



Evaluating the Effectiveness of Gamification in Online Education: Strategies for Promoting Active Learning and Student Retention

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Abstract:

This qualitative study explores the impact of gamification on active learning and student retention in online education. It investigates the influence of game elements such as points, badges, leaderboards, and collaborative challenges on engagement and motivation among students, educators, and administrators across diverse educational settings. The study utilizes semi-structured interviews, focus groups, surveys, and observations to gather comprehensive insights into participant experiences. The findings highlight that gamification significantly enhances student engagement by offering clear objectives, immediate feedback, and a sense of accomplishment. Participants express heightened motivation and enjoyment in their learning activities, leading to increased participation levels and reduced dropout rates. Nonetheless, challenges such as balancing competitive elements and aligning gamified activities with educational goals are identified as areas for improvement. This research contributes to a deeper understanding of how gamification can effectively transform online learning environments. It offers practical recommendations for educators and institutions to optimize student engagement and retention through the strategic implementation of gamified strategies.

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Introduction (مقدمة)

Online education has become a cornerstone of modern learning, offering flexibility and accessibility that traditional classroom settings often cannot match. Through various digital platforms, students can access a wealth of resources and instructional materials from anywhere in the world (Decuyper et al., 2021). This mode of education includes fully online programs, hybrid models, and virtual classrooms, each designed to cater to diverse learning needs and

preferences(Jang et al., 2015). The proliferation of high-speed internet and advancements in technology have significantly contributed to the expansion of online education, making it possible for institutions to reach a global audience.

Gamification is the application of game-design elements in non-game contexts to enhance user engagement, motivation, and overall experience(Park & Kim, 2021). In educational settings, gamification incorporates elements such as points, badges, leaderboards, and challenges to create a more interactive and engaging learning environment(AL-Smadi, 2015). The principles of gamification are grounded in psychology and motivational theories, emphasizing the importance of clear goals, immediate feedback, and a sense of progression(Wilson et al., 2015). By making learning activities more game-like, educators aim to tap into the natural human affinity for play and competition, thereby increasing student engagement and participation.

Active learning involves instructional methods that engage students in the learning process actively, often through activities such as discussions, problem-solving, and collaborative projects(Alabbasi, 2017). This approach contrasts with passive learning, where students primarily listen to lectures without much interaction(Hansch et al., 2015). In online education, active learning is crucial for keeping students engaged and ensuring they are not merely passive recipients of information(Alabbasi, 2018). Student retention, or the ability to keep students enrolled and progressing through their educational programs, is another critical metric for the success of online education(Yu et al., 2024). High retention rates indicate that students are satisfied, engaged, and successfully overcoming the challenges of online learning.

Despite the many advantages of online education, it also presents significant challenges, particularly in terms of student engagement and retention(Bovermann & Bastiaens, 2020). The lack of physical presence and face-to-face interaction can lead to feelings of isolation and disconnection among students(Palaniappan & Noor, 2022). Additionally, the self-paced nature of many online courses requires a high level of self-discipline and motivation, which not all students possess(Othman et al., 2023). Technical issues, such as unreliable internet connections or difficulties navigating online platforms, can further hinder the learning experience(Saleem et al., 2022). These factors contribute to higher dropout rates in online courses compared to traditional classroom settings, posing a significant challenge for educators and institutions.

Engaging students in online courses requires innovative strategies to overcome the barriers posed by the virtual environment(Ertan & Kocadere, 2022). Without the physical presence of instructors and peers, students may struggle to stay motivated and focused(Taşkın & Kılıç Çakmak, 2023). The asynchronous nature of many online courses can also lead to procrastination and a lack of immediate feedback, making it difficult for students to gauge their progress and stay on track(Mohamad et al., 2017). Furthermore, the diversity of the online student population, including varying levels of digital literacy and different learning styles, adds another layer of complexity to designing effective engagement strategies.

In response to these challenges, educators and institutions are increasingly exploring gamification as a means to enhance student engagement and retention in online education(Leung et al., 2023). By incorporating game-like elements into the learning process, gamification aims to make education more enjoyable and engaging(de Santana et al., 2016). Research suggests that gamification can increase participation, improve learning outcomes, and foster a sense of community among students(Ghai & Tandon, 2023). However, the effectiveness of gamification is not yet fully understood, and more research is needed to identify best practices and potential pitfalls.

