

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



e-DIPLOMA



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

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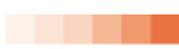
1. Technical References

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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.

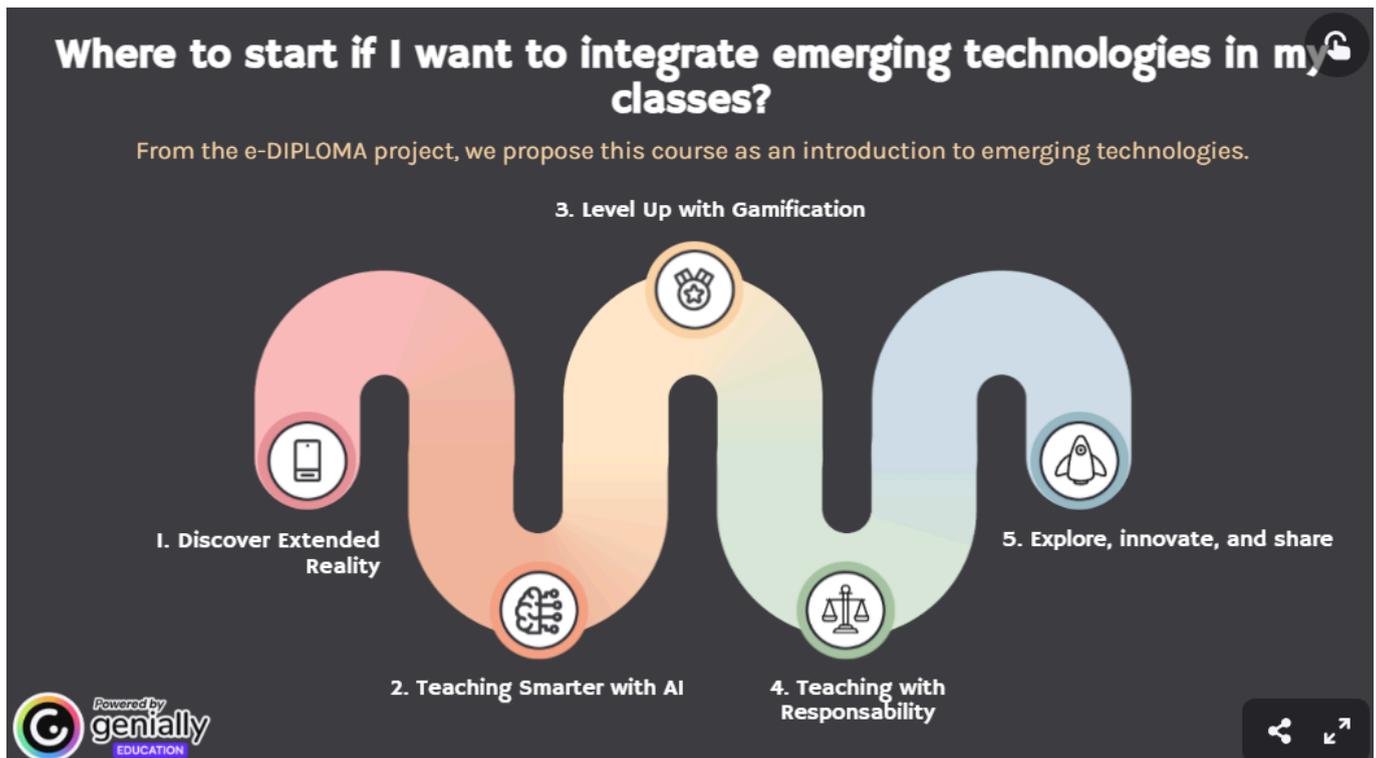


Image 1. Interactive roadmap presenting the overall structure of the course

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.

What is Extended Reality?

