



Gamification and Artificial Intelligence Integration in Online Learning

Fitriyanti Rusbi¹, Andi Arwati¹

¹Faculty of Teacher Training and Education, Cokroaminoto University, Palopo, Indonesia

*Corresponding Author: Fitriyanti Rusbi

E-mail: fitrayniurs@gmail.com

Article Info

Article History:

Received: 23 July 2026

Revised: 3 September 2026

Accepted: 17 September 2026

Keywords:

Artificial Intelligence, Digital Learning, Gamification, Higher Education, Online Learning, Student Engagement

Abstract

The rapid adoption of digital technologies in higher education has increased the need to develop effective approaches for improving student engagement in online learning. This study aims to explore students' experiences of integrating Artificial Intelligence and gamification in online learning at a public university in Indonesia and identify factors influencing learning engagement. A qualitative case study approach was employed through interviews and thematic analysis of students' learning experiences. The findings reveal that Artificial Intelligence enhances engagement through personalized support, adaptive feedback, and learning autonomy, while gamification promotes motivation and active participation. The integration of both technologies creates interactive learning experiences that strengthen cognitive, behavioral, and emotional engagement. The study contributes practical insights for higher education institutions in designing student centered digital learning environments and highlights the importance of aligning technological innovation with meaningful pedagogical strategies.

INTRODUCTION

The rapid digital transformation of higher education has reshaped how teaching and learning are designed, delivered, and evaluated. Online learning environments have developed from basic content repositories into interactive ecosystems supported by technologies that enable personalized, collaborative, and data-driven learning. Despite expanding educational accessibility and flexibility, digital learning has also raised concerns about declining student engagement, limited participation, and reduced learning persistence (Yadav, 2024; Arifudin, 2025; Tate & Warschauer, 2022; Aspandi & Muttaqin, 2025). These challenges have become particularly evident with the continued adoption of online and hybrid learning, where sustaining meaningful cognitive, emotional, and behavioral engagement remains a persistent concern in higher education (Mulenga & Shilongo, 2025; Bidarra et al., 2025; Hill & Smith, 2023; Singh et al., 2022; Gamage et al., 2022). Consequently, universities increasingly require instructional approaches that can maintain meaningful student involvement in technology-mediated learning environments.

Gamification has emerged as an important strategy for addressing engagement challenges by incorporating game-based elements such as points, badges, leaderboards, challenges, progress indicators, and immediate feedback into learning activities (Saleem et al., 2022; Bennani et al., 2022; Ghai & Tandon, 2023; Ng & Lo, 2022; Tabe, 2025; Kabilan et al., 2023). These mechanisms can make learning activities more motivating and encourage participation, persistence, course completion, and knowledge retention. However, evidence indicates that the effectiveness of gamification depends on instructional design, learner characteristics, and implementation context rather than simply on the presence of game mechanics. Poorly designed gamification may encourage superficial participation without supporting meaningful learning (Hadi Mogavi et al., 2022; Dah et al., 2025; Ullah et al., 2026; Jose et al., 2024; Zainuddin et al., 2024). Understanding students' experiences is therefore important for determining how gamification contributes to sustained engagement.

Artificial Intelligence (AI) has simultaneously become an increasingly important component of digital education. Intelligent tutoring systems, learning analytics, adaptive recommendation systems, and generative AI can provide personalized feedback, adaptive learning pathways, automated assessment, and continuous learning support. These capabilities position AI not only as a tool for instructional automation but also as a means of supporting learner-centered education through responsive and individualized learning experiences (Kavitha et al., 2025; Kolhatin, 2025; Chu & Ashraf, 2025). The use of AI can therefore complement gamification by addressing individual learning needs while maintaining interactive and responsive learning environments (Vetrivel et al., 2024; Zairon et al., 2025; Oliveira et al., 2023; Manoharan & Nagulapally, 2024).