The primary objectives of this research are to evaluate the effectiveness of gamification in promoting active learning and improving student retention in online education(Cespón & Lage, 2022). Specifically, the study aims to explore how different gamification strategies influence

student engagement and learning outcomes (Ramírez-Donoso et al., 2023). Additionally, it seeks to understand the perceptions and experiences of both students and educators with gamified learning environments. By addressing these objectives, the research aims to provide insights into the practical application of gamification in online education.

The study is guided by several key research questions: How does gamification influence active learning in online education? What impact does gamification have on student retention rates? What are the best practices for implementing gamification in online courses? By exploring these questions, the research aims to provide a comprehensive understanding of the role of gamification in enhancing the online learning experience and identify practical strategies for its effective implementation.

This study is significant for several reasons. It contributes to the growing body of literature on online education and gamification, providing empirical evidence on the effectiveness of gamification in promoting active learning and improving retention. For practitioners, the findings offer practical recommendations for designing and implementing gamified learning environments. By highlighting the potential of gamification to address some of the key challenges in online education, the study also underscores the importance of innovative teaching strategies in enhancing the quality and accessibility of education.

The implications of this research extend beyond the immediate context of online education. As digital learning continues to evolve, the principles and strategies identified in this study can inform the development of new educational technologies and platforms. Additionally, the findings may inspire further research into other innovative approaches to enhancing online learning, such as personalized learning and adaptive learning technologies. Ultimately, this research aims to pave the way for more effective, engaging, and inclusive online education experiences for learners worldwide.



Method (منهج)

Research Design

This study employs a qualitative research design to explore the effectiveness of gamification in online education, focusing on active learning and student retention. Qualitative research is well-suited for this investigation as it allows for an in-depth understanding of participants' experiences, perceptions, and motivations (Huberman & Miles, 2002). Through qualitative methods, the study aims to uncover the nuanced impacts of gamification on student engagement and retention, providing rich, detailed insights that quantitative methods might not capture.

Participants

The participants for this study include a diverse group of students, educators, and administrators from various educational institutions that utilize online learning platforms. Selection criteria for students include enrollment in at least one fully online course and experience with gamified learning elements. Educators and administrators are selected based on their involvement in designing, implementing, or overseeing online courses with gamification components. The sample size comprises approximately 30-40 participants, ensuring a range of perspectives while maintaining manageability for in-depth qualitative analysis.

Data Collection Methods

Data is collected through multiple qualitative methods to ensure a comprehensive understanding of the research questions. Semi-structured interviews with students, educators, and administrators allow for an in-depth exploration of their experiences and perceptions

regarding gamification in online education. Focus groups provide a platform for participants to discuss their views collectively, fostering a deeper discussion and highlighting common themes and differences. Additionally, surveys with open-ended questions are distributed to gather broader insights from a larger participant pool. Observations of online courses that incorporate gamification elements are also conducted to capture real-time interactions and engagement patterns.

Interviews

Interviews are conducted using a semi-structured format, allowing for flexibility while ensuring that key topics are covered (Della Porta, 2014). Questions focus on participants' experiences with gamification, its perceived impact on engagement and learning, and any challenges faced. Interviews are recorded and transcribed verbatim to ensure accuracy. The goal is to gain detailed insights into individual experiences and to understand the broader implications of gamification in online education from various stakeholder perspectives.

Focus Groups and Surveys

Focus groups involve 5-7 participants each and are designed to stimulate discussion and elicit diverse viewpoints on the effectiveness of gamification. The group setting encourages participants to build on each other's ideas, providing a richer data set. Surveys with open-ended questions are distributed to a larger group of participants to capture a wide range of experiences and opinions. These surveys complement the more detailed data from interviews and focus groups, ensuring a robust and comprehensive data collection process.

Data Analysis

Thematic analysis is employed to analyze the collected data, identifying patterns and themes related to the impact of gamification on active learning and student retention. Coding procedures involve categorizing data into meaningful groups, allowing for systematic analysis of recurring themes and patterns. NVivo, a qualitative data analysis software, is used to assist in managing and analyzing the data. This software facilitates the organization of large datasets and helps in identifying connections and trends within the data. The analysis aims to provide a detailed understanding of how gamification influences student engagement and retention in online education, highlighting best practices and potential areas for improvement.