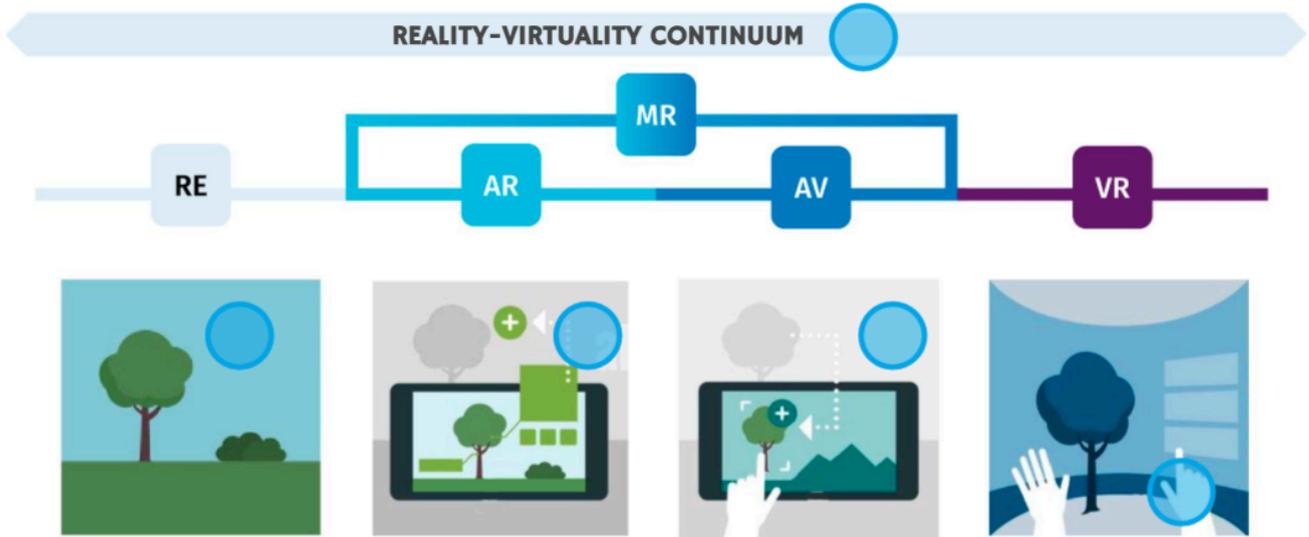


Image 2. Interactive image introducing Reality-Virtuality Continuum and key concepts of XR

What tools and devices do I need for the XR?



Augmented Reality

Smartphone/tablet

The most accessible and low-cost option. Students can use their own devices with a camera to detect surfaces.

Example in class: Visualize 3D models of molecules or historical artifacts directly on the desk.

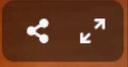


Image 3. Interactive image displaying the main XR tools and devices.