The integration of gamification and AI offers a potentially complementary approach to student engagement. Gamification primarily supports motivation through challenge, achievement, interaction, and enjoyment, whereas AI facilitates personalization by adapting learning support to students' progress and behavior (Zhao, 2025). Their combination may create learning environments that are simultaneously adaptive, interactive, and motivating, with the potential to sustain engagement throughout the learning process. However, the effectiveness of such integration is influenced by pedagogical design, institutional conditions, technological readiness, and students' perceptions of technology-supported learning. These factors suggest that examining the integration of both technologies requires attention not only to measurable outcomes but also to how students experience and interpret the learning process.

Despite growing research on gamification and AI, important gaps remain. Previous studies have largely examined these technologies independently and have frequently relied on quantitative approaches focusing on motivation, learning performance, technology acceptance, or system effectiveness. Consequently, students' lived experiences of using AI and gamification together remain less understood, particularly in public universities in developing-country contexts. Empirical evidence from Indonesian higher education is also limited despite the increasing use of AI-supported digital learning. This study addresses these gaps by qualitatively exploring students' experiences of AI-integrated gamified online learning at a public university in Indonesia, with particular attention to the factors shaping student engagement. Its novelty lies in examining the two technologies as an integrated learning experience and capturing students' authentic perspectives within a developing-country higher education context. The study is expected to contribute to the understanding of technology-enhanced engagement and inform the design of more adaptive, motivating, and learner-centered online learning environments.

METHODS

Research Design

This study used a qualitative case study design to examine students' experiences with the integration of Artificial Intelligence (AI) and gamification in online learning at a public university in Indonesia. The qualitative approach was selected to capture students' perceptions, experiences, and interpretations of technology-enhanced learning within its actual educational context. The case study design also enabled consideration of the pedagogical, institutional, and technological conditions that shaped student engagement (Creswell & Poth, 2018; Yin, 2018).

Research Context and Participants

The study was conducted at a public university where online learning incorporates AI-supported technologies and gamification features, such as personalized recommendations, automated feedback, quizzes, badges, and leaderboards. Participants were undergraduate students who had used these technologies for at least one semester. Purposive sampling was applied to select students with direct experience of AI-integrated gamified learning. Data collection continued until thematic saturation was reached, when subsequent interviews no longer generated substantial new information.

Data Collection

Data were obtained primarily through semi-structured interviews conducted either face-to-face or online. The interviews explored students' experiences of AI-assisted learning and gamification, particularly personalization, motivation, interaction, learning support, challenges, and perceived effects on engagement. Interview data were supplemented with observations of the online learning environment and relevant documents, including institutional guidelines, course materials, and digital learning records. The combination of these sources provided methodological triangulation and strengthened the contextual interpretation of participants' experiences (Patton, 2015).

Data Analysis

Data analysis followed the six-phase thematic analysis framework of Braun and Clarke (2022). Interview transcripts were reviewed to establish familiarity with the data, followed by initial coding of statements relevant to AI, gamification, and student engagement. Related codes were grouped into categories and developed into broader themes. The themes were reviewed and refined in relation to the research objectives, while constant comparison was used to identify similarities and differences across participants. The resulting themes represented the main patterns underlying students' experiences of AI-supported gamified learning. Trustworthiness was established through triangulation, member checking, systematic documentation, and researcher reflexivity. Triangulation involved comparing interview, observation, and documentary evidence, while selected participants were invited to review the researchers' interpretations of their responses. Detailed documentation of the research and coding procedures supported dependability, whereas an audit trail and reflexive practices strengthened confirmability. These procedures addressed credibility, transferability, dependability, and confirmability in accordance with established qualitative research standards (Lincoln & Guba, 1985; Nowell et al., 2017).

RESULTS AND DISCUSSION

This section presents the findings from the qualitative investigation of students' experiences regarding the integration of gamification and Artificial Intelligence in online learning at a public university in Indonesia. The analysis focused on identifying factors that influenced student engagement through students' perceptions, interactions, and experiences with AI supported and gamified learning environments. Based on the thematic analysis of interview data, four main themes were identified, namely Artificial Intelligence supported personalization, gamification driven motivation, integrated AI and gamification learning experiences, and challenges associated with technology implementation. These themes illustrate how technological integration shaped students' behavioral, cognitive, and emotional engagement during online learning activities.