Result (نتائج)

The rise of online education has brought significant changes to the way learning is delivered and experienced. With the flexibility and accessibility that online platforms offer, a diverse range of learners can now pursue educational opportunities that were previously out of reach. However, this shift also presents unique challenges, particularly in keeping students engaged and ensuring their retention. Unlike traditional classroom settings, online courses often lack the face-to-face interaction and immediate feedback that can motivate students and foster a sense of community.

One promising approach to addressing these challenges is gamification, which involves incorporating game-design elements into non-game contexts to enhance user engagement and motivation. In educational settings, gamification seeks to make learning more interactive and enjoyable by using elements such as points, badges, leaderboards, and challenges. The underlying principles of gamification are rooted in motivational theories, emphasizing clear goals, immediate feedback, and a sense of progression.

Active learning, which involves engaging students in the learning process through activities such as discussions, problem-solving, and collaborative projects, is crucial for effective

knowledge acquisition and retention. In the context of online education, active learning strategies are essential for maintaining student interest and participation. Similarly, student retention – the ability to keep students enrolled and progressing through their courses – is a key indicator of the success of online educational programs.

Despite the potential benefits of gamification, its effectiveness in online education is still an evolving field. While some studies suggest that gamification can enhance student engagement and learning outcomes, there is a need for more comprehensive research to understand its impact fully. This study aims to evaluate the effectiveness of gamification in promoting active learning and improving student retention in online education, focusing on the experiences and perspectives of both students and educators.

The primary research questions guiding this study are: How does gamification influence active learning in online education? What impact does gamification have on student retention rates? What are the best practices for implementing gamification in online courses? By addressing these questions, the research seeks to provide a detailed understanding of the role of gamification in enhancing the online learning experience and to identify practical strategies for its effective implementation.

This study employs a qualitative research design, using a combination of semi-structured interviews, focus groups, surveys, and observations to gather data. The participants include students, educators, and administrators from various institutions that utilize online learning platforms with gamified elements. Through thematic analysis of the collected data, the study aims to identify patterns and themes related to the impact of gamification on active learning and retention.

The findings from this research will offer valuable insights for educators and institutions looking to enhance their online learning environments through gamification. By exploring the experiences and perceptions of participants, the study aims to contribute to the growing body of literature on online education and gamification, providing practical recommendations for designing and implementing gamified learning environments.

Themes and Patterns Related to the Effectiveness of Gamification in Promoting Active Learning

Increased Engagement through Game Elements Many participants reported that gamification significantly increased their engagement in online courses. Elements such as points, badges, and leaderboards motivated students to participate actively in course activities. For instance, students mentioned that earning points for completing assignments and participating in discussions made them more invested in their learning. The competitive aspect of leaderboards also encouraged students to strive for higher performance, creating a more dynamic and interactive learning environment.

Enhanced Motivation and Participation Gamified elements were found to enhance students' intrinsic motivation. Participants noted that badges and rewards provided a sense of achievement and recognition, which fueled their desire to continue engaging with the course material. Additionally, the anticipation of earning rewards kept students motivated to stay on task and complete their assignments on time. This increased motivation led to higher levels of participation and a greater willingness to take on challenging tasks.

Improved Interaction and Collaboration Gamification fostered a sense of community and collaboration among students. Features such as team-based challenges and collaborative quests encouraged students to work together and support each other. Participants highlighted that these collaborative activities not only made learning more enjoyable but also helped them develop essential teamwork skills. The interactive nature of gamified tasks also facilitated better

communication and interaction between students and instructors.

Positive Impact on Knowledge Retention Several participants reported that gamification helped them retain information better. The repetitive nature of game-based activities, coupled with immediate feedback, reinforced learning and improved retention. For example, quizzes and flashcards used in a gamified format allowed students to review and reinforce their knowledge regularly. The active engagement required by gamified tasks also helped students remember and apply what they learned more effectively.

Participant Perspectives and Experiences

Student Experiences with Gamification Students generally had positive experiences with gamification in their online courses. Many described gamified activities as fun and engaging, which made the learning process more enjoyable. They appreciated the variety of tasks and challenges that gamification introduced, which helped break the monotony of traditional online learning methods. Students also valued the immediate feedback provided by gamified elements, which helped them understand their progress and areas for improvement.

