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Trends in Wordwall Integration for Elementary IPAS Learning: A Systematic Literature Review

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Abstract
The integration of digital media in education has become increasingly important in supporting interactive, engaging, and sustainable learning processes. This study presents a systematic literature review (SLR) of research on the use of the Wordwall application in elementary Natural and Social Sciences (IPAS) learning published between 2021 and 2025. Guided by the PRISMA protocol, a total of 1,659 records were initially identified, of which 33 articles met the inclusion criteria and were analyzed. The review highlights three main findings. First, Wordwall-based learning interventions significantly improve student motivation, creativity, and conceptual understanding, making it a valuable tool for enhancing learning outcomes in elementary education. Second, bibliometric mapping shows steady research growth, with interdisciplinary linkages to education, computer science, and psychology, indicating its broad academic relevance. Third, challenges such as technological infrastructure gaps, limited teacher digital literacy, and overreliance on gamification remain obstacles to maximizing Wordwall's potential. The thematic synthesis reveals that creativity-centered and motivational design approaches are dominant research foci, reflecting global educational priorities toward 21st-century skills. However, limited exploration of long-term impacts and large-scale implementation indicates the need for further empirical investigation. This study contributes to the scholarly understanding of digital gamification in education by providing evidence-based insights into Wordwall's effectiveness and constraints. It also emphasizes the importance of integrating Wordwall within comprehensive instructional frameworks rather than treating it as a stand-alone solution. Future directions are proposed to guide researchers, practitioners, and policymakers in strengthening Wordwall's role as a sustainable innovation for improving IPAS learning in elementary schools.

INTRODUCTION

The digital transformation of education has reshaped pedagogical practices, requiring the integration of technology into multiple learning contexts. In the era of Education 4.0, interactive digital tools are not merely supportive instruments but essential catalysts for innovation and adaptive pedagogy (Nadawina et al., 2025). This transformation is especially critical in interdisciplinary subjects such as Natural and Social Sciences (IPAS), where students are expected to observe, investigate, and interpret complex natural and social phenomena. However, the connection between Education 4.0 principles such as personalization, automation, and data-driven learning and IPAS education at the elementary level has not been extensively explored. At the elementary school level, IPAS education aims to foster critical thinking, problem-solving, and scientific literacy, which align with 21st-century

skills (Thana & Hanipah, 2023). The incorporation of digital platforms in IPAS instruction offers opportunities to enhance engagement, motivation, and creativity, providing students with dynamic learning experiences (Liriwati, 2023). Technology-based learning environments allow educators to create active and student-centered classrooms that address diverse learning needs. Consequently, the urgency of adopting interactive technologies is increasing, as they prepare students to become adaptive learners in a digital society (Hafizah, 2023). Thus, the integration of technology in IPAS learning is not an optional enhancement but a necessity in the digital era.

Among the digital tools widely implemented in education, Wordwall has emerged as a popular platform that provides interactive and game-based learning opportunities. Wordwall offers various activities such as quizzes, matching games, and puzzles, which are adaptable to different curricular needs and learning styles (Lestari & Rohmani, 2024). These features align with the principles of gamification, which have been shown to increase student motivation, participation, and achievement. In the context of IPAS learning, where abstract concepts often challenge students' understanding, Wordwall provides visual and interactive support that helps bridge theoretical knowledge with practical experiences (Putri et al., 2024). Its flexibility in both online and offline settings makes it suitable for hybrid and blended learning environments, which are increasingly prevalent after the COVID-19 pandemic (Astuti & Anafiah, 2024). Furthermore, the platform facilitates differentiated instruction, allowing teachers to adapt content to students' levels of comprehension. This adaptability makes Wordwall an effective instructional tool for elementary education, especially in developing higher-order thinking skills such as creativity and critical reasoning (Azzahra et al., 2025). Therefore, Wordwall holds potential as a transformative medium in IPAS learning.

The integration of Wordwall into elementary IPAS education has been associated with significant improvements in students' engagement and learning outcomes. Previous studies have shown that interactive platforms stimulate motivation and foster positive attitudes toward learning, which are essential for young learners (Tarishah & Yatri, 2025). For example, Wordwall-based activities provide immediate feedback that supports formative assessment practices and enhances students' self-regulation in learning. Additionally, by embedding game elements in instruction, Wordwall encourages participation even among students who may be less motivated in traditional classroom settings (M. P. Wulandari et al., 2025). Beyond motivation, research suggests that the use of Wordwall enhances conceptual understanding by promoting inquiry-based and reflective learning approaches. These approaches align with the objectives of IPAS, which emphasize observation, reasoning, and problem-solving through real-world contexts (Dewi et al., 2025). Moreover, digital tools such as Wordwall support learning across cognitive, affective, and psychomotor domains, which are central to the holistic development of elementary students. Nonetheless, many of these studies are limited in scope, often focusing on short-term motivation or test performance without examining sustained behavioral or conceptual impacts. This indicates a need for more comprehensive, longitudinal, and comparative research on Wordwall's pedagogical value. Hence, the evidence points to the pedagogical value of Wordwall in advancing IPAS instruction in primary schools.

