Exploring Authentic Learning Scenarios in Online and Blended Environments Across European Universities

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Abstract. *This paper explores authentic learning scenarios for online and blended higher education across four European universities. Grounded in situated cognition theory and Herrington et al.'s authentic learning design framework, we report a two-phase empirical study. In Study 1, 13 learning design experts used consensus workshop methodology to identify 11 applicable scenarios. In Study 2, 95 practitioners in 13 focus groups examined benefits, challenges, and enablers of implementation. Two structural clusters emerged: method-focused scenarios primarily demand pedagogical expertise and facilitation skills; technology-focused scenarios require technical infrastructure and digital competence. Professional development, institutional support, and learning design examples prove crucial cross-cutting enablers.*

Keywords. authentic learning; blended learning; learning design; higher education; focus groups; hybrid teaching; professional development; innovative pedagogy

1 Introduction

The rapid expansion of online and blended learning in higher education has renewed sustained interest in authentic learning scenarios; pedagogical approaches that engage students with real-world problems, collaborative inquiry, and meaningful knowledge construction (Donovan et al., 1999; Herrington et al., 2014). Over the past decade, more than one hundred such scenarios have been catalogued in influential reports such as the Innovating Pedagogy series (Kukulska-Hulme et al., 2022; Sharples et al., 2012), and a recent analysis confirmed strong alignment between emerging pedagogical proposals and empirical research trajectories (Liu et al., 2024).

Despite this proliferation, substantial evidence shows that many higher education practitioners struggle to implement innovative learning scenarios effectively, particularly in online and blended environments (Nelson et al., 2019; Rienties et al., 2022; Tondeur et al., 2012). Key barriers include limited pedagogical and digital competencies, insufficient institutional support, and inadequate professional development (Bragg et al., 2021; Koehler & Mishra, 2006). While individual studies have examined specific scenarios, e.g. flipped classrooms (Divjak, Rienties et al., 2022), problem-based learning (Dochy et al., 2003), and AI in education (Holmes & Tuomi, 2022), cross-institutional, multi-country studies systematically combining expert consensus with practitioner experience remain scarce.

This paper addresses that gap through a two-phase study involving four European universities in Croatia, Finland, Germany, and the United Kingdom, conducted as part of the Erasmus+ project 'Innovating Learning Design in Higher Education' (iLed). We investigate the following research questions:

RQ1: Which authentic learning scenarios do higher education experts consider most applicable across diverse European institutional contexts?

RQ2: What benefits, challenges, and enabling conditions do practitioners identify when implementing these scenarios in online and blended environments?

The study's contribution is threefold: it provides, to our knowledge, the first systematic cross-institutional expert consensus on applicable authentic learning scenarios across four European higher education contexts; it combines expert and practitioner perspectives in a single study design; and it generates an empirically grounded typology (method-focused versus technology-focused scenarios) that offers a practically applicable framework for professional development design and institutional learning design policy.

2 Theoretical Background

2.1 Authentic Learning: Conceptual Foundations

The concept of authentic learning is rooted in situated cognition theory, which holds that knowledge is inseparable from the context of its use (Brown et al., 1989; Lave & Wenger, 1991). Building on cognitive apprenticeship principles, Herrington and Oliver (2000) operationalised authentic learning through nine design characteristics of authentic learning environments: an authentic real-world context, authentic ill-defined activities, access to expert performance, multiple roles and perspectives, collaborative knowledge construction, reflection, articulation, coaching and scaffolding, and authentic integrated assessment.

Critically for the present study, Herrington et al. (2014) clarified that these characteristics describe design qualities, not inherent properties of any particular method or technology. A flipped classroom, a virtual reality environment, or an AI-supported tutorial can each facilitate authentic learning when the design ensures engagement with real-world problems, access to expertise, and meaningful assessment; or fail to do so when these conditions are absent. We therefore define authentic learning scenarios as pedagogical approaches, whether method-focused or technology-mediated, intentionally designed to activate students and enable them to meaningfully construct knowledge in contexts involving real-world problems relevant to their disciplinary or professional practice (Donovan et al., 1999). Learning design refers to the deliberate alignment of learning activities with intended outcomes through constructive alignment (Biggs, 2014; Divjak, Grabar et al., 2022).

