MULTIPLE
Journal of Global and Multidisciplinary
https://journal.institercom-edu.org/index.php/multiple
Volume 3 Issue 10 (2025) E-ISSN 2988-7828
INSTITERCOM PUBLISHER

The Role of Wordwall Gamification Mechanics in Developing Higher Level Thinking Skills (HOTS) of Elementary Science Students: A Systematic Review

Rohmani[1]*, Supriyono[2], Bunga Adelia[3]
[1-3]Universitas Muhammadiyah Kotabumi, Indonesia
Article Info: Accepted: 1 Oktober 2025; Approve: 20 Oktober 2025; Published: 31 Oktober 2025

Abstract: Modern education demands the development of Higher-Order Thinking Skills (HOTS), particularly in elementary school science learning. Gamification, through platforms like Wordwall, has emerged as a promising strategy to enhance motivation and stimulate high-level cognitive processes. However, existing research has not specifically analyzed which gamification mechanics contribute to HOTS development. This study aims to identify, analyze, and synthesize empirical evidence on the specific role of Wordwall's gamification mechanics in developing the HOTS of elementary science students through a Systematic Literature Review (SLR) using the PRISMA framework. A literature search was conducted on the Google Scholar database for articles published between 2020 and 2024. From an initial 686 articles, 6 met the inclusion criteria and were thematically analyzed. The analysis reveals that key mechanics such as (1) instant feedback and challenges promote the process of analysis; (2) interactivity and visualization facilitate interpretation and evaluation; and (3) elements of competition and time constraints are effective for measuring knowledge application within project/problem-based learning models. It is concluded that Wordwall is not merely a motivational tool but a strategic pedagogical instrument that, when designed appropriately, can effectively train various aspects of students' HOTS. While this review identifies key correlations, future experimental research is recommended to establish a direct causal relationship between these specific mechanics and the development of distinct HOTS components.
Keywords: Gamification; Wordwall; Higher-Order Thinking Skills (HOTS); Science; Systematic Review.

Correspondence Author: Rohmani
Email: rohmani@umko.ac.id

Introduction

Global education in the last decade has undergone a fundamental paradigm shift, moving from mere content mastery to the development of holistic competencies that are relevant for the future (Sa'diyah, 2023). In the midst of technological disruption and the complexity of global challenges, the education system is required to equip young generations with 21st Century Skills, which include communication, collaboration, creativity, and critical thinking skills (Borgonovi & Greiff 2022, ; Margfiroh. et al., 2023). Of all these skills, critical thinking skills or more broadly known as Higher Level Thinking Skills (HOTS), are seen as the main foundation that allows individuals to adapt and innovate sustainably.

In the context of Natural Sciences (IPA) learning at the elementary school (SD) level, the urgency of developing HOTS is increasingly crucial. Science is not just a set of facts that must be memorized, but a process of inquiry that requires students to observe, question, analyze phenomena, evaluate evidence, and formulate conclusions (Allahyarova, 2022). Without HOTS,

science learning risks becoming superficial and isolated from the real world, failing to cultivate essential scientific reasoning (Syahgiah et al., 2023). The ability to analyze cause-and-effect relationships, evaluate the validity of information, and create solutions to environmental problems is a manifestation of HOTS which is the ultimate goal of modern science education. (Lestari & Firmansyah, 2022)

In line with global trends, the education system in Indonesia through the implementation of the Independent Curriculum explicitly places the development of critical reasoning as one of the main dimensions in the Pancasila Student Profile (Kemendikbudristek, 2022) This policy emphasizes the urgent need to move from teacher-centered and Low-Level Thinking Skills (LOTS) learning methods, to a more innovative and student-centered approach that is able to actively stimulate HOTS (Susanto & Pratiwi, n.d.). Therefore, the exploration and adoption of pedagogical strategies that have proven to be effective in developing HOTS is a priority agenda for educators and researchers in Indonesia.

