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Kahoot in Digital-Era Classrooms: Benefits, Limitations, and Pedagogical Implications

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ABSTRACT

The need for interactive, adaptive, and engaging learning media that can enhance the student motivation is increasingly growing. One widely used innovation across various educational levels is Kahoot, a game-based quiz platform that offers competitive, enjoyable, and easily accessible learning experiences. This study is a qualitative literature review aimed at analyzing the effectiveness of Kahoot as a gamified learning tool, particularly in its role as an assessment medium and reinforcement of learning outcomes. Data were collected through a systematic review of published literature from national and international journals and scientific conference proceedings accessed via the Google Scholar database by using the keywords Kahoot, learning assessment, and learning outcomes. The selection was limited to publications from 2017 to 2025 that specifically discussed the effectiveness of Kahoot in educational contexts. From this process, 14 relevant studies were identified, categorized based on their focus on learning assessment and/or learning outcomes, and analyzed through an in-depth review of their results and discussion sections. The findings indicate that Kahoot consistently enhances the student motivation, engagement, interest, and learning outcomes. Gamification elements such as scoring, leader boards, time limits, and real-time feedbacks foster active, competitive, and enjoyable learning environments. However, several studies highlight challenges, including the dependence on internet connectivity, potential anxiety due to competition and time constraints, and student fatigues when Kahoot is used too frequently without any variation. Overall, Kahoot is effective as a formative assessment tool and learning reinforcement strategy, but requires appropriate pedagogical integrations. Further research with stronger methodological designs is recommended to evaluate long-term impacts and moderating factors such as technological readiness and learning styles.

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INTRODUCTION

Learning in the digital era has undergone significant transformation alongside rapid technological advancements and the growing accessibility of digital platforms. One notable development is the increasing adoption of game-based learning approaches and real-time student response systems to enhance student participation, motivation, and learning outcomes (Ervina et al., 2025). Among the available platforms, Kahoot has been widely documented as one of the most frequently adopted game-based learning platforms in educational settings, with numerous empirical studies and reviews reporting its extensive classroom use and pedagogical relevance (Wang & Tahir, 2020; Licorish et al., 2018). Its core features—interactive quizzes, competitive leaderboards, time-limited responses, and immediate feedback—are consistently identified as factors that enhance student engagement and participation (Plump & LaRosa, 2017; Bicen & Kocakoyun, 2018). Kahoot was selected in this study not merely due to its popularity, but because it has been examined more extensively than comparable platforms such as Quizizz, thereby providing a stronger empirical foundation for evaluating its effectiveness as a formative assessment tool (Wang & Tahir, 2020). A study published in Education, titled "Kahoot is Gamifying the Classroom," similarly highlights the shift from traditional learning environments to more participatory and engaging ones (Wang & Tahir, 2020).

A substantial body of empirical research has shown that Kahoot use is positively correlated with student engagement (Sihololo et al., 2025), positive attitudes toward learning, and improved academic performance (Suparmi & Susanto, 2025). In elementary mathematics classes, for instance, a quasi-experimental study found that students in the Kahoot-assisted group scored higher on post-tests than those in the control group (82.10 vs. 74.73), indicating better conceptual understanding (Sari & Utami, 2025). However, Kahoot's effectiveness is not uniform across all contexts. Several studies emphasize that its success depends largely on instructional design, frequency of use, type of assessment (e.g., formative vs. summative), and student characteristics such as age, technological readiness, and learning context. For example, a study on the use of Kahoot to support writing skills in the IELTS context found increased engagement but also noted challenges related to competitive pressure, varying proficiency levels, and technology readiness among students (Rowiyah, 2024). A broader literature review concluded that "some studies suggest that Kahoot has little or no effect" when contextual factors and implementation quality are not adequately controlled (Cadungog-Uy, 2022).