2.2 The Implementation Gap and Professional Development

Despite theoretical consensus, a well-documented implementation gap persists between pedagogical innovation and classroom practice (Nelson et al., 2019; Rasheed et al., 2020). The Technological Pedagogical Content Knowledge framework (TPACK; Koehler & Mishra, 2006) helps explain this gap: effective use of authentic learning scenarios in technology-mediated environments requires the integration of technological, pedagogical, and content knowledge in ways many educators have not had the opportunity to develop. Institutional constraints like workload, resource limitations, and weak collegial support, further restrict adoption (Bragg et al., 2021; Brown, 2016).

In this study, TPACK serves as an interpretive lens rather than a deductive coding framework: rather than applying TPACK categories a priori to the focus group data, we use the framework post-hoc to interpret the emergent pattern of challenges and enablers, specifically to explain why method-focused and technology-focused scenarios produce structurally different demands on educators. The distinction between pedagogical knowledge demands (dominant in MF scenarios) and technological knowledge demands (dominant in TF scenarios) directly reflects the core TPACK distinction between the pedagogical and technological knowledge components.

A cross-institutional professional development study found that while online professional development can improve educators' competencies with authentic learning scenarios, impacts are shaped by institutional culture and disciplinary context (Rienties et al., 2023).

Taken together, these findings suggest that the question of which authentic learning scenarios exist is secondary to the question of under what conditions educators in specific institutional contexts perceive them as feasible, worthwhile, and amenable to implementation. It is precisely this practitioner-level, cross-institutional understanding that the present study seeks to provide.

3 Methods

3.1 Research Design

This paper reports a two-phase empirical study conducted in 2023. Study 1 used expert consensus methodology to identify applicable authentic learning scenarios. Study 2 used focus group research with practitioners to explore perceived benefits, challenges, and enabling conditions for each scenario. Ethical approval was obtained at the coordinating institution; participation was fully voluntary and informed. Fig. 1 shows the timeline of the two studies.

3.2 Study 1: Expert Consensus Workshop

Thirteen learning design experts (6 male, 7 female) from four institutions participated in a two-day in-person consensus workshop in May 2023. The four institutions represent diverse European higher education contexts: a large multi-disciplinary Croatian university (CU1, >70,000 students), a Finnish research university (FU2, ~14,000 students), a German research university (GU3, >43,000 students), and a large UK distance-learning university (UU4, >200,000 students). Collectively, participants had published over 900 peer-reviewed articles and had experience with learning design across more than 400 courses.

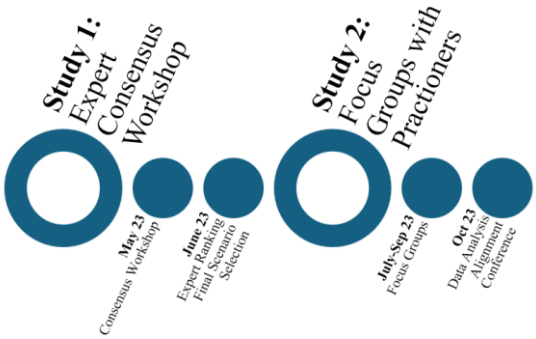


Figure 1. Timeline of Study 1 and Study 2 in 2023.

Using the Consensus Workshop Method (ICA:UK, 2014), participants identified 16 initial scenarios through a two-hour facilitated brainstorming session. Experts then independently ranked all 16 scenarios in an online survey (response rate: 69%) over two weeks, rating relevance to their institution on a 1 (most relevant) to 10 (least relevant) scale. Results were discussed in a one-hour online follow-up meeting, leading to the selection of 11 scenarios[1] with an average rank below 6.0 and cross-institutional applicability as the key selection criteria.

3.3 Study 2: Focus Groups with Practitioners

Between July and September 2023, 13 focus groups were conducted with 95 higher education practitioners (63 female, 32 male) across the four institutions, including experienced university teachers and pre-service educators. Each focus group followed a structured five-step procedure: participants received scenario materials in advance; voted on two scenarios to discuss; engaged in 30–45 minute discussions per scenario guided by prompts on benefits, learning outcomes, and implementation challenges; and the facilitator summarised findings. Sessions were conducted in participants' local language, recorded, transcribed with Amberscript, and fully anonymised.

After that, Data were analysed using Qualitative Content Analysis (Mayring, 2015, 2023) with an inductive approach in which the category system emerged concurrently with analysis. Two coders per institution conducted the coding; inter-coder reliability was verified through joint evaluation conferences. Three superordinate categories (*benefits*, *challenges*, and *enablers*) were set deductively as starting categories across all four institutions.

