtuality Continuum (Milgram et al., 1995) through an interactive image (see Image 2), presents the main XR tools and devices (see Image 3), and illustrates real cases of XR in education via a video (see Image 4). In addition, it provides a guided tutorial for launching project-developed applications (see Image 5) and links to the e-DIPLOMA prototype 3 application: an interactive environment where teachers can experience fundamental aspects of VR, such as controllers, navigation, lighting, or physics. Please note that to run the e-DIPLOMA applications, users must be logged in. It is recommended to visit the guided tutorial before launching the application.

Upon completing this section, teachers acquire an overview of the broad spectrum of technologies encompassed within XR. They learn to differentiate between various XR modalities and to recognize the specific tools and devices associated with each. This knowledge enables them to make informed decisions about which technology is most appropriate for a given type of content or learning activity, considering both pedagogical objectives and technical feasibility. Furthermore, by experimenting with prototype 3, teachers acquire first-hand experiential competencies that reduce entry barriers and increase their confidence in exploring immersive technologies.

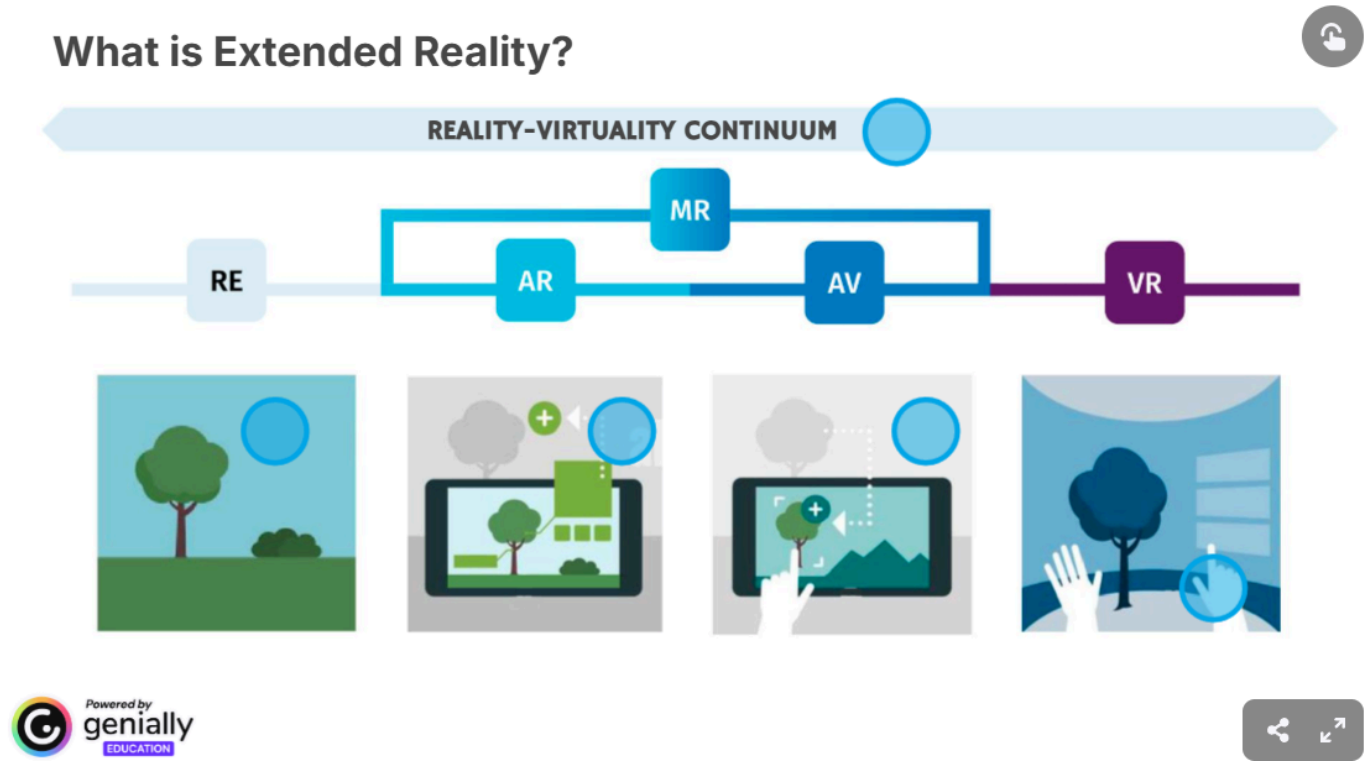

Image 2. Interactive image introducing Reality-Virtuality Continuum and key concepts of XR