Artificial Intelligence Supported Personalization Enhances Learning Engagement

The first theme identified from the interview data highlights the role of Artificial Intelligence in supporting personalized learning experiences and improving student engagement in online learning. Participants perceived AI as a supportive learning tool that helped them access explanations, receive immediate responses, and overcome difficulties when studying independently. Unlike conventional online learning environments that often provide the same materials and activities for all students, AI supported systems were perceived as more responsive because they allowed students to interact with learning content based on their individual needs and learning progress.

One participant explained that the availability of AI assistance changed the way they approached online learning activities because they no longer had to wait for external support when encountering difficulties.

"Before using AI based learning support, I usually stopped studying when I found difficult concepts because I needed to wait for the lecturer's explanation or search through many different sources. With AI assistance, I can immediately ask questions and receive explanations that help me understand the topic better. It makes me more motivated to continue learning because I feel that I have support whenever I need it."

This statement indicates that AI reduced learning barriers by providing immediate academic assistance. The participant's experience demonstrates that accessibility and responsiveness were important factors influencing engagement, particularly in online learning contexts where students often experience limited interaction compared with traditional classroom environments. The ability to obtain instant clarification encouraged students to remain involved in learning activities and reduced frustration caused by uncertainty during the learning process. Another participant emphasized that AI supported their learning through personalized recommendations and explanations that matched their level of understanding.

"The most useful part of using AI is that it can adjust the explanation according to what I need. Sometimes I understand the basic concept but still have difficulties with deeper analysis. The AI helps explain the material step by step, so I can study according to my own learning pace instead of following the same speed as other students."

This experience suggests that personalization was a key mechanism through which AI contributed to cognitive engagement. Students perceived AI not only as an information provider but also as a learning partner that supported individual differences in knowledge development. The adaptive nature of AI encouraged students to actively explore learning materials, reflect on their understanding, and continue improving their knowledge independently. A third participant further

described how AI influenced their confidence and participation during online learning activities.

"Using AI before joining online discussions helps me prepare better. I can review the material, ask questions, and check my understanding. Because I feel more prepared, I become more confident when participating in discussions and completing assignments."

This finding further demonstrates that AI supported engagement beyond individual learning activities by influencing students' readiness to participate in collaborative learning environments. The interaction between AI assistance and student confidence suggests that personalized learning support can strengthen both cognitive and behavioral engagement.

Gamification Features Promote Motivation and Active Participation

The second theme identified from the interview data concerns the role of gamification features in increasing students' motivation and active participation in online learning activities. Participants described that the incorporation of game elements such as points, achievement indicators, progress tracking, challenges, and rewards created a more engaging learning atmosphere compared with conventional online learning formats. These features were perceived as mechanisms that encouraged students to participate more consistently, complete learning tasks, and monitor their own progress throughout the learning process.

One participant explained that gamification elements influenced their willingness to actively participate because learning activities became more interactive and provided a sense of achievement.

"When the online course only provides materials and assignments, sometimes I feel less motivated because there is no indication of my progress. However, when the system provides points, progress levels, or achievements, I feel more encouraged to complete the activities. It feels like there is a target that I want to achieve, even though it is still part of the learning process."

This response indicates that gamification contributed to behavioral engagement by transforming learning activities into structured experiences with clear goals and progress indicators. The presence of achievement mechanisms helped students visualize their learning development and encouraged continuous participation. Rather than perceiving assignments as isolated tasks, students began to view them as part of a progressive learning journey.

Another participant highlighted the motivational influence of competition and comparison features within gamified online learning environments.

"The leaderboard feature makes me more aware of my participation because I can see my position compared with other students. It does not mean that I always want to compete, but it motivates me to become more active and not fall behind. I become more disciplined in completing quizzes and assignments."