One of the main challenges in implementing HOTS-based learning is maintaining students' engagement and motivation levels, especially when faced with abstract and complex material (Putra & Santosa, 2021). Answering this challenge, gamification has emerged as a promising pedagogical strategy. Gamification is defined as the use of game design elements and mechanics in non-gaming contexts to encourage participation, motivate action, and facilitate learning (Kapp & Boller, 2021). This approach has the potential to change students' perception of challenging academic tasks from a burden into an interesting game to conquer (Dichev & Dicheva, 2020).

The effectiveness of gamification stems from its ability to tap into the intrinsic and extrinsic motivational drivers of humans. Game mechanics such as points, badges, and leaderboards provide instant feedback and a measurable sense of accomplishment, which can increase extrinsic motivation (Sailer & Homner, 2020). On the other hand, elements such as narrative, gradually increasing challenges, and freedom to experiment can foster intrinsic motivation by meeting basic psychological needs for autonomy, competence, and connectedness, as described in Self-Determination Theory (Hamari & Sjöblom, 2021). This combination creates an immersive learning environment and encourages student persistence.

More than just boosting motivation, careful gamification design has been shown to stimulate higher cognitive processes. Rapid corrective feedback allows students to conduct fault analysis (analysis), while problem-based scenarios encourage them to design strategies (creation) and make decisions based on available information (evaluation) (Moa & Lucas, 2024). Thus, gamification not only makes learning fun, but also has the potential to be a safe "practice arena" for students to hone and apply HOTS in a structured environment (Kim & Lee, 2021).

Among various educational technology platforms, Wordwall has gained significant popularity among educators in Indonesia due to its ease of use and variety of interactive templates (Pradani & Wibowo, 2021). The platform inherently integrates various gamification mechanics. Templates like Quiz Show, Maze Chase, and Airplane not only present questions, but also wrap them up with elements of competition, time limits, life systems, and scores, which are direct implementations of gamification principles. Its accessibility and popularity make Wordwall a relevant object of study to understand gamification practices in the field (Nugraha & Mawardi, 2023).

A large number of studies in the last five years have confirmed the positive impact of using Wordwall in the classroom. These studies have consistently shown that Wordwall is

effective in increasing learning motivation (Yolanda, 2021), increasing student engagement and activeness during learning(Savira & Gunawan, 2023), as well as improving learning outcomes in basic cognitive domains such as conceptual understanding and mastery of science vocabulary (Adzhana et al., 2022). These findings have laid a solid foundation for the benefits of Wordwall as an engaging and effective learning medium.

However, the existing literature shows a significant gap. The majority of existing research tends to treat Wordwall as a "black box", with a focus on proving the cause-and-effect relationship between the platform's use in general and improved learning outcomes. Very few studies have gone further to "dismantle" the black box and analyze specifically which gamification mechanics (e.g., timers, scores, avatars, or level systems) are the most dominant in Wordwall templates, and how those mechanisms causally contribute to the development of aspects of HOTS such as analysis, evaluation, and creation. This gap leaves an important unanswered question: is the improvement in learning outcomes limited to the level of memory (LOTS), or does it really touch the development of high-level reasoning (HOTS)?

To fill this gap, a comprehensive literature synthesis is needed. Therefore, this systematic literature review aims to identify, analyze, and synthesize empirical evidence from existing research on the specific role of gamification mechanics on the Wordwall platform in developing students' Higher Level Thinking Skills (HOTS) in science learning at the elementary school level. The results of this review are expected to provide a deeper and more detailed understanding for educators and instructional designers in utilizing gamification tools not only as motivational triggers, but as a strategic instrument to train students' critical thinking skills.

Theoritical Review

Higher-Order Thinking Skills (HOTS) Higher-Order Thinking Skills (HOTS) are cognitive processes that go beyond simply remembering information (Lower Order Thinking Skills/LOTS). Based on the revised Bloom's taxonomy, HOTS include the ability to analyze (breaking information into component parts to explore relationships), evaluate (making judgments based on criteria and standards), and create (putting elements together to form a new, coherent whol. In the context of science learning, HOTS are crucial as they enable students not only to know scientific facts but also to understand scientific processes, interpret data, assess the validity of arguments, and design innovative solutions to complex problems.