Despite its benefits, the implementation of Wordwall in elementary schools is not without challenges. Limited digital literacy among teachers remains a significant barrier to effective integration of interactive technologies (F. S., Omweri, 2024). Teachers may struggle to design meaningful activities using digital platforms without sufficient training and institutional support. Moreover, infrastructural inequalities, such as inconsistent internet access and limited device availability, further hinder equitable adoption of Wordwall in diverse educational settings. Another challenge is the need to align Wordwall activities with curricular standards and learning objectives to ensure pedagogical relevance (Astuti & Anafiah, 2024). Without careful planning, digital tools risk being used superficially, serving only as entertainment rather than as instruments for deeper learning. Additionally, some studies highlight the time-consuming nature of preparing customized Wordwall activities, which may discourage teachers from consistent use. Addressing these challenges requires comprehensive strategies, including professional development and supportive policy frameworks. Therefore, while

Wordwall presents considerable promise, its successful application depends on overcoming systemic and pedagogical constraints.

Research on the integration of Wordwall in elementary IPAS learning has grown in recent years, particularly during and after the COVID-19 pandemic. However, the available literature remains fragmented, with varying focuses on motivation, achievement, creativity, and engagement. While some studies emphasize the motivational benefits of Wordwall, others highlight its potential in promoting reflective thinking and problem-solving (Putri et al., 2024). Yet, few studies critically address methodological weaknesses such as small sample sizes, lack of control groups, or limited theoretical grounding in gamification frameworks. Moreover, existing reviews tend to summarize findings rather than synthesize evidence or identify cross-study trends. Consequently, a systematic literature review is essential not only to consolidate fragmented findings but also to critically evaluate research quality, identify conceptual gaps, and guide future empirical inquiry. Furthermore, the methodologies applied in previous research vary widely, ranging from experimental studies to qualitative explorations of teacher and student perceptions (Dou, 2025). This methodological diversity underscores the need for systematic reviews that can consolidate and critically evaluate existing evidence. Systematic Literature Reviews (SLR) provide a rigorous framework for identifying trends, assessing effectiveness, and highlighting research gaps through transparent and replicable protocols such as PRISMA. Hence, conducting an SLR on Wordwall in IPAS education offers a valuable contribution to both academic and practical domains.

Based on the identified gaps, this study aims to systematically review trends in the use of Wordwall for IPAS learning in elementary schools during the digital era. Specifically, it addresses four guiding research questions: (1) What are the emerging research trends in Wordwall-assisted IPAS learning in elementary schools between 2021 and 2025? (2) How does Wordwall impact student engagement and learning outcomes across cognitive, affective, and psychomotor domains? (3) What pedagogical approaches, instructional designs, and evaluation methods are employed in previous studies? and (4) What challenges and research gaps remain in integrating Wordwall into IPAS education? By addressing these questions, the review aims to provide comprehensive insights into the opportunities and limitations of Wordwall in supporting transformative learning practices. Furthermore, the study contributes practical recommendations for teacher training, instructional design, and policy development to optimize technology integration in elementary education. Ultimately, the findings of this research are expected to advance the discourse on digital learning innovations and support evidence-based practices in IPAS instruction.

METHODS

This study adopted a Systematic Literature Review (SLR) approach, guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The choice of the SLR method was based on its capacity to provide a comprehensive overview of research trends, effectiveness, and challenges related to the use of Wordwall media in Natural and Social Sciences (IPAS) learning at the elementary school level in the digital era. The review process was structured into five sequential stages: (1) identification of the research focus using the PICO (Population, Intervention, Comparison, Outcome) framework; (2) systematic literature search through major academic databases including Scopus, Web of Science, and Google Scholar; (3) selection of articles based on predetermined inclusion and exclusion criteria; (4) data extraction and thematic analysis; and (5) synthesis of findings in both narrative and visual formats. This rigorous structure was designed to ensure transparency, replicability, and comprehensiveness in the analysis.