This finding demonstrates that gamification influenced students' motivation through social interaction and achievement orientation. The leaderboard function created external motivation by encouraging students to maintain their participation and improve their performance. However, the participant also suggested that competition was effective when implemented as a supportive mechanism rather than as a source of pressure. This indicates that the impact of gamification depends on how students interpret and experience the competitive elements.

A third participant provided a more balanced perspective regarding the use of rewards and game based features in online learning.

"The rewards and badges are interesting because they make the learning process less monotonous. However, I think the most important thing is still the quality of the learning materials. Gamification helps me stay interested, but it cannot replace meaningful explanations and interaction with lecturers."

This statement reveals that students viewed gamification as a supporting element rather than the main determinant of learning effectiveness. While game mechanics increased motivation and reduced boredom, students emphasized that engagement was strongest when gamification was combined with relevant content and effective instructional strategies. The findings demonstrate that gamification enhanced student engagement by increasing motivation, encouraging participation, and providing visible indicators of learning progress. Students perceived gamified elements as valuable tools for maintaining interest and persistence in online learning environments. However, the effectiveness of gamification depended on its alignment with educational objectives, suggesting that game elements should be strategically designed to support meaningful learning rather than merely increase participation.

Integration of Artificial Intelligence and Gamification Creates Interactive Learning Experiences

The third theme highlights how the combination of Artificial Intelligence and gamification created a more interactive and engaging online learning experience. Participants indicated that the effectiveness of these technologies was not only determined by their individual functions but also by how they complemented each other during the learning process. Artificial Intelligence was perceived as providing personalized academic support, while gamification contributed motivational elements that encouraged participation and persistence. The integration of both technologies created a learning environment where students felt more involved, supported, and motivated to actively engage with online learning activities.

One participant described how the combination of AI assistance and gamified activities changed their overall learning experience.

"When AI and gamification are combined, online learning feels more interactive. AI helps me understand the material when I have difficulties, while the gamification elements encourage me to complete activities and continue learning. If there is only AI, it helps with understanding, but sometimes learning can still feel passive. The game elements make me more interested in participating."

This statement illustrates that students perceived AI and gamification as complementary components that addressed different aspects of engagement. AI primarily supported cognitive engagement by improving understanding and providing personalized assistance, whereas gamification strengthened behavioral engagement by encouraging participation and completion of learning tasks. The interaction between these two approaches created a more balanced learning experience that combined academic support with motivational reinforcement.

Another participant emphasized that the integration of these technologies increased their sense of involvement in online learning activities.

"Previously, online learning sometimes felt like just reading materials and submitting assignments. After using learning activities supported by AI feedback and game features, I became more involved because I could interact with the system. I could see my progress, receive suggestions, and understand what I needed to improve."

This finding suggests that integrated technology transformed online learning from a passive process into a more interactive experience. The combination of continuous

feedback and progress monitoring encouraged students to reflect on their learning development. Participants perceived that these features increased their awareness of learning goals and supported self regulation, which are important components of sustained engagement.

A third participant explained that the integrated approach influenced their emotional connection with online learning.

"The biggest difference is that learning becomes more enjoyable. The AI support reduces the feeling of being alone when studying online, while gamification makes the activities more interesting. I feel that the learning platform is responding to me, not just giving instructions."

This perspective demonstrates that the integration of AI and gamification also influenced emotional engagement. Students experienced the learning environment as more responsive and supportive, reducing feelings of isolation commonly associated with online learning. The perception of interaction with the learning system contributed to a stronger sense of connection and involvement. The findings indicate that the integration of Artificial Intelligence and gamification generated a more comprehensive engagement experience by combining personalization, motivation, and interaction. While AI enhanced students' ability to access individualized learning support, gamification encouraged active participation through motivational mechanisms. Together, these technologies contributed to a more adaptive and student centered online learning environment. The findings further suggest that the value of technology integration lies not merely in adopting advanced tools but in designing meaningful learning experiences that address multiple dimensions of student engagement.