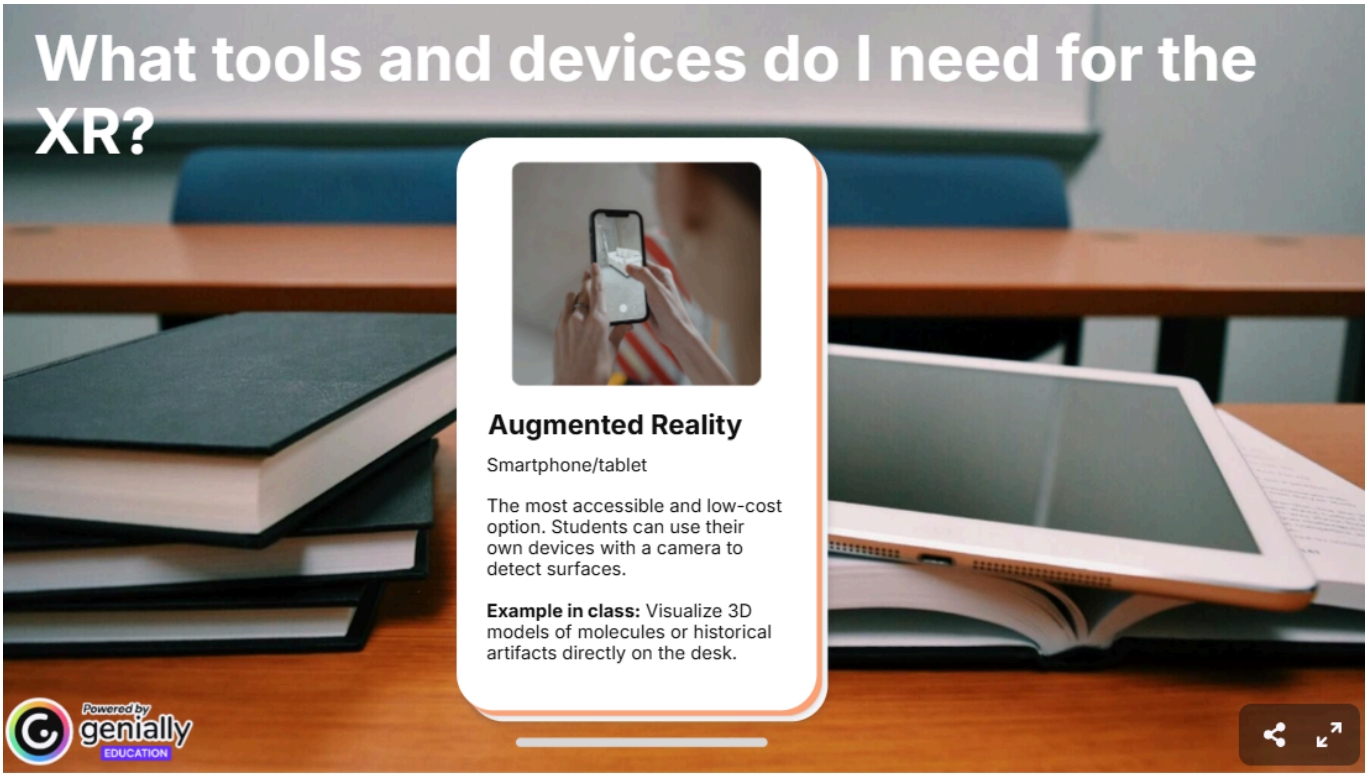

Image 3. Interactive image displaying the main XR tools and devices.

Image 4. Video presenting research examples of XR applications in education.