Theoretically, Kahoot's pedagogical relevance can be explained through the lens of gamification, defined as the application of game elements (e.g., points, leaderboards, time limits, challenges) in non-game contexts to enhance motivation and engagement (Wijaya & Hapsari, 2025). In educational settings, gamification is expected to foster immersive learning experiences (flow), strengthen intrinsic motivation, and cultivate social interaction among students (Aini & Hasna, 2025). Prior research suggests that although gamification holds substantial potential, findings remain heterogeneous due to variations in design features, implementation contexts, and measurement instruments (Oliveira et al., 2021). Within the specific context of Kahoot, Wang and Tahir (2020) reported improvements in learning outcomes but also noted the presence of a "wear-out effect" when the platform is used repeatedly without instructional variation (Aibar-Almazan et al., 2024). This is particularly important for learning design, as motivational benefits depend on other factors such as content relevance, meaningful feedback, and the quality of teacher–student interactions.

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Studies in Indonesia similarly indicate that while students perceive Kahoot as "fun," limitations such as technological infrastructure, teacher readiness, and competitive pressure may reduce its effectiveness (Harahap et al., 2025).

From a practical standpoint, several challenges frequently appear in Kahoot related research. These include: (1) variations in quiz design (number of questions, time limits, item types), which hinder cross-study comparability; (2) short-term interventions, as Kahoot is often used only once or twice, limiting understanding of long-term effects; (3) an overreliance on quantitative measures (scores, participation rates) with limited attention to affective variables such as anxiety, attitudes toward competition, or the experiences of students with special needs; and (4) diverse learning contexts (subjects, grade levels, school cultures) that complicate generalization. For example, while language-learning studies report increased motivation, they also note that some students experience stress due to the competitive nature of leaderboards.

Within the Indonesian educational context (primary, secondary, and tertiary levels) Kahoot holds considerable potential to support a shift toward more interactive and participatory learning. However, effective implementation requires careful pedagogical integration, adequate technological readiness, and teacher sensitivity to affective factors such as motivation, anxiety, and competitive dynamics. Therefore, this literature review not only synthesizes existing findings but also provides guidance for educators and researchers in designing more effective and inclusive Kahoot-based learning interventions. Ultimately, this review is expected to contribute meaningfully to the theoretical development and practical implementation of digital game-based learning in both local and global contexts.

METHODS

This study employs a qualitative research design using a Systematic Literature Review (SLR) approach. A literature review involves systematically collecting data through reading, recording, and organizing relevant research sources to develop theoretical foundations and provide scholarly references that support the analysis (Nurcahyani, 2023). The SLR approach followed the PRISMA framework to ensure a transparent, rigorous, and structured review process. This method was selected to examine the effectiveness of the Kahoot application as a learning assessment tool in enhancing student learning outcomes.

Data Sources

Data were obtained from previously published research articles indexed in national and international peer-reviewed journals as well as scientific conference proceedings. The literature search was conducted using the Google Scholar database with the keywords "Kahoot," "learning assessment," "formative assessment," and "learning outcomes."

Selection Criteria

The inclusion criteria for this review were: (1) publications released between 2017 and 2025; (2) studies focusing on the use of Kahoot in educational contexts; (3) empirical research examining the effectiveness of Kahoot in assessment or learning outcomes; (4) availability of full-text articles; and (5) peer-reviewed academic sources.

The exclusion criteria consisted of: (1) studies unrelated to Kahoot-based learning; (2) conceptual or opinion papers without empirical data; (3) duplicate publications; and (4) non-scholarly sources.

Selection Procedures

The article selection process followed four PRISMA stages: identification, screening, eligibility assessment, and final inclusion. Initial search results were screened based on titles and abstracts to exclude irrelevant studies. Subsequently, full-text articles were reviewed to

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ensure methodological relevance and alignment with the research objectives. After completing all PRISMA stages, 14 articles were retained as the final dataset for analysis.