Gamification in Education Gamification is the application of game-design elements and mechanics—such as points, badges, leaderboards, challenges, and narratives—in non-game contexts, like education, to enhance user engagement, motivation, and participation (Kapp & Boller, 2021). The goal is to leverage people's natural inclinations for play and competition to make challenging tasks more appealing and enjoyable (Dichev & Dicheva, 2020). In education, well-designed gamification can transform passive learning into an active, immersive experience, encouraging students to persist through difficulties and achieve learning objectives.

Wordwall as a Gamification Platform Wordwall is an online platform that allows educators to easily create interactive learning resources and educational games. It offers a variety of customizable templates, such as quizzes, match-ups, anagrams, and more, which inherently incorporate gamification mechanics (Nugraha & Mawardi, 2023). Elements like time limits, scores, instant feedback, and retry opportunities directly apply gamification principles to create a dynamic learning environment. Due to its ease of use and variety of activities, Wordwall has become a popular tool for presenting subject matter and conducting formative assessments in an engaging way for students (Pradani & Wibowo, 2022).

Method

This study uses the Systematic Literature Review (SLR) method to identify, evaluate, and synthesize all research evidence relevant to the research questions that have been determined. To ensure that the review process is carried out in a transparent, systematic, and replicable manner, this study adopts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. The PRISMA framework provides clear guidance through four key stages: identification, screening, eligibility, and inclusion (Page et al., 2021).

1. Data Sources and Search Strategies

The literature search process is focused on one major academic database that has a wide scope and high accessibility, namely Google Scholar. The search strategy is designed to capture the most relevant articles by using a single comprehensive search string that combines Indonesian and English keywords. Boolean operators (AND, OR) as well as advanced search operators (intitle:) are used to maximize the relevance of results.

2. Final Search String in Google Scholar

To ensure wide coverage and high precision, the following single search strings are used in the literature search process: (("Wordwall") AND (gamification OR gamifikasi)) AND ("berpikir tingkat tinggi" OR "higher-order thinking skills" OR "HOTS" OR "critical thinking" OR "berpikir kritis") AND ("IPA" OR "sains" OR "science") AND intitle:("sekolah dasar" OR "elementary school" OR "primary school"). This string specifically targets articles that discuss the "Wordwall" platform in the context of "gamification", focus on various terms for "HOTS", within the subject "Science/Science", and most importantly, have the phrase "elementary school" or its equivalent in the article title.

3. Inclusion and Exclusion Criteria

To ensure that the articles under review are of high quality and relevance, a set of inclusion criteria (criteria that must be met) and exclusion (criteria that make the article excluded) are carefully established.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusions (Included)	Exclusion (Excluded)
Publication Type	Articles published in scientific journals and have gone through a peer-reviewed process.	Opinion articles, book reviews, editorials, news reports, or popular magazine articles.
Time Range	Articles published in the last 5 years, i.e. between January 2020 and December 2024.	Articles published before 2020 or after 2024.
Context	Research that explicitly uses the Wordwall platform as a learning medium or intervention.	Research that uses other gamification platforms or does not mention Wordwall.
Research Subject	The research subjects are students at the elementary school (SD) level or equivalent (for example, Madrasah Ibtidaiyah).	The subjects of the study are junior high school students, high school students, college students, or teachers.

Content Focus	The article discusses the impact or role of Wordwall on aspects of HOTS (analysis, evaluation, creation) or high-level cognitive processes, both implicitly and explicitly.	Articles that only discuss the impact on motivation, interests, or low-level cognitive learning outcomes (LOTS) without attributing them to HOTS.
Language	Articles are written in Indonesian or English.	Articles in languages other than Indonesian or English.
Accessibility	Articles are available in full-text format.	Articles that are only available in abstract form or require a fee for access.