The uneven distribution of scenario discussions across institutions, e.g. Problem-Based Learning appearing only at CU1 and VR only at CU1 and GU3, reflects genuine differences in institutional priorities and teaching cultures rather than a sampling error. To mitigate the risk of institution-specific patterns skewing the inductive category system, coders at each institution developed their sub-categories independently before a joint cross-institutional alignment conference, where categories were compared, merged, and renegotiated until consensus was reached. These 2-day alignment conference with all coders took place in Finland in October 2023.

4 Results

4.1 Study 1: Expert Rankings and Scenario Selection

Table 1 presents the full ranking results for all 16 scenarios. The 11 scenarios marked 'Yes' were selected for Study 2 based on an average rank below 6.0 and confirmed cross-institutional applicability.

Table 1. Expert ranking results
(n=13; Avg.=average rank (1=most relevant, 10=least relevant); Med.=median; SD=standard deviation; Sel.= selected for Study 2; *excluded despite high rank, see text)

Scenario	Avg.	Med.	SD	Sel.
Blended Learning	2.33	1	2.16	No*
AI in Education	2.38	2	1.60	Yes
Student Engagement in Learning Design	2.43	2	1.51	Yes
Hybrid Teaching (large groups)	3.50	3	2.51	Yes
Flipped Classroom	3.71	2	3.04	Yes
Project-Based Learning (virtual)	3.75	3	2.92	Yes
Hybrid Teaching (small groups)	4.00	4	2.19	Yes
Problem-Based Learning	4.00	4	2.10	Yes
Virtual Reality / Augmented Reality	4.00	3	3.00	Yes

[1] For a detailed description of the 11 selected authentic learning scenarios, see: 10.6084/m9.figshare.32788440

Inquiry-Based Learning	4.14	4	2.54	Yes
Game-Based Learning	4.50	5	2.43	Yes
Simulation (SSP)	5.80	6	3.83	Yes
Authentic assessment tasks supervised by Employers	6.25	7	3.86	No
Fully online Learning	6.50	8	3.73	No
Work-Based Learning (online)	7.71	9	2.93	No
Student placement and shadowing	7.80	8	2.28	No

Blended learning ranked highest overall but was excluded because experts judged the term too broad: most teaching at the three face-to-face institutions could already be described as blended, making it more informative to specify a particular pedagogical approach within blended settings. Fully online learning and work-based learning online were excluded as not applicable across all four institutions, particularly UU4, which as a fully online university could not meaningfully discuss scenarios requiring physical classroom presence. Student Placement and Shadowing and Authentic Assessment Tasks Supervised by Employers were excluded because, despite their conceptual alignment with authentic learning principles, experts judged them as requiring employer partnerships and organisational arrangements that fall outside the direct pedagogical control of higher education institutions. As such, they represent valid forms of authentic learning but constitute a distinct category of work-integrated learning that demands different institutional infrastructure and is beyond the immediate scope of this study's focus on in-course pedagogical design.

The resulting 11 scenarios span method-focused approaches (Flipped Classroom, Game-Based Learning, Inquiry-Based Learning, Problem-Based Learning, Project-Based Learning, Simulation, Student Engagement in Learning Design) and technology-focused approaches (AI in Education, Hybrid Teaching in Large and Small Groups, Virtual Reality/AR).

4.2 Study 2: Distribution and Overview

In total, 34 scenario discussions were conducted across the 13 focus groups. Table 2 shows the distribution per institution.

Table 2. Scenario discussions per institution
(+ = one focus group discussion)

Scenario	CU1 (4 FG)	FU2 (4 FG)	GU3 (2 FG)	UU4 (3 FG)
Flipped Classroom	++	+++	++	++
AI in Education	+	++	++	+
Hybrid – Large	+	+		+
Game-Based Learning		+		+
Hybrid – Small	+	+		
Inquiry-Based	+			+
Problem-Based	++			
Project-Based	+	+		
Simulation (SSP)	+			+
Student Eng. in LD		+		+
VR/AR	+		+	

Flipped Classroom was the most frequently discussed scenario (9 discussions across all four countries), followed by AI in Education (6 discussions). These were also the only two scenarios discussed in all four national contexts, reflecting both widespread prior experience (Flipped Classroom) and strong interest in an emerging topic despite limited practical experience (AI in Education). Table 3 provides a comprehensive overview of the benefits, challenges, and enabling conditions identified for all 11 scenarios.