Challenges in Implementing AI Integrated Gamified Learning

The fourth theme identified from the data concerns the challenges experienced by students during the implementation of AI integrated gamified learning. Although participants generally perceived the integration of Artificial Intelligence and gamification as beneficial for improving engagement, they also identified several limitations that influenced their learning experiences. These challenges were mainly related to technological accessibility, differences in digital literacy, concerns regarding AI reliability, and the possibility that gamification features could shift students' attention from meaningful learning toward superficial achievement. These findings indicate that successful technology integration requires not only advanced digital tools but also appropriate institutional support and pedagogical consideration.

One participant highlighted that technological conditions influenced the effectiveness of AI supported and gamified learning activities.

"The system is useful, but sometimes the experience depends on internet access and device availability. When the connection is unstable, the interactive features do not work smoothly, and it reduces my motivation to continue the activity. Sometimes I have already been interested in completing the task, but technical problems interrupt the learning process."

This statement indicates that infrastructure remains an important factor affecting students' engagement with digital learning environments. Although AI and gamification can provide interactive experiences, technological barriers may reduce their potential benefits. The participant's experience suggests that engagement is influenced not only by the quality of digital features but also by the reliability of the technological environment supporting those features. Another participant described challenges related to students' ability to use Artificial Intelligence effectively.

"Not all students understand how to use AI properly. Some students only use it to find quick answers without trying to understand the learning process. I think students need guidance on how to use AI as a learning support tool, not just as a shortcut for completing assignments."

This response reveals concerns regarding digital literacy and responsible AI use among students. While Artificial Intelligence provides opportunities for personalized learning, ineffective use may limit its educational value. The finding suggests that students require adequate guidance regarding critical evaluation, ethical use, and effective interaction with AI systems to ensure that the technology supports deeper learning rather than passive dependence. A third participant expressed concerns regarding the motivational effects of gamification when it is not carefully designed.

"The game features are interesting, but sometimes students focus too much on collecting points or achieving rankings. They may complete activities because they want rewards rather than because they want to understand the material. The challenge is making sure that the competition still supports learning objectives."

This perspective demonstrates that gamification may produce unintended consequences if implemented without strong pedagogical alignment. While rewards and competition can encourage participation, excessive emphasis on external incentives may reduce intrinsic motivation and encourage surface level engagement. Therefore, participants emphasized the importance of designing gamification elements that promote meaningful learning outcomes rather than focusing solely on achievement indicators. The findings demonstrate that the implementation of AI integrated gamified learning requires careful consideration of technological, pedagogical, and human factors. Students recognized the potential of these technologies to enhance engagement, but they also emphasized the importance of digital readiness, appropriate guidance, and meaningful instructional design. These challenges highlight that technology adoption alone is insufficient to improve online learning engagement unless supported by effective implementation strategies and institutional preparation.

Integrating Artificial Intelligence and Gamification as a New Approach to Enhance Online Learning Engagement

The findings demonstrate that the integration of Artificial Intelligence (AI) and gamification contributes to student engagement by combining personalized learning support, motivational mechanisms, and interactive learning experiences. Unlike previous studies that often examine AI and gamification as separate educational interventions, this study highlights their complementary role in shaping behavioral, cognitive, and emotional engagement within online learning environments. The findings therefore extend existing research by emphasizing that the effectiveness of educational technology depends not only on the availability of digital tools but also on how they are integrated into meaningful pedagogical practices.

The finding that AI-supported personalization enhances student engagement is consistent with recent research showing that AI-based learning systems can strengthen learner autonomy through adaptive feedback, personalized recommendations, and responsive learning assistance. Students are more likely to remain engaged when digital learning environments accommodate their individual learning needs rather than provide standardized experiences. This study further indicates that personalization involves not only technological functionality but also students' perceptions of receiving meaningful support during independent learning. This perspective strengthens the argument that AI adoption in education should be examined from the learner-experience perspective rather than solely from the

perspective of technological capability (Wu et al., 2024; Wang & Huang, 2025; Matar, 2025).