4. Study Selection Process

The article selection process follows the flow of the PRISMA 2020 diagram which consists of four stages:

a. **Identification:** All articles that appear from search results using keywords in Google Scholar are collected.
b. **Screening:** Removal of duplicate articles, followed by filtering by title and abstract to eliminate clearly irrelevant articles.
c. **Eligibility:** Passing articles are read thoroughly in full-text format to be assessed for eligibility based on all criteria.
d. **Included:** Articles that successfully pass all stages of selection become a collection of final studies that are analyzed.

Figure 1. Stages of Research Systematic Literature Review Method

5. Data Extraction and Analysis

Data from each included article was systematically extracted, including: (a) the identity of the article, (b) the design of the research, (c) the subject, (d) the mechanics of gamification identified, (e) the aspects of HOTS measured, and (f) the key findings. Data analysis will be conducted using a thematic analysis approach to identify recurring patterns and themes to answer the research questions.

Results and Discussion

1. Results

This chapter presents the main findings obtained from the systematic literature review process, covering the article selection process, publication distribution, and characteristics of the selected studies. Article Selection Process The article selection process is depicted in the PRISMA 2020 flowchart (Figure 1). The initial identification resulted in 686 articles. After screening by year (503 remaining), title, and abstract (40 remaining), a feasibility assessment was conducted on 40

full-text articles. A total of 34 articles were excluded because they did not meet the criteria. Thus, the final number of articles included in this systematic review is 6.