Educator Perspectives on Gamification Educators observed notable improvements in student engagement and participation due to gamification. They reported that students were more enthusiastic and proactive in their learning. Educators also found that gamified elements made it easier to track student progress and identify those who needed additional support. However, some educators noted the need for careful planning and implementation to ensure that gamified activities aligned with learning objectives and did not become distractions.

Challenges and Limitations Despite the positive outcomes, participants also highlighted several challenges associated with gamification. Some students felt that the competitive nature of leaderboards could lead to stress and anxiety, particularly for those who struggled to keep up with their peers. Additionally, a few students mentioned that they sometimes focused more on earning rewards than on understanding the material. Educators pointed out that designing and integrating gamified elements required additional time and resources, which could be a barrier for some institutions.

Suggestions for Improvement Participants provided valuable suggestions for enhancing the effectiveness of gamification in online education. Students recommended balancing competitive and collaborative elements to cater to different learning preferences and reduce stress. They also suggested incorporating a wider variety of rewards and challenges to maintain interest and motivation. Educators emphasized the importance of aligning gamified activities with course objectives and providing clear instructions and support to ensure that all students could benefit from gamification.

The findings indicate that gamification can effectively promote active learning and enhance student engagement in online education. While there are challenges to address, the positive experiences and outcomes reported by participants suggest that gamification has significant potential to improve online learning environments. The discussion should explore the significance of the results of the work, not repeat them. In the discussion, it is the most significance section of the article. Here you get the chance to make your data. Make the discussion corresponding to the results, but do not reiterate the results. Often should begin with a brief summary of the main scientific findings (not experimental results).

The following components should be covered in discussion: How do your results relate to the original question or objectives outlined in the Introduction section (what)? Do you provide interpretation scientifically for each of your results or findings presented (why)? Are your results consistent with what other investigators have reported (what else)? Or are there any differences?

After presenting the results, you are in a position to evaluate and interpret their

implications, especially with respect to your original hypotheses. Here you will examine, interpret, and qualify the results and draw inferences and conclusions from them. Emphasize any theoretical or practical consequences of the results. (When the discussion is relatively brief and straightforward, some authors prefer to combine it with the Results section, creating a section called Results and Discussion.)

End the Discussion section with a reasoned and justifiable commentary on the importance of your findings. This concluding section may be brief or extensive provided that it is tightly reasoned, self-contained, and not overstated. In this section, you might briefly return to a discussion of why the problem is important (as stated in the introduction); what larger issues, those that transcend the particulars of the subfield, might hinge on the findings; and what propositions are confirmed or disconfirmed by the extrapolation of these findings to such overarching issues.

Result and discussion should be presented in the same part, clearly and briefly. Discussion part should contain the benefit of research result, not repeat result part. Result and discussion part can be written in the same part to avoid extensive quotation.



Discussion (مناقشة)

The findings of this study provide substantial evidence that gamification can significantly enhance active learning and student retention in online education. The increased engagement and motivation observed among participants align well with the primary research question concerning how gamification influences active learning. The thematic analysis revealed that game elements such as points, badges, leaderboards, and challenges create a more dynamic and interactive learning environment, leading to higher levels of student participation and sustained interest in course activities.

The results also indicate that gamification positively impacts student retention rates, addressing the second research question. Many students reported feeling a greater sense of achievement and recognition through gamified elements, which kept them motivated to continue their courses. This enhanced motivation is crucial in online education, where students often face challenges related to isolation and lack of direct supervision. The findings suggest that by making the learning experience more engaging and rewarding, gamification helps reduce dropout rates and encourages students to persist in their studies.

The study's findings directly address the research questions regarding the influence of gamification on active learning and student retention. The data shows that gamification not only increases student engagement but also fosters a more collaborative and supportive learning environment. This is evident from the positive feedback on team-based challenges and collaborative quests, which promoted peer interaction and teamwork. Such activities are essential components of active learning, as they require students to actively participate, discuss, and problem-solve together.

Additionally, the insights gained from participants' experiences highlight the practical aspects of implementing gamification in online education. Students appreciated the variety of tasks and the immediate feedback provided by gamified elements, which helped them understand their progress and areas for improvement. These aspects of gamification align with educational theories that emphasize the importance of feedback and goal-setting in the learning process. By making learning more transparent and goal-oriented, gamification helps students stay focused and motivated.