The role of gamification in increasing motivation and participation also supports previous research indicating that game-based elements can encourage active involvement, persistence, and learning commitment. Nevertheless, the findings suggest that gamification does not automatically produce meaningful engagement. Its effectiveness depends on the alignment between game mechanics and educational objectives. Concerns regarding excessive emphasis on rewards and competition indicate that gamification should be designed to facilitate meaningful learning rather than rely primarily on extrinsic motivation (Kim, 2025; Lo, 2026; Fuchs, 2024). Thus, appropriate pedagogical design remains essential to ensure that gamification promotes deeper engagement instead of merely encouraging superficial participation.

The integration of AI and gamification represents the principal novelty of this study. While previous research has largely investigated AI-driven personalization and gamification-based motivation independently, limited attention has been given to their combined role in authentic higher education contexts. The findings suggest that these technologies operate through complementary mechanisms, with AI supporting cognitive engagement through individualized assistance, while gamification strengthens behavioral engagement through motivation and participation. This integrated perspective contributes to technology-enhanced learning research by suggesting that student engagement can emerge from the interaction of personalization, motivation, and learning interaction rather than from a single technological feature.

From a practical perspective, higher education institutions should treat AI and gamification as components of comprehensive instructional strategies rather than simply as technological innovations. Universities should strengthen digital infrastructure, develop students' AI literacy, and support lecturers in designing learning activities that balance technological assistance with meaningful human interaction. However, this study is limited by its qualitative case-study design within a single public university in Indonesia, meaning that its findings are context-specific and cannot be generalized to all higher education settings. Future research should examine technology integration across multiple institutions, disciplines, and cultural contexts using longitudinal or mixed-method approaches, while also investigating how AI and gamification influence different dimensions of student engagement over time and incorporating the perspectives of lecturers and institutional stakeholders.

CONCLUSION

This study concludes that the integration of Artificial Intelligence and gamification provides a meaningful approach to enhancing student engagement in online learning within higher education. The findings demonstrate that Artificial Intelligence supports engagement through personalized learning assistance, adaptive feedback, and increased learner autonomy, while gamification strengthens motivation, participation, and learning persistence. More importantly, the combination of these technologies creates a more interactive and student centered learning environment by integrating cognitive support with motivational mechanisms. The study contributes theoretically by extending discussions on technology enhanced learning through an integrated perspective of personalization, motivation, and engagement.

Practically, the findings highlight the importance of designing AI supported gamified learning environments that align technological features with pedagogical objectives. However, the study is limited by its single institutional context, which restricts broader generalization. Future research should explore diverse educational contexts, investigate long term engagement outcomes, and incorporate perspectives from

lecturers and institutional stakeholders to develop a more comprehensive understanding of sustainable digital learning transformation.