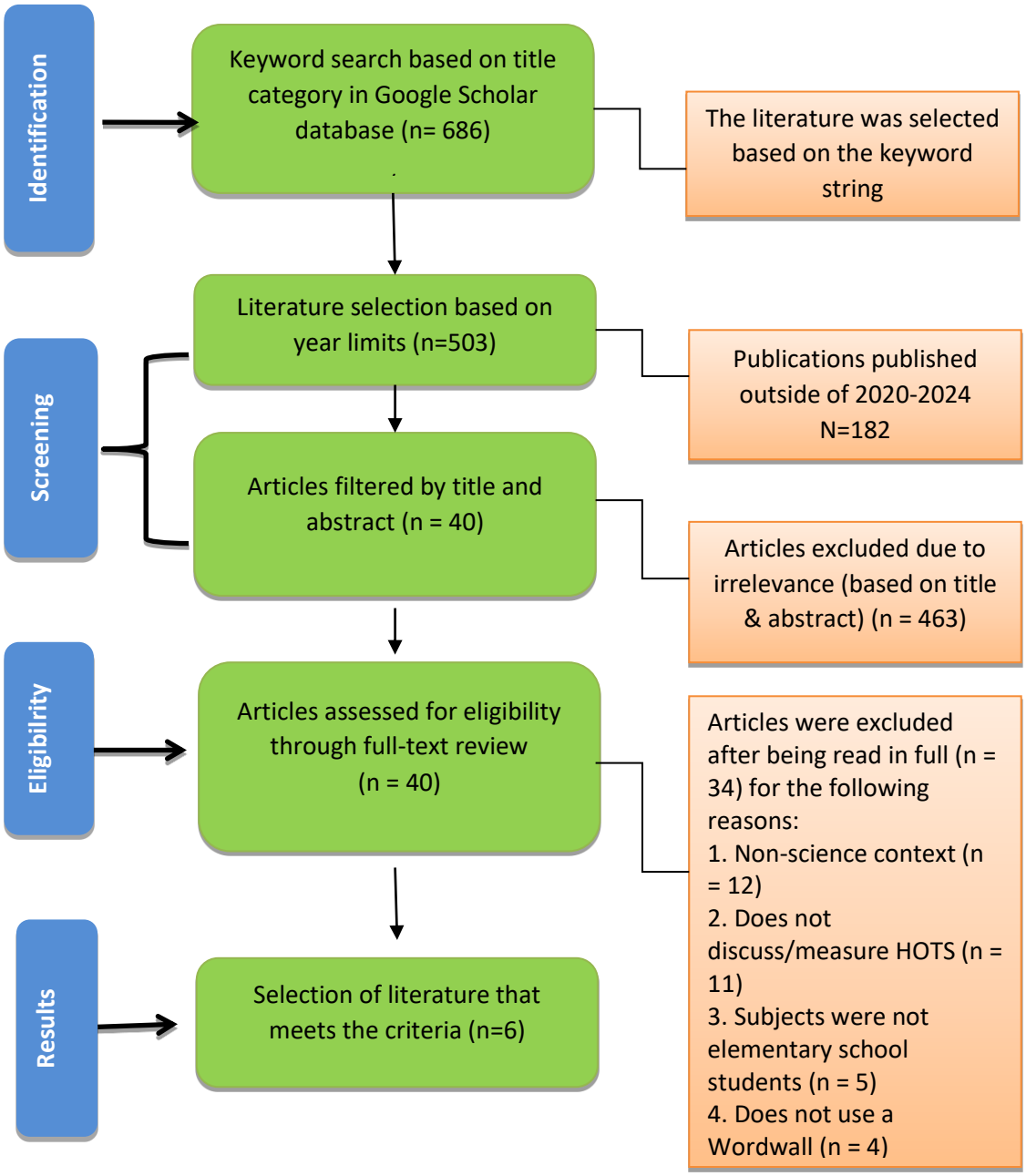

Figure 1. PRISMA 2020 Flow Diagram Article Selection Process

Distribution of Article Publications per Year The annual distribution of articles found at the initial screening stage is presented in Figure 2. This chart shows the trend in research publications related to the keywords used within the 2020 to 2024 time frame. There has been an exponential increase in research interest year over year. The number of relevant publications drastically increased from just 2 articles in 2020, to 302 articles in 2023, and peaked with 503 articles in 2024. This trend indicates that the topic addressed in this study is a very dynamic and rapidly developing field of study, thus confirming the relevance and urgency of this systematic review.

Figure 2. Development of Articles Published on Google Scholar by Year (Based on Initial Search Results). Characteristics of Selected Studies The six selected articles specifically discuss the use of Wordwall in elementary school science learning in connection with HOTS. Table 2 summarizes the key characteristics and findings of each study.

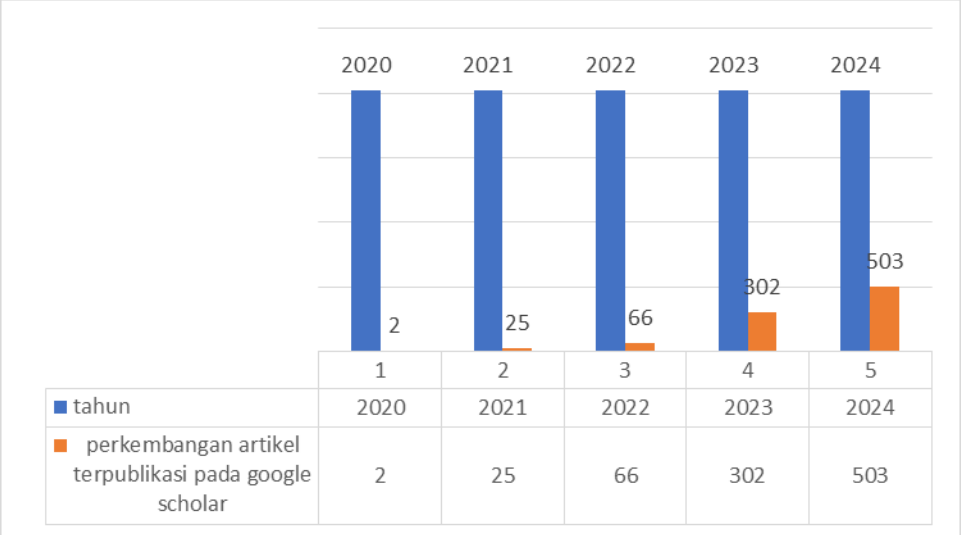

Figure 2. Progress of Articles Published on Google Scholar by Year (Based on Initial Search Results)

