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## The Impact of AI-Powered Gamified Learning Tools on Language Proficiency and Student Engagement of JHS Students from Private Schools in Bulacan

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*AI-Powered Learning, Bibliometric Analysis, Digital Learning Tools, Educational Technology, Gamification, Language Proficiency, Private Schools, SDG 4, Student Engagement*

### ABSTRACT

This study investigates the impact of AI-powered gamified learning tools on language proficiency and student engagement among Junior High School (JHS) students from private schools in Bulacan, contributing to the advancement of Sustainable Development Goal 4 (SDG 4) on Quality Education. A bibliometric analysis was conducted using 205 documents retrieved from the Scopus database (2015–2025), utilizing keyword-based searches and analytical methods such as citation analysis, co-citation analysis, and co-word mapping to identify key research trends and theoretical foundations. The study analysis revealed increasing academic interest in AI-powered gamification, digital language learning, and student engagement strategies. Key theoretical frameworks underpinning the literature include Constructivism, Self-Determination, and Flow Theory. Findings from the reviewed studies, alongside the present study, show that integrating AI-powered gamified tools significantly enhances students' language proficiency and fosters higher levels of motivation, participation, and active learning. This study emphasizes the need for educational institutions to invest in AI-driven educational technologies, develop teacher competencies in digital pedagogy, and redesign language curricula to leverage gamification for improved student outcomes and engagement. This study offers a comprehensive overview of the academic landscape surrounding AI-powered gamified learning in language education. It provides actionable insights for educators, researchers, and policymakers aiming to promote innovative, engaging, and technology-enhanced learning environments.

### INTRODUCTION

The rapid integration of technology into the education system has significantly transformed how learning experiences are designed. In particular, AI-driven tools have emerged as game-changers by offering personalized learning and immediate feedback (Zainuddin *et al.*, 2020). As technology continues to reshape education, it is increasingly important to explore how these tools can enhance language learning, particularly for Junior High School (JHS) students in private institutions.

Moreover, AI-gamified learning environments have garnered considerable attention as practical tools for enhancing student engagement and improving learning outcomes. By integrating elements such as points, rewards, and challenges into the learning process, gamification transforms traditional education into a more interactive, competitive, and engaging experience (Sailer & Homner, 2019; Kalogiannakis *et al.*, 2021). This approach has proven effective across various educational contexts and subjects, boosting student motivation and deepening content understanding.

There has been a noticeable shift toward integrating modern, technology-driven teaching methodologies in Bulacan, particularly within private schools. These institutions increasingly adopt innovative tools such as AI-powered systems and gamified learning platforms to boost student engagement and improve academic performance. This transition is necessary to equip students with the future challenges in a constantly changing world.

Language skills form the foundation for academic achievement and future professional opportunities. In today's increasingly interconnected global economy, effective communication, particularly in English and other widely spoken languages, is vital for emerging learners. Moreover, technology-enhanced learning supports the development of these skills by offering participatory, responsive, and immersive experiences that resonate with the digitally native generation. Language proficiency involves communicating, understanding, and producing language effectively across diverse contexts. Within the school setting, this not only translates to achieving high marks in exams and assessments but also to participating in global conversations and contributing meaningfully to various professional fields (Sanchez *et al.*, 2020). Furthermore, engagement is frequently identified as one of the most crucial factors influencing positive learning outcomes. When students are actively engaged, they are more likely to stay motivated, retain knowledge, and apply their learning in real-world situations. The use of interactive tools further enhances this engagement, leading to improvements in both academic performance and language proficiency (Zainuddin *et al.*, 2020).

The synergy of student engagement and language proficiency is critical in learning. When students are actively involved in learning tasks, particularly those that challenge and engage them, there is a high likelihood that they will enhance their language abilities. Gamification, mainly when supported by AI-enabled tools, has been

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proven to significantly improve engagement and learning gains, as it offers an engaging and stimulating mechanism for language skills practice (Manzano-León *et al.*, 2021; Smiderle *et al.*, 2020). Gamified learning technologies that leverage AI combine the aspects of gamification with AI to develop individualized, interactive learning experiences. These technologies apply adaptive algorithms to offer real-time feedback, tailor lessons according to students' requirements, and enable them to learn at their own pace. Commonly used applications such as Duolingo, Quizlet, and Kahoot! have been extensively utilized for language learning, demonstrating the capabilities of gamification and AI fusion to improve proficiency (Zainuddin *et al.*, 2020).

Gamification revolutionizes conventional learning by adding rewards, challenges, and competition. This strategy enhances motivation and maintains student engagement (Klock, 2020). AI also individualizes this process by adapting lessons and quizzes to each learner's learning speed and achievement (Zainuddin *et al.*, 2020). These applications enable learners to enjoy the thrill of advancing through levels while at the same time building their language abilities. Whereas the efficacy of gamification and AI has long been documented within other educational contexts, little prior research has attended to their potential impact on private school JHS students. The present study attempts to examine the effects of AI-facilitated gamified tools on language ability and the participation of students in this specific population. The importance of this research is that teaching practices need to change to accommodate the needs of students today. With technology advancing and changing the face of education, knowing how these technologies can improve language learning in private schools is essential. This study will give valuable insights into the practical use of AI-driven gamified tools and how they can revolutionize language learning. The increasing use of AI and gamification in teaching practices indicates the movement towards equipping students for a future characterized by the fourth industrial revolution. This research is part of an ongoing initiative to investigate technology's role in influencing pedagogical practices and enhancing student performance (Saleem *et al.*, 2022).