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

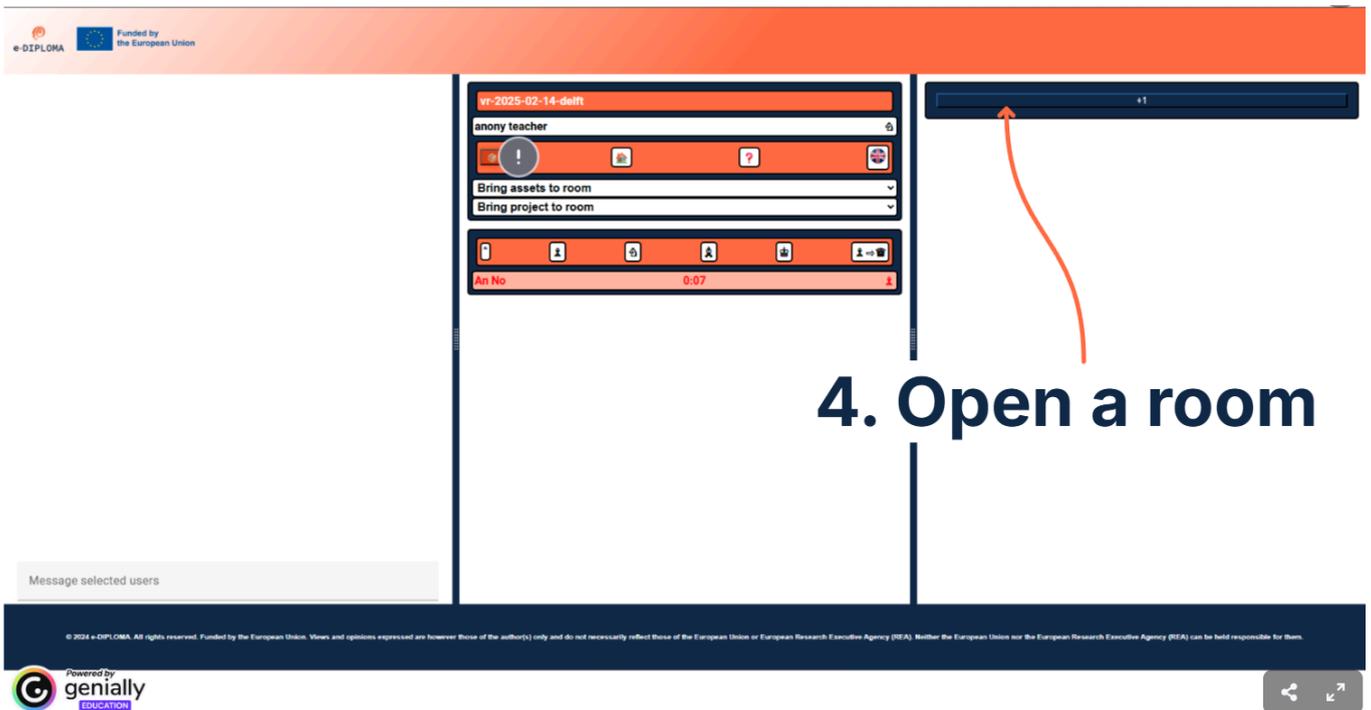


Image 5. Interactive slide guiding teachers through the launch of e-DIPLOMA applications.

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.