Table 2. Critical Review of Selected Articles

No.	Title & Author	Main Results/Findings	Related to HOTS Recommendations for Analysis
1	"Development of a Wordwall-Based E-Module to Train Students' Critical Thinking Skills in Science Materials" (Sari, 2023)	Wordwall as a formative evaluation tool with instant feedback and challenges encourages students to analyze questions more carefully.	Highly Recommended. Provides strong evidence of the connection between Wordwall evaluation and the improvement of students' analysis processes.
2	"Development of a Wordwall-Based E-Worksheet to Improve Critical Thinking Skills of Elementary School Students in Science Subjects" (Wulandari, et al., 2024)	Wordwall as a formative evaluation tool with instant feedback and challenges encourages students to analyze questions more carefully.	Highly Recommended. Links Wordwall's interactive features to interpretation and argumentation skills.
3	"Development of Wordwall Learning Media to Improve Critical Thinking Skills of 5th Grade Students in Science Learning" (Lestari, et al., 2024)	The game format requires students to make inferences (drawing conclusions) and provide explanations (logical reasons), which are key indicators of	Highly Recommended. Provides insight into the translation of HOTS questions into a game format that triggers inference.

		critical thinking.	
4	"The Influence of a PjBL Model Assisted by Wordwall on Students' Critical Thinking and Collaboration Skills" (Suastra, et al., 2024)	The competitive elements (leaderboards) and timed challenges encourage students to apply knowledge quickly and accurately (a form of evaluation).	Highly Recommended. Shows Wordwall's role as a culminating assessment within a HOTS-rich PjBL framework.
5	"Improving Students' Critical Thinking Skills in Science Learning Through Wordwall Learning Media" (Rahayu, et al., 2024)	The variety of game templates keeps students challenged, improving their ability to provide explanations and clarifications.	Highly Recommended. Provides qualitative evidence from real classroom practice about the importance of varying game mechanics.
6	"Application of a Problem-Based Learning (PBL) Model Assisted by Wordwall Media to Improve Critical Thinking Skills" (Sari, et al., 2023)	Wordwall as an enjoyable evaluation tool in PBL requires students to evaluate various answer options presented in a game format.	Highly Recommended. Provides qualitative evidence from real classroom practice about the importance of varying game mechanics.

2. Discussion

An in-depth analysis of the six selected articles reveals a consistent pattern regarding the role of gamification mechanics on the Wordwall platform in stimulating Higher-Order Thinking Skills (HOTS). The main findings from this literature synthesis can be grouped into several themes. First, the instant feedback and challenge mechanics inherent in Wordwall quizzes are consistently reported to encourage students to perform a more careful analysis process. As found by Sari, et al. (2022), students do not just answer but are prompted to analyze questions more thoroughly to avoid mistakes and achieve the highest score. This finding is supported by broader research stating that rapid formative feedback can enhance students' metacognition and self-regulated learning strategies (Butler & Winne, 2020).

Second, the interactivity and visualization features in various Wordwall game templates play a crucial role in facilitating interpretation and evaluation skills. Wulandari, et al. (2024) highlight how these features assist students in interpreting data and constructing arguments. This aligns with the findings of Lestari, et al. (2024), who show that the game format allows abstract HOTS questions to be translated into concrete tasks that require students to make inferences and provide logical explanations. The importance of visualization in science learning for young children is also emphasized by other studies, which have found that visual representations can simplify complex concepts and support scientific reasoning (Zuhri et al., 2023).