The literature search strategy applied a combination of Boolean operators and relevant keywords: ("Wordwall" OR "interactive media") AND ("IPAS" OR "science and social studies") AND ("primary school" OR "elementary school") AND ("learning outcomes" OR "student engagement"), covering the publication period from 2015 to 2025. The inclusion criteria required studies to be empirical (quantitative, qualitative, or mixed methods), explicitly focused on the use of Wordwall in

IPAS learning at the elementary level, and published in peer-reviewed journals. Exclusion criteria applied to non-empirical articles, studies outside the IPAS domain, or papers that did not explicitly mention Wordwall. The screening process employed systematic review management tools such as Zotero, Mendeley, and Rayyan to ensure efficiency, transparency, and accurate documentation of decisions. This process reduced subjectivity and enhanced the reliability of article selection, ensuring only relevant and high-quality sources were analyzed.

Data analysis was conducted using a thematic content analysis approach, enabling the identification of recurring patterns and findings across the selected studies. The analysis emphasized three main aspects: the forms of Wordwall-based instructional interventions, their impact on student engagement and learning outcomes, and the challenges encountered in classroom implementation. The extracted data were coded and categorized into thematic clusters to facilitate synthesis. To strengthen the validity of results, a cross-checking process among researchers was conducted, accompanied by systematic documentation of analytical decisions. Ultimately, this methodology ensured that the review produced rigorous, evidence-based insights into the integration of interactive media in elementary IPAS education. The review focused on empirical studies published between 2021 and 2025, and from an initial pool of 1,659 identified records, 33 eligible articles were selected based on PRISMA guidelines. The article selection process is summarized in Figure 1.

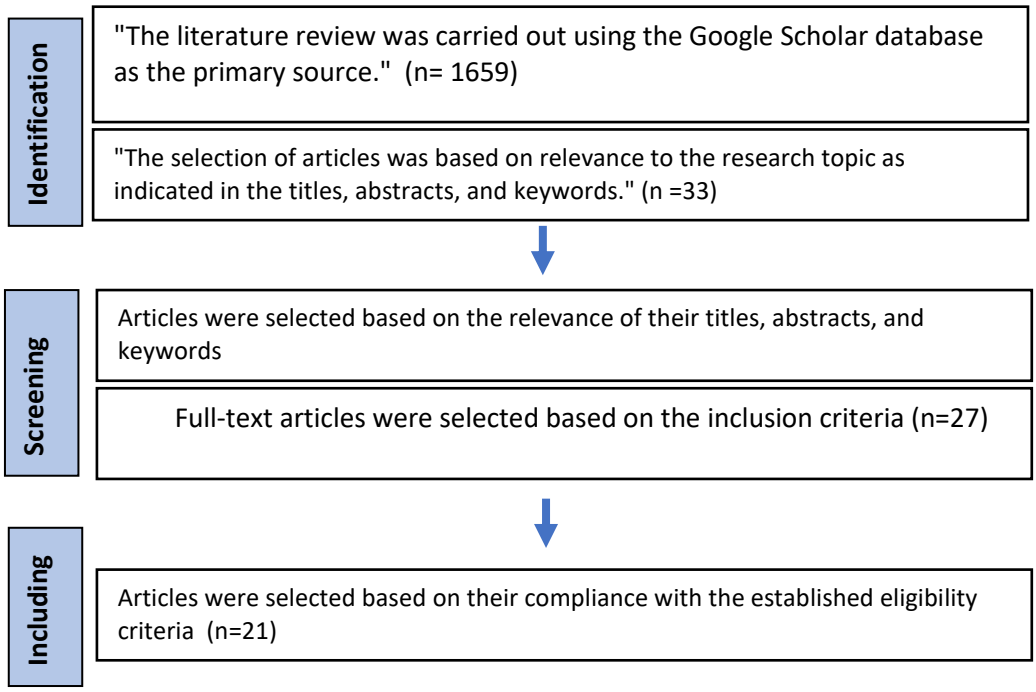

Figure 1. PRISMA Flow Diagram of Article Selection Process

RESULTS AND DISCUSSION

Results

Based on Scopus-indexed publications, the distribution of documents per year demonstrates a dynamic trend in research related to the application of Wordwall in education from 2021 to 2025. In 2021, three documents were recorded, marking the initial emergence of scholarly attention to this digital medium. However, in 2022, there was a sharp decline with no publications listed, which may be attributed to a temporary shift in research priorities or the limited adoption of Wordwall within formal educational contexts. A substantial increase occurred in 2023 with six publications, reflecting the growing academic interest aligned with the rise of digital learning and gamification strategies during the post-pandemic period. Nevertheless, the number decreased again in 2024 to only two documents, potentially due to competing technologies or challenges in large-scale implementation. In contrast,

2025 witnessed a renewed surge with six publications, indicating not only the sustained relevance of Wordwall but also its recognition as a promising pedagogical innovation. This trajectory underscores that Wordwall is not a fleeting trend but an emerging sustainable practice in the context of primary and secondary education in the digital era.