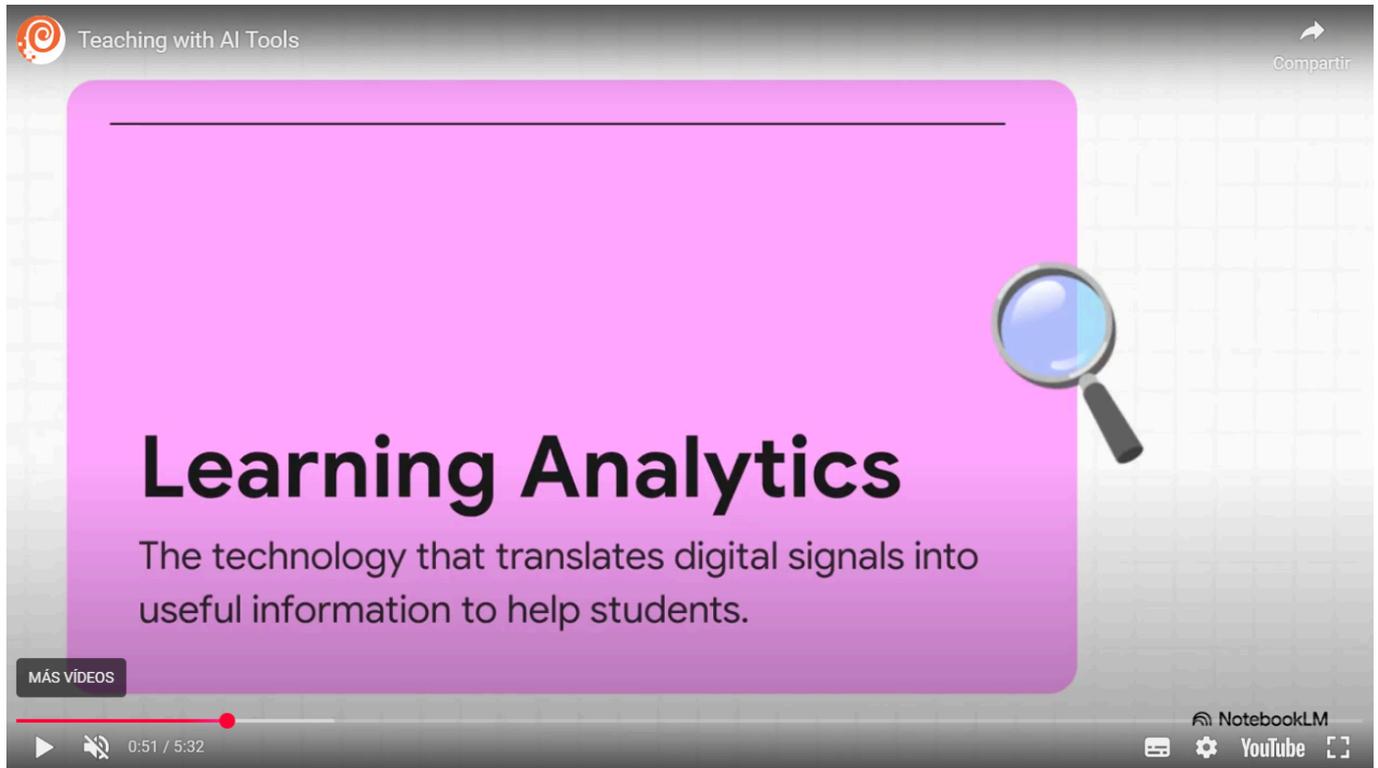


Image 6. Video presentation explaining the use of AI tools for early detection of learning difficulties and personalized support.

AI Analytics Tools for Education

Explore built-in Moodle options, plugins, external platforms, and open resources to monitor learning, spot early risks, and make better decisions.

Search by name, type, or keywords... (e.g., risk, dashboards, pre) **All (10)** **Moodle** Plugins Platforms Open resources

Moodle Learning Analytics

Moodle #predictive #dropout risk #models #early warning

Built-in predictive models in Moodle (e.g., dropout risk). Lets you configure signals from course activity.

What it measures & how

- Use it to:** anticipate students at risk.
- Views:** course indicators and trend reports.
- Note:** needs enough history to learn patterns.

When to use

Moodle Custom Reports

Moodle #logins #submissions #forums #reporting

Build reports on logins, assignment submissions and forum participation to track course progress.

What it measures & how

When to use

- When your course already runs on Moodle and you want to start **without installing** anything.
- When you need **simple alerts** and participation trends.

Moodle Early Alerts

Moodle #notifications #attendance #engagement #tracking

Automatic notifications when a learner stops participating or activity drops.

What it measures & how

- Simple rules: "X days without login", "No on-time submission".
- Link alerts to helpful nudges and reminders.

When to use

[Export favorites \(.txt\)](#) [Clear stars](#)

Note: Some names (Smart Sparrow, Knewton, Squirrel AI) are commercial examples of adaptive learning; always review privacy, licensing, and data exit strategies before use.

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.