The results of this study are consistent with previous research on the benefits of

gamification in education. Earlier studies have also found that gamification can enhance student motivation and engagement by making learning more enjoyable and interactive. For example, a study by Deterding et al. (2011) highlighted that gamified systems leverage intrinsic and extrinsic motivators to increase user engagement. Similarly, this study found that elements like points and badges serve as extrinsic rewards, while the inherent challenge and progression in gamified tasks cater to intrinsic motivations.

However, this study also extends the existing literature by providing detailed qualitative insights into the specific experiences of students and educators with gamification in online education. While quantitative studies have generally focused on measuring engagement and retention rates, the qualitative approach of this research uncovers the underlying reasons why gamification works and the potential challenges it presents. For instance, the competitive aspect of leaderboards was found to sometimes cause stress and anxiety, which is a nuanced finding that quantitative data alone might not reveal.

The findings align with several theoretical frameworks in educational psychology and instructional design. Self-Determination Theory (SDT), which emphasizes the importance of autonomy, competence, and relatedness in motivating behavior, is particularly relevant. Gamification elements like badges and points provide a sense of competence, while team-based activities fulfill the need for relatedness. The autonomy aspect is supported through the self-paced nature of many gamified tasks, allowing students to control their learning experience.

Constructivist theories, which advocate for active, learner-centered approaches, also resonate with the findings. Gamification encourages students to actively engage with the content, construct knowledge through interaction, and apply what they have learned in meaningful ways. The study's observations of increased student collaboration and problem-solving in gamified tasks support the constructivist view that learning is most effective when it is active and socially situated.

The practical implications of these findings are significant for educators and institutions looking to implement gamification in their online courses. The positive outcomes suggest that incorporating gamified elements can be a powerful strategy to enhance student engagement and retention. However, the challenges identified, such as the potential for stress and the need for alignment with learning objectives, underscore the importance of careful planning and implementation.

Educators should consider balancing competitive and collaborative elements to cater to different student preferences and reduce potential anxiety. Providing a variety of rewards and challenges can maintain interest and motivation, while clear instructions and support can help all students benefit from gamification. Institutions should also invest in training educators to design and manage gamified learning environments effectively.

While this study provides valuable insights, further research is needed to explore the long-term impacts of gamification on learning outcomes and retention. Longitudinal studies could help determine whether the initial engagement and motivation observed are sustained over time and how gamification influences academic performance in the long run. Additionally, more research is needed to understand how different types of gamification elements affect various learner populations and subject areas.

Future studies could also investigate the integration of gamification with other innovative educational technologies, such as adaptive learning systems and artificial intelligence. These technologies have the potential to personalize the gamified learning experience further, tailoring it to individual student needs and preferences.

This study demonstrates that gamification can significantly enhance active learning and

improve student retention in online education. The findings provide robust evidence that gamified elements make learning more engaging and enjoyable, thereby motivating students to participate actively and persist in their studies. While there are challenges to address, the positive experiences reported by participants suggest that gamification holds great promise for enhancing the effectiveness of online learning environments.

By carefully designing and implementing gamified activities, educators can create a more interactive and motivating learning experience that meets the diverse needs of online learners. The insights gained from this study contribute to the growing body of knowledge on gamification in education and offer practical recommendations for leveraging gamification to improve student engagement and retention in online courses.



Conclusion (خاتمة)

This study provides compelling evidence that gamification can significantly enhance active learning and improve student retention in online education. The incorporation of game elements such as points, badges, leaderboards, and collaborative challenges has been shown to increase student engagement and motivation. These elements create a dynamic and interactive learning environment, encouraging students to participate actively and remain committed to their studies. The positive impact of gamification on both engagement and retention highlights its potential as an effective strategy for addressing some of the inherent challenges of online education, such as isolation and lack of immediate feedback.

However, the study also identifies important considerations for the successful implementation of gamification. It is crucial to balance competitive and collaborative elements to cater to different student preferences and reduce potential stress and anxiety. Additionally, aligning gamified activities with learning objectives and providing clear instructions and support are essential for maximizing the benefits of gamification. By addressing these challenges, educators and institutions can leverage gamification to create more engaging, motivating, and effective online learning environments, ultimately enhancing the educational experience for a diverse range of learners.