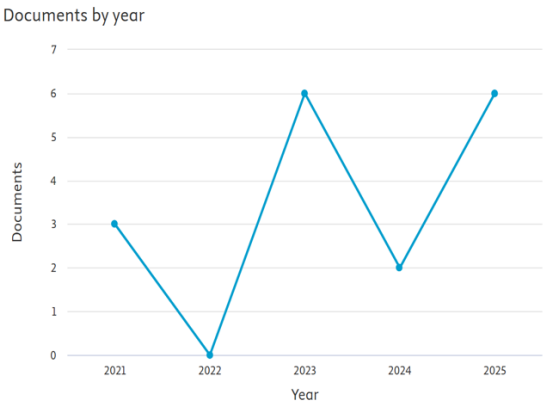

Figure 1. Publication Trends in the Study "Trends in IPAS Learning Supported by Wordwall."

The bibliometric analysis of author collaboration patterns reveals two major clusters of researchers contributing to the development of Wordwall-related scholarship. The first cluster, highlighted in red, consists of authors such as Utami Tri Lita, Trissa Trissa, Nurlela Ela, Fitriani Syifa, Suri Sofyan, Komar Komar, Wulansari Yuli Sri, Prasetya Hanjas, and Destiani Kania Dwi. This group demonstrates intensive collaboration, reflecting a cohesive research community with frequent internal interactions, as well as engagement with external contributors indicated by the "others" node. Conversely, the second cluster, illustrated in green, is structured around a centralized figure, Yuliyanto Aan, who functions as both a hub for collaboration within his group and a bridge to the red cluster. This dual role signifies a structural position of strategic importance, linking two otherwise distinct research communities. Such a configuration highlights two complementary collaboration dynamics: a tightly interconnected community and a hub-dependent network that facilitates broader integration of ideas and innovation.

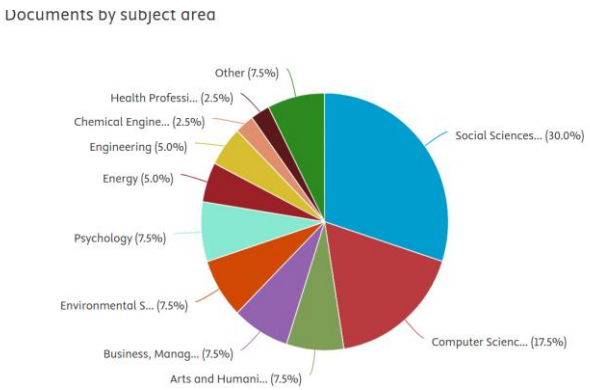

Figure 2. Author Collaboration in the Study "IPAS Learning Supported by Wordwall."

Further examination of disciplinary distribution shows that publications on Wordwall usage span across multiple academic fields, confirming its interdisciplinary appeal. The Social Sciences contribute the largest proportion at 30%, reflecting the emphasis on pedagogy, learning strategies, and technology integration in education. Computer Science follows with 17.5%, underscoring the connection between Wordwall and digital innovation in gamified learning environments. Psychology, Environmental Science, Business and Management, and Arts and Humanities each account for 7.5%,

pointing to the broader relevance of Wordwall beyond educational contexts into behavioral, managerial, and cultural studies. Energy and Engineering fields contribute 5% each, likely linked to STEM-focused applications of interactive media. Meanwhile, Health Professions and Chemical Engineering contribute 2.5% each, and an additional 7.5% is categorized as "Other." Collectively, these findings demonstrate that Wordwall has become a cross-disciplinary educational medium adaptable to diverse contexts and fields of inquiry.