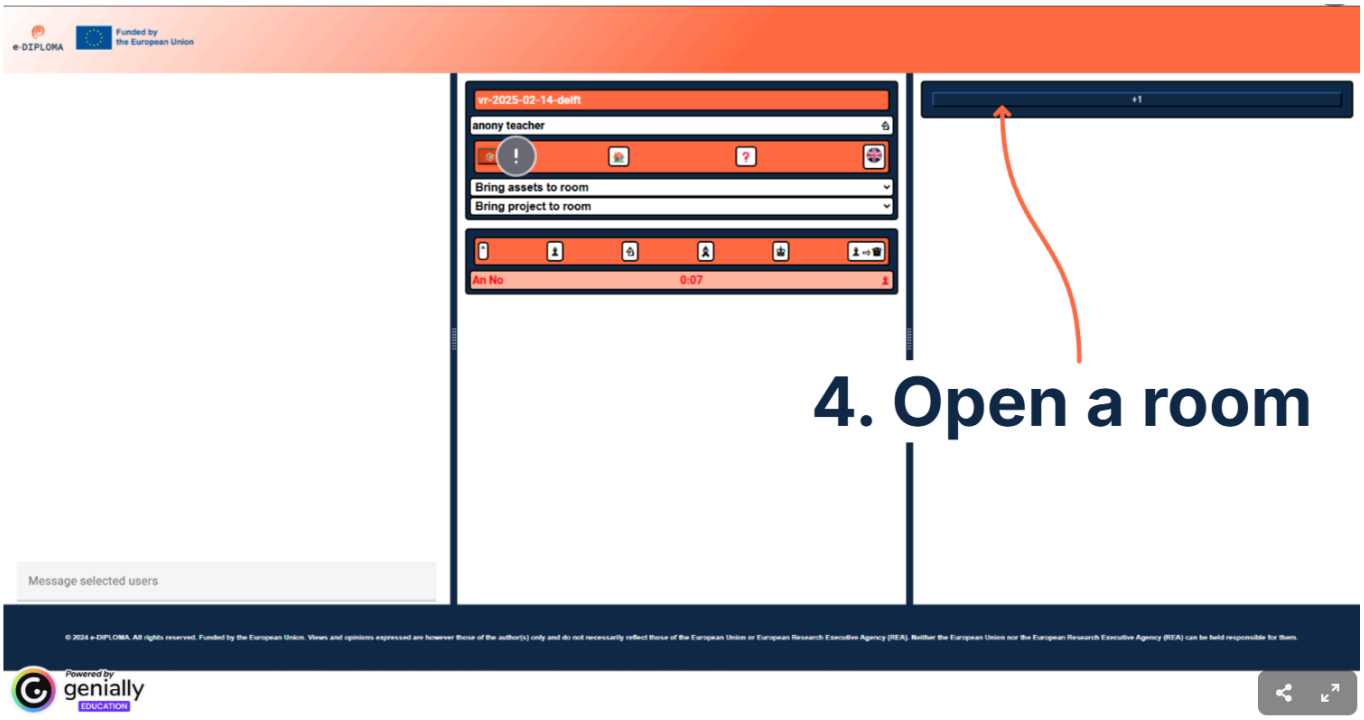

Image 5. Interactive slide guiding teachers through the launch of e-DIPLOMA applications.

5.2. Section 2 - Teaching Smarter with Artificial Intelligence

The second section begins with a short audio introduction to AI in education, followed by a video presentation that demonstrates how AI tools can be applied to identify learning difficulties and support personalized learning (see Image 6). This is complemented by an interactive page presenting a curated selection of AI analytics tools, organized by category and described in terms of their functions and

contexts of use (see Image 7). Teachers can personalize the resource by bookmarking preferred tools and exporting them for later consultation.

After completing this section, teachers enhance their understanding of AI as a pedagogical support mechanism that goes beyond content generation. They acquire the competence to use AI for early detection of learning difficulties, contingency planning, and individualized support. In addition, they strengthen their ability to critically interpret the outputs of AI-driven analytics, developing data literacy that enables more informed decision-making in the classroom.