Third, Wordwall proves to be highly effective when it functions as a formative assessment tool within the framework of larger learning models such as Project-Based Learning (PjBL) and Problem-Based Learning (PBL). Suastra, et al. (2024) and Sari, et al. (2023) demonstrate that

competition mechanics (like leaderboards) and time constraints at the end of a learning cycle encourage students to apply and evaluate the knowledge they have constructed quickly and accurately. The use of gamified assessments in constructivist learning models like PBL has been shown to improve concept mastery and problem-solving skills (Huang & Soman, 2021).

Finally, the qualitative findings from the Classroom Action Research (CAR) study by Rahayu, et al. (2024) confirm the importance of game template variation. This variety keeps students engaged in the long term and allows them to practice different aspects of HOTS repeatedly without feeling bored. The need for variation in gamification to maintain long-term motivation is a recurring theme in the literature (Zainuddin et al., 2020). Students' ability to provide clarification and explanation, which is the foundation of critical thinking, is shown to improve with exposure to different types of interactive challenges

Conclusion

Based on a systematic review of the existing literature, it can be concluded that the gamification mechanics contained in the Wordwall platform significantly play a role in developing the Higher Level Thinking Skills (HOTS) of science students in elementary schools. This role is manifested through several key mechanisms: (1) Instant feedback and challenges drive a more in-depth analysis process; (2) Interactivity and visualization facilitate interpretation and evaluation capabilities; (3) Elements of competition and effective time limits to measure application and evaluation ability in a problem-based or project-based learning model; and (4) A variety of game templates keeps engagement for HOTS exercises on an ongoing basis. These findings confirm that Wordwall is more than just a tool to increase motivation, but a strategic pedagogical instrument to train critical thinking skills if designed and implemented appropriately.

Reference

A., S., W., E., Fachriza, A., Khoiriyah, K., Simpol, W., Syaputra, R. A., & Lathifah, L. (2023). Maghfiroh. *Indonesian Journal on Learning and Advanced Education*. https://doi.org/10.23917/ijolae.v6i1.23081

Adzhana, H. A., Rukmana, E. N., & Rohman, A. S. (2022). Processing of Library Materials at Irreplaceable Books Library. *ABDI PUSTAKA: Jurnal Perpustakaan Dan Kearsipan*, 2(1), 13–22. https://doi.org/10.24821/jap.v2i1.6355

Allahyarova, T. (2022). Search for a new paradigm in the educational system in the era of artificial intelligence and digital technologies: challenges, opportunities. *Actual Problems in the System of Education: General Secondary Education Institution – Pre-University Training. Higher Education Institution*, 2, 179–190. https://doi.org/10.18372/2786-5487.1.16597

Borgonovi, F. (2022). Greiff, S. *Nature Reviews Psychology*, 1(6), 314–315. https://doi.org/10.1038/s44159-022-00064-w

Syahgiah, L., Zan, A. M., & Asrizal, A. (2023). Effects of Inquiry Learning on Students' Science Process Skills and Critical Thinking: A Meta-Analysis. https://doi.org/10.24036/jipt/vol1-iss1/9

Rosmiati, R., Fanny, A. M., Azmy, B., Satianingsih, R., & Rusminati, S. H. (2024). HOTS-Based Teaching Module Design Planning in the Independent Curriculum. *Abdimas Umtas*, 7(1), 212–219. https://doi.org/10.35568/abdimas.v7i1.4373

Sa'diyah, M. (2023). The transformation of education in the era of disruption: challenges and opportunities towards the future. *Journal of Islamic Education and Pesantren*. https://doi.org/10.33752/jiep.v3i2.5725

Zuhri, R. S., Wilujeng, I., & Haryanto, H. (2023). Multiple Representation Approach in Elementary School Science Learning: A Systematic Literature Review. *International Journal of Learning, Teaching and Educational Research*, 22(3), 51–73. https://doi.org/10.26803/ijlter.22.3.4