Table 3. Summary of benefits, challenges, and enablers by scenario
(MF=method-focused; TF=technology-focused)

Scenario (Type)	Benefits	Challenges	Enablers
Flipped Classroom (MF)	Active learning, interaction, motivation	Student non-preparation, teacher workload	Clear expectations, supportive culture
AI in Education (TF)	Individualised support, shifts learning outcomes	Guidelines, legal/ethical concerns	Didactic input, teacher testing, student co-development
Hybrid – Large (TF)	Remote inclusion, digital skills	High preparation, dual-audience demands	In-class assistant, structured planning
Game-Based (MF)	Motivation, flexible methods	Perceived non-educational, design effort	Clear objectives, safe game space
Hybrid – Small (TF)	Collaborative formats, flipped pairing	Technical demands, effectiveness scepticism	Improved infrastructure

Inquiry-Based (MF)	Critical thinking, co-creation	Sustaining motivation, grading flexibility	Practice examples, clear instructions
Problem-Based (MF)	Theory application, motivation via context	Intensive involvement, over-use risks	Curriculum integration, AI support
Project-Based (MF)	Real-world feedback	Needs theory background, large groups	Scenario examples, peer feedback
Simulation/SSP (MF)	Safe, realistic, clinical preparation	Authentic experience design, cost	Combination methods, AI
Student Eng. in LD (MF)	Student responsibility, diverse perspectives	Unfamiliar to teachers, resource constraints	Co-teaching, workshops, clear examples
VR/AR (TF)	Practical content, AI convergence, flexibility	Cost, experience limits, technical barriers	Funding, instructor training

4.3 Detailed Findings: Five Focal Scenarios

To illustrate the range of findings in depth, we present detailed results for five scenarios selected on three complementary criteria: discussion frequency (Flipped Classroom and AI in Education were the most frequently discussed, each in all four countries), thematic and structural variance (Hybrid Teaching and Virtual Reality represent the technology-focused cluster with contrasting maturity profiles), and institutional divergence (Problem-Based Learning was discussed exclusively at CU1, offering the clearest example of discipline-specific contextualisation). Together, these five scenarios span both structural clusters and cover the full spectrum from widely practised to emerging.

4.3.1 Flipped Classroom

The Flipped Classroom was by far the most extensively discussed scenario, with 9 focus group sessions (52 participants) across all four countries. Practitioners widely recognised its potential to enhance active learning during class time and to strengthen teacher-student interaction, shifting face-to-face time from information transmission toward discussion, problem-solving, and application. Several participants described observed gains in student engagement and intrinsic motivation when pre-class materials were carefully designed to build genuine curiosity for the in-class phase.

The most frequently cited challenge was uneven student preparation: when students did not engage with pre-class materials, the in-class phase collapsed, placing considerable pressure on teachers to improvise. This was especially pronounced in large cohorts where monitoring preparation rates is difficult. Practitioners from CU1 noted that the flipped approach worked best in smaller seminar formats, while GU3 and FU2 participants reported more mixed outcomes in large lecture-based courses. Increased workload for teachers, particularly in creating high-quality pre-class video or reading materials, was a near-universal concern.

Key enablers identified included a supportive departmental culture in which flipped teaching is a shared norm rather than an individual experiment, clear communication of expectations to students from the outset, and institutional provision of repositories containing reusable pre-class materials. Participants at UU4 noted that the flipped model closely parallels existing distance-learning design principles, making it relatively transferable to that context.

4.3.2 AI in Education

AI in Education generated the most animated discussions across the study, driven by the rapid emergence of generative AI tools in the months preceding data collection. Unlike most other scenarios, practitioners discussed AI primarily from a position of curiosity and concern rather than established experience: the majority had limited hands-on implementation of AI tools in their teaching and treated the focus group as an opportunity to collectively think through implications.

Perceived benefits centred on the potential for individualised learning support: AI providing tailored feedback at scale, supporting students who fall behind, and enabling personalised learning pathways beyond what any individual teacher could offer. Participants also acknowledged that AI fundamentally challenges traditional assessment design, with several noting that assignments requiring AI-generated answers needed to be reconceived entirely to assess higher-order competencies. This was framed not merely as a challenge but as a productive pressure to reconsider what authentic assessment means.

