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### AI AND GAMIFICATION EMPOWER FOREIGN LANGUAGE LEARNING

#### Annotation

The study examines the impact of integrating artificial intelligence and gamified digital platforms on grammatical competence among university students. Using an experimental design, results from control and experimental groups across five academic disciplines were compared. The methodology combined quantitative analysis of grammatical gains, motivation, and behavior with qualitative insights from interviews and journals. Findings reveal significant improvements in grammatical productivity, engagement, and intrinsic motivation in the experimental group. A positive correlation was found between digital activity and academic achievement. The proposed model, combining cognitive, motivational, and technological elements, proved adaptable in multilingual settings. These results support personalized feedback and game-based learning mechanisms. The model aligns with Kazakhstan's digital education strategy and offers practical value for educators, EdTech developers, and researchers in linguistics and educational psychology.

**Key words:** Artificial intelligence, gamification, multilingual education, foreign language, pedagogy.

### SUN'IY INTELLEKT VA GAMIFIKATSIYA XORIJIY TIL O'RGANISHDA

#### Annotatsiya

Mazkur tadqiqot sun'iy intellekt va gamifikatsiyalangan raqamli platformalarning universitet talabalari orasida grammatik kompetensiyani rivojlantirishga ta'sirini baholaydi. Eksperimental dizayn asosida beshta akademik yo'nalishdagi nazorat va tajriba guruhlarini natijalari solishtirildi. Metodologiya grammatik ko'nikmalar, motivatsiya va xulq-atvor bo'yicha miqdoriy tahlil hamda intervyular va reflektiv kundaliklar asosida sifatli izohlarni o'z ichiga oldi. Tajriba guruhida grammatik mahsuldorlik, jalb etilish va ichki motivatsiya sezilarli darajada oshdi; raqamli faollik va o'quv yutuqlari o'rtasida ijobiy bog'liqlik aniqlandi. Kognitiv, motivatsion va texnologik komponentlarni birlashtirgan model ko'p tilli muhitda yuqori moslashuvchanlikni ko'rsatdi. Olingan ma'lumotlar shaxsiylashtirilgan fikr-mulohaza va o'yin asosidagi mexanizmlarning dolzarbligini tasdiqlaydi hamda modelni Qozog'iston ta'lim raqamlashtirish strategiyasi doirasida kengaytirish imkoniyatlarini ochadi.

**Kalit so'zlar:** Sun'iy intellekt, geymifikatsiya, ko'p tilli ta'lim, xorijiy til, pedagogika

### ИИ И ГЕЙМИФИКАЦИЯ В ОБУЧЕНИИ ИНОСТРАННЫМ ЯЗЫКАМ

#### Аннотация

Исследование оценивает влияние интеграции искусственного интеллекта и геймифицированных цифровых платформ на развитие грамматической компетенции студентов вузов. В рамках эксперимента сравнивались результаты контрольной и экспериментальной групп из пяти академических направлений. Методология включала количественный анализ грамматических навыков, мотивации и поведения, а также качественную интерпретацию интервью и рефлексивных дневников. Результаты показали значительное улучшение грамматической продуктивности, рост вовлечённости и внутренней мотивации, а также положительную связь между цифровой активностью и академической успеваемостью. Разработанная модель, объединяющая когнитивные, мотивационные и технологические компоненты, продемонстрировала высокую адаптивность в многоязычной среде. Полученные данные подтверждают значимость персонализированной обратной связи и игровых механизмов, открывая перспективы масштабирования модели в рамках цифровизации образования Казахстана.

**Ключевые слова:** искусственный интеллект, геймификация, многоязычное образование, иностранный язык, педагогика

**Introduction.** In an era when digital technologies no longer merely accompany the educational process but define its very architecture, foreign language teaching faces the urgent necessity to reconsider its foundational principles. We live in a world where algorithms can predict students' behavioral patterns, and virtual platforms simulate communicative situations with a degree of precision once reserved for live interaction. However, beneath the surface of

technological advancement emerge a range of pedagogical concerns: emotional disengagement, diminished intrinsic motivation, fragmented mastery of grammatical structures, and a shallow interaction with language as a dynamic cultural medium.

Such challenges are particularly evident in multilingual educational contexts such as Kazakhstan, where students simultaneously acquire several languages under

conditions of high cognitive load and cultural polyphony. In aforementioned contexts, traditional teaching methods: linear, reproductive, and control-oriented, are increasingly giving way to flexible, adaptive, and interactive approaches that account for individual learning trajectories. The relevance of the study is further underscored by Kazakhstan's national strategy for digital education and the Conceptual Framework for the Implementation of Artificial Intelligence in the Education System (2025–2029), which calls for ethical, scalable, and pedagogically sound integration of AI technologies. In this context, foreign language instruction becomes a testing ground for innovative, student-centered digital methodologies.

Hence arises the need for solutions that automate learning while restoring its human dimension – empathy, motivation, and engagement. A commonly adopted method is the synergy between Artificial Intelligence (AI) and gamification: the former serving as an instrument of personalization and adaptation, the latter as a mechanism of emotional engagement and playful interaction. Together they form a new paradigm of language education, where algorithms do not suppress but instead reinforce the humanistic essence of learning.