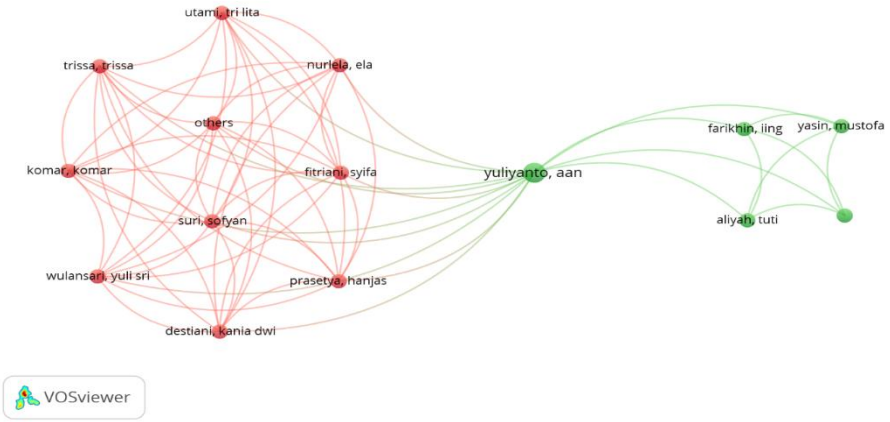

Figure 3. Academic Disciplines in the Study "IPAS Learning Supported by Wordwall."

The bibliometric visualization of topic relationships reveals two major clusters shaping the intellectual structure of Wordwall research in IPAS learning. The red cluster emphasizes Wordwall as an interactive medium associated with keywords such as creative thinking, application of Wordwall learning, and science learning. This suggests that most publications highlight Wordwall as a tool to foster creative thinking and active engagement, particularly in experimental studies involving elementary school students. The green cluster, centered on the term elementary school, connects themes such as science learning, study literature, and Wordwall, indicating that both empirical and systematic literature reviews are increasingly used to evaluate its effectiveness. Together, these clusters reveal two dominant research streams: empirical studies testing Wordwall's effects on learning outcomes and conceptual reviews synthesizing evidence for its broader application. This indicates the growing maturity of the field, with both practical and theoretical contributions reinforcing Wordwall's role in pedagogical innovation.

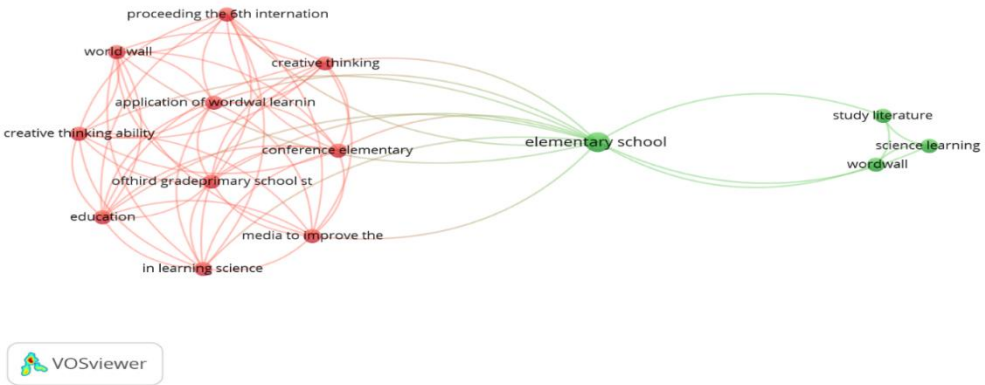

Figure 4. Bibliometric Visualization Map of Topic Relationships.

The keyword density visualization provides further insights into research emphases and their frequency of occurrence. The left cluster demonstrates high density around keywords such as Wordwall, creative thinking, and learning science, indicating strong interest in evaluating its

effectiveness for creativity and higher-order cognitive outcomes. The central cluster is dominated by the term elementary school, confirming the primary context in which Wordwall research is situated. The right cluster includes terms such as study literature and science learning, suggesting that the SLR approach has gained traction in analyzing the effectiveness of interactive digital media in IPAS contexts. This density distribution reflects a trend where Wordwall is predominantly investigated as a means of creativity-based science learning, while simultaneously opening avenues for meta-analytical approaches to assess its pedagogical value.