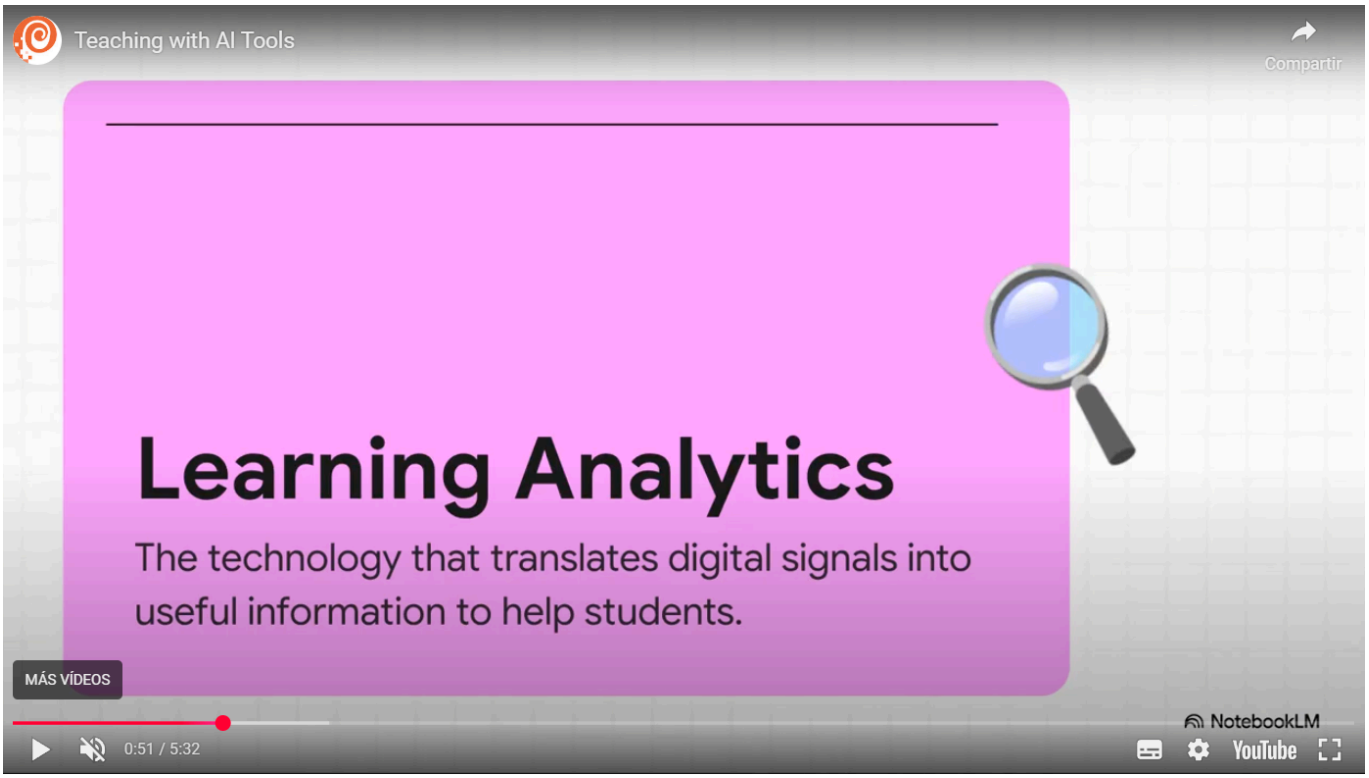

Image 6. Video presentation explaining the use of AI tools for early detection of learning difficulties and personalized support.