The primary challenges were institutional and ethical: participants across all four countries called urgently for clear guidelines on acceptable AI use, legal frameworks governing data privacy and copyright, and training to help educators use AI purposefully rather than reactively. A recurring enabler was the proposal to develop AI guidelines collaboratively with students rather than imposing top-down rules, fostering shared ownership and transparency. Participants in GU3 and FU2 also highlighted the value of teachers experimenting personally with AI tools before introducing them into courses, to develop pedagogical judgment about their affordances and limitations.

4.3.3 Hybrid Teaching

Hybrid Teaching, enabling simultaneous participation by students on-site and online, was discussed in seven focus groups across three of the four institutions (CU1, FU2, UU4), in both large-group and small-group formats. Practitioners valued it primarily for its inclusivity benefits: students with mobility constraints, work commitments, or geographic distance could participate without being disadvantaged, and the digital participation modality was seen as developing skills of increasing importance in professional life.

However, hybrid teaching also generated some of the strongest expressions of implementation difficulty in the study. Managing two concurrent audiences, one physical, one virtual, requires sustained dual attention that many participants described as exhausting and cognitively demanding. The risk of one group (typically the online participants) becoming passive observers rather than active participants was repeatedly raised. Participants from FU2 described asymmetric participation patterns in which online students spoke less frequently and were overlooked in spontaneous discussion. Digital infrastructure failures, e.g. particularly camera placement, microphone coverage, and video latency, were cited as significant disruptors, especially for small-group collaborative formats.

The most consistently cited enablers were technical: a dedicated in-class assistant to manage the online stream and flag contributions from remote participants, and a structured lesson plan that explicitly allocates interaction time to both groups. Several participants noted that combining hybrid teaching with flipped classroom principles, so that information transfer happened asynchronously before class, substantially reduced the cognitive load of the in-class facilitation. Improved technical infrastructure, including dedicated hybrid teaching rooms, was identified as the single most important institutional investment.

4.3.4 Problem-Based Learning

Problem-Based Learning (PBL) was discussed in two focus groups at CU1, reflecting the strong tradition of problem-based approaches in health professional education at that institution. Practitioners valued PBL primarily for its capacity to bridge theoretical and applied knowledge: working through concrete, realistic cases motivated students in ways that abstract instruction did not. Also the collaborative group process was seen as developing professional competencies like teamwork, communication, clinical reasoning, alongside content knowledge.

The central challenge identified was the intensity of involvement required from both teachers and students. Effective PBL requires sustained scaffolding: teachers must design or select authentic problems carefully calibrated to current student knowledge, facilitate without over-directing, and provide timely feedback throughout the process rather than only at the end. Participants noted a paradox of motivation: while well-implemented PBL was highly motivating, excessive or poorly scaffolded PBL, where problems are too abstract, too easy, or poorly aligned with assessment, could produce frustration and disengagement. Curriculum integration was therefore identified as an essential condition: PBL worked best when it was embedded coherently across a course module rather than treated as an isolated activity.

Structured problem-scenario templates were highlighted as a practical enabler that reduced the design burden on individual teachers. Participants also raised AI as a potential support tool within PBL: AI could assist students in accessing background information, provide iterative feedback on draft solutions, and help teachers generate or adapt problem scenarios more efficiently. This emergent integration of AI as a support tool, not a replacement for the PBL process, was seen as a promising development.

4.3.5 Virtual Reality and Augmented Reality

Virtual Reality and Augmented Reality (VR/AR) was discussed in three focus groups (CU1, GU3) and generated a notably bifurcated response: participants who had hands-on experience with VR/AR were enthusiastic about its potential; those without direct experience were largely sceptical and uncertain. The primary benefit cited by experienced practitioners was the creation of safe, repeatable learning environments for high-stakes professional practice; particularly in medicine and engineering, where errors in real settings carry serious consequences. Participants from CU1's medical faculty described VR simulation as transformative for procedural skills training.

The most prominent challenges were cost and access: high-quality VR hardware remains expensive, and few institutions have sufficient headsets for whole-cohort deployment. Technical limitations were also noted, e.g. latency, display quality, user discomfort during prolonged use. A further challenge was the limited experience of most teaching staff with VR environments, both as users and as designers, creating a double barrier of personal unfamiliarity and design complexity.

Participants identified a convergence with AI as a particularly promising direction: AI-driven adaptive scenarios within VR environments could personalise difficulty and feedback in ways that static VR content cannot. Enablers at the institutional level included dedicated funding streams for equipment, partnerships with industry or healthcare providers to develop and maintain VR content, and structured instructor training programmes. A programme-level approach, i.e. integrating VR into multiple courses rather than a single elective, was recommended to justify the investment and build staff competence over time.