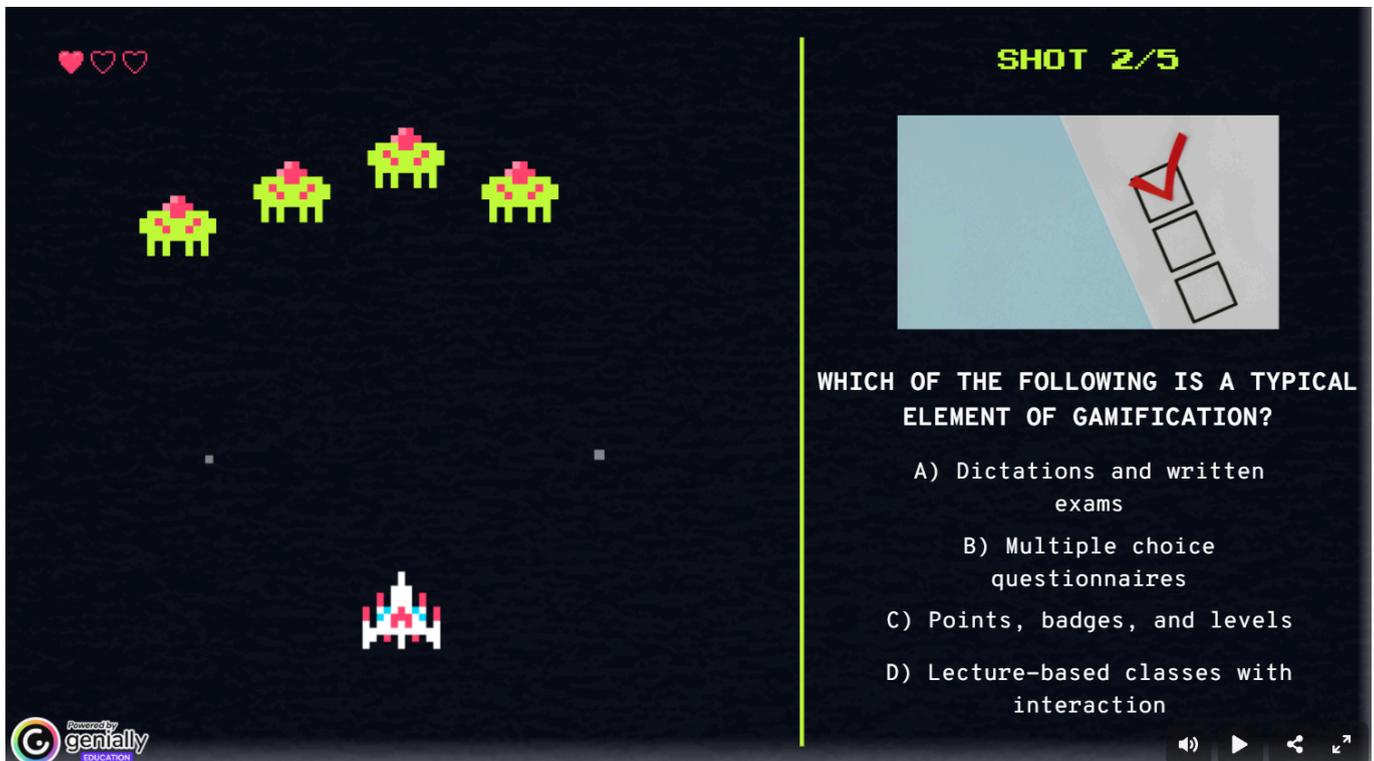


Image 8. Quiz activity designed to assess prior knowledge and introduce gamification concepts.

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 & Völjätaga, 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.

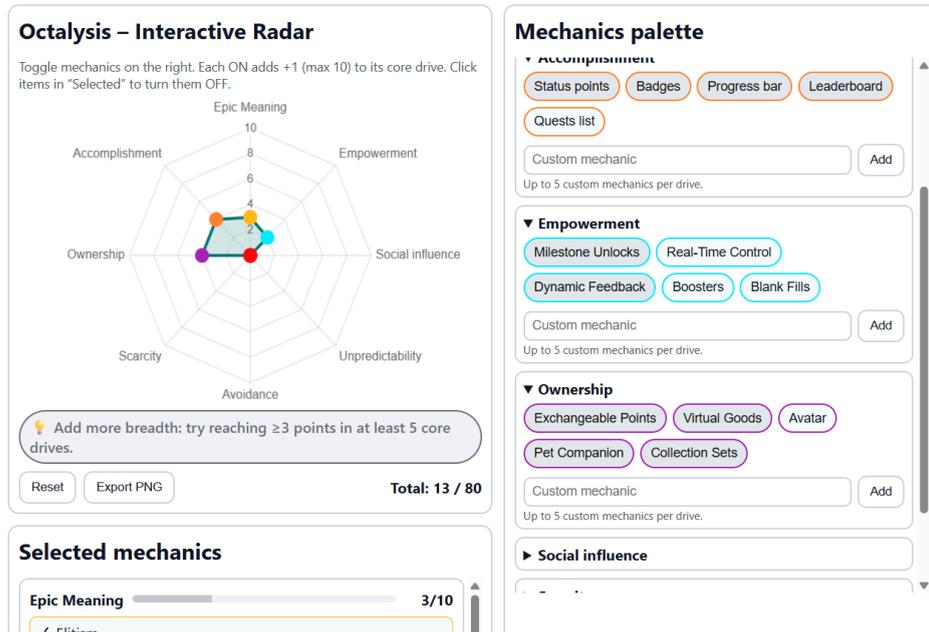


Image 9. Interactive tool based on the Octalysis Framework to analyze and design gamified systems.

Students are motivated, but problems arise: not everyone can access the devices and there are very few available at your institution

Organize turns to share devices, even if this wastes class time and some students have limited experience.