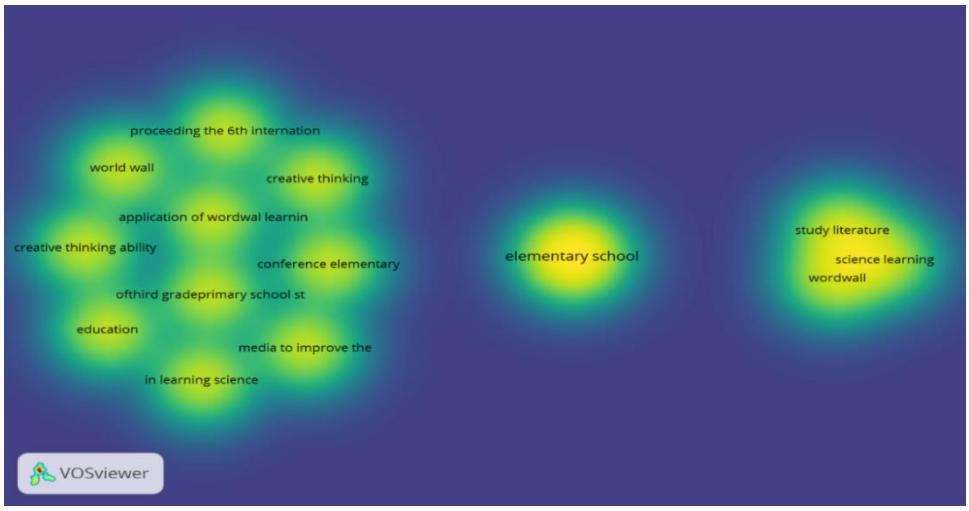

Figure 5. Density Visualization of Keyword Occurrence in Wordwall Research.

The keyword co-occurrence map highlights the thematic diversity and interconnectedness of research topics. The red cluster is centered on school, resource, and assessment instruments, pointing to a focus on educational context and evaluative frameworks. The yellow cluster emphasizes motivation and learning models, including references to the ARCS model, indicating a growing interest in motivational design. Green and pink clusters revolve around game-based learning and evaluation metrics, while light blue and dark blue clusters address perceptions and methodologies, such as qualitative research and English learning. The co-occurrence structure illustrates that Wordwall research is inherently multidisciplinary, linking pedagogical theories, motivational strategies, digital innovations, and evaluative approaches.

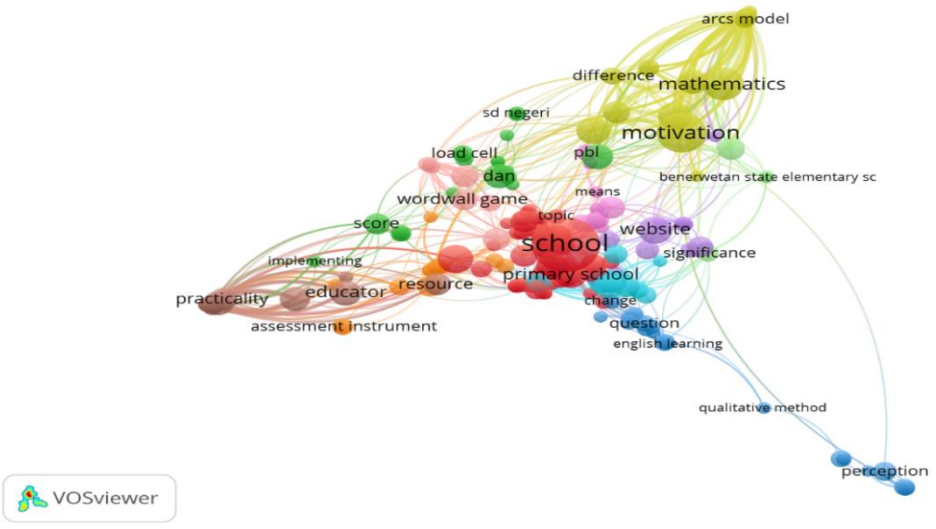

Figure 6. Keyword Co-occurrence Map in the Study of "IPAS Learning Supported by Wordwall."

Finally, the overlay visualization illustrates the temporal evolution of research themes between 2023 and 2024. Early research, represented in dark blue to green, focused primarily on practical evaluation and implementation, emphasizing teacher perceptions, feasibility, and qualitative methods. Mid-phase research highlighted the integration of Wordwall in classroom contexts, with terms such as game, primary school, and resource reflecting its adoption as a practical instructional tool. More recent studies, marked in yellow, expanded towards theoretical deepening, including motivational approaches (e.g., ARCS model) and student-centered pedagogies such as project-based learning. This progression suggests a shift from exploratory implementation to strategic pedagogical frameworks, indicating that Wordwall research is moving toward a more evidence-based and theory-driven trajectory.

Discussion

The integration of interactive media such as Wordwall into elementary education has become a significant trend in the digital era, particularly in science and social studies learning (IPAS). Research has shown that interactive platforms can enhance student engagement and foster deeper understanding through gamified approaches (Dahniar, 2025). The bibliometric trends indicate that publications related to Wordwall began to emerge in 2021 and experienced fluctuations in the subsequent years. This suggests that although the adoption of Wordwall is growing, its use is still being refined and contextualized across different learning environments. The resurgence of publications in 2025 demonstrates its sustainability as a pedagogical innovation. Such a trend aligns with global shifts in education toward digitalization and blended learning environments (Julita, 2025). It also reflects the broader recognition of gamification as a key driver of student-centered learning. Therefore, Wordwall research can be considered both timely and impactful for the transformation of elementary education.

