

GAMIFICATION AND AI IN PROFESSIONAL DEVELOPMENT FOR TEACHERS AND TRAINERS

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Abstract

The rapid development of AI and digitalization of education has intensified the need for vocational teachers and trainers to adopt learner-centered approaches that sustain engagement and motivation. Traditional instructional methods often struggle to address diverse learner needs and expectations, particularly in digital skills training contexts. This paper aims to examine how structured training in gamification and AI-supported instructional design can enhance educators' capacity to design engaging learning experiences. The study reports on three implementations of an intensive masterclass program delivered in two countries (Georgia and North Macedonia), targeting vocational teachers, ICT educators, and digital skills trainers. The training combined theoretical foundations of gamification, including motivational psychology and the Octalysis framework, with hands-on design activities, peer feedback, and AI-assisted content creation using large language models. Participants developed and piloted their own gamified learning activities, integrating game elements, narrative, feedback mechanisms, and adaptive AI support. Validation was conducted through participant feedback, reflective activities, peer evaluation, and post-training implementation reports. Results indicate consistently positive feedback, increased self-reported confidence in designing engaging learning experiences, and successful transfer of gamified and AI-supported practices into real training contexts. The findings suggest that vocational teacher training programs that systematically integrate gamification principles and AI tools can significantly enhance learner engagement, support professional competence development, and contribute to sustainable innovation in digital skills education.

Keywords: *Gamification in education, vocational teacher training, learner engagement, Artificial Intelligence in teaching, professional development.*

1. Introduction

The rapid digital transformation of education accelerated by the broad uptake of generative AI has increased expectations for VET teachers and digital-skills trainers to deliver learning that is both competency-aligned and engaging (Dahalan et al., 2025). In VET and ICT-skills trainings, cohorts often differ substantially in prior knowledge, learning pace, and motivation.

Gamification, defined as the use of game design elements in non-game contexts, can support motivation and engagement in learning. However, literature notes that its use is often short-term and context-specific, making engagement claims hard to compare across settings (Dichev & Dicheva, 2017). Meta-analytic evidence reports small positive average effects on motivational, behavioral, and cognitive outcomes (Sailer & Homner, 2020). In addition, "engagement" is frequently operationalized narrowly (e.g., participation counts or self-reported enjoyment); therefore, multidimensional measures and longer time horizons are needed to separate durable effects (Ruiz et al., 2024).

Structured integration of games into educational settings that relates to learner characteristics and learning outcomes, illustrates how game-like learning experiences can be educationally meaningful when they are deliberately embedded in instruction (Trajkovik et al., 2018). Gamification does not inherently produce engagement; rather, engagement depends on how motivational mechanics, feedback loops, progression, and narrative are aligned with learning objectives and learner needs (Videnovik et al., 2022).

Large language models (LLMs) and AI copilots have become accessible tools that can reduce "design friction" for educators by accelerating ideation, narrative drafting, task generation, differentiation, and formative feedback scaffolding. Recent studies stress both pedagogical opportunities and risks and

highlight measurable learning and motivational effects in some contexts, while demonstrating that outcomes depend on how tools are integrated pedagogically (Deng et al., 2025). For teacher professional development (PD), these imply a dual competence target: educators need (i) motivational design competence to construct coherent gamified learning experiences, and (ii) AI-supported instructional design literacy to use LLMs productively while maintaining pedagogical judgment and responsibility.

This paper examines how structured training in gamification and AI-supported instructional design can strengthen vocational teachers' and trainers' capacity to design engaging learning activities. The intervention integrates (a) motivational framing through a gamification design lens (including an Octalysis-based emphasis on motivational drivers), (b) hands-on design studios in which participants prototype gamified learning activities, (c) peer feedback cycles, and (d) guided use of LLMs to accelerate creation and adaptation of narratives, tasks, and feedback mechanisms.

2. Methodology

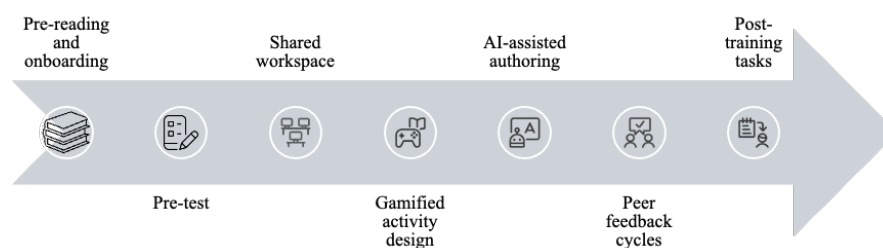
The study presents a multi-site professional development (PD) program and its evaluation conducted across three implementations in two countries, using a common instructional backbone, shared facilitation routines, and comparable participant design tasks. The evaluation is positioned as feasibility and early-transfer evidence, not as a causal impact study on learner engagement, consistent with guidance that stronger claims about student outcomes require learner-level measures and more rigorous designs (Desimone, 2009).