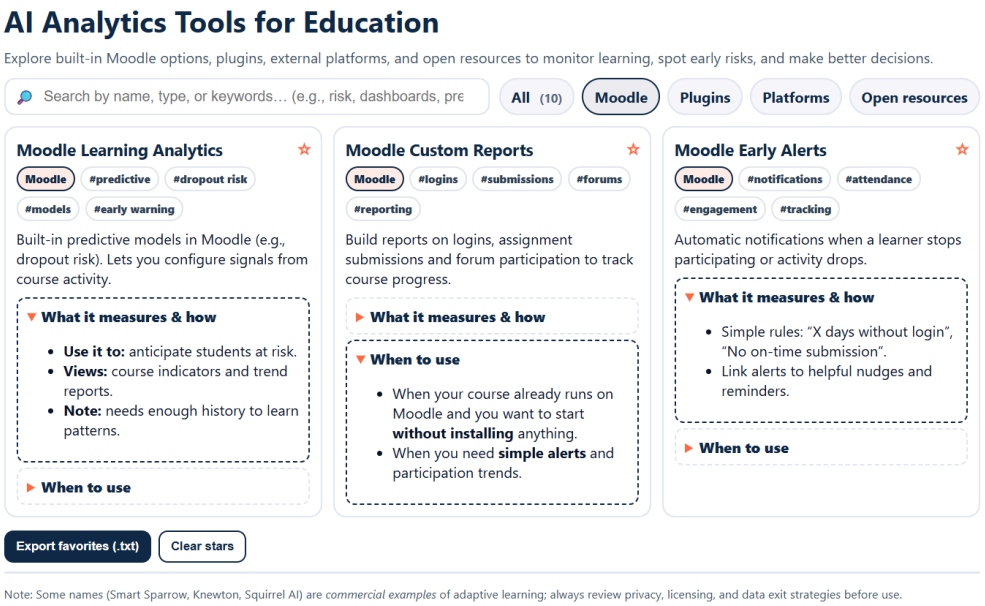

Image 7. Interactive HTML page showcasing categorized AI analytics tools for educational use.

5.3. Section 3 - Level Up with Gamification

This section adopts a more participatory approach, starting with a quiz designed to activate prior knowledge and spark curiosity about gamification (see Image 8), followed by an interactive tool based on the Octalysis Framework (Chou, 2019) (see Image 9). This tool enables teachers to analyze gamification strategies systematically, providing a basis for informed future application.

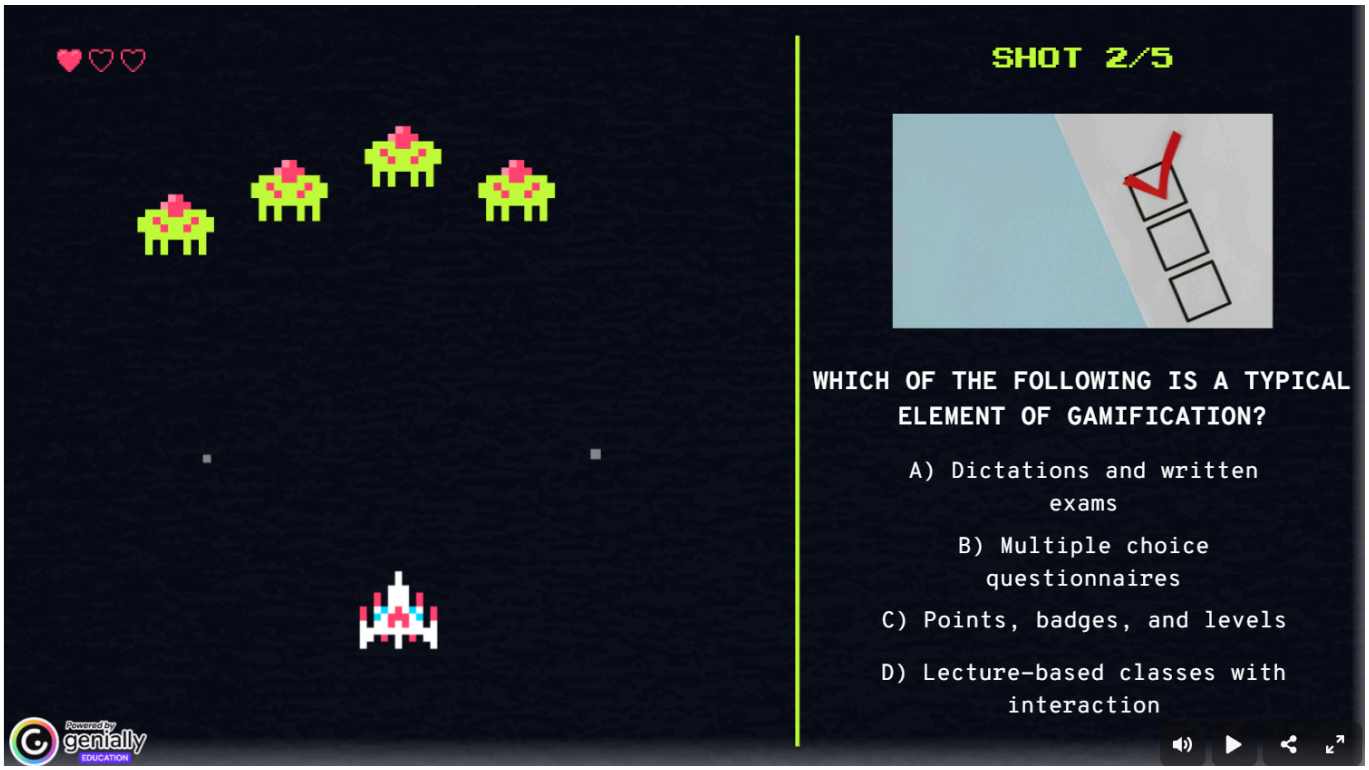

Image 8. Quiz activity designed to assess prior knowledge and introduce gamification concepts.