This research aims to determine the effect of AI-driven gamified tools on language skills and motivation among JHS students in private schools in Bulacan. The study will examine if the tools contribute to better language skills, increased student motivation, and overall academic achievement. This study will add to the existing literature regarding the convergence of educational technology, gamification, and language learning. It will give evidence-based recommendations that can assist teachers in adopting better teaching approaches and enhancing language instruction in private schools and beyond.

## MATERIALS AND METHODS

The current study used bibliometric analysis to systematically examine the literature on applying AI-based

gamified learning systems to enhance student engagement and English language proficiency. Bibliometric analysis is a quantitative research method aimed at determining patterns in scientific literature, such as publication trends, author networks, citation structure, and new thematic areas.

The data were gathered from the Scopus database, which was chosen for its broad coverage of high-quality, peer-reviewed academic literature across fields. A total of 215 documents published between 2013 and 2025 were retrieved. The search process was informed by a Boolean logic style utilized to conjoin two sets of keywords. The first cluster concentrated on instructional innovations and gamified resources, employing keywords like "Gamification" and "English Language Proficiency." In contrast, the second cluster concentrated on language skill acquisition and student motivation, using keywords like "Gamification" and "English Language Skills." Boolean operators (AND/OR) and phrase searches ensured a broad but appropriate set of articles while retaining terminological variations. Wildcards (\*) were used where necessary to capture all the pertinent forms of the root words.

Once the data had been retrieved, bibliometric mapping software, specifically VOSviewer, was used to carry out multiple levels of analysis. These involved citation analysis (establishing the most cited works and authors in the dataset), co-citation analysis (the identification of intellectual connections and most cited pairs of studies), and co-word analysis (the identification of most frequently occurring keywords to identify dominant research themes and upcoming topics). Cluster analysis was also conducted to map the dominant areas of knowledge and connections between the researched concepts. This methodology presented an in-depth overview of the trends in research, intellectual basis, and possible future directions in AI-based gamification and language learning, particularly focusing on its influence on student motivation and English language proficiency.

## Search Strategy and Data Collection

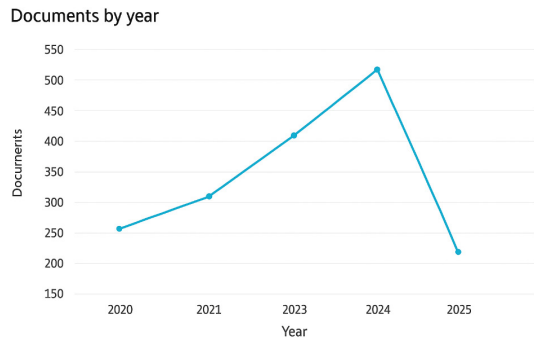
**Table 1:** Search string used for the database search

Keyword	Justification
Gamification OR "English Language Proficiency"	To identify literature on the role of educational tools in business education
AND	
Gamification OR "English Language Skills"	

## RESULTS AND DISCUSSION

This section presents key findings from a bibliometric analysis based on Scopus data, illustrating the annual distribution of documents related to a specific research theme. The figure shows a notable upward trend in scholarly output from 2020 to 2024, beginning with 256 papers in 2020 and peaking at over 520 in 2024. This increase indicates growing academic interest and

engagement in the topic. However, a sharp decline is observed in 2025, with the number of documents dropping to just over 220, likely due to the partial coverage of the year or delays in indexing. Overall, the publication pattern reflects heightened research activity and expanding contributions to the field, particularly in recent years, aligning with global academic efforts and priorities.



**Figure 1:** Number of publications and citations

The Scopus trend analysis in the figure above illustrates the number of documents published annually from 2020 to 2025. The data show a dynamic pattern of scholarly output, with notable fluctuations in publication trends over the six years.

In 2020, the number of documents was approximately 260, marking the starting point of this trend. A moderate increase occurred in 2021, reaching just over 300 publications, indicating a growing academic interest. This upward trend continued sharply into 2023, when document output rose to over 400. The consistent rise from 2020 to 2023 suggests sustained and expanding

research activity, driven by the global shift toward digitalization and technology integration in various fields. The most significant peak occurs in 2024, with over 500 documents published, representing the highest output within the timeframe. This surge could be attributed to intensified post-pandemic research efforts, increased funding, and a widespread emphasis on digital transformation, artificial intelligence, and innovation across disciplines.

However, the trend sharply declines in 2025, with the number of documents falling to just over 200. This abrupt decline may be due to several factors, including incomplete indexing for the current year, shifting research priorities, or reduced academic output following the post-pandemic research boom.

The figure reflects a general increase in research activity between 2020 and 2024, followed by a dramatic drop in 2025. The peak in 2024 underscores a period of heightened scholarly engagement, while the 2025 decrease signals the need for further analysis to determine whether it represents an actual decline or a temporary data gap. Further bibliometric analyses of leading authors, institutions, and research themes could provide deeper insights into this evolving field.

### Citation analysis

By applying document citation analysis, Table 2 presents the publications that have been the most cited within the dataset. The top three most frequently cited works were Sailer and Homner (2019) with 664 citations, Zainuddin *et al.* (2020) with 530 citations, and Kalogiannakis *et al.* (2021) with 338 citations. These citations reflect these studies' substantial influence and academic relevance within gamification in education.

**Table 2:** Top 10 highest-cited documents

No	Authors	Title	Citations
1	Sailer & Homner (2019)	The Gamification of learning: A meta-analysis.	664
2	Zainuddin <i>et al.</i> (2020)	The impact of gamification on learning and instruction: A systematic review of empirical evidence.	530
3	Kalogiannakis <i>et al.</i> (2021)	Gamification in science education. A systematic review of the literature.	338
4	Manzano-León <i>et al.</i> (2021)	Between level up and game over: A systematic literature review of Gamification in education.	272
5	Zainuddin <i>et al.</i> (2020)	The role of gamified E-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system.	262
6	Klock (2020)	Tailored gamification: A review of literature.	254
7	Smiderle <i>et al.</i> (2020)	The impact of gamification on students' learning, engagement, and behavior based on their personality traits.	232
8	Saleem <i>et al.</i> (2022)	Gamification applications in E-learning: A literature review.	227
9	Sanchez <i>et al.</i> (2020)	Gamification in the classroom: Examining the impact of gamified quizzes on student learning.	209
10	Legaki (2020)	The effect of challenge-based gamification on learning: An experiment in the context of statistics education.	186

### Trends and Emerging Themes in English Language Education Tools

As technology advances, educational methods are evolving to serve diverse learners better, leading to a significant shift in language learning from traditional classroom settings to digital platforms. One prominent example is Duolingo, an AI-driven gamified language learning app, which utilizes artificial intelligence and gamification techniques such as points, badges, and levels to enhance learner motivation. Moreover, gamifying the experience caters to a wide range of users, from casual learners to those seeking fluency. Thus, this approach offers immediate feedback, personalized learning paths, and bite-sized lessons that integrate easily into daily routines.

Recent research on gamification in English Language Education (ELE) indicates a significant shift in traditional teaching methods to enhance student engagement, motivation, and overall learning outcomes. Gamification incorporates points, badges, leaderboards, and challenges, significantly increasing student motivation by making learning more enjoyable and interactive. According to Sailer and Homner (2019), gamified learning environments can alleviate the stress typically associated with conventional education, allowing students to engage in a more inviting and less intimidating learning experience. This enjoyment boosts participation and enhances retention and performance, particularly in language acquisition.

Zainuddin *et al.* (2020) support this notion by highlighting that gamified assessments, like quizzes integrated into game mechanics, provide students with immediate feedback. This feedback fosters a sense of accomplishment and offers valuable insights into their learning progress. Manzano-León *et al.* (2021) further stress that these interactive feedback mechanisms enable educators to customize instruction, addressing individual learning gaps and enriching the educational experience.

A significant trend is the personalization of gamification, where educators tailor game-based elements to meet their students' diverse needs and personalities. Smiderle *et al.* (2020) argue that personality traits significantly affect students' engagement with gamified content. For instance, competitive learners may excel in point-based systems, while collaborative learners thrive in team-based challenges. This personalized approach ensures that gamification effectively reaches a wide range of learners, fostering a more inclusive environment. Klock (2020) notes the increasing prevalence of tailored gamification, where educational tools and experiences are customized according to specific learner preferences, further enhancing engagement and academic outcomes. This is especially pertinent in English language classrooms, where students exhibit varying proficiency levels and learning styles.

The role of gamification in collaborative learning is also essential for language acquisition. Zainuddin *et al.* (2020b) demonstrate that gamified activities encourage students

to collaborate, solve problems, and learn from each other, aligning with social constructivist language learning theories. Such peer interaction improves linguistic skills and cultivates critical thinking and teamwork. Moreover, integrating gamification into digital platforms, as investigated by Sanchez *et al.* (2020), has broadened the accessibility of gamified learning experiences. Digital tools facilitate more flexible, interactive, and personalized learning opportunities, making gamification a scalable and effective approach across various educational contexts. Using technology, students can interact with gamified content outside traditional classroom settings, reinforcing language learning engagingly.

### Citation Distribution and Implications for Integrating Technology in ESL Classrooms

Technology integration, mainly through gamification, has attracted significant attention in English as a Second Language (ESL) classrooms. Recent studies highlight various applications and benefits of this approach, revealing distinct patterns in its use and implications for enhancing ESL learning outcomes.

Sailer & Homner (2019) conducted a meta-analysis demonstrating that gamification can significantly boost student engagement in ESL settings through interactive elements like rewards and challenges. Their findings indicate that gamified experiences motivate students and foster a sense of accomplishment, which is crucial for language learners who may find traditional acquisition methods challenging. Zainuddin *et al.* (2020) further emphasize the role of gamification in enhancing instructional strategies, particularly with tools like gamified quizzes, which provide immediate feedback. This formative assessment can address language acquisition challenges by offering real-time data on student progress and areas needing improvement. Manzano-León *et al.* (2021) support this approach, highlighting the importance of continuous feedback in sustaining motivation and guiding personalized learning pathways.

Research also underscores the need for personalized gamification to cater to the diverse needs of ESL learners. Klock (2020) and Smiderle *et al.* (2020) stress the significance of tailoring gamified experiences based on student characteristics such as personality traits, learning preferences, and language proficiency. Klock's literature review reveals that a personalized approach engages diverse learners, ensuring all ESL students benefit from gamified learning. Personalized gamification can support both beginners and advanced learners by adjusting the difficulty and type of game elements. Smiderle *et al.* note that considering personality types, competitive or cooperative, enables educators to design resonant gamified tasks, increasing participation and effectiveness. Collaborative learning is another vital implication of gamification in ESL classrooms. Zainuddin *et al.* (2020) and Sanchez *et al.* (2020) discuss how gamified activities, especially team-based challenges and interactive quizzes, promote peer collaboration, which is essential for

developing fluency in ESL contexts. Gamified tools encourage teamwork and peer learning, enhancing language skills while fostering social connections among learners. Digital platforms further amplify the effectiveness of these collaborative activities. Sanchez *et al.* (2020) highlight how digital gamification tools create scalable and accessible solutions for ESL students to engage with content inside and outside the classroom. The technological aspect of gamification in ESL classrooms offers flexibility and scalability. Kalogiannakis *et al.* (2021) note that digital tools support gamified learning and provide a flexible instructional approach, allowing students to engage with content at their own pace. This flexibility is particularly beneficial in ESL education, accommodating students from diverse backgrounds who may require varying amounts of time to master language skills. Digital gamified tools enable educators to customize lessons and assessments to meet individual needs, ensuring personalized learning experiences for all students

### Co-citation analysis

The top ten most-cited documents in gamification and educational research reflect the evolving understanding of how game elements enhance learning, motivation, and engagement. Sailer and Homner (2019), with the highest citation count of 664, present a meta-analysis that forms the theoretical backbone for evaluating gamification's impact across various educational settings. Zainuddin *et al.* (2020a) follow closely with 530 citations, offering

a systematic review of empirical studies that solidify gamification as a credible instructional approach in modern pedagogy.

Kalogiannakis *et al.* (2021), cited 338 times, explore the integration of gamification in science education, highlighting the domain-specific benefits of gamified learning tools. Similarly, Manzano-León *et al.* (2021) (272 citations) and Zainuddin *et al.* (2020b) (262 citations) offer in-depth reviews of gamification in education and its use in formative assessments, respectively, emphasizing its adaptability and positive influence on student learning and engagement.

Further supporting these insights are Klock (2020), with 254 citations, and Smiderle *et al.* (2020), with 232 citations. These authors investigate tailored gamification strategies and how personality traits shape gamification outcomes. Saleem *et al.* (2022), with 227 citations, underscore the expanding application of gamification in e-learning environments.

Sanchez *et al.* (2020) (209 citations) and Legaki (2020) (186 citations) close the list with studies focused on gamified quizzes and challenge-based learning, respectively. Together, these works highlight the breadth and depth of gamification research, from theoretical frameworks to applied classroom practices, signaling its growing impact in transforming contemporary education.

Together, these studies establish a robust framework for examining how AI-enhanced gamification can significantly boost student engagement and language proficiency in junior high settings.

**Table 3:** Top 10 documents with the highest co-citation and total link strength

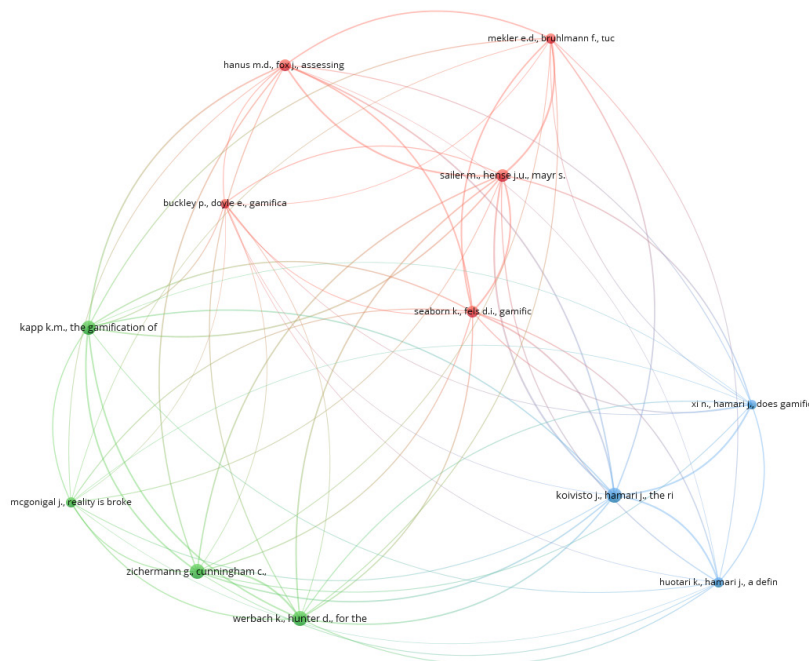
Documents	Citation	Total link strength
Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. <i>Computers in Human Behavior</i> , 69, 371-380. <a href="https://doi.org/10.1016/j.chb.2016.12.033">https://doi.org/10.1016/j.chb.2016.12.033</a>	118	308
Koivisto, J., & Hamari, J. (2017). The rise of motivational information systems: A review of Gamification research. <i>SSRN Electronic Journal</i> . <a href="https://doi.org/10.2139/ssrn.3226221">https://doi.org/10.2139/ssrn.3226221</a>	156	296
Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. <i>International Journal of Human-Computer Studies</i> , 74, 14-31. <a href="https://doi.org/10.1016/j.ijhcs.2014.09.006">https://doi.org/10.1016/j.ijhcs.2014.09.006</a>	105	250
Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. <i>Computers &amp; Education</i> , 80, 152-161. <a href="https://doi.org/10.1016/j.compedu.2014.08.019">https://doi.org/10.1016/j.compedu.2014.08.019</a>	101	236
Werbach, K., & Hunter, D. (2020). For the win, revise and update the edition. <a href="https://doi.org/10.9783/9781613631041">https://doi.org/10.9783/9781613631041</a>	157	233
Kapp, K. M. (2012). The gamification of learning and instruction: Game-based methods and strategies for training and education. Pfeiffer. <a href="https://doi.org/10.1145/2379057.2379059">https://doi.org/10.1145/2379057.2379059</a>	147	224
Zichermann, G., & Cunningham, C. (2011). Gamification by design: Implementing game mechanics in web and mobile apps. O'Reilly Media. <a href="https://doi.org/10.5555/2073550">https://doi.org/10.5555/2073550</a>	156	222

Mekler, E. D., Brühlmann, F., Tuch, A. N., & Opwis, K. (2017). Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. <i>Computers in Human Behavior</i> , 71, 525-534. <a href="https://doi.org/10.1016/j.chb.2015.08.048">https://doi.org/10.1016/j.chb.2015.08.048</a>	80	199
Xi, N., & Hamari, J. (2019). Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction. <i>International Journal of Information Management</i> , 46, 210-221. <a href="https://doi.org/10.1016/j.ijinfomgt.2018.12.002">https://doi.org/10.1016/j.ijinfomgt.2018.12.002</a>	64	162
Huotari, K., & Hamari, J. (2016). A definition for gamification: Anchoring gamification in the service marketing literature. <i>Electronic Markets</i> , 27(1), 21-31. <a href="https://doi.org/10.1007/s12525-015-0212-z">https://doi.org/10.1007/s12525-015-0212-z</a>	82	154
Mcgonigal, J. (2012). Reality is broken: Why games make us better and how they can change the world. <i>Choice Reviews Online</i> , 49(11), 49-6095-49-6095. <a href="https://doi.org/10.5860/choice.49-6095">https://doi.org/10.5860/choice.49-6095</a>	76	119
Buckley, P., & Doyle, E. (2014). Gamification and student motivation. <i>Interactive Learning Environments</i> , 24(6), 1162-1175. <a href="https://doi.org/10.1080/10494820.2014.964263">https://doi.org/10.1080/10494820.2014.964263</a>	66	97

Source: Author's interpretation based on VOSviewer analysis

Based on network visualization, co-citation analysis produced three distinct clusters. Figure 2 shows the network structure of co-citation analysis. Each cluster

was labelled and characterized based on representative publications according to the authors' inductive interpretation and understanding of the three clusters.



**Figure 2:** Co-citation analysis of the Impact of AI-Powered Gamified Learning Tools on Language Proficiency and Student Engagement

The co-citation analysis examining the impact of AI-powered learning tools in ESL education identifies three significant research clusters, each reflecting a crucial dimension of gamification's role in enhancing student engagement and language proficiency. The red cluster, which includes the works of Sailer *et al.* (2017), Hanus & Fox (2015), and Seaborn & Fels (2015), emphasizes the effects of gamification on student motivation. The frequent citation of these studies together highlights the importance of game design elements, such as rewards and challenges, in fostering intrinsic motivation and

engagement in language learning. Moreover, the blue cluster, represented by Koivisto & Hamari (2017), Huotari & Hamari (2016), and Xi & Hamari (2019), explores the broader applications of gamification in education. It mainly focuses on how gamified systems contribute to student satisfaction and overall educational outcomes. The connections within this cluster suggest that AI-powered gamification can effectively meet intrinsic needs like competence and autonomy, making learning more enjoyable and efficient. The green cluster led by Kapp (2012), McGonigal (2012), and Werbach

& Hunter (2020) delves into the pedagogical aspects of gamification. It examines how game mechanics can be integrated into teaching strategies to enhance learning experiences. This cluster underscores the significance of using game-based methods to accommodate diverse learning styles, promote active participation, and foster collaborative learning environments.

This co-citation network illustrates a robust interrelationship between gamification's effects on student motivation, pedagogical innovation, and overall educational effectiveness. As AI-driven gamification tools advance, future research should investigate how these technologies can create more personalized, adaptive, and engaging ESL learning environments, ultimately enhancing language proficiency and student engagement.

- Cluster 1 (Red) - This cluster examines how gamification influences student motivation within academic settings. Key studies, including those by Sailer *et al.* (2017), Hanus & Fox (2015), and Seaborn & Fels (2015), highlight the psychological advantages of gamification, such as heightened intrinsic motivation and engagement. Sailer *et al.* (2017) demonstrate that specific game design elements—like rewards and challenges—play a crucial role in meeting students' psychological needs, enhancing the learning experience. Hanus & Fox (2015) further affirm that gamification positively affects academic performance by boosting intrinsic motivation, social comparison, and overall classroom satisfaction. This cluster indicates that integrating gamified elements into ESL classrooms, mainly through AI-driven tools, could maintain student motivation and promote ongoing language practice by making learning more interactive and rewarding.

- Cluster 2 (Green) - The second cluster delves into the theoretical foundations of gamification and its pedagogical implications. Influential works by Kapp (2012), McGonigal (2012), Werbach & Hunter (2020), and Zichermann & Cunningham (2011) investigate how game

mechanics can be integrated into educational practices. They argue that gamification offers a framework for creating engaging learning environments aligned with academic objectives. Kapp (2012) advocates using game-based methods and strategies in instructional design, highlighting gamification's potential to accommodate diverse learning styles and foster collaborative learning. Werbach & Hunter (2020) contend that gamification is a powerful pedagogical tool that enhances engagement and effective learning outcomes when applied appropriately. This cluster emphasizes that AI-powered gamification tools in ESL classrooms can support dynamic, student-centered teaching approaches that promote language development through interactive and enjoyable learning experiences.

- Cluster 3 (Blue) - This cluster addresses the broader implications of gamification in education, with studies by Huotari & Hamari (2016), Koivisto & Hamari (2017), and Xi & Hamari (2019) examining the use of gamified elements across various educational contexts. Huotari & Hamari (2016) offer a conceptual definition of gamification, drawing connections to service marketing literature and stressing the importance of satisfaction in gamified systems. Koivisto & Hamari (2017) note the growing prevalence of motivational information systems, indicating that gamification is increasingly utilized in educational technologies to enhance learning experiences. Xi & Hamari (2019) investigate how gamification features cater to intrinsic needs, contributing to increased student satisfaction. In the ESL context, this cluster suggests that AI-driven gamified educational tools can be customized to address students' intrinsic needs for autonomy, competence, and relatedness, ultimately improving language proficiency and creating a more enjoyable learning experience.

Table 4 summarizes the co-citation analysis by presenting its clusters, cluster labels, number of articles, and representative publications.

**Table 4:** Co-citation clusters on the role of educational tools in business education

Cluster	Cluster label	Number of articles	Representative publications
1 (red)	Effects of Gamification in Student Motivation	5	Buckley & Doyle (2014), Hanus & Fox (2015), Meckler & Bruhlmann (2017), Sailer <i>et al.</i> (2017), Seaborn & Fels (2015)
2 (Green)	Pedagogy	4	Kapp (2012), McGonigal (2012), Werbach & Hunter (2020), Zichermann & Cunningham (2011)
3 (Blue)	Gamification in Education	3	Huotari & Hamari (2016), Koivisto & Hamari (2017), Xi & Hamari (2019)

The co-citation analysis of educational tools in business education identified three distinct research clusters, each focusing on specific aspects of gamification and pedagogy in academic contexts:

The red cluster, labeled “Effects of Gamification in Student Motivation,” includes five publications that explore how gamification strategies influence student engagement, participation, and motivation. Key works

in this cluster include Buckley & Doyle (2014), Hanus *et al.* (2015), and Meckler *et al.* (2017), which investigate the psychological and behavioral impacts of gamified learning environments. These studies emphasize how game elements such as rewards, competition, and interactivity foster intrinsic motivation and enhance learning outcomes. The findings suggest that gamification is valuable for increasing student involvement and

improving educational experiences.

The green cluster, titled “Pedagogy,” comprises four influential articles focused on teaching strategies, instructional design, and theoretical foundations of learning. Contributions from authors like Kapp (2012), McGonigal (2012), and Zichermann & Cunningham (2011) highlight the role of effective pedagogical frameworks in implementing gamified learning. This cluster also underscores the importance of aligning gamification with sound educational principles to maximize its impact on learning. It suggests that thoughtful pedagogical integration is key to successfully applying gamification in business education.

The blue cluster, labeled “Gamification in Education,” contains three studies broadly examining gamification’s role across different educational settings. Key works by Huotari & Hamari (2016), Koivisto & Hamari (2017), and Xi *et al.* (2019) explore conceptualization, implementation, and assessment of gamified systems in education. These studies offer insights into user experience, motivational design, and educational outcomes, supporting that gamification can be a powerful tool for transforming traditional teaching practices.

Overall, the three clusters reflect an evolving research landscape where gamification is being integrated into pedagogy to enhance motivation, learning efficacy, and educational innovation in business education.

**Co-word analysis**

A co-word analysis was conducted on the dataset to identify the most frequently associated terms. Of 7,150 total keywords, 63 met the threshold of at least six occurrences. This analysis revealed multiple keyword clusters that reflect key themes in the literature. As shown in Table 5, the keywords with the highest co-occurrence were gamification (1,808 occurrences; total link strength: 1,776), motivation (281 occurrences; total link strength: 1,842), and learning (155 occurrences; total link strength: 1,771). These results highlight the centrality of gamification and its strong association with motivational and learning contexts in the analyzed research. Table 5 presents the top 15 co-occurring keywords, including their occurrence counts and total link strength, underscoring their relevance in the academic discourse.

**Table 5:** Top 15 keywords in the co-occurrence of keywords analysis

Ranking	Keyword	Occurrences	Total link strength
1	gamification	1808	1776
2	human	189	878
3	humans	128	649
4	article	125	635
5	motivation	281	1842
6	learning	155	1771
7	female	95	1660

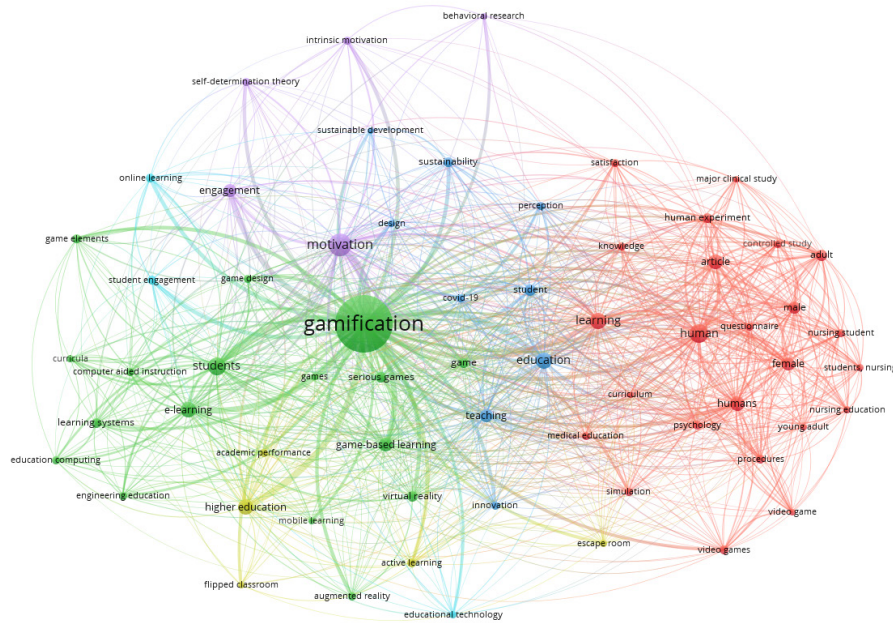
8	male	88	1529
9	students	185	1418
10	education	153	1328
11	adult	72	1237
12	teaching	94	1096
13	human experiment	60	1023
14	e-learning	136	888
15	game-based learning	115	850

Figure 3 presents a network map of the co-word analysis. The map produced six clusters, which were classified and labeled based on the author’s inductive interpretation of the occurring words. All clusters were closely related and partially integrated.

- Cluster 1 (Red) - This cluster emphasizes the application of technology, especially simulation tools, in educational environments. It also underscores the role of simulations and controlled studies in enhancing learning experiences. In medical education, simulations allow students to practice real-world scenarios in a safe, controlled setting. The frequent co-occurrence of terms like "video games" and "learning" indicates that gamified simulations are increasingly integrated into curricula, creating engaging and interactive learning environments. Research from Sailer *et al.* (2017) and Hanus & Fox (2015) demonstrates how these simulations are not just about content delivery; they foster immersive, gamified experiences that deeply engage students, a principle applicable to English language education.

- Cluster 2 (Green) - The second cluster highlights the rising influence of gamified and immersive learning technologies in educational contexts. Keywords such as "augmented reality," "game-based learning," and "mobile learning" reflect the integration of innovative technologies that allow students to partake in interactive, game-like educational experiences. This aligns with findings by Koivisto & Hamari (2017) and McGonigal (2012), illustrating how gamification enhances motivation and learning outcomes by providing immediate feedback and rewards. The co-occurrence of terms like "gamification" and "learning systems" suggests that AI-powered tools and game-based platforms are central to modern educational strategies, making language learning more engaging and tailored to individual needs.

- Cluster 3 (Blue) - This cluster addresses the broader educational context and challenges of integrating new technologies into teaching. Keywords such as "COVID-19," "innovation," and "sustainability" underscore the necessity for educational systems to adapt to global challenges, including the transition to online learning during the pandemic. Researchers like McGonigal (2012) analyze how educational innovations like gamification can tackle these challenges by fostering flexible, engaging, and sustainable learning environments.



**Figure 3:** Co-word analysis on the Role of Gamification Educational Tools in English Language Proficiency

The connection between "perception" and "student" signifies that the success of educational innovations largely relies on students' perceptions of these tools and their willingness to engage.

- Cluster 4 (Yellow) This cluster underscores the significance of active learning strategies. Keywords such as "academic performance," "active learning," and "flipped classroom" illustrate the incorporation of gamified tools to promote student-centered learning environments. Research from Werbach & Hunter (2020) and Kapp (2012) supports this notion, showing that gamified elements in active learning settings empower students to take ownership of their education, thus improving motivation and academic performance. Including "escape room" and "higher education" indicates innovative teaching methods that challenge students interactively, which can significantly enhance English language proficiency through problem-solving tasks.

- Cluster 5 (Purple) - Focusing on the psychological aspects of gamification, this cluster centers on learner motivation. Keywords like "intrinsic motivation," "self-determination theory," and "engagement" indicate that gamified learning tools are designed to foster motivation by satisfying psychological needs such as autonomy, competence, and relatedness. Research by Seaborn & Fels (2015) and Sailer *et al.* (2017) aligns with this cluster, suggesting that well-structured gamified environments can enhance students' intrinsic motivation, leading to more effective and sustained learning. This is particularly crucial in ESL classrooms, where engaging students with the language can be challenging.

- Cluster 6 Educational Technology and Student Engagement (Cyan) - The final cluster investigates the relationship between educational technology and student engagement. Keywords such as "online learning" and

"student engagement" reflect the shift towards digital and remote learning platforms. Research from Koivisto & Hamari (2017) shows that educational technologies, especially gamified systems, effectively maintain student interest and participation in online settings. This cluster highlights the increasing reliance on technology to sustain engagement in language learning. This trend has become especially pronounced during the COVID-19 pandemic, as traditional classroom-based learning faced disruptions. The connection among the six clusters illustrates a vibrant ecosystem in which technology, gamification, learner motivation, and active learning strategies converge to elevate English language education. Each cluster plays a supportive and complementary role, forming a comprehensive framework for language learning that is interactive, engaging, and adaptable. By weaving these clusters into a unified strategy, educators can cultivate a rich language learning environment that prioritizes proficiency and fosters student motivation and engagement sustainably and effectively. Ongoing research should optimize these interconnected themes to meet current and future educational demands. The co-word analysis comprehensively overviews how gamification and technology-enhanced tools transform language learning. The clusters illustrate a clear trend towards utilizing AI and gamified elements to engage students and improve learning outcomes, from simulations and immersive technologies to active learning strategies and learner motivation. Future research should delve into refining and integrating these technologies into ESL education, considering the evolving needs of learners in both physical and online classrooms.

Table 6 summarizes the co-word analysis represented by the cluster label, number of keywords, and representative keywords.

**Table 5:** Co-word analysis on the Role of Gamification Educational Tools in English Language Proficiency

Cluster No and color	Cluster label	Number of keywords	Representative Keywords
1 (red)	Technology-Enhanced Simulation	24	adult, article. Controlled study. curriculum, female, human, human experiment, humans, knowledge, learning, major clinical study, male medical education, simulation, students, video game, video games, young adult
2 (green)	Gamified and Immersive Learning Technologies in Education	17	augmented reality, computer-aided instruction, curricula, e-learning, game design. game-based learning, gamification, learning systems, mobile learning
3 (blue)	Contemporary Educational Challenges and Innovations	9	COVID-19, design, education, innovation, perception, student. sustainability, sustainable development, teaching
4 (yellow)	Active Learning and Educational Innovation	5	academic performance, active learning, escape room, flipped classroom, higher education
5 (purple)	Learner Motivation	5	behavioral research, engagement, intrinsic motivation, motivation, self-determination theory
6 (cyan)	Educational Technology and Student Engagement	3	educational technology, online learning, student engagement

**Implications of the Study**

The conclusions of this bibliometric study provide valuable insights into the theoretical and practical significance of language education and the integration of educational technology. With the increasing use of AI-based gamified tools by schools to improve the teaching and learning process, understanding the emerging trends, theoretical underpinnings, and practical usage of these technologies becomes imperative. This research adds to the debate on how technology-inclined, gamified learning environments can ensure increased student engagement, enhanced language skills, and inclusive, adaptive education systems to achieve the objectives of the Fourth Industrial Revolution. Additionally, it brings out the contribution of digital innovation toward ensuring quality education by Sustainable Development Goal 4 (SDG 4). The subsequent section presents the major theoretical and practical conclusions of this research.

**Theoretical Implications**

The results of this bibliometric study highlight significant theoretical contributions to educational technology, gamification, and language learning. To begin with, the use of AI-driven gamified tools supports constructivist theories of learning, which assume that learners actively build knowledge through meaningful and interactive experiences. The dominance of studies highlighting learner-centered environments indicates that AI gamified platforms provide dynamic scaffolding that adjusts to learners' needs, thus encouraging deeper cognitive engagement and long-term language acquisition. In addition, the bibliometric trends identify the growing impact of Self-Determination Theory (SDT) in accounting for student motivation and engagement. Gamified AI systems are more likely to meet students'

autonomy, competence, and relatedness needs, which are at the core of SDT. Therefore, theoretical frameworks that account for intrinsic motivation are supported by evidence that AI-augmented gamification enhances engagement and academic achievement, especially in language learning environments.

Furthermore, the function of Flow Theory is supported theoretically, as the research indicates that gamified tools, designed well, assist students in achieving "flow" a condition of concentrated immersion resulting in improved language proficiency. The tools offer instant feedback, suitable challenges, and a feeling of advancement, all the main components of inducing flow in learning environments.

Lastly, the analysis identifies a developing theoretical framework that combines Artificial Intelligence in Education (AIED) models with gamification approaches. It indicates how intelligent algorithms tailor learning pathways and tests, lending theoretical justification to adaptive learning environments that transcend static, one-size-fits-all teaching.

Therefore, the bibliometric results confirm current learning theories and imply the necessity of an integrated theoretical model that captures AI-based personalization, gamification mechanics, and language learning processes. Future theoretical research may address conceptualizing the interaction among these factors to more effectively explain and predict student engagement and proficiency in AI-facilitated, gamified learning environments.

**Practical Implications**

Bibliometric analysis provides several practical insights that can guide educational practitioners, curriculum developers, and policymakers in effectively leveraging AI-powered gamified learning tools in language education,

especially for Junior High School students in private schools in Bulacan.

First, the strong emphasis across studies on personalization and adaptability suggests that schools should prioritize the adoption of AI-based platforms that can tailor learning experiences to individual students' proficiency levels, learning styles, and motivational needs. Practical implementation should involve integrating adaptive learning technologies that monitor real-time progress and adjust content difficulty to maintain optimal engagement. Second, the analysis indicates that gamification elements such as rewards, leaderboards, and interactive storytelling significantly enhance student engagement. Teachers should be trained to strategically embed these gamified features into their lessons to create a more motivating and enjoyable language learning environment. Moreover, incorporating healthy competition and collaborative tasks through gamified activities can foster individual achievement and student social interaction.

The findings highlight the need for ongoing professional development focused on AI literacy for teachers. Educators must be equipped to use gamified tools effectively and critically evaluate which tools best align with their instructional goals and students' needs. Schools should invest in workshops and training sessions that bridge the gap between technological innovation and classroom practice.

Finally, the success of AI-powered gamified tools in improving language proficiency suggests that educational institutions should integrate these technologies into their broader curriculum planning. Pilot programs and research-based implementations could help schools fine-tune best practices for maximizing the impact of these tools on student learning outcomes and engagement.

## CONCLUSION

The study focuses on the growth of scholarly curiosity at the crossover of artificial intelligence, gamification, and foreign language teaching.

- The research confirms that AI-based gamified instruments play a central role in improving linguistic competence and enhancing learning engagement.
- They are based on critical educational theories, such as constructivism, Self-Determination, and Flow Theory, prioritizing active, individualized, and engaging learning experiences.
- In practice, the evidence suggests that incorporating AI and gamification into language learning can create more adaptive, dynamic, and student-centered environments, leading to improved learning outcomes.
- In general, the research reaffirms the need for the purposeful incorporation of AI-driven gamified learning aids into Junior High School curricula to address the changing needs of learners in the 21st century.

Although bibliometric analysis presents valuable insights, it is limited. The study mainly relied on academic databases, which may have left out pertinent articles within other sources. In addition, the dependence on

specific keywords and search criteria could have excluded interdisciplinary or nascent research that could offer a comprehensive view of the subject. Additionally, because bibliometric analysis was concerned with numerical trends, it did not analyze the included studies critically about their quality, methodology, or contextual features. Another limitation is the period considered, as more recent developments in AI-driven gamification might not yet be adequately represented in the data under examination. These limitations indicate that although the findings are significant, they must be taken cautiously and supplemented by further in-depth studies.

To extend the outcomes of this study, further research needs to incorporate more qualitative methods, like interviews, classroom observations, and case studies, to record richer insights into how AI-facilitated gamified tools influence individual learning experiences. Extending the scope to interdisciplinary and emerging studies would offer a better picture of how these technologies develop in various education settings. In addition, longitudinal research is encouraged to evaluate the long-term impacts of gamified AI learning software on language ability and student engagement. Future research must also investigate the difficulties teachers and schools encounter when integrating these technologies to create more comprehensive models of support for integration. Lastly, educational institutions should continue investing in teacher training and infrastructure development to get the most out of AI-driven gamified learning tools in schools.

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