REFERENCES

- Arifudin, O. (2025). Why digital learning is the key to the future of education. *International Journal of Education and Digital Learning (IJEDL)*, 3(4), 201-210.
- Aspandi, A., & Muttaqin, M. A. (2025). Transforming teacher roles in Indonesia's digital era: Enhancing learning effectiveness and student engagement. *Journal of General Education and Humanities*, 4(4), 1495-1510. <https://doi.org/10.58421/gehu.v4i4.616>
- Bennani, S., Maalel, A., & Ben Ghezala, H. (2022). Adaptive gamification in E-learning: A literature review and future challenges. *Computer Applications in Engineering Education*, 30(2), 628-642. <https://doi.org/10.1002/cae.22477>
- Bidarra, J., Rocio, V., Sousa, N., & Coutinho-Rodrigues, J. (2025). Problems and prospects of hybrid learning in higher education. *Open Learning: The Journal of Open, Distance and e-Learning*, 40(3), 304-323. <https://doi.org/10.1080/02680513.2024.2404036>
- Chu, T. S., & Ashraf, M. (2025). Artificial intelligence in curriculum design: A data-driven approach to higher education innovation. *Knowledge*, 5(3), 14. <https://doi.org/10.3390/knowledge5030014>
- Dah, J., Hussin, N., Zaini, M. K., Isaac Helda, L., Senanu Ametefe, D., & Adozuka Aliu, A. (2025). Gamification is not working: Why?. *Games and Culture*, 20(7), 934-957. <https://doi.org/10.1177/15554120241228125>
- Ede, S. (2022). Gamification and motivation. *Issues and Trends in Learning Technologies*, 10(1). <https://doi.org/10.2458/itlt.4872>
- Fuchs, K. (2024). Challenges with gamification in higher education: A narrative review with implications for educators and policymakers. *International Journal of Changes in Education*, 1(1), 51-56. <https://doi.org/10.47852/bonviewIJCE32021604>
- Gamage, K. A., Gamage, A., & Dehideniya, S. C. (2022). Online and hybrid teaching and learning: Enhance effective student engagement and experience. *Education Sciences*, 12(10), 651. <https://doi.org/10.3390/educsci12100651>
- Ghai, A., & Tandon, U. (2023). Integrating gamification and instructional design to enhance usability of online learning. *Education and information technologies*, 28(2), 2187-2206. <https://doi.org/10.1007/s10639-022-11202-5>
- Hadi Mogavi, R., Guo, B., Zhang, Y., Haq, E. U., Hui, P., & Ma, X. (2022, June). When gamification spoils your learning: A qualitative case study of gamification misuse in a language-learning app. In *Proceedings of the ninth ACM conference on learning@ scale* (pp. 175-188). <https://doi.org/10.1145/3491140.3528274>
- Hill, J., & Smith, K. (2023). Visions of blended learning: Identifying the challenges and opportunities in shaping institutional approaches to blended learning in higher education. *Technology, pedagogy and education*, 32(3), 289-303. <https://doi.org/10.1080/1475939X.2023.2176916>
- Jose, B., Cherian, J., Jaya, P. J., Kuriakose, L., & Leema, P. R. (2024, November). The ghost effect: How gamification can hinder genuine learning. In *Frontiers in Education* (Vol. 9, p. 1474733). Frontiers Media SA. <https://doi.org/10.3389/educ.2024.1474733>

- Kabilan, M. K., Annamalai, N., & Chuah, K. M. (2023). Practices, purposes and challenges in integrating gamification using technology: A mixed-methods study on university academics. *Education and Information Technologies*, 28(11), 14249-14281. <https://doi.org/10.1007/s10639-023-11723-7>
- Kavitha, D., Anitha, D., Jeyamala, C., & Fusic, S. J. (2025). Instructional Design with Artificial Intelligence Tools to Support Student-Centered Learning. *Adopting Artificial Intelligence Tools in Higher Education: Teaching and Learning*, 74-99. <https://doi.org/10.1201/9781003469315-4>
- Kim, S. I. (2025). Reward and competition in motivation and learning: Myths, pitfalls, and insights. *Learning and Instruction*, 98, 102139. <https://doi.org/10.1016/j.learninstruc.2025.102139>
- Kolhatin, A. O. (2025). From automation to augmentation: a human-centered framework for generative AI in adaptive educational content creation. In *AREdu* (pp. 143-195). <https://doi.org/10.55056/ceur-ws.org/Vol-4060/paper05.pdf>
- Lo, C. H. (2026). Gamification is not just fun: the effect of gamification design elements on shaping intrinsic motivation and learning persistence. *BMC psychology*. <https://doi.org/10.1186/s40359-026-05046-8>
- Manoharan, A., & Nagulapally, S. (2024). Adaptive gamification algorithms for personalized learning experiences in educational platforms. *Int. Res. J. Mod. Eng. Technol. Sci*, 6(3), 2582-5208. <https://doi.org/10.56726/IRJMETs49966>
- Matar, S. (2025). The development of educational technology and artificial intelligence and their impact on the future of education: Opportunities and risks. *Journal of Posthumanism*, 5(7), 1271-1292. <https://doi.org/10.63332/joph.v5i7.2915>
- Mulenga, R., & Shilongo, H. (2025). Hybrid and blended learning models: Innovations, challenges, and future directions in education. *Acta Pedagogica Asiana*, 4(1), 1-13. <https://doi.org/10.53623/apga.v4i1.495>
- Ng, L. K., & Lo, C. K. (2022). Flipped classroom and gamification approach: Its impact on performance and academic commitment on sustainable learning in education. *Sustainability*, 14(9), 5428. <https://doi.org/10.3390/su14095428>
- Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. *Education and information technologies*, 28(1), 373-406. <https://doi.org/10.1007/s10639-022-11122-4>
- 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. <https://doi.org/10.1007/s10758-020-09487-x>
- Singh, J., Evans, E., Reed, A., Karch, L., Qualey, K., Singh, L., & Wiersma, H. (2022). Online, hybrid, and face-to-face learning through the eyes of faculty, students, administrators, and instructional designers: Lessons learned and directions for the post-vaccine and post-pandemic/COVID-19 world. *Journal of Educational Technology Systems*, 50(3), 301-326. <https://doi.org/10.1177/00472395211063754>
- Tabe, H. T. (2025). Exploring Teaching Strategies in Open Distance and eLearning: Addressing Challenges, Embracing Innovations, and Identifying Best Practices: International Teaching and Learning Conference. *Progressio*, 46,

