GAMIFICATION AS AN EFFECTIVE TEACHING STRATEGY: A LITERATURE REVIEW OF ITS RELEVANCE AMIDST CHANGES IN THE INDONESIAN EDUCATION CURRICULUM

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Abstract: Indonesian education has faced significant challenges in the implementation of new curricula, such as the innovative application of the Merdeka curriculum in the education sector, and the curriculum requires more advanced technology. Gamification has emerged as a strategic approach to enhance student engagement and motivation by incorporating game elements into the learning process. The objective of this research is to review the current literature on gamification in education, particularly at the high school level, and to identify best practices, challenges, and opportunities in education in Indonesia. The methodology used is a systematic literature review consisting of four main stages: identification, screening, eligibility, and inclusion. Data were taken from the Scopus and Google Scholar databases using the Publish or Perish tool, resulting in 30 relevant articles for analysis. These articles encompass various research approaches, including quantitative, qualitative, and mixed methods. Analysis shows that gamification has the potential to enhance student engagement, intrinsic motivation, and academic performance. However, the implementation of gamification in Indonesia still faces various obstacles, such as limited technological infrastructure and a lack of teacher training. In conclusion, gamification can be an effective strategy to support learning in the 21st century. However, its success will depend on efforts to address implementation challenges, particularly through enhanced teacher training and the provision of appropriate technology. Therefore, gamification has the potential to bridge the gap between traditional learning methods and the needs of modern education in Indonesia.

INTRODUCTION

The application of game elements (Gamification) in non-game contexts has developed into an interesting strategy in education. In Indonesia, the application of gamification as a pedagogical approach has become a hot topic, especially in efforts to improve the quality of education and student motivation. Education in Indonesia faces various challenges, such as the gap in the quality of education between urban and rural areas, low student motivation to learn, and limited facilities and accessibility to quality education (Anwar, 2022). One of the major issues facing Indonesia is the gap in access to education which can affect learning outcomes.

This gap lies not only in geographical differences but also in the quality of teaching and facilities available in various regions (Timotheou et al., 2023). In many regions, the education curriculum is often not relevant enough to the needs of the world of work or rapid technological developments. In addition, Indonesia is currently facing major changes in the education curriculum. These changes require teachers to adapt to new policies that continue to develop, which can affect the way they teach and interact with students. Although areas such as Baraka District can overcome the education gap through the digitalization of education policy communication that accelerates access to information (Anwar, 2022). One of the major issues facing Indonesia is the gap in access to education which can affect learning outcomes. This gap lies not only in geographical differences but also in the quality of teaching and facilities available in various regions. Although areas such as Baraka District can overcome the education gap through the digitalization of education policy communication that accelerates access to information related to national education policies, the digitalization of learning is still not optimal, due to the limited use of digital facilities such as Rumah Belajar and Canva by teachers, as well as infrastructure problems such as unequal internet access in the region (Anita & Astuti, 2022). In addition, the implementation of the independent curriculum which requires students and teachers to have 21st-century learning skills, such as communication, collaboration, critical thinking, and creativity, still faces obstacles in implementation due to limited training and the lack of integration of learning environments that support the mastery of these skills as a whole (Jufriadi et al., 2022).

The introduction of the Independent Curriculum, which is designed to provide flexibility and autonomy to schools, marks an important milestone in efforts to reform the education system. However, this policy change still presents significant challenges at the implementation level, especially at the senior high school (SMA) level (Qomariyah & Maghfiroh, 2022). Some of the main challenges faced include educators who must adapt to more modern learning methods, decreasing student engagement, and a gap between policy expectations and reality in the classroom. This situation is further exacerbated by the change in the direction of education policy due to the change of Minister of Education. In the statement of the Minister of Education, Mr Abdul Mu'ti, there is a plan to introduce a deep learning approach to the curriculum that focuses on deep understanding, complex problem solving, and the development of essential skills. Although this concept is relevant to the needs of the 21st century, its success will depend greatly on the ability of educators to integrate this approach into innovative learning methods that are relevant to students (Dilekçi & Karatay, 2023). The education method in Indonesia is

still dominated by traditional methods, such as rote learning (Hadi et al., 2022), which emphasizes the repetition of facts without deep understanding and limits the development of critical thinking and 21st-century skills in students.

This is reflected in Indonesia's low ranking in international assessments such as PISA in reading, mathematics, and science. This challenge is further compounded by the lack of adequate teacher training, with many educators lacking the skills or experience to implement innovative teaching methods, especially those relevant to the technological era (Solihin et al., 2024). In addition, infrastructure constraints and geographical disparities also hamper the implementation of more modern education reforms. With the promise of initiatives such as 'Merdeka Belajar' (Freedom to Learn) that encourage competency-based learning, and local culture-based curricula that aim to bridge traditional values with modern practices, the transition to a more advanced education system requires solutions that address these structural barriers, including improved teacher training and better infrastructure. Gamification has emerged as a possible solution to address these challenges. Gamification, which uses game elements in a non-game environment, has been shown to create more engaging and meaningful learning experiences. This approach is globally recognized for its ability to increase student engagement, foster intrinsic motivation, and deepen understanding of the material (AlAli & Wardat, 2024). The application of gamification is also in line with the immersive learning paradigm, as it can engage students in critical thinking, problem-solving, and collaboration through fun and interactive activities. Although the application of gamification in Indonesian secondary education is still relatively limited, integrating gamification into a curriculum that focuses on immersive learning could be an innovative solution.

Platforms such as Kahoot!, Quizizz, Classcraft, and Duolingo have demonstrated the effectiveness of gamification in increasing student engagement. For example, Kahoot! and Quizizz enable quiz-based learning that encourages healthy competition and deep understanding of concepts, while Classcraft combines narrative-based learning and role-playing in a digital environment. Artificial intelligence (AI) technology also enriches gamification with personalization, creating adaptive learning experiences that are tailored to students' needs and pace. Gamification has great potential to create more inclusive, culturally relevant, and engaged learning around the world, including in developing countries. However, its implementation still presents challenges, such as over-reliance on technology that can reduce the value of traditional pedagogy. Therefore, a blended approach that combines traditional methods with modern technology is the optimal solution (Temel & Cesur, 2024).

The purpose of this study is to review the current literature on gamification in education, especially at the high school level, and identify best practices, challenges, and opportunities for its implementation in Indonesia. It is hoped that this research can provide strategic insights for the successful implementation of a new curriculum that focuses on deep learning while strengthening the relevance of secondary education in equipping students with 21st-century skills. This research is also expected to provide practical guidance for educators in designing more innovative and transformative learning.

RESEARCH METHODS

This research methodology uses a systematic literature review approach to identify, select, and analyze relevant literature. The Publish or Perish application is used to facilitate data searches from various sources, including Google Scholar and Scopus. The focus of this study is directed at studies published in the period 2021–2024 to ensure the relevance and novelty of the findings. This literature review was carried out through four main stages: identification, screening, eligibility, and inclusion. In the identification stage, articles were collected from two main databases, namely Scopus and Google Scholar, resulting in a total of 210 articles after data merging. Furthermore, the screening stage was carried out by removing redundant articles, resulting in 30 relevant articles based on the title, although the relevance criteria were not explained in detail. In the eligibility stage, 3 articles in non-English languages were removed, leaving 27 articles eligible for further analysis.

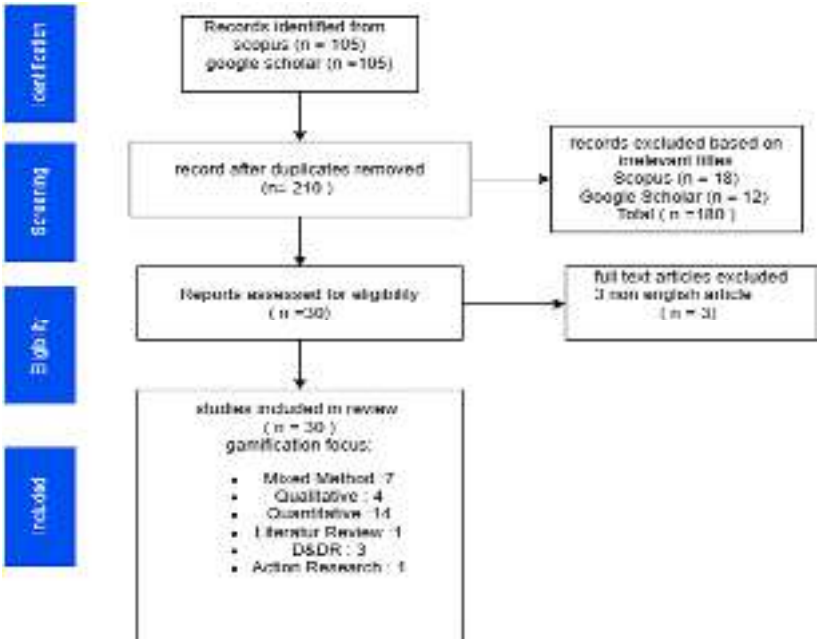

Figure 1. PRISMA framework

The inclusion stage classifies articles based on research methodology, namely Mixed Method (7), qualitative (4), quantitative (14), literature review (1), Design and Research (3), and action research (1), with a primary focus on the theme of gamification. This approach reflects the diversity of methodologies in relevant research but has several weaknesses. The selection criteria at the identification and screening stages were not explained in detail, potentially introducing bias in the selection process. The removal of non-English articles, although facilitating the analysis process, may eliminate relevant global insights. In addition, the final number of literature, which was only 30 articles, is a limitation that can affect the breadth of the analysis. Therefore, to increase the validity and scope of the study, it is recommended to explain the selection criteria in detail, provide reasons for selecting the Scopus and Google Scholar databases, and reconsider the use of non-English literature to expand the scope of the analysis. A diagram resembling the PRISMA flowchart has been included to show the systematic structure of this review.

RESULTS AND DISCUSSION

The research began with a keyword discovery process using the Publish or Perish tool, a popular bibliographic analysis software. This tool is used to evaluate scientific literature based on data from Google Scholar and Scopus. This process helps identify the most frequently discussed keywords in relevant research, thus providing an overview of topic trends, research focus, and the relevance of emerging issues in the research field being studied. Once the keywords have been successfully identified using the Publish or Perish tool, the next step is to visualize the keywords using VOSviewer software. VOSviewer is a tool for building and visualizing bibliographic networks, such as the network of relationships between keywords, authors, institutions, and articles. In this context, we use VOSviewer to create a visual map showing the relationships and groupings of keywords based on their occurrence in the scientific literature. This visualization helps researchers understand patterns, trends, and relationships between evolving research topics (Năstase et al., 2024).

Figure 2. VOSviewer, "gamification

Based on the visualization from VOSviewer, "gamification" is the Main concept that is often associated with keywords such as "education," "higher education," and "design," which indicates the relevance of gamification as a strategic pedagogical tool. This study highlights the important role of gamification in driving student engagement, as reflected in the map through close connections with topics such as "challenge," "development," and "approaches." These elements confirm that gamification not only serves to increase student motivation but also helps design more engaging and relevant learning methods. In the context of curriculum transformation, the visualization shows that topics such as "implementation," "concept," and "impact" are key components in implementing gamification. This shows that the process of designing and implementing gamification requires a structured approach to achieve optimal impact. The relationship with keywords such as "academic process" and "benefit" also shows that gamification not only brings innovation at the level of teaching methods but also has an impact on student learning outcomes and the overall learning experience.

Table1. Main Study Design

Main Study Design	**Number of Documents**	**Paper ID**
Quantitative	15	A01, A02, A04, A05, A06, A07, A08, A13, A15, A16, A17, A18, B03, B04, C04
Qualitative	5	A02, B01, C01, C02, C05
Mixed Methods	7	A03, B02, A11, C03, A12, A14, B07
D&DR (Design and Development Research)	3	A09, A10, B06

The next step in Table 1 is to achieve optimal results by classifying the main research design with a focus on the gamification aspect. The purpose of this phase is to narrow the scope of the investigation so that the analysis can be more focused and provide a more specific picture. This process will also help identify variations in research related to the topic of gamification and determine the main characteristics of the research. The next stage, as shown in Table 2, is to group the results of each article that has passed the screening process for the literature review research.

Table 2. Research references from 30 articles

Research and Years	Self Management	Adaptability	Involvement	Cognitive	Social	Leadership	Digital Literacy	Creativity	Technology Competence	Critical Thinking
(Sotos-Martínez et al., 2024)	✓		✓		✓					
(Calles-Esteban et al., 2024)		✓	✓							
(Teerawongpairoj et al., 2024)			✓	✓	✓					
(Garcia Garcia, 2024)				✓						
(AlAli & Wardat, 2024)	✓		✓							
(Temel & Cesur, 2024)	✓		✓	✓					✓	
(Kliziene et al., 2024)		✓		✓						✓
(Hmoud et al., 2024)	✓			✓	✓					
(Conlin & Santana, 2022)			✓		✓					
(Koppitsch & Meyer, 2022)	✓		✓	✓						
(Alexander et al., 2024)	✓		✓	✓	✓		✓			
(Yañez Sepulveda et al., 2024)	✓	✓	✓	✓				✓		✓
(Moreira Parrales et al., 2024)			✓							
(Morales et al., 2024)	✓	✓	✓	✓	✓			✓		✓
(Gironella, 2023)	✓		✓	✓	✓					
(Marcaida et al., 2022)	✓	✓	✓	✓	✓			✓		✓
(Fuentes-Riffo et al., 2023)			✓	✓						
(Ren & Barrett, 2023)		✓	✓	✓	✓					
(Bernal Cerza et al., 2023)	✓	✓	✓	✓	✓			✓		✓
(Cevallos-Almeida & Quiroz-Martinez, 2023)	✓		✓	✓						
(Andrade & Passos, 2023)	✓	✓	✓	✓	✓		✓		✓	✓
(Santos et al., 2023)	✓		✓	✓	✓	✓			✓	✓

(Casillas-Martín et al., 2023)		✓	✓	✓	✓		✓		✓	✓
(Taguas et al., 2022)		✓	✓		✓	✓				
(Humeniuk et al., 2022)	✓		✓	✓			✓		✓	
(Gianni & Antoniadis, 2023)	✓		✓	✓					✓	
(Acosta-Medina et al., 2021)			✓	✓			✓		✓	
(Romero Rodrigo & López Marí, 2021)	✓	✓	✓	✓	✓				✓	
(Manzano León et al., 2022)			✓	✓						
(Baiden et al., 2022)	✓		✓					✓		

Based on the analysis of 30 journals related to the application of gamification in education, several important findings show that gamification can be a very relevant and effective approach to pedagogy in schools. Here are some of the main points raised from the analyzed literature:

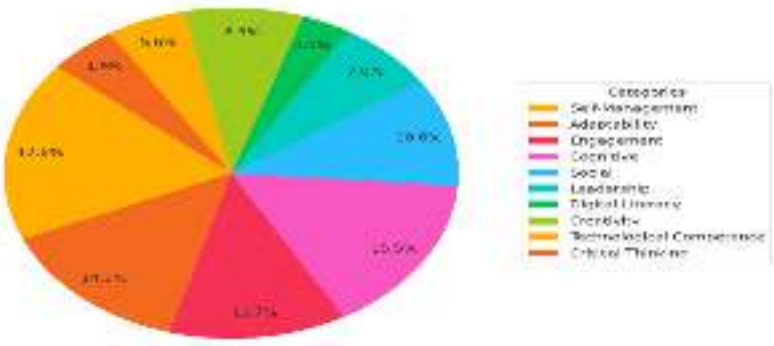

Figure 3. Distribution of categories from 30 journal articles

Based on the distribution of categories created from 30 journal articles, here is a brief analysis covering the strengths and challenges faced;

1. Advantages Of Gamification
    - Self-Management Domination

      The highest percentage (17.6%) is in the Self-Management category. This shows that many studies prioritize a person's ability to manage themselves, such as emotional control, time management, and personal decision-making. This is relevant in various work and educational contexts, especially to increase individual

productivity. These skills are very important for Indonesian high school students to develop to prepare them to face the challenges of education, daily life, and work. An effective approach is gamification. This is the use of game elements such as points, badges, and challenges to learn. Gamification helps students develop emotional control on tasks that require concentration under pressure, trains time management through deadline-bound missions, and improves decision-making skills through real-world simulations. Furthermore, gamification increases student motivation by making learning more interesting, rewarding student effort, encouraging active participation, and training independence in completing tasks. By using applications such as Kahoot, Quizizz, and Classcraft, or integrating a points and badge system into the classroom, gamification can create an interactive, relevant, and effective learning experience. Through this approach, students not only learn better but also acquire skills that are important for the future.

- Adaptability and Cognitive

  Adaptability (14.1%) and Cognitive (15.5%) are important categories that can be developed through gamification in learning, especially for high school students in Indonesia. Adaptability, which refers to an individual's ability to adapt to change, is essential in the digital era, as students must be able to respond flexibly to new challenges and situations. Gamification supports this by creating a dynamic task-based learning environment where students must adapt their strategies to changing situations and game rules. For example, simulation and strategy games require students to think creatively and find new solutions to unexpected challenges. On the other hand, gamification can also improve cognitive skills such as analysis, logical thinking, and information processing. Puzzle-based, logic-based, or problem-solving games encourage students to analyze situations, recognize patterns, and make rational decisions based on the data and information provided. For example, through interactive story-based games and strategic quizzes, students can develop critical thinking skills and deepen their understanding of learning content. Gamification makes learning more exciting through elements of competition and rewards that help students stay focused and motivated. This approach enables high school students to better prepare for a rapidly changing world while honing deep and adaptive thinking skills, fostering a more creative, resilient and intelligent generation.

- Engagement dan Social Skills

  Engagement (12.7%) and Social Skills (10.6%) reflect the importance of active participation and social interaction skills, which are top priorities, especially in high school learning in Indonesia. Gamification plays an important role in supporting the development of both aspects. By using engaging game elements such as group challenges, leaderboards, and reward systems, gamification increases student engagement by making learning more fun and interactive. When students feel actively involved in the learning process, they are more motivated to participate, understand the material, and achieve their goals. In addition, the social elements of gamification, such as game-based community projects and team challenges, provide students with opportunities to develop social skills. In this context, students learn to work together, communicate effectively, resolve conflicts, and build positive relationships with their classmates. For example, team-based games that require students to share ideas, develop strategies, and solve problems together create a learning environment that encourages teamwork and interpersonal skills. By incorporating gamification into learning, students not only learn to engage more deeply as individuals but also gain practical experience in collaborating and building harmonious social relationships. This is important in preparing them for the world of work, where interpersonal skills and the ability to work in teams are increasingly needed. Gamification, which combines competitive and cooperative elements, is a powerful tool for developing more engaged, confident and socially competent students.

- The Role of Technological Competence and Creativity

  Although not dominant, Creativity (8.5%) and Technological Competence (5.6%) are not dominant, both aspects are still important, especially in preparing high school students in Indonesia to face the challenges of the industrial era 4.0. Creativity reflects students' ability to generate innovative ideas and unique solutions, while technological competence shows the ability to use and understand technology effectively. Gamification can be an effective tool to develop both aspects simultaneously. In the aspect of creativity, gamification provides space for students to explore new ideas through project-based games or simulations. For example, games that allow students to design solutions to certain problems, such as building a virtual city or solving environmental challenges, encourage them to think outside

the box and find creative approaches. Gamification also allows students to explore different perspectives and create original results through varied scenarios and challenges. On the other hand, technological competence can be developed through the integration of technology in gamification-based learning. The use of learning applications such as Minecraft Education, Classcraft, or AR/VR-based platforms not only introduces students to cutting-edge technology but also trains them to understand and utilize it efficiently. This technology-based gamification helps students get used to digital tools that are relevant to the needs of Industry 4.0, such as basic programming, data analysis, and simulation. By integrating creative and technological elements into learning, gamification helps high school students not only think innovatively but also be ready to face the challenges of the digital world. Although the contribution of these two aspects in research is not as large as other categories, creativity and technological competence remain important foundations in creating an adaptive, visionary, and competent generation in the modern era.

- Digital Literacy and Critical Thinking

  Digital literacy (3.5%) and critical thinking (4.9%), although the percentage is low, are important factors that need to be considered in the learning of high school students in Indonesia, especially in the digital information era. Gamification can be an effective approach to address these challenges in an interesting and relevant way. Digital literacy is a fundamental skill in the digital era, although it has not been widely discussed. Gamification allows students to learn to understand, evaluate, and use digital information critically through technology-based activities. For example, gamification platforms can teach students how to verify information sources, identify fake news, and understand cybersecurity through simulation games. These activities make learning digital skills more interactive and understandable and encourage students to practice digital skills in real-world situations. Meanwhile, critical thinking is becoming increasingly important in dealing with the complexity of information and decision-making processes in modern society. Gamification helps students develop critical thinking skills through logical challenges, scenario-based games, or puzzles that require detailed analysis and problem-solving. For example, educational games where students must solve criminal cases or make strategic decisions in business simulations train systematic thinking to evaluate data and consider multiple perspectives before acting. By combining digital literacy and

critical thinking through gamification, high school students gain important skills that will not only help them succeed in education but also make them individuals ready to face the challenges of the modern world. Although the proportion of the two topics discussed in this study is small, their influence on the development of intelligent and competent students cannot be ignored.

- Leadership

  Leadership (7%) ranks in the middle, with leadership development still considered important, although often combined with other categories such as self-management and social skills. For high school students in Indonesia, leadership skills are important skills that help them lead themselves and others in a variety of situations, not only in the school environment but also in preparation for entering society and higher education. Gamification can be an effective tool for developing leadership skills by creating a learning environment that allows students to take on leadership roles in interesting and challenging situations. For example, in a team-based game, students might be given the responsibility of leading a group to complete a mission or achieve a specific goal. Such situations practice decision-making, conflict management, and motivating team members, which are the essence of leadership. Additionally, gamification allows for leadership development through real-world simulations such as games that involve strategic decision-making, resource allocation, or project management. For example, students can lead a "virtual team" in a business simulation and develop strategies to achieve a specific goal while overcoming new challenges. These experiences teach students to think critically, communicate well, and take responsibility for the outcomes of their decisions. With this approach, gamification can not only help high school students understand what it means to be a leader but also provide relevant practical experience. Although leadership is often associated with other categories such as self-management and social skills, the role of leadership in influencing personal development cannot be ignored. Gamification allows students to practice and develop leadership skills in a fun and effective way, preparing them to become adaptive and visionary leaders in the future.

2. Gamification Challenge
    - Technology and Content Concerns

      The study identified challenges in implementing ICT-based gamification, including conceptual issues, content, and potential technology overuse. This can be very tiring (Romero Rodrigo & López Marí, 2021).
    - Acceptance of technology and infrastructure A study conducted by

      Found that factors such as IT infrastructure, management support, and financial resources have a significant impact on the success of gamification implementation and are considered barriers to implementation. It has been shown that it is possible. Resources are limited. An institution can be formed (Hmoud et al., 2024).
    - Design and Implementation of Complexity Research by

      Shows that designing complex gamification experiences requires a lot of effort to effectively integrate learning and game elements (Taguas et al., 2022).
    - Long-term effects

      A study by Koppitsch & Meyer (2022) showed that point-based gamification that rewards quick responses has long-term impacts, especially if learning is not done properly. Internalized.
    - Different User Preferences According to a study conducted by

      students' preferences for gamification tools vary depending on factors such as ease of use, enjoyment, and relevance of the content. This requires an adaptive design to meet the needs of all students (Acosta-Medina et al., 2021),.
    - Technology overload

      Concerns about technology overload come from the same study as (Romero Rodrigo & López Marí, 2021), where excessive implementation can dilute the focus on the main material.

CONCLUSIONS AND RECOMMENDATION

Gamification can increase student engagement, and internalization, especially in overcoming the challenges of implementing the Merdeka curriculum to increase motivation and academic achievement. Schools can implement gamification through platforms such as Kahoot!, Quizizz, and Classcraft to create an interactive and collaborative learning environment. However, its successful implementation requires overcoming challenges such as limited technological infrastructure and lack of teacher training. Strategies such as ongoing teacher training and

providing equitable access to technology greatly support the sustainability of this approach. Gamification can also help develop 21st-century skills such as critical thinking, collaboration, and creativity. These skills are essential in preparing students for the modern world. When implemented correctly in schools, gamification can bridge traditional learning methods and future educational needs, creating relevant and enjoyable learning experiences for students.

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