Request funding for more devices, knowing they are expensive, quickly become obsolete, and budgets are limited.

Use XR only with a small pilot group (e.g., one class or a few students), while the rest continue with traditional activities. This allows experimentation but creates inequality in learning opportunities.

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



Best Practices for Immersive Learning
Guidelines from e-DIPLOMA Project

- Task Design**
Structure learning for clarity and engagement.
 - Short, progressive, scaffolded tasks.
 - Combine exploration with guidance.
 - Use AR overlays to link theory & practice
 - Keep cognitive load manageable.
- Cognitive Diversity**
Adapt to learners' pace and capacity
 - Adjust complexity by experience level.
 - Limit new concepts per task.
 - Support multisensory input carefully.
- Collaboration & Motivation**
Learning thrives in social immersion
 - Enable teamwork via shared virtual spaces.
 - Use gamification: avatars, scores, challenges.
 - Foster fun, empathy, and engagement
- Scaffolding & Guidance**
Support learners through hybrid mentoring
 - Combine human facilitators with AI avatars.
 - Offer video/text guidance before tasks.
 - Give instant feedback.
- Engagement & Reflection**
Learn through experience and reflection.
 - Follow Kolb's learning cycle.
 - Add reflective debriefing moments.
 - Encourage learners to create, not just consume.
- Safety, Health & Accessibility**
Keep immersive learning safe and inclusive.
 - Ensure physical safety in VR spaces.
 - Avoid long sessions, prevent fatigue & nausea.
 - Optimize visuals and sound quality.
- Competence & Skill**
Train both mind and motion
 - Allow time to master VR controls.
 - Align psychomotor actions with learning goals.
 - Gradually increase task complexity.

Source: D3.1 Guidelines and Best Practices Extracted from Piloting Monitorization

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.

References

Abramenka-Lachheb, V., Leung, J., Lachheb, A., & Seo, G. (2024). Increasing the Authenticity of Learning Through the Integration of Extended Reality. *The Journal of Applied Instructional Design*, 13(4).

Cabrera Félix, C. ., & Román Santana, W. M. . (2025). Tendencias y desafíos de la gamificación e inteligencia artificial en la educación: revisión sistemática. *Horizontes. Revista De Investigación En Ciencias De La Educación*, 9(39), 2971–2988. <https://doi.org/10.33996/revistahorizontes.v9i39.1098>

Carvajal Chávez, C. A. (2024). Inteligencia artificial como recurso didáctico en la educación superior. Una revisión sistemática. *RECIMUNDO: Revista Científica de la Investigación y el Conocimiento*, 8(4), 51-65.

Chou, Y. K. (2019). *Actionable gamification: Beyond points, badges, and leaderboards*. Packt Publishing Ltd.



Comisión Europea. (2025). Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones sobre el Plan de Acción para las Competencias Básicas [COM(2025) 88 final]. EUR-Lex.

Lucero Baldevenites, E. V. (2024). Transformando la educación: IA y realidades aumentada y virtual en la formación docente. *European Public & Social Innovation Review*, 9, 01-16. <https://doi.org/10.31637/epsir-2024-854>

Milgram, P., Takemura, H., Utsumi, A., & Kishino, F. (1995, December). Augmented reality: A class of displays on the reality-virtuality continuum. In *Telem manipulator and telepresence technologies* (Vol. 2351, pp. 282-292). Spie.

Paredes Rosado, K. A. (2025). Influencia de un programa de capacitación docente en realidad virtual en el desempeño y las habilidades de los profesores universitarios. *Sage Sphere Multidisciplinary Studies*, 2(1). <https://sagespherejournal.com/index.php/SSMS/article/view/23>

Pata, K., & Våljataga, T. (2025). e-DIPLOMA: Guidelines and best practices extracted from piloting monitorization.

Villafuerte, V. P. E., Arcos, W. R. P., Morán, O. O. V., & Rodas, G. C. A. (2023). La gamificación como estrategia didáctica para mejorar la motivación y el rendimiento académico de los estudiantes en Educación Básica Media. *Polo del Conocimiento*, 8(12), 875-894.



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