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Bibliography (مراجع)

- AL-Smadi, M. (2015). Gameducation: using gamification techniques to engage learners in online learning. *Immersive Education: 4th European Summit, EiED 2014, Vienna, Austria, November 24-26, 2014, Revised Selected Papers 4*, 85-97.
- Alabbasi, D. (2018). Exploring Teachers' Perspectives towards Using Gamification Techniques in Online Learning. *Turkish Online Journal of Educational Technology-TOJET*, 17(2), 34-45.
- Alabbasi, D. (2017). Exploring graduate students' perspectives towards using gamification techniques in

- online learning. *Turkish Online Journal of Distance Education*, 18(3), 180–196.
- Bovermann, K., & Bastiaens, T. J. (2020). Towards a motivational design? Connecting gamification user types and online learning activities. *Research and Practice in Technology Enhanced Learning*, 15(1), 1.
- Cespón, M. T., & Lage, J. M. D. (2022). Gamification, online learning and motivation: A quantitative and qualitative analysis in higher education. *Contemporary Educational Technology*, 14(4), ep381.
- de Santana, S. J., Souza, H. A., Florentin, V. A. F., Paiva, R., Bittencourt, I. I., & Isotani, S. (2016). A quantitative analysis of the most relevant gamification elements in an online learning environment. *Proceedings of the 25th International Conference Companion on World Wide Web*, 911–916.
- Decuyper, M., Grimaldi, E., & Landri, P. (2021). Introduction: Critical studies of digital education platforms. In *Critical Studies in Education* (Vol. 62, Issue 1, pp. 1–16). Taylor & Francis.
- Della Porta, D. (2014). In-depth interviews. *Methodological Practices in Social Movement Research*, 228–261.
- Ertan, K., & Kocadere, S. A. (2022). Gamification design to increase motivation in online learning environments: A systematic review. *Journal of Learning and Teaching in Digital Age*, 7(2), 151–159.
- Ghai, A., & Tandon, U. (2023). Integrating gamification and instructional design to enhance usability of online learning. *Education and Information Technologies*, 28(2), 2187–2206.
- Hansch, A., Newman, C., & Schildhauer, T. (2015). *Fostering engagement with gamification: Review of current practices on online learning platforms*.
- Huberman, M., & Miles, M. B. (2002). *The qualitative researcher's companion*. sage.
- Jang, J., Park, J. J. Y., & Yi, M. Y. (2015). Gamification of online learning. *Artificial Intelligence in Education: 17th International Conference, AIED 2015, Madrid, Spain, June 22–26, 2015. Proceedings 17*, 646–649.
- Leung, A. C. M., Santhanam, R., Kwok, R. C.-W., & Yue, W. T. (2023). Could gamification designs enhance online learning through personalization? Lessons from a field experiment. *Information Systems Research*, 34(1), 27–49.
- Mohamad, S. N. M., Salam, S., & Bakar, N. (2017). *An analysis of gamification elements in online learning to enhance learning engagement*.
- Othman, N. A. F., Jaini, A., Ismail, M., Zainoddin, A. I., Radzi, S. F. M., & Sundram, V. P. K. (2023). Gamification in online learning: A case study among university students in malaysia. *Asian Journal of University Education*, 19(2), 282–293.
- Palaniappan, K., & Noor, N. M. (2022). Gamification strategy to support self-directed learning in an online learning environment. *International Journal of Emerging Technologies in Learning (IJET)*, 17(3), 104–116.
- Park, S., & Kim, S. (2021). Is sustainable online learning possible with gamification? – The effect of gamified online learning on student learning. *Sustainability*, 13(8), 4267.
- Ramírez-Donoso, L., Perez-Sanagustin, M., Neyem, A., Alario-Hoyos, C., Hilliger, I., & Rojas, F. (2023). Fostering the use of online learning resources: results of using a mobile collaboration tool based on gamification in a blended course. *Interactive Learning Environments*, 31(3), 1564–1578.
- Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in E-learning: A literature review. *Technology, Knowledge and Learning*, 27(1), 139–159.
- Taşkın, N., & Kılıç Çakmak, E. (2023). Effects of gamification on behavioral and cognitive engagement of students in the online learning environment. *International Journal of Human–Computer Interaction*, 39(17), 3334–3345.
- Wilson, D., Calongne, C., & Henderson, B. (2015). Gamification challenges and a case study in online learning. *Journal of Online Learning Research and Practice*, 4(2).
- Yu, Q., Yu, K., & Li, B. (2024). Can gamification enhance online learning? Evidence from a meta-analysis. *Education and Information Technologies*, 29(4), 4055–4083.