17-pages. <https://doi.org/10.25159/2663-5895/17452>

- Tate, T., & Warschauer, M. (2022). Equity in online learning. *Educational Psychologist*, 57(3), 192-206. <https://doi.org/10.1080/00461520.2022.2062597>
- Ullah, A., Khan, A., & Baig, M. (2026). THE PERCEIVED IMPACT OF GAMIFICATION ON STUDENTS' MOTIVATION AND ACADEMIC PERFORMANCE: A QUALITATIVE ANALYSIS OF STUDENTS' EXPERIENCES. *Policy Journal of Social Science Review*, 4(3), 1506-1533.
- Vetrivel, S. C., Arun, V. P., Maheswari, R., & Saravanan, T. P. (2024). Technology integration in online learning platforms: Blended learning gamification. In *Transdisciplinary teaching and technological integration for improved learning: Case studies and practical approaches* (pp. 219-247). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-8217-2.ch011>
- Wang, D., & Huang, X. (2025). Transforming education through artificial intelligence and immersive technologies: enhancing learning experiences. *Interactive Learning Environments*, 33(7), 4546-4565. <https://doi.org/10.1080/10494820.2025.2465451>
- Wu, D., Zhang, S., Ma, Z., Yue, X. G., & Dong, R. K. (2024). Unlocking potential: Key factors shaping undergraduate self-directed learning in AI-enhanced educational environments. *Systems*, 12(9), 332. <https://doi.org/10.3390/systems12090332>
- Yadav, N. (2024). The impact of digital learning on education. *International Journal of Multidisciplinary Research in Arts, Science and Technology*, 2(1), 24-34. <https://doi.org/10.61778/ijmrast.v2i1.34>
- Zainuddin, Z., Chu, S. K. W., & Perera, C. J. (2024). Gamification in education. In *Gamification in a flipped classroom: Pedagogical methods and best practices* (pp. 67-113). Singapore: Springer Nature Singapore. <https://doi.org/10.1007/978-981-97-2219-8>
- Zairon, I. Y., Wook, T. S. M. T., Salleh, S. M., & Dahlan, H. A. (2025). Adaptive gamification in collaborative virtual classroom: a systematic review. *PeerJ Computer Science*, 11, e3146.
- Zhao, Z. (2025). Optimization of personalized learning paths in educational ai driven by student behavior data. *Journal of Industrial Engineering and Applied Science*, 3(2), 16-25. <https://doi.org/10.70393/6a69656173.323738>