Through this section, teachers gain an advanced understanding of gamification that extends beyond simple mechanisms such as points, leaderboards, or progress bars. They acquire the competence to design and evaluate gamified systems using a structured framework, reinforcing both the pedagogical relevance and the human-centered design. These competences enable teachers to align gamification strategies with specific educational objectives and to adapt them to the needs of diverse learner profiles, thereby sustaining student motivation.

5.4. Section 4 - Teaching with Responsibility

The final section addresses the importance of situating technological adoption within broader pedagogical, ethical, and policy frameworks. It engages teachers in an interactive branching-scenario activity (see Image 10) where they are prompted to reflect on possible dilemmas and outcomes, encouraging a more comprehensive perspective on the consequences of educational innovation. Additionally, teachers can access an overview of best practices for immersive learning (see Image 11), summarised from the results and experiences gathered during the piloting sessions that applied this technology in practical learning contexts (Pata & Väljataga, 2025).

By completing this section, teachers develop competencies of critical reflection on the use of emerging technologies in education. They learn to evaluate the pedagogical, ethical, and policy implications of integrating XR, AI, and gamification into teaching. This includes the ability to anticipate dilemmas, weigh potential consequences, and make informed choices that balance innovation with responsibility. As a result, teachers cultivate a professional stance that emphasizes inclusiveness, equity, and sustainability

in the adoption of new technologies. In addition, they are provided with a set of best practices derived from the project's experimentation, offering them practical guidance to integrate these technologies more effectively into their classrooms.

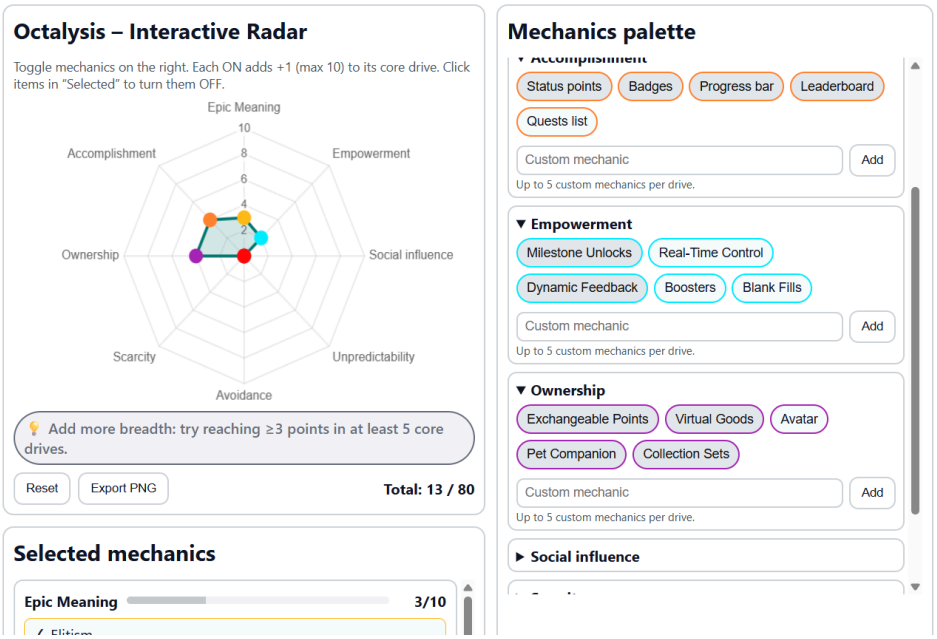

Image 9. Interactive tool based on the Octalysis Framework to analyze and design gamified systems.