The collaborative patterns among authors reveal two distinct clusters, which highlight the social dynamics of research on Wordwall in IPAS learning. One cluster demonstrates dense internal collaboration, which may result in more cohesive and targeted research outcomes. Meanwhile, the second cluster relies on a central author who acts as a bridge between different groups. This structure suggests that Wordwall research is still in a formative stage where collaborative networks are being established. The importance of such collaboration lies in knowledge sharing, methodological refinement, and dissemination of best practices (Emilia et al., 2024). Interdisciplinary collaboration is particularly crucial for educational technology research due to its reliance on multiple domains such as pedagogy, psychology, and computer science (I. P. Sari, 2024). These collaborative networks also enhance the visibility and credibility of findings within the academic community. Thus, author collaboration is a critical factor in shaping the development of Wordwall-related scholarship.

Disciplinary distribution data indicates that research on Wordwall is not confined to education alone but spans across multiple academic fields. The largest contribution comes from the social sciences, underscoring its pedagogical relevance. Computer science contributes significantly as well, given that Wordwall is a digital platform requiring technological development and adaptation. Psychology's presence reflects interest in cognitive and motivational outcomes related to gamification. This interdisciplinary nature demonstrates the versatility of Wordwall as a subject of study. Similar findings were observed in studies of gamification more broadly, where applications extended to management, health, and STEM education (Subramaniam & Saleh, 2024). The presence of environmental science and engineering suggests that Wordwall may also support subject-specific content delivery. This diversity reinforces the idea that Wordwall is not merely a teaching tool but an adaptable digital medium with cross-disciplinary applications.

Thematic analysis of research outputs reveals two dominant streams: empirical studies and conceptual reviews. Empirical research focuses on classroom implementation and its impact on student outcomes. Such studies often emphasize creativity, engagement, and problem-solving skills as primary outcomes of Wordwall integration (Wulandari & Nasution, 2023). Conceptual and review-

based studies, on the other hand, analyze the broader implications of Wordwall adoption for curriculum design and teacher professional development. This duality reflects the maturity of the field, as both theoretical foundations and practical applications are being developed in tandem. Similar patterns have been observed in other areas of educational technology research, where evidence-based practice is supported by theoretical synthesis (Ningrum et al., 2024). This balance is necessary to ensure that Wordwall integration is not only effective but also sustainable within educational systems. Therefore, the current trajectory of Wordwall research appears promising for long-term pedagogical innovation.

One of the most prominent themes in the literature is the role of Wordwall in enhancing creative thinking. Studies indicate that gamified learning environments provide opportunities for students to experiment, collaborate, and engage in higher-order cognitive processes (Fauziyati, 2025). Wordwall activities, through their interactive and customizable formats, encourage learners to explore concepts beyond rote memorization. This aligns with constructivist learning theories, which emphasize active participation and meaning-making as essential for deep learning. In addition, creativity-oriented tasks are crucial for the development of 21st-century skills, which are increasingly demanded in modern education (Elfani et al., 2025). The strong association between Wordwall and creativity, as indicated in keyword density analysis, highlights its potential as a transformative learning tool. Furthermore, the use of gamification fosters intrinsic motivation, which is often linked to sustained student engagement. Therefore, Wordwall's contribution to creativity represents one of its most significant educational values.

Another key theme is the use of Wordwall in elementary school science learning. The majority of studies reviewed indicate that Wordwall supports comprehension of complex concepts through interactive simulations and quizzes. Such approaches reduce cognitive load by breaking down abstract ideas into manageable tasks (R. Sari et al., 2025). Moreover, Wordwall has been shown to improve retention and application of knowledge in practical problem-solving contexts. These outcomes are particularly relevant for IPAS learning, which integrates both natural and social sciences. By facilitating hands-on engagement, Wordwall aligns with inquiry-based learning models, which have proven effective in primary education. Teachers also report that Wordwall enhances classroom dynamics by fostering collaboration and peer discussion. This suggests that beyond cognitive benefits, Wordwall may also contribute to socio-emotional learning. Overall, its application in science education underscores its capacity to support holistic learning outcomes.