Object of the study – the process of foreign language acquisition in a multilingual university setting.

Subject of the study – the pedagogical impact of integrating artificial intelligence and gamification on students' motivation, cognitive engagement, and grammatical competence.

Hypothesis: It is hypothesized that the combined use of AI and gamified digital tools will significantly enhance students' grammatical productivity and intrinsic motivation compared to traditional instructional methods.

The study employs a mixed-methods approach, combining quantitative analysis of grammar test scores and motivation scales with qualitative data from student interviews and reflective journals. The quasi-experimental design ensures comparative validity across control and experimental groups, allowing for a nuanced understanding of how digital tools affect language learning in real classroom settings.

The purpose of the study is to evaluate how the combined implementation of AI and gamification influences students' motivation, cognitive engagement, and grammatical competence in foreign language learning within a multilingual educational environment.

Research objectives:

- To analyze theoretical approaches to the use of AI and gamification in foreign language teaching.
- To explore existing digital platforms and tools implementing AI and gamified elements.
- To design an experimental model integrating AI and gamification into a foreign language course.
- To conduct a pedagogical experiment with control and experimental groups.
- To assess the impact of the proposed model on students' motivation, engagement, and grammatical competence.
- To formulate practical recommendations for educators.

Research focus: the study investigates the impact of integrating Artificial Intelligence and gamified digital tools on students' motivation, cognitive engagement, and grammatical competence. It refines the mechanisms of digital motivation, develops a model of AI–gamification synergy, and contributes to modern methodologies in foreign language instruction.

Theoretical significance: the study contributes to the refinement of digital motivation mechanisms and expands existing models of adaptive learning by integrating

sociocultural and self-determination frameworks into AI-enhanced language instruction.

Practical significance: the results can be applied to enhance the effectiveness of language education in higher institutions, adapt teaching to students' digital habits, and support the design of innovative pedagogical solutions.

Literature Review. Recent scholarship has increasingly explored the intersection of gamification and artificial intelligence (AI) in language education. A systematic review published in *Frontiers in Psychology* (2023) demonstrated that gamification significantly enhances learner motivation, engagement, and language acquisition outcomes, though it also presents limitations such as short-term effects and technical instability.

Building on this foundation, researchers from Taylor & Francis (2024) emphasize that integrating AI with gamification promotes the development of 21st-century competencies, critical thinking, creativity, and digital literacy, while simultaneously supporting personalized learning experiences. A study presented at the AIP Conference Proceedings (2025) introduced a “synergy model” in which adaptive AI algorithms and game mechanics work in tandem to improve learner motivation and comprehension, thereby facilitating individualized learning trajectories. Similarly, findings published in the *Open Psychology Journal* (2025) revealed a positive correlation between gamification and cognitive processes such as working memory and attention, which contributed to enhanced linguistic performance.

A quasi-experimental study featured in the *International Journal of English Language Education* (2025) confirmed significant gains in learner motivation and grammatical productivity through the use of AI-powered chatbots embedded in gamified instructional settings. Data collected from the Busuu platform (2025) indicated that at least 16 hours of practice led to improvements in writing and speaking skills among all participants, while 8 or more hours resulted in lexical-grammatical gains for 88.7% of learners.

The theoretical underpinnings of these findings are grounded in the work of Karl Kapp (2012) and James Paul Gee (2003), who conceptualize gamification as a pedagogical tool and describe games as “learning machines” that provide continuous feedback and safe environments for experimentation. Edward Deci and Richard Ryan's Self-Determination Theory (2000) explain motivational mechanisms through the constructs of autonomy, competence, and relatedness. Lev Vygotsky's Sociocultural Theory (1978) frames learning within the zone of proximal development and emphasizes the role of digital mentorship. The proposed model draws upon these frameworks, reinterpreting them through the lens of digital learning environments and AI-supported scaffolding.

Kazakhstani scholars such as Kaliaskarova, Rzabayeva, Duisenova and Zhorabekova, and Nurasyil (various years) have confirmed the effectiveness of AI and gamification in multilingual educational contexts, particularly in enhancing learner motivation, communicative activity, and reducing language anxiety. However, most existing studies focus on general engagement and vocabulary acquisition, leaving grammatical competence as a relatively underexplored domain.

**Research Methodology.** The present investigation sought to examine how the integration of artificial intelligence and gamified digital tools influences university students' motivation, cognitive engagement, and grammatical competence in foreign language learning. The experimental phase was conducted during the spring semester of 2025, while the analytical processing and interpretation of findings were carried out in the autumn semester. A mixed-methods design, combining quantitative and qualitative approaches,

was selected to provide a multifaceted assessment encompassing both measurable learning outcomes and students' subjective perceptions of the digital environment. The selected methodological framework corresponds with contemporary trends in digital pedagogy (Luo, 2023; Springer, 2024), offering a more refined perspective on the ways in which technological tools influence the learning process.

