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THE IMPACT OF GAMIFICATION ON STUDENT ENGAGEMENT AND RETENTION: INSIGHTS FROM A SYSTEMATIC LITERATURE REVIEW

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Abstract: In the digital era, technology in learning has become a fundamental need to improve the quality of teaching and learning. One innovative approach that can increase student motivation, engagement, and knowledge retention is learning gamification. This study aims to explore the impact of using gamification on student retention through the Systematic Literature Review (SLR) method. A total of 20 articles from scientific journals published in the 2020-2024 period were systematically analyzed based on journal quality criteria (Quality Assessment), including topic relevance, the impact of using gamification, and the correlation between gamification and student retention. The results of the analysis show that gamification positively affects student knowledge retention. So that teachers can develop learning by integrating gamification elements into learning to create a more enjoyable, competitive, and practical learning experience.

Keywords: Gamification, Learning, Knowledge Retention, Students

INTRODUCTION

In the ever-evolving digital era, technology in education has become a fundamental need to improve the quality of the learning process. The use of technology in the learning process has become an integral part of the concept of independent learning. In the current learning process, students have great curiosity in searching for information, assignments, materials, and so on, so they inevitably have to use technology in it (Kartini & Putra, 2020). Utilizing technology such as online learning platforms, Sakiinah et al. (2022), mobile applications and innovative software are great opportunities to improve learning. In line with research, Mweene and Muzaza (2020) revealed that technology can increase student engagement in learning.

One of the learning platforms used is a game; this is solely developed to increase student motivation and involvement in the learning process so that it can affect student retention. Rakhman and Surur (2024) define motivation as an effort based on moving, directing, and maintaining a person's behavior to encourage them to act to do something to achieve specific results or goals. Learning is a relatively permanent behavior change that potentially occurs or can be called a result of practice in a reinforcement based on achieving specific goals. With this, it can be concluded that learning motivation is one effort to move students to do everything to get satisfactory results in the learning process at school. Strong learning motivation in students will encourage them to participate actively in every learning activity, overcome challenges, and continue improving their understanding of the material being studied (Hanaris, 2023). At the same time, Zulfikar et al. (2023) define student

retention as the ability of students to absorb and remember information that enters long-term memory. Therefore, to succeed in the learning process, an educator must develop and utilize several learning media.

One of the essential things to achieve success in the learning process is to use creative and innovative learning media (Yuliati et al., 2024). Media is part of the learning system that plays an essential component in supporting the achievement of learning objectives that must be designed and used integrally and consistently with the entire learning process (Dany, A., Rifan, H., & Suryandari, 2024). Learning media are all things that can be used to encourage thoughts, convey messages, attract attention and emotions, and motivate students to strengthen the learning process (Zaza Salsabila et al., 2024). Using the right learning media, teachers can adjust teaching methods according to student needs because each student has different problems. So that success in learning objectives cannot be achieved.

Problems often faced in school learning are low motivation and student involvement. Many students are less motivated to learn because they feel the concepts are complicated or irrelevant to everyday life. In addition, the lack of use of interactive learning media, such as computer simulations or educational games, makes learning difficult to understand. As a result, the learning process does not run effectively, so the learning outcomes are not optimal.

A practical approach to increase motivation and engagement in learning is the Gamification of learning to improve student knowledge retention. The application of gamification in education continues to develop with various forms of strategies and presentations in the classroom (Al Fadillah & Rafli Akbar, 2024). One form of gamification widely studied in educational research is developing and implementing educational game-based learning media. In educational game-based learning media, gamification is presented through learning game media designed by teachers to attract student activity and help them understand concepts more easily (Latip et al., 2024). The idea of gamification comes from the framework of games specifically designed to increase user retention and participation (Marisa, Maukar, Widodo, et al., 2022).

Recently, gamification of learning has become a trending topic in education (Zulkifli et al., 2024). Several studies above reveal that the use of gamification in the learning process can affect students' motivation and knowledge retention. Thus, this study aims to analyze the impact of learning gamification on students' knowledge retention.

METHOD

This research is a type of literature review that uses the systematic method. Literature review. According to Ramayanti et al. (2023), a Systematic literature review (SLR) is a methodology and development used to collect and evaluate studies relevant to a particular topic. Generally, the SLR method goes through three stages: Planning, Conducting, and Reporting. The stages of this research can be seen in the following image:

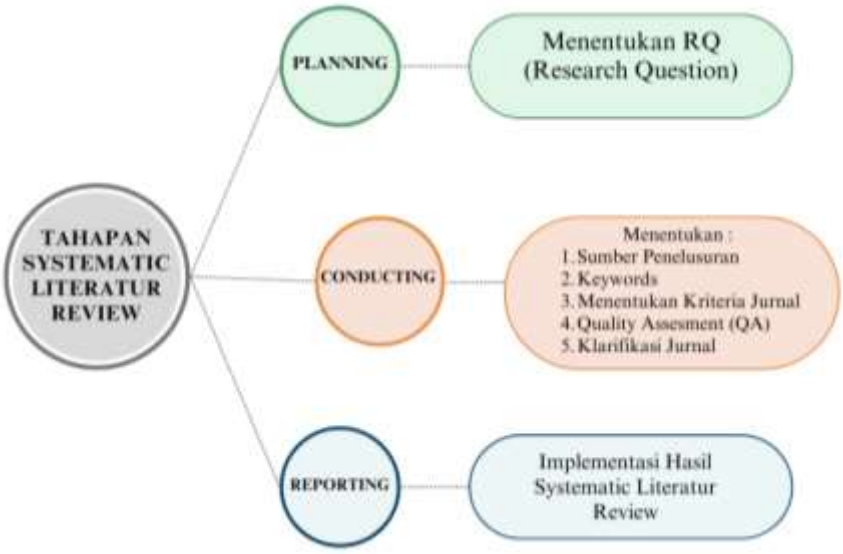

Figure 1. Research Stages

Planning Stage: First, we determine the Research Question (RQ). RQ is a research question. RQ helps in the process of searching and extracting literature. A good RQ is practical, measurable, and leads to a contemporary understanding of the research topic (Maulid, 2022). Here are the researcher's questions:
RQ1: Does the journal explain the impact of gamification on student retention?
RQ2: Do the journals show a positive correlation between the use of gamification and increased student retention?

Conducting Stage: Maulid (2022) defines conducting as the implementation stage of the systematic method literature review. In this stage, the researcher formulates the steps that must be taken, including (1) Determining search sources using Scopus, Google Scholar, Semantic Scholar, ScienceDirect, IEEE, and ResearchGate; (2) Researchers use keywords that are by the topic of Gamification learning such as, "the impact of gamification, "gamification on increasing student retention," and "correlation between the use of gamification and student retention"; (3) Selecting the proper literature with journal criteria explaining the impact of the use of gamification can increase student retention so that researchers can execute the data found to be suitable for use or not; (4) Evaluating the criteria determined based on QA (Quality Assessment) which means quality assessment. This is done to determine whether the journals are included in the criteria and answer the researcher's questions. Here are the criteria (Quality Assessment) in this study: QA1: Journals published in the last 5 years from 2020-2024, QA2: Journals explain the impact of using gamification on increasing student retention, QA3: Journals discuss the correlation between using gamification and increasing student retention; (5) The last step is for the researcher to clarify in each journal whether it can answer the researcher's questions (RQ) or not. If yes, it is symbolized by "Y." If not, it is by "X."

Reporting Stage: According to Maulid (2022), Reporting is the stage of delivering the SLR results in written form. This stage is the final stage of the research, which discusses the answers to each RQ (Research Questions).

RESULT

Journal Quality Assessment (QA)

QA1, QA2, and QA3 Quality Assessment called Quality Assessment in this study includes:

QA1: Has the journal been published in the last 5 years, from 2020 to 2024?

QA2: Does the journal explain the impact of using gamification on increasing student retention?

QA3: Does the journal discuss the correlation between the use of gamification and increased student retention?

Journal quality assessment (QA) is carried out to answer the researcher's questions (RQ), which are presented in the following table:

Table 1 Assessment Results in Quality Journal

No	Researcher	Quality Assessment		
		QA1	QA2	QA3
1.	Wan Ariffin et al. (2024)	Y	X	X
2.	Chandrasehgaran & Ismail (2024)	Y	X	X
3.	Ramos and al. (2024)	Y	Y	Y
4.	James et al. (2024)	Y	Y	Y
5.	Duisenova (2024)	Y	Y	Y
6.	Wulan and al. (2024)	Y	Y	Y
7.	Wang et al. (2024)	Y	Y	Y
8.	Hamid & Barzenji (2024)	Y	Y	Y
9.	Saputri (2024)	Y	Y	Y
10.	Redelinghuys & Bekker (2021)	Y	Y	Y
11.	Tavares (2022)	Y	Y	Y
12.	Purba and al. (2024)	Y	Y	Y
13.	Yang & Oh, (2022)	Y	X	X
14.	Smirani & Yamani (2024)	Y	Y	Y
15.	Nathaniel (2023)	Y	Y	Y
16.	The Greatest Showman (2023)	Y	Y	Y
17.	Lutfi et al. (2023)	Y	Y	Y
18.	The Good News et al. (2024)	Y	Y	Y
19.	The Greatest Showman (2023)	Y	Y	Y
20.	Marisa, et al. (2022)	Y	Y	Y

Based on the table above results, it can be clarified that 20 journals published in 2020-2024 were related to the keyword "Impact of Gamification." Researchers found 17 journals with the keyword" Gamification on Increasing Student Retention;" the remaining three journals were not included in the keyword. Researchers also found 17 journals with the keyword "correlation between the use of gamification and student retention."

After clarifying 20 journals with the specified criteria, three journals did not meet the requirements, including three that did not answer QA1 and QA2. These three journals discuss gamification, but none describe its impact on student retention. It focuses on the positive relationship between gamification assessment and student motivation and engagement,

highlighting its benefits for the learning experience. So, only 17 journals were obtained that met the requirements as secondary data and were analyzed in the following table:

Table 2 Results of Secondary Data Analysis

No	Researcher	Title	Research result
1.	Ramos et al. (2024)	Gamification and Motivation in Learning	Gamification for teaching literature in education (LiE) has a positive impact on student motivation, which is closely related to knowledge retention. By increasing engagement through game elements, students are more likely to retain information, thereby improving their overall academic performance. This study shows a positive relationship between gamification and increased student motivation, which can improve student knowledge retention with motivational theory and effective integration of technology such as virtual reality.
2.	James et al. (2024)	Improving retention while enhancing student engagement and learning outcomes using gamified mobile technology	Gamified mobile applications (GMA) significantly increase student retention due to their engagement with teachers, learning materials, and peers. Users also report better learning outcomes, which encourages more students to continue learning.
3.	Duisenova (2024)	The Impact of Gamified Educational Applications on Secondary School Students' Achievement In Learning English As A Foreign Language	Gamified educational applications significantly increase student engagement and motivation. This can lead to increased retention of English as a foreign language. The presence of interactive learning can encourage a dynamic learning environment that is conducive to student retention. This study shows a significant relationship between gamification and increased student engagement, and motivation in language proficiency which can affect student retention.
4.	Wulan et al. (2024)	Exploring the Benefits and Challenges of Gamification in Enhancing Student Learning Outcomes	The use of gamification can increase students' motivation and engagement, which in turn can improve their knowledge retention and participation. Gamification in improving student learning outcomes, reveals significant improvements in motivation, engagement, and academic performance.

No	Researcher	Title	Research result
5.	Wang et al. (2024)	Gamification for Learning: Development and Application of Learning Software for Enhancing Student Engagement and Motivation	Gamified learning software developed for applied mathematics courses enhances student engagement and motivation, improving learning outcomes and teaching quality. The software design effectively addresses students' aversion to formulaic calculations, leading to improved learning outcomes and willingness to continue using the software with mean scores for various questions ranging from 2.38 to 2.71.
6.	Hamid & Barzenji (2024)	Evaluating the Effectiveness of Gamification in Online Education: Strategies for Promoting Active Learning and Student Retention	Gamification has a positive impact on increasing student retention. Gamification can increase student engagement and motivation, which in turn increases participation and reduces dropout rates. The study emphasizes the importance of balancing competitive and collaborative elements and suggests that educators provide clear instructions and support.
7.	The Last Supper (2024)	A Comprehensive Exploration of Effective Learning Strategies Through Engaging and Interactive Kahoot Games in Educational Setting	The use of Kahoot-based gamification can increase student engagement, conceptual understanding, and knowledge retention. Most students consider Kahoot useful for learning, although there are differences of opinion among them. This study emphasizes the importance of using Kahoot in a moderate and tailored way to meet the various learning styles and needs of students.
8.	Redelinghuys & Bekker (2021)	Gamification and simulation teaching system created to improve the depth of knowledge and knowledge retention of engineering students	Gamification improves knowledge retention and student motivation. This study found that gamification strategies significantly improved students' academic performance and showed that gamification is a viable educational tool for industrial engineering, although it should be implemented gradually and taking into account student feedback.
9.	Tavares (2022)	The use and impact of game-based learning on the learning experience	Game-based learning was well received by students and was considered more successful in

No	Researcher	Title	Research result
		and knowledge retention of nursing undergraduate students: A systematic literature review	facilitating group work, improving student relationships, and more enjoyable than non-game-based learning. Game-based activities helped consolidate and conceptualize content for some students. This learning had a positive influence on learning and could improve student knowledge retention.
10.	Ancient et al. (2024)	Gamification in Education: Increasing Student Motivation and Engagement	Gamification in education has a positive impact on student learning and engagement in the classroom. The application of gamification in education plays an important role in creating a more engaging and enjoyable learning environment, as well as improving students' digital literacy. Gamification uses game concepts and mechanisms to increase learning motivation, higher student engagement, increased information retention, development of teamwork skills, increased task completion, feedback on student performance, increased intrinsic motivation, and teacher performance measurement.
11.	Smirani & Yamani (2024)	Analyzing the Impact of Gamification Techniques on Enhancing Learner Engagement, Motivation, and Knowledge Retention: A Structural Equation Modelling Approach	Gamification significantly increased learners' engagement, motivation, and perceived enjoyment in e-learning environments. Specifically, there was a 25% increase in engagement, a 30% increase in motivation, and a 20% increase in perceived enjoyment. Overall, this study highlights how gamification can help students learn better and balance competitive components to optimize learning outcomes and student retention.
12.	Nathaniel (2023)	Implementation of Gamification in the Mathematics Learning Process for Elementary School Children to Increase Student Learning Motivation	The application of gamification in mathematics subjects can change tasks and learning processes to be active for students, and student retention or student comprehension ability is greatly influenced by the model of learning activities guided by the teacher. Students have an interest in mathematics subjects when using the

No	Researcher	Title	Research result
			concept of gamification. It was found that students can only absorb 5% of the learning material in learning activities carried out by the teacher, while when learning activities are carried out with friends, the strength of student retention gets a value of 90%.
13.	The Greatest Showman (2023)	Using Gamification Techniques to Improve Student Learning and Engagement in the Classroom	gamification techniques in learning can significantly increase student motivation and engagement. Game elements such as points, levels, and prizes can increase student active participation, understanding of the material, and academic achievement. Gamification has been proven effective in creating an engaging and interactive learning environment. In addition, the use of gamification techniques also has a positive impact on learning achievement, with improvements in understanding the material, the ability to apply concepts, and overall academic achievement.
14.	Lutfi et al. (2023)	Gamification: Game As A Medium For Learning Chemistry To Motivate And Increase Retention Of Students' Learning Outcomes	Hydrocarbons game-based learning process Chem-Rush significantly improved students' memory and motivation compared to traditional learning methods. Specifically, the experimental group using the game had a memory retention of 92%, compared to 50% in the control group. The study concluded that gamification through the Hydrocarbons game Chem-Rush effectively improves learning outcomes, retention, and motivation in chemistry education.
15.	The Good News et al. (2024)	Exploring the long-term effects: Retention and transfer of skills in a gamified learning environment	Gamified learning is an effective solution for increasing skill retention and application, with motivation and engagement being critical factors in this process. The study noted a gradual decline in retention over time, indicating the need for ongoing training to maintain optimal retention levels. Students showed significant skill retention immediately after gamified learning.

No	Researcher	Title	Research result
16.	The Greatest Showman (2023)	Augmented Technology Reality For User Experience In Educational Applications	Augmented Technology Reality (AR) can improve student comprehension and retention through interactive visualizations, as well as increase student motivation and engagement through gamification elements. AR also supports collaborative learning and personalization of learning.
17.	Marisa, et al. (2022)	Analysis of the Influence of Learning Motivation on Gamification Model Learning During the Covid-19 Pandemic	Gamification has a positive effect on students' learning interest and retention in online learning. Data analysis shows that gamification motivation has a positive effect on students' learning interest and retention with a regression coefficient of 0.108. Hypothesis testing confirms that gamification significantly affects learning interest, which leads to student retention. Although the effect size is relatively small, explaining only 0.14% of the variance in learning interest, this study concludes that gamification methods positively affect online learning outcomes that can improve knowledge retention.

DISCUSSION

RQ1: Does the journal explain the impact of gamification on student retention?

Knowledge retention is defined as the ability of students to store and remember information over a more extended period. Most studies support the idea that gamification can increase student retention based on the results of 20 articles analyzed using the Systematic Literature Review (SLR) method. Using element games interests students in a way, giving stimulants, which ultimately influence the ability to remember information—gamified mobile applications stated that retention students significantly experienced improvement through involvement with teachers, learning materials, and other students (James et al., 2024).

Research Duisenova (2024). James et al. (2024). Smirani & Yamani (2024), Gunawan (2023), Marisa et al. (2022), and Srimulyani (2023) State that gamification creates an interactive learning environment through the use of game elements that can increase students' active engagement and collaborative interactions with teachers and peers.

According to research by Smirani and Yamani (2024), gamification indirectly and directly increases student retention By improving motivation, engagement, and comfort. With the acquisition score of a 25% increase in engagement, a 30% increase in motivation, and a 20% increase in perceived comfort. Nathaniel (2023) Found that students can only absorb 5% of the material. Studied from activities and learn what is taught by the teacher, but

when they participate in activities and study with friends in a game, power retention student reaches 90%. Lutfi et al. (2023) Suggest that the use of gamification through games *Hydrocarbons Chem-Rush* significantly improved students' memory retention with a score of 92% in the experimental group and 50% in the control group. In addition, 60% of the experimental group scored high in memory, while only 14.3% of the control group scored high. The level of motivation in the experimental group increased by 4%-17.6%, with overall motivation ranging from 75.2% to 90.4%. Marisa et al. (2022) Said that gamification can increase student learning interest and retention with a regression coefficient 0.108.

Based on the descriptions of several studies, these results prove that gamification can help students understand and remember concepts taught in class. Interactive and competitive learning activities become key to improving Power Remember students.

RQ2: Do the journals show a positive correlation between the use of gamification and increased student retention?

In addition, the study found that 17 of the 20 analyzed articles indicated that gamification was correlated with student retention. Several of these studies supported this correlation.

Gamification increases the desire of students to learn by creating an environment in which studying becomes interesting and fun. Hamid & Barzenji (2024) Found that gamification involves component collaboration and competitively increases the motivation and retention of students. Research by Lutfi et al. (2023) Using games Educative for teaching chemistry. They found that the power to remember students in group experiments increased by 42% compared to the group control. Nathaniel (2023) Shows that gamification in mathematics learning increases students' interest in the lesson, which positively impacts student retention. High interest in education allows students to become more focused and participate more actively in the learning process. Relationship This correlation shows the importance of learning based on gamification in the classroom. Gamification Not only makes lessons easier but also helps students remember material better.

CONCLUSION

Based on the research results, gamification has a significant positive impact on student knowledge retention. Of the 20 articles analyzed, 17 supported the hypothesis that gamification can improve student knowledge retention. This is because learning with gamification provides an engaging learning atmosphere by presenting collaborative and competitive components, which can increase student motivation and student engagement and affect student retention. Teachers, learning media developers, and education policymakers must integrate gamification mechanisms into their learning process to improve student retention. This is because effective gamification mechanisms, learning application design, and content quality are the main components that affect the success of gamification in student knowledge retention.

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