Agusti, N. M., & Aslam, A. (2022). The Effectiveness of the Wordwall Application as a Learning Medium on Elementary School Students' Science Learning Outcomes. *Jurnal Basicedu*, 6(4), 5794–5800. https://doi.org/10.31004/basicedu.v6i4.3053

Butler, D. L., & Winne, P. H. (2020). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 90(2), 245-281. https://doi.org/10.3102/0034654320904838

Dichev, C., & Dicheva, D. (2020). Gamifying education: what is known, what is believed and what is missing: a systematic review of the literature. *International Journal of Educational Technology in Higher Education*, 17(1), 9. https://doi.org/10.1186/s41239-020-00187-3

Hamari, J., & Sjöblom, M. (2021). What is Gamification? A Literature Review of Theory, Applications, and Outcomes. In *Gamification*. MIT Press. https://doi.org/10.7551/mitpress/9780262045205.003.0002

Huang, R., & Soman, D. (2021). *A practitioner's guide to gamification of education*. University of Toronto Press. https://doi.org/10.3138/9781487588722

Jannah, M., & Puspitasari, D. (2023). The Effect of Wordwall Educational Games on the Learning Activeness of Elementary School Students. *Jurnal Inovasi Pendidikan Dasar*, 7(1), 34-42. https://doi.org/10.21009/JIPD.071.04

Kapp, K. M., & Boller, S. (2020). *The Gamification of Learning and Instruction Fieldbook: Ideas into Practice*. Wiley.

Kemendikbudristek. (2022). Dimensions, Elements, and Sub-elements of the Pancasila Student Profile in the Merdeka Curriculum. Badan Standar, Kurikulum, dan Asesmen Pendidikan.

Kim, S., & Lee, J. (2021). A systematic review of the effects of game-based learning on students' cognitive and non-cognitive skills. *Journal of Educational Technology & Society*, 24(1), 1-16.

Landers, R. N. (2019). Gamification in education and business. In *The Oxford Handbook of Human Motivation*, 2nd ed. (pp. 237-262). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190666453.013.14

Lestari, S., & Firmansyah, D. (2022). Development of HOTS Assessment Instruments in Science Learning to Measure Critical Thinking Skills of Elementary School Students. *Jurnal Inovasi Pendidikan IPA*, 8(1), 45-56. https://doi.org/10.21831/jipi.v8i1.47892

Moa, L., & Lucas, G. (2024). Gamification elements and their impacts on education: A review. *Multidisciplinary Reviews*, 8(5), 2025155. https://doi.org/10.31893/multirev.2025155

Nugraha, A., & Mawardi, M. (2023). Elementary School Teachers' Perceptions of the Use of the Wordwall Platform as an Interactive Learning Medium. *Jurnal Teknologi Pendidikan*, 12(1), 88-97. https://doi.org/10.21009/JTP.v12i1.30123

Page, M. J., et al. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71

Pradani, T. G., & Wibowo, A. (2022). The Use of Wordwall Learning Media to Increase Students' Interest and Motivation in Science Learning at Elementary School. *Educenter: Jurnal Ilmiah Pendidikan*, 1(5), 452-457. https://doi.org/10.55904/educenter.v1i5.88

Putra, A., & Santosa, C. A. H. (2021). Challenges of Implementing HOTS-Based Learning in Elementary Schools. *Jurnal Pendidikan Dasar Nusantara*, 7(1), 112-124. https://doi.org/10.29407/jpdn.v7i1.15789

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Sailer, M., & Homner, L. (2020). The Gamification of Learning: a Meta-analysis. *Educational Psychology Review*, 32(1), 77–112. https://doi.org/10.1007/s10648-019-09498-w

Savira, A., & Gunawan, R. (2022). The Influence of the Wordwall Application Media in Improving Science Learning Outcomes in Elementary Schools. *Edukatif: Jurnal Ilmu Pendidikan*, 4(4), 5453–5460. https://doi.org/10.31004/edukatif.v4i4.3332

Setiawan, B., & Hidayat