Despite its many benefits, research has also identified several challenges in implementing Wordwall effectively. These include issues related to infrastructure, such as limited internet access and device availability in some schools. Teacher readiness and digital literacy also play a significant role in determining the success of Wordwall integration (Awinda & Septiana, 2025). Furthermore, concerns about screen time and potential overreliance on gamified platforms have been raised in the literature. These challenges highlight the need for comprehensive training and support systems for teachers. They also underscore the importance of balancing digital tools with traditional pedagogical approaches. Without careful implementation, Wordwall risks being used as a superficial engagement tool rather than as a meaningful learning aid. Thus, future research should focus on addressing these barriers to ensure equitable and effective adoption.

Keyword co-occurrence and overlay analyses suggest a growing interest in linking Wordwall with motivational models such as ARCS. The ARCS model (Attention, Relevance, Confidence, Satisfaction) provides a framework for designing engaging and motivational learning environments. Studies that integrate Wordwall with ARCS principles demonstrate improved learner motivation and sustained engagement (Choirunnisa et al., 2025). This is particularly important in elementary education, where motivation strongly influences learning outcomes. The progression from implementation studies to theory-driven research reflects a deepening understanding of Wordwall's pedagogical potential. Such developments parallel trends in gamification research, which increasingly focuses on motivational design rather than mere technological novelty (Azikyn et al., 2025). The integration of Wordwall with

motivational frameworks ensures that its application is not only innovative but also theoretically grounded. Consequently, Wordwall is evolving into a sophisticated tool for motivational pedagogy.

In addition to motivational aspects, Wordwall research has increasingly emphasized student-centered pedagogies such as project-based learning. By embedding Wordwall activities into larger instructional frameworks, teachers can create integrated learning experiences. Such approaches align with contemporary calls for active, inquiry-based education (Lestyono et al., 2024). Empirical evidence suggests that Wordwall enhances collaboration and critical thinking when used in project-based settings. This integration also addresses concerns about overreliance on gamification by situating Wordwall within broader learning designs. Furthermore, student-centered use of Wordwall empowers learners to take ownership of their learning processes. This is consistent with self-determination theory, which posits that autonomy is a key factor in motivation and achievement (Nabila & Mubarok, 2025). Therefore, the evolution of Wordwall research toward student-centered paradigms signifies its potential to support transformative learning practices.

Overall, the findings of this review suggest that Wordwall represents both an opportunity and a challenge for contemporary education. On the one hand, it provides engaging, creativity-enhancing, and motivational learning experiences. On the other, its successful implementation requires adequate resources, teacher training, and careful pedagogical integration. The bibliometric evidence demonstrates that research on Wordwall is expanding, diversifying, and becoming increasingly sophisticated. Its interdisciplinary appeal and cross-sectoral applications further strengthen its relevance in global educational contexts. Future research should continue to explore both empirical and theoretical dimensions, ensuring that Wordwall contributes not only to academic outcomes but also to holistic student development. In this regard, Wordwall can be seen as a microcosm of broader trends in digital education, reflecting the promises and complexities of integrating technology into learning. Ultimately, Wordwall is positioned as a valuable, adaptable, and sustainable educational innovation in the digital era.

CONCLUSION

This systematic review demonstrates that the integration of Wordwall in elementary IPAS learning offers significant pedagogical benefits, particularly in enhancing creativity, motivation, and conceptual understanding. The bibliometric trends from 2021 to 2025 reveal a steady expansion of research interest, indicating Wordwall's growing recognition as a sustainable educational innovation. The findings also show that Wordwall research is highly interdisciplinary, intersecting education, computer science, and psychology, thus confirming its broad applicability in both cognitive and socio-emotional learning contexts. Moreover, thematic analyses highlight creativity and motivational design as the most dominant areas of exploration, aligning with global educational priorities for 21st-century skills. However, challenges such as limited infrastructure, digital literacy gaps, and concerns regarding overreliance on gamification must be addressed. Without strategic implementation, the potential of Wordwall may be underutilized or misapplied. Therefore, Wordwall should be seen not as a stand-alone solution but as an integral component of holistic instructional design.

Future research should expand beyond classroom implementation studies to examine long-term impacts, cross-cultural contexts, and large-scale adoption of Wordwall in diverse educational settings. Teacher training and professional development must also be prioritized to ensure effective pedagogical integration and avoid superficial use of digital platforms. Additionally, policy makers should consider equitable access to technological infrastructure, particularly in under-resourced schools, to bridge the digital divide. From a theoretical standpoint, Wordwall research should further align with motivational and learning frameworks, such as ARCS and self-determination theory, to strengthen its academic rigor. Integrating Wordwall into project-based and inquiry-based learning can also enhance its contribution to critical thinking and collaborative skills. Finally, researchers and practitioners should collaborate more closely to build evidence-based best practices that ensure Wordwall is used as a meaningful tool for sustainable innovation in elementary education.

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