5 Discussion

The findings confirm and extend existing evidence on authentic learning scenario implementation across European higher education. The two-group structure that emerged inductively from the focus group data, method-focused (MF) and technology-focused (TF) scenarios, maps meaningfully onto the TPACK framework (Koehler & Mishra, 2006). MF scenarios primarily challenge educators' pedagogical knowledge: they require sophisticated facilitation skills, curriculum integration, and learner-centred design regardless of which digital tools are used. TF scenarios, by contrast, place greater demands on technological knowledge and infrastructure, digital barriers rather than pedagogical ones represent the primary challenge. This distinction is particularly evident in the contrasting profiles of Flipped Classroom (MF, high pedagogical demand) and Hybrid Teaching (TF, high technical demand).

This distinction has direct implications for professional development design. Support for MF scenarios should prioritise didactic skill-building, structured learning design templates, and curriculum integration strategies. Support for TF scenarios requires attention to technological infrastructure, digital competence development, and institutional investment. The cross-cutting finding that collections of good-practice examples and learning design templates are key enablers across both groups aligns with Rienties et al. (2023) and supports the use of structured learning design tools grounded in constructive alignment principles (Biggs, 2014; Divjak, Grabar et al., 2022).

AI in Education stands out as qualitatively different from all other scenarios: it is the only one discussed primarily from a position of limited experience, making it prospective and normative in character rather than reflective of established practice. The urgency of calls for institutional guidelines and ethical frameworks around AI aligns with Holmes and Tuomi's (2022) analysis of systemic readiness gaps in higher education's response to AI. The finding that AI was also mentioned as a support tool in PBL, Simulation, and VR discussions suggests that AI's role may be as much infrastructural (cutting across scenarios) as scenario-specific.

The prominence of practical examples, learning design templates, and structured problem scenarios as cross-cutting enablers across all five focal scenarios aligns with Rienties et al. (2023) and supports the use of constructive alignment tools in professional development (Biggs, 2014). Institutional context shaped scenario relevance substantially, confirming Herrington et al.'s (2014) argument that authenticity is realised differently across settings. The cross-institutional variation, particularly UU4's distinct scenario profile as a distance-learning institution, and CU1's stronger orientation toward simulation and PBL, confirms that authentic learning design cannot be approached prescriptively: it requires contextual adaptation.

The following limitations should be noted. First, the sample is restricted to four European universities, limiting transferability to other cultural and national contexts. Second, only educator perspectives were captured; student experiences of these scenarios remain unexplored. Third, the qualitative design yields rich descriptions of perceived conditions but cannot establish causal links between scenario use and learning outcomes.

A fourth limitation concerns the temporal context of the data. All focus groups were conducted in 2023, at a moment when generative AI tools such as large language models had only recently entered mainstream educational discourse. Practitioners' perceptions of AI in Education reflect an early adoption phase characterised by uncertainty, experimentation, and limited institutional guidance. Given the pace of development in this area, the specific challenges and enablers identified for AI in Education are likely to have evolved significantly and should be interpreted as a snapshot of practitioner perspectives at a particular moment rather than stable findings. Future studies should revisit this scenario longitudinally to track how growing practitioner familiarity and emerging institutional frameworks reshape its implementation profile.

6 Conclusion

This paper has identified 11 authentic learning scenarios considered applicable across four European higher education contexts (RQ1) and documented their perceived benefits, challenges, and enabling conditions from 95 practitioners' perspectives (RQ2). Scenarios cluster into method-focused and technology-focused groups with distinct profiles of pedagogical and technical demands. Across both groups, institutional support, differentiated professional development, and practical learning design resources emerge as critical enablers.

Detailed analysis of five focal scenarios (Flipped Classroom, AI in Education, Hybrid Teaching, Problem-Based Learning, and Virtual Reality) illustrates both the specific implementation challenges of each scenario and a set of cross-cutting themes: the need for shared institutional norms, structured design support, and adaptive professional development that goes beyond awareness-raising to skill-building in context. Future research should extend this framework to include student perspectives, examine long-term learning outcomes, and track how AI integration reshapes the authentic learning scenario landscape over time.

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Disclosure of Interests.

The authors have no competing interests to declare that are relevant to the content of this article.

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