Participants were vocational teachers, ICT educators, and digital-skills trainers recruited through partner and organizer networks in each location. Cohorts included educators working in schools, training centers, and community-based digital literacy initiatives. Participation was voluntary and implemented in an intensive masterclass format, with common curriculum components applied across sites to support comparability.

The masterclass was designed to reflect widely cited features of effective PD: active learning, collaboration, coherence, and a focus on practical classroom transfer, while remaining feasible for intensive delivery (Darling-Hammond et al., 2017; Desimone, 2009).

The training workflow consisted of seven linked elements (see Figure 1):

Figure 1. Training workflow.



(1) Pre-reading and onboarding: Before the synchronous sessions, participants received pre-reading to reduce cognitive load during the intensive workshop and to align baseline vocabulary.

(2) Pre-test (baseline self-assessment): Participants completed a short self-assessment focused on prior experience with gamification mechanics, comfort with instructional design, and familiarity with AI/LLMs for content creation. This served as a descriptive baseline and as an input to facilitation.

(3) Shared workspaces (Padlets): A Padlet-based collaborative workspace was used to collect and share artifacts throughout the training: early ideas, Octalysis mappings, prototype drafts, peer feedback, and implementation intentions. This supported transparency, reuse, and cross-pollination of ideas across participants.

(4) Gamified activity design using the Octalysis Framework: The core design studio followed an Octalysis-informed workflow, using Octalysis framework as the primary design lens (Chou, 2019). Participants mapped target learner profiles and desired behaviors, selected appropriate motivational drivers, and then translated these into concrete mechanics (e.g., narrative framing, challenges/quests, progression, feedback loops, collaboration/competition, and recognition).

(5) AI-assisted authoring and adaptation: LLMs were introduced as support tools for instructional design tasks such as generating narrative hooks and quest text, producing alternative task variants (differentiation), and proposing assessment/criteria descriptions. The use of LLMs was framed with explicit emphasis on teacher oversight and pedagogical responsibility, aligning with the broader literature that calls for careful integration and evaluation (Kasneci et al., 2023).

(6) “Show & Grow” peer feedback cycles: Prototypes were refined through structured peer critique (“show” the artifact; “glow” strengths; “grow” actionable improvements). This feedback routine operationalized formative feedback principles by clarifying success criteria, enabling dialogic feedback, and creating opportunities to close performance gaps (Hattie & Timperley, 2007).

(7) Post-training task, implementation support, and reflection: After the synchronous sessions, participants completed a post-training task (pilot planning and/or micro-pilot implementation), followed by light-touch support (Q&A, troubleshooting, and iterative refinement) and structured reflection on what worked, what required adaptation, and constraints encountered in real settings. This element targets the “training-to-practice” gap and aligns with PD evaluation logic that distinguishes immediate learning from behavioral transfer (Kirkpatrick, 1994).

2.1. Data sources and analyses

Data sources were structured using established professional development (PD) impact levels. Reaction was captured through end-of-training satisfaction, perceived relevance, and open-ended feedback. Learning was examined via pre/post self-assessment shifts, reflective prompts, and analysis of participant-produced design artifacts (Octalysis maps and prototypes). Transfer was assessed through post-training implementation logs describing piloting activities, adaptations, and, where reported, perceived learner responses. Results at the learner level were not measured consistently with validated instruments across cohorts; accordingly, this study reports learner feedback only when available and treats learner impact as a priority for future evaluation rather than a confirmed outcome.

Qualitative data (open-ended feedback, reflections, post-training reports) were analyzed using thematic analysis, starting from an a priori coding structure aligned with the program’s theory of change (Braun & Clarke) (motivation design → prototype quality → transfer) and then iteratively refined to incorporate emergent themes. Prototype artifacts were analyzed descriptively to identify recurring design patterns and feasibility constraints (e.g., alignment between learning objective and selected motivational drivers; clarity of progression and feedback loops; practicality of implementation).

3. Results

Across the three implementations, the program consistently culminated in participant-produced, ready-to-pilot gamified learning activities created through an Octalysis-guided design workflow, documented in shared online workspaces (Padlets), and iteratively refined through structured peer feedback.

In Georgia, the program trained 45 participants in total, with 43 certified upon completion (19 in Tbilisi; 24 in Kutaisi), and produced 40 prototype gamified lesson/activity designs (See Figure 2). In North Macedonia the program trained 40 participants in total, with 40 certified upon completion, and produced 38 prototype gamified lesson/activity designs.

Figure 2. The MasterClass example.



The trainings resulted in a shared digital resource hub containing templates and examples, and it catalyzed the formation of peer-support connections among participants. These outputs align with the intervention’s intended proximal outcome: strengthening educators’ capability to translate motivational design principles into implementable learning activities rather than remaining at the level of conceptual awareness.

3.1. Participant-reported outcomes and perceived competence development

The masterclass evaluation indicates consistently high participant satisfaction across three cohorts. In all cohorts, ratings for content, activities, and delivery were strongly concentrated at the highest end of the scale, with average scores shown at more than 9/10. Word-cloud descriptors further reinforce this pattern: participants most frequently characterized the training as “useful”, “motivating/inspiring”,

“interesting,” “productive” and “cool,” with repeated signals of interactivity, creativity, and collaboration including explicit references to building new connections.

Participant feedback and reflection activities across cohorts converged on three recurring themes:

(1) Increased perceived design capability. Participants reported improved ability to design gamified learning activities that include explicit motivational drivers, progression logic, and feedback mechanisms. This was reflected in the quality and completeness of the prototypes produced, and in participants’ ability to articulate why certain mechanics were selected for specific learner profiles.

(2) Increased confidence with interactive/digital tools, including AI-assisted authoring. Participants described greater confidence in using interactive tools to support engagement and in using LLMs pragmatically for authoring tasks (e.g., drafting narrative prompts, generating activity variants, and refining instructions). The evidence for this outcome is self-reported; therefore, it should be interpreted only as perceived competence development rather than verified performance change.

(3) Improved understanding of motivation beyond “points and badges”. Reflections frequently emphasized a shift from superficial mechanics toward more intentional motivational alignment (i.e., selecting mechanics to fit desired behaviors and learner needs), consistent with the Octalysis emphasis on multiple motivational drivers (Chou, 2015) and with prior critiques that gamification benefits depend strongly on design coherence (Dichev & Dicheva, 2017; Sailer & Homner, 2020).

Given the nature of the collected data (feedback forms, reflective prompts, and peer critique notes), these outcomes should be understood as perceived learning and design self-efficacy indicators, not as direct evidence of learner outcomes. A key objective of the training design was to reduce the common “workshop-to-classroom” gap by embedding explicit transfer mechanisms: post-training tasks, pilot implementation encouragement, follow-up support, and guided reflection. For that purpose, both in Georgia and North Macedonia, the post trainings next steps included (i) encouragement to pilot the designed activity with learners, (ii) an online follow-up peer-support to troubleshoot and reflect on implementation, and (iii) continued access to the shared Padlet resource hub. This structure constitutes planned transfer support, and it provides a traceable pathway from prototype production to classroom use.

4. Discussion and future work

Across three implementations, the masterclass consistently led participants to produce ready-to-pilot gamified learning activities. They all reported positive perceptions of relevance, usability, and confidence in applying gamification and AI-assisted design. These outcomes are best interpreted as feasibility and capacity-building evidence, and not confirmed learner-level impact, because the primary validation sources were reflective and self-reported (Desimone, 2009).

This study contributes by documenting a replicable PD workflow: pre-reading and baseline self-assessment; collaborative Padlet workspaces; Octalysis-guided design and prototyping; structured peer feedback (“Show & Grow”); post-training tasks; and follow-up support and reflection to address the “workshop-to-classroom” gap highlighted in PD evaluation frameworks. A key design decision was to treat gamification as motivational instructional design rather than a set of isolated mechanics. Octalysis served as a shared language for motivational drivers and a scaffold for translating learner needs into coherent mechanics (Chou, 2015). This supports gamification alignment among goals, motivational drivers, progression, and feedback loops (Dichev & Dicheva, 2017).

The “Show & Grow” peer-feedback routine operationalized established feedback principles like clarifying criteria, enabling dialogic feedback, and supporting iterative improvement, thus helping explain how participants refined prototypes within short intensive formats (Hattie & Timperley, 2007). LLMs were integrated as tools for assisted authoring and adaptation, not as automated pedagogy. This reflects emerging research showing that impacts depend on pedagogical integration and governance (Kasneci et al., 2023). The intervention also embedded sustainability mechanisms (Padlet repositories, post-training tasks, and follow-up support). These elements are integral to the intervention logic through explicit piloting expectations and continued support.

Future iterations should add learner-level measures and more objective indicators while remaining feasible for VET settings. A minimum evaluation package should include: (i) teacher outcomes and rubric-based scoring of design artifacts; (ii) learner engagement outcomes measured with validated behavioral, emotional, and cognitive engagement scales; and (iii) implementation fidelity captured through brief logs documenting what was used, what was adapted, and key constraints. This aligns with PD evaluation guidance (Desimone, 2009).

5. Conclusion

This paper reports on a structured professional development model implemented as masterclass that integrates gamification design and AI-supported instructional design to strengthen the capacity of vocational teachers and digital-skills trainers to create engaging learning experiences. Across three implementations in two countries, the masterclass consistently enabled participants to progress from conceptual grounding to the production of ready-to-pilot gamified learning activities, supported by collaborative workspaces, iterative peer critique, and post-training tasks oriented toward classroom transfer.

The primary contribution of the study is a replicable training workflow that operationalizes gamification as coherent motivational design rather than isolated mechanics, while positioning LLMs as assistive tools that reduce design friction (e.g., rapid drafting of narratives, task variants). The validation evidence provided by participant feedback and reflection, peer review, and post-training implementation reporting supports conclusions about feasibility and perceived usefulness. The findings suggest that vocational teacher training programs that combine motivational design frameworks with AI-enabled authoring support can provide innovative practical pathways for educators.

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