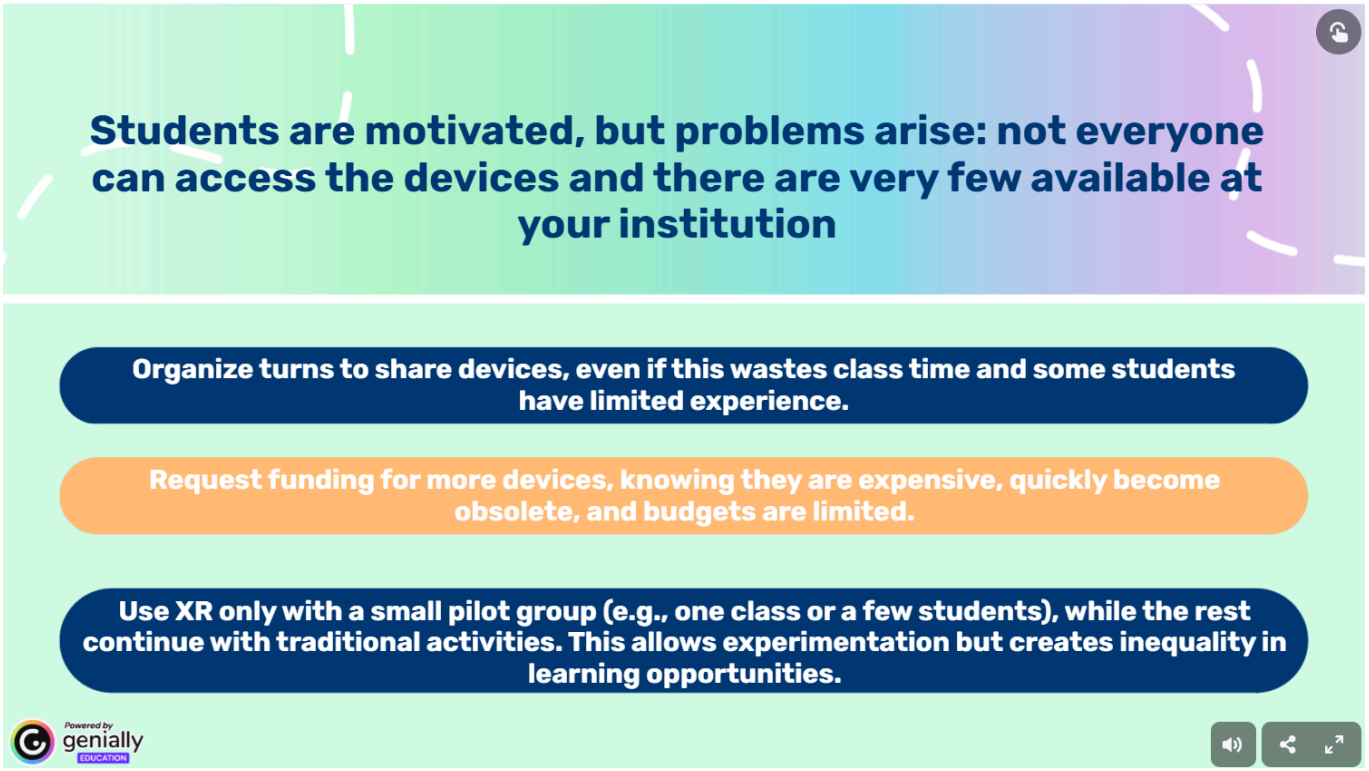

Image 10. Interactive branching-scenario activity exploring pedagogical, ethical, and policy dilemmas in technology adoption.

Image 11. Best practices for immersive learning.

6. Conclusion

This training course, developed within the e-DIPLOMA project, represents a concise and practice-based pathway to explore how emerging technologies can enhance teaching and learning. By combining theoretical input with interactive experiences, the course helps educators develop confidence and basic competences in the use of XR, AI, and gamification.

As a result, teachers completing the course acquire a set of competences that go beyond technical familiarity. They learn to evaluate which technologies are most appropriate for specific pedagogical objectives, to use AI as a tool for learner support and data-informed decision-making, to design gamification strategies grounded in research, and to anticipate the ethical and policy implications of technology adoption. Together, these competences constitute a solid foundation for the future integration of emerging technologies into online learning, reinforcing the course's role as a first step towards more innovative, inclusive, and sustainable teaching practices.

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