Data Analysis

The selected articles were categorized according to their primary focus, namely learning assessment, learning outcomes, or both. Metadata from each study were systematically organized, including author(s), publication year, journal, research type, and key findings. An in-depth qualitative analysis was then conducted, particularly focusing on the results and discussion sections, to synthesize evidence and draw conclusions regarding the effectiveness of the Kahoot application in enhancing student learning outcomes.

RESULTS

Based on a review of various national and international studies on the use of Kahoot as a learning medium, several important findings emerged that reveal a consistent pattern regarding its effectiveness on learning processes and outcomes. Overall, the analyzed studies show that Kahoot can enhance student engagement, motivation, and learning outcomes across primary, secondary, and higher education settings. Several studies reported significant improvements in post-test scores and concept retention following the use of Kahoot (Plump & LaRosa, 2017; Sari & Utami, 2025; Setiawati et al., 2018). Table 1 summarizes the articles identified through the literature search process.

Table 1. Literature review

Name and year	Title	Method	Results
Plump, C. M., & LaRosa, J. (2017)	Using Kahoot! In the Classroom to Create Engagement and Active Learning: A Game-Based Technology Solution for eLearning Novices	Descriptive quantitative	Kahoot is considered easy to use, free, and utilizes students' personal devices (mobile learning). Kahoot successfully provides real-time feedback to instructors, allowing them to quickly adjust instruction. Researchers recommend integrating Kahoot into classrooms across disciplines, both for quizzes and anonymous surveys, as the survey feature has been shown to encourage more inclusive class participation. Kahoot also has limitations related to its reliance on a stable internet connection and the need to validate the academic value of the game-based format.
Cortés-Pérez, I., et al. (2023)	Study Based on Gamification of Tests through Kahoot™ and Reward Game	Quasi-experimental (*preliminary study*).	Kahoot and the reward system are effective tools for encouraging daily student learning. Limitations of this study lie in its preliminary nature and focus on a single discipline

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	Cards as an Innovative Tool in Physiotherapy Students: A Preliminary Study		(physiotherapy), which may limit the generalizability of the results.
Licorish, S. A., et al. (2018)	Students' perception of Kahoot's influence on teaching and learning.	Mixed methods	Kahoot increases engagement, motivation, and learning experiences. Students felt Kahoot helped minimize distractions and improve the quality of instruction beyond conventional methods. Kahoot's key strengths include fostering motivation, providing timely feedback, and offering gamification strategies that make learning more fun and competitive. Other factors contributing to improved learning include the appropriate content structure and integration of game-play strategies. Limitations of this study include the fast-paced nature of Kahoot, which can cause anxiety due to time constraints, as well as technical challenges such as poor internet connection.
Wirani, Y., Nabarian, T., & Romadhon, M. S. (2022)	Evaluation of continued use on Kahoot as a gamification-based learning platform from the perspective of Indonesia students	Survey study	Regular use of Kahoot, especially in longer sessions, can effectively improve a variety of essential skills in students, such as attention, creativity, critical thinking, self-managed learning, problem-solving, and computer literacy. Kahoot's primary advantage is its increased motivation, engagement, and positive classroom atmosphere through its time-based competition and scoring system.
Sandoval-Hernández,	Analysis of different	Literature review	Gamification resources (Kahoot) encourage fun and creativity,

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Name and year	Title	Method	Results
I., et al. (2023)	gamification-based teaching resources for physiotherapy students (review)		increase commitment, and facilitate the achievement of academic goals.
Ali, H. F. M., et al. (2022)	Effect of Using Kahoot As a Digital Game-Based Formative Assesment Tool in Enhcing Nursing Students' Khowledge and Learning Motivation	Quasi-experimental	Kahoot improves students' knowledge and motivation to learn. One of Kahoot's key advantages is its ability to increase students' intrinsic and extrinsic motivation and maintain their attention throughout the learning process. Kahoot also serves as a useful formative assessment tool, providing positive feedback from students.
Salam, I. (2022)	The Effect of Kahoot Media on Learning Outcomes of Prospective Elementary School Teacher Students.	Quasi-experimental	The use of Kahoot media on the learning outcomes of prospective elementary school teachers in Indonesia. The strength of Kahoot, which underlies this effectiveness, is its ability to stimulate intrinsic motivation, increase student engagement, and make the learning process more engaging and interactive.
Nazmi, Y. F. (2024)	The The Effect of Using Kahoot on Students' Reading Achievement: a Quasi-Experimental Study	Quasi-experimental	Kahoot was found to be more effective in improving reading achievement than Quizizz. The advantage of using Kahoot here is its ability as a dynamic gamification strategy, effective in increasing student engagement, and making the learning process enjoyable, thus positively impacting their academic achievement. Kahoot helps students understand the material more easily and enjoyably.

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Name and year	Title	Method	Results
Saputro, F., C & Mansur, H. (2024)	The Utilization of Kahoot-Based Interactive Learning Media in Enhancing Students' Learning Interest	*Library Research*	The use of Kahoot media in learning increases student interest and motivation, making the learning process more active, interesting, and less monotonous. The main advantages of Kahoot include its ability to create a positive competitive atmosphere, encourage direct student participation, and its flexible nature (accessible via mobile devices) and free, thus saving time and costs. However, like other online applications, the main drawback of using Kahoot is its dependence on the availability of devices and a stable internet connection in the school environment. Therefore, the recommendation given is that Kahoot be used as an alternative, innovative and relevant learning media for teachers to implement in various subjects to improve the quality of learning and arouse student enthusiasm in the digital era.
Juliani, R.P., ERlita, S., & Anggraini, R.S. (2025).	The Use of Game-Based Kahoot Learning Media to Improve Students' Learning in Mathematics Instruction	Pre experimental	Kahoot is a highly effective gamification tool in educational settings across various disciplines, proven to increase student engagement, motivation, and learning outcomes. Research consistently shows that using Kahoot helps facilitate active learning, provides valuable real-time feedback for both instructors and students, and is positively received as a fun and easy-to-use learning method. Limitations of Kahoot include its reliance on a stable internet connection.
Fajriyah, E., Febriyana, D.,	The Effect of Using Online	Quantitative	Research on the consistent use of the online game-based learning media

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Name and year	Title	Method	Results
Rahmiati, A., & Uctuvia, V. (2025)	Game-Based Kahoot Learning Media on Students' Mathematics Learning Outcomes		Kahoot on mathematics learning outcomes. Kahoot's main advantage is its ability to drastically increase student interest and motivation, making learning more interactive and enjoyable, and encouraging students to prepare more diligently for quizzes. Kahoot's drawback lies in its online nature, which relies heavily on a stable internet connection.
Pupitasari, R,. Uparman, Suparman., Fahrunnisa, F. (2022)	The Effect of Game-Based Learning Kahoot Media on Students' Learning Interest and Learning Outcomes	*Quasi-eksperimental*	The use of game-based learning media increases student interest and learning outcomes, particularly in Chemistry. Kahoot's primary advantage is its high motivation, but its drawback is its reliance on internet connections and student devices.
Lusiana, E.M., Gustiana, E. (2025)	The Effect of Kahoot Learning Media on Students' Learning Outcomes in Indonesian Language Subjects for Grade 8 at MTS PUI Kuningan	Experiment	The Kahoot learning tool improved learning outcomes in Indonesian language for 19 students. Kahoot proved to be an effective and interactive tool for enhancing conceptual understanding and fostering active student participation, offering a more optimal alternative to conventional teaching methods.
Setiawati, H. D., Sihkabuden,S ., & Adu,, E P. (2018)	The Effect of Kahoot on the Learning Outcomes of Grade XI Students at SMAN 1 Blitar	*Quasi experimental*	Kahoot has proven effective in improving student learning outcomes, making it a superior medium compared to conventional teaching methods.

Findings from quantitative and quasi-experimental research further indicate that Kahoot positively influences conceptual understanding, particularly in subjects such as mathematics, science, physiotherapy, and English. For instance, studies by Sari and Utami (2025) and Fajriyah et al. (2025) reported significant improvements in learning outcomes,

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while Lusiana and Gustiana (2025) documented an increase in average scores from 62.63 to 93.16 after the intervention.

From an affective standpoint, numerous studies highlight Kahoot's effectiveness in fostering a more enjoyable and positively competitive learning environment. Students in higher education settings have reported increased interest in learning, enhanced intrinsic motivation, and a stronger sense of social engagement (Licorish et al., 2018; Harahap et al., 2025; Saputro & Mansur, 2024). Gamification elements—such as scoring, leaderboards, time constraints, and real-time feedback—are considered the most influential factors contributing to an active and engaging learning experience (Wijaya & Hapsari, 2025; Aini & Hasna, 2025). Sandoval-Hernández et al. (2023) also found that Kahoot effectively increases student engagement, while other gamification strategies, such as Escape Rooms, can encourage deeper and more creative learning experiences.

Despite these benefits, the literature also identifies several limitations associated with Kahoot implementation. Some studies point out that the platform's competitive structure and rapid-response format can induce anxiety among certain learners, especially in language learning contexts and high-stakes classroom environments (Rowiyah, 2024; Licorish et al., 2018). In addition, the reliance on digital devices and stable internet connectivity poses a major challenge for many educational institutions, particularly in regions with limited technological infrastructure (Harahap et al., 2025; Ali et al., 2022). Aibar-Almazán et al. (2024) further reported a potential "wear-out effect" when Kahoot is used too frequently without incorporating variations in instructional methods.

DISCUSSION

A review of national and international studies on the use of kahoot in educational settings reveals consistent evidence of its positive impact on student motivation, engagement, and learning outcomes across various levels of education. Research by Plump and Larosa (2017) and licorish et al. (2018) shows that gamification elements such as competition, scoring, and real-time feedback contribute to an active, engaging, and distraction-free learning environment. These findings are consistent with studies conducted in indonesia, including those by Sari and Utami (2025), Setiawati et al. (2018), and Lusiana and Gustiana (2025), which reported significant improvements in post-test scores among students using kahoot compared to those taught through conventional methods. Overall, the literature affirms kahoot's strong effectiveness as a game-based learning medium that benefits both cognitive and affective domains.

Beyond improving learning outcomes, kahoot has been shown to enhance emotional and social engagement during classroom activities. Studies by Harahap et al. (2025) and Saputro and Mansur (2024) revealed that students responded enthusiastically to kahoot, as its interactive features reduce boredom, support healthy competition, and promote collaborative learning experiences. In the indonesian context—where teacher-centered and passive learning approaches are still prevalent in some regions—kahoot offers an effective alternative that facilitates more dynamic, two-way interactions. These findings are aligned with gamification theory, which posits that game elements can stimulate intrinsic motivation through feelings of achievement and challenge (aini & hasna, 2025).

However, both national and international studies highlight that kahoot's effectiveness is not uniform across all contexts. Rowiyah (2024) found that although kahoot increased engagement in ielts writing classes, some students felt uncomfortable with its competitive nature and strict time limits. The resulting cognitive load contributed to anxiety for certain learners—a pattern also observed in the study by Licorish et al. (2018), who noted that rapid-

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response formats and time pressure may hinder some students' performance. These findings suggest that while kahoot can be highly effective, inappropriate instructional design may reduce its potential benefits.

The literature also indicates that kahoot's implementation is strongly influenced by technological factors such as internet connectivity and access to digital devices. Harahap et al. (2025) noted that regions in indonesia with inadequate technological infrastructure face challenges when integrating kahoot into classroom learning. Similar issues were reported by Ali et al. (2022) in the context of nursing education, where unstable internet connections disrupted formative assessment activities and the overall learning flow. As such, effective use of kahoot requires adequate device availability, stable network access, and teacher readiness to manage digital learning environments.

In addition, kahoot's effectiveness is found to depend on the duration and frequency of use. Aibar-almazán et al. (2024) reported the presence of a potential "wear-out effect," in which motivation decreases when kahoot is used excessively without variation in instructional methods. This issue is also reflected in the study by Sandoval-hernández et al. (2023), who compared kahoot with other gamification strategies such as escape rooms. Their findings showed that while kahoot is effective in generating rapid engagement, escape rooms tend to better support creativity, deeper concentration, and higher-order thinking. This suggests that kahoot is particularly suitable for formative assessments but may be less optimal for activities requiring in-depth exploration or complex reasoning.

Several studies also demonstrate kahoot's strong effectiveness in improving learning outcomes in mathematics and science. Fajriyah et al. (2025) reported that kahoot contributed to a 70.4% improvement in students' mathematics achievement. Similarly, Juliani et al. (2025) found that kahoot-based game learning significantly enhanced students' understanding of mathematical concepts. These results reinforce that kahoot is especially well-suited for concept-based learning and drill practices, as its immediate feedback mechanism accelerates the learning process.

In the context of language education, the use of kahoot has also produced positive results. Suparmi and Susanto (2025) showed that kahoot improved students' attitudes and motivation in english reading classes. In another study, Nazmi et al. (2024) concluded that kahoot was more effective than quizizz in improving reading achievement, suggesting that kahoot's speed, interface design, and competitive structure enhance learners' attention and short-term memory.

Despite the overwhelmingly positive findings, this literature review also reveals methodological limitations in several studies, such as reliance on quasi-experimental designs, short intervention durations, and limited evaluation of long-term learning effects. Most studies measure gains primarily through short-term post-tests, leaving long-term retention underexamined. Consequently, future research should consider employing randomized controlled trials (rcts), extended intervention periods, and moderating variables such as digital literacy, learning styles, and academic anxiety.

In summary, this literature review confirms that kahoot is a highly effective gamified learning tool for enhancing student motivation, engagement, and academic performance. However, its effectiveness is closely tied to instructional design quality, technological readiness, and appropriate usage frequency. Kahoot should not be used as a standalone strategy; rather, it should be integrated with complementary approaches such as discussions, problem-based learning, and collaborative activities to achieve comprehensive learning outcomes. Thus, educators in indonesia can adopt kahoot as an innovative learning tool while

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remaining attentive to student diversity, contextual challenges, and the need for varied pedagogical methods to ensure effective, inclusive, and sustainable learning.

CONCLUSION

Based on the literature review, it can be concluded that Kahoot is an effective, interactive, gamification-based learning medium capable of significantly improving the quality of learning across various educational levels and subjects. The majority of studies show that using Kahoot increases student motivation, engagement, attention, and interest in learning, while creating a more enjoyable, competitive, and participatory classroom atmosphere. Kahoot's effectiveness is also evident in improved learning outcomes in science, mathematics, language arts, and social studies. Most studies report significant increases in post-test scores after implementing Kahoot compared to traditional learning methods.

Overall, Kahoot has proven superior as a medium for formative assessment, material reinforcement, and motivational activities. However, it is less than optimal when used as the sole learning method or for activities that require in-depth understanding and high-level reasoning. Therefore, Kahoot's use is ideally combined with other, more exploratory and collaborative pedagogical strategies. Considering these benefits and limitations, this literature recommends that teachers integrate Kahoot in a planned, varied, and contextual manner, while considering students' technological readiness. Further research with more robust designs, longer intervention durations, and a focus on long-term effects is also needed to enrich the empirical evidence. With proper implementation, Kahoot can be an innovative learning medium that supports the transformation of education toward more interactive, effective, and enjoyable digital learning.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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