The study involved 183 second- and third-year undergraduate students from five academic disciplines, divided into experimental ( $n = 92$ ) and control ( $n = 91$ ) groups. Participants met basic English proficiency and device access criteria. The experimental group was taught using AI-integrated and gamified platforms such as ChatGPT, Copilot,

Busuu, Kahoot, and Quizlet, while the control group followed a traditional curriculum. Groups studied identical grammatical topics as Present Perfect, Passive Voice, and Modal Verbs, but differed in delivery methods.

Effectiveness was measured through pre- and post-tests on grammatical competence, Likert-scale surveys on motivation and engagement, and behavioral data from Busuu. Qualitative insights were gathered via interviews, reflective journals, and digital artifacts. Quantitative data were analyzed using SPSS (t-tests, correlations), and qualitative data were coded in NVivo. To address external limitations such as internet access and digital literacy, the study included training, technical support, and regular feedback (See table 1).

Table 1. The structure of the experimental design

Research Stage	Duration	Methods	Purpose
Diagnostic	Week 1	Test, questionnaire, briefing	Determining the initial level and motivation
Main	Weeks 2-7	Digital learning (experimental) / traditional learning (control)	Examining the influence of AI and gamification on the learning process
Final	Week 8	Post-test, repeated questionnaire, interview, artifact analysis	Comparative analysis of outcomes and perceptions

The proposed methodology provides a solid foundation for analyzing the effectiveness of digital technologies in foreign language education and enables the formulation of practical recommendations for teachers working in a multilingual educational environment.

**Analysis and results.** During the study, both quantitative and qualitative data were obtained, reflecting the impact of integrating artificial intelligence and gamification on students' motivation, cognitive engagement, and grammatical competence. A comparative analysis revealed that the average grammar score in the experimental group increased from 62.4 to 81.7, while the control group showed a more modest improvement from 61.8 to 69.2. The difference in gains: 19.3 versus 7.4 points was statistically significant ( $p < 0.01$ ). Motivational indicators measured on a Likert scale were also higher in the experimental group: intrinsic motivation averaged 4.3, engagement 4.5, enjoyment 4.6, and goal awareness 4.2, compared to 3.4–3.7 in the control group.

Behavioral data collected from Busuu, ChatGPT, and Kahoot indicated that students in the experimental group spent an average of 42 minutes per day interacting with digital tools, completed 87% of assigned tasks, used AI approximately four times per week, and demonstrated a high level of autonomy (4.4 out of 5). Weekly tracking of grammar scores showed consistent growth, with a notable acceleration after the third week, coinciding with active use of ChatGPT and Kahoot.

Discipline-specific analysis revealed the highest gains among students in Information Technology (+21.3 points) and Pedagogy (+20.1), followed by Law and Accounting (+17 to +18.5). Engagement levels ranged from 4.1 (Law) to 4.7 (IT). Correlation analysis confirmed significant relationships: time spent on Busuu correlated with grammar improvement ( $r = 0.68$ ,  $p < 0.01$ ), intrinsic motivation with engagement ( $r = 0.74$ ,  $p < 0.01$ ), and frequency of AI use with increased confidence in grammar ( $r = 0.59$ ,  $p < 0.05$ ).

Qualitative data from interviews and reflective journals supported these findings, highlighting increased confidence, reduced anxiety, personalized learning, and emotional involvement. Students described AI as a supportive tool that clarified mistakes and made grammar practice enjoyable. Individual cases further illustrated the model's effectiveness: a pedagogy student improved from 58 to 89, an IT student created a mini-game in English and gained 26 points, and a law student with low initial motivation (2.8) reached an engagement level of 4.3 by week four.

Despite overall success, several technical challenges were noted: internet connectivity issues (12 cases, mostly in dormitories), initial confusion with the Busuu interface (7 cases), and a temporary decline in activity during week five (9 cases), coinciding with exam periods.

**Conclusion and Recommendations.** The conducted study confirmed the effectiveness of integrating artificial intelligence and gamification into the development of students' grammatical competence within a multilingual educational environment. The findings demonstrate a consistent positive trend in academic performance, enhanced motivation and engagement, and a more conscious approach to language learning. Those outcomes are particularly significant in the context of higher education in Kazakhstan, where multilingualism and digital transformation intersect in complex ways.

The results open new avenues for the advancement of theoretical models in digital education, particularly adaptive systems that merge AI technologies with game-based mechanics. The research contributes to the ongoing discourse on educational digitalization, expanding the understanding of how cognitive and emotional components of learning can be strengthened through technology. The model presented in the study can serve as a foundation for future empirical and interdisciplinary investigations in the fields of linguodidactics, digital pedagogy, and educational psychology. It also aligns with global trends in learner-centered design and personalized instruction, reinforcing the pedagogical value of AI-supported feedback loops and motivational scaffolding.

Despite the promising results, several aspects warrant further exploration. First, the long-term effects of AI and gamification on students' written production and communicative competence require deeper investigation, particularly in relation to sustained language retention and transfer. Second, it is essential to consider individual learner differences, aforementioned levels of digital literacy, motivational profiles, and disciplinary orientations, which may mediate the effectiveness of AI-enhanced instruction. Third, future studies should address the ethical dimensions of AI-assisted learning, including academic integrity, personalization, and data protection, especially in multilingual and multicultural contexts.

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