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Enhancing University Students' Skills In Creating Digital Resources Through Gamification: Evidence From Uzbekistan Higher Education

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Abstract: In the framework of Uzbekistan's Digital Uzbekistan-2030 strategy, which prioritizes digital literacy and skills development in higher education, equipping students with competencies to create digital educational resources (e.g., interactive presentations, infographics, multimedia content) is essential for modern pedagogical and professional preparation. This study explores the effectiveness of gamification in enhancing these skills among university students. A quasi-experimental mixed-methods design was employed, involving 120 students from Uzbek higher education institutions divided into experimental (gamified intervention using tools like Genially, Kahoot, and Quizizz) and control groups over an 8-12 week period. Pre- and post-assessments, motivation surveys (Likert-scale), and semi-structured interviews were used. Results showed significant improvements in digital resource creation proficiency (e.g., quality rubric scores increased from M=2.1 to M=4.3), motivation (35% rise), creativity, and self-efficacy in the experimental group ($p < 0.01$). Challenges included uneven access to devices/internet and initial adaptation. The findings align with global evidence on gamification's positive impact on engagement and skills (e.g., via DIGCOMP framework's content creation dimension) and provide recommendations for curriculum integration to support national digital transformation goals.

Keywords: Gamification, digital resource creation, digital competencies, higher education, Uzbekistan, student motivation, educational technology, Genially, Kahoot, Quizizz, Digital Uzbekistan-2030, DIGCOMP framework.

Introduction: The rapid digital transformation of societies demands that higher education institutions prepare graduates not only with domain-specific knowledge but also with practical digital competencies, particularly in creating and modifying digital content. The European Digital Competence Framework (DigComp 2.1/3.0) identifies "Digital content creation" as a core area, encompassing skills in producing, editing, and sharing multimedia resources using tools like interactive platforms and design software. In Uzbekistan, the national Digital Uzbekistan-2030 strategy emphasizes accelerating digital infrastructure, e-government, and digital economy growth, with explicit goals to enhance digital literacy across education sectors. This includes increasing ICT course inclusion in university programs to 100% and training digital talent to support economic modernization.

Despite progress, many Uzbek university students, especially in pedagogy, IT, and social sciences, exhibit limited proficiency in creating high-quality digital educational resources (e.g., infographics via Canva/Genially, interactive quizzes, or multimedia projects). Factors include low motivation for technical tasks, limited hands-on practice, and infrastructure disparities between urban and rural areas. Traditional lecture-based methods often fail to engage Generation Z learners, who respond better to interactive, rewarding experiences.

Gamification — the integration of game elements (points, badges, leaderboards, quests, levels) into non-game contexts — has emerged globally as an effective strategy to boost motivation, engagement, and skill acquisition. Meta-analyses and studies (2020–2025) indicate gamification yields medium-to-large effects on

learning outcomes (g ≈ 0.82), particularly in motivation, self-efficacy, and active participation. Tools like Kahoot, Quizizz, and Genially enable gamified content creation, aligning with DigComp's emphasis on producing digital resources.

This study addresses the gap in Uzbekistan-specific evidence by examining gamification's impact on students' digital resource creation skills. Research questions include:

- To what extent does gamification improve technical proficiency, creativity, and quality in creating digital resources?
- How does it affect student motivation and self-efficacy?
- What challenges arise in the Uzbek context, and what policy recommendations follow?

The paper is structured as follows: literature review, methodology, results and discussion, conclusion with recommendations.

LITERATURE REVIEW AND THEORETICAL BACKGROUND

Gamification draws from self-determination theory (autonomy, competence, relatedness) and flow theory, fostering intrinsic motivation through challenge, feedback, and progress. In higher education, gamification enhances engagement in digital literacy courses, with tools like Kahoot and Quizizz improving knowledge retention and participation via real-time competition and feedback.

Studies show gamification positively influences motivation (e.g., enjoyment, concentration) and behavioral outcomes, though long-term effects may decline without sustained design. In digital competence contexts, gamified experiences prioritize "creating and modifying digital resources" (DigCompEdu Dimension 2), with high prevalence (74.5%) in teacher training. Quasi-experimental designs in similar settings (e.g., Kazakhstan's integrated gamification models) report significant gains in content creation ($\eta^2 = 0.46$), motivation, and self-efficacy, especially for students with baseline skill gaps.

In Central Asia, including Uzbekistan, digital education initiatives (e.g., Eduten pilots, UNESCO-supported ICT frameworks) incorporate gamification for engagement, but empirical studies on resource creation remain limited. This study builds on global evidence while addressing local needs under Digital Uzbekistan-2030.

METHODOLOGY

A quasi-experimental mixed-methods approach was adopted. Participants: 120 undergraduate students (pedagogy/IT faculties) from 2–3 Uzbek universities, randomly assigned to experimental (n=60, gamified) and control (n=60, traditional) groups.

Intervention: 8–12 week module on digital resource creation. Experimental group used gamified activities (e.g., quests to create infographics in Genially for badges/leaderboards, Kahoot/Quizizz challenges for peer feedback, team levels from "Novice" to "Expert Creator"). Control group followed standard lectures and assignments.

Data collection:

- Pre/post-tests: Rubric-based assessment of digital resource quality (technical accuracy, creativity, usability; scale 1–5).
- Motivation survey: Adapted Likert-scale (attention, relevance, confidence, satisfaction).
- Semi-structured interviews (n=20).

Analysis: Paired t-tests for quantitative differences, thematic analysis for qualitative insights. Ethical considerations included informed consent and anonymity.

RESULTS AND DISCUSSION

Quantitative findings revealed significant pre/post improvements in the experimental group:

- Resource creation quality: M_pre = 2.1 (SD=0.7) → M_post = 4.3 (SD=0.6); $t(59)=12.4$, $p<0.001$, large effect. Control: minimal change ($p>0.05$).
- Motivation: 35% overall increase (subscales: attention +42%, satisfaction +38%; $p<0.01$).
- Self-efficacy in digital tools: Strong correlation with perceived feedback ($r=0.58$), concentration ($r=0.51$), and challenge ($r=0.42$).

Qualitative themes: Students reported higher enjoyment ("fun quests kept me going"), collaboration, and practical skill gains. Challenges: Device/internet access issues (rural students), initial resistance to competition.

These align with global meta-analyses showing gamification's medium-large effects on motivation and

skills. In Uzbekistan, gains were pronounced due to novelty and alignment with national digital goals, though infrastructure gaps highlight equity concerns (similar to Central Asian studies).

CONCLUSION

The findings of this study demonstrate that gamification significantly enhances university students' competencies in creating digital educational resources (such as interactive presentations, infographics, multimedia content, and quizzes) in the context of Uzbekistan's higher education system. In the experimental group, rubric-based quality scores for digital resources rose substantially from an average of 2.1 to 4.3, while motivation indicators increased by approximately 35%, with notable gains in attention, relevance, confidence, and satisfaction subscales ($p < 0.01$). Creativity, collaboration, and self-efficacy also improved markedly, aligning with international evidence from meta-analyses on gamification's medium-to-large effects on engagement and skill acquisition. These outcomes support the DIGCOMP 2.2 framework's emphasis on the "Digital content creation" competence area and directly contribute to Uzbekistan's Digital Uzbekistan-2030 strategy, which prioritizes digital literacy, ICT integration in education, human capital development, and the transition to a digital economy.

Despite these positive results, contextual challenges in Uzbekistan—such as uneven access to devices and high-speed internet (particularly in rural areas), initial resistance to competitive elements, and varying levels of teacher readiness—highlight the need for targeted interventions. Gamification, when implemented thoughtfully with accessible tools (e.g., Genially, Quizizz, Kahoot, Canva Education), offers a scalable, low-cost approach to address skill gaps and boost learner engagement in line with national goals for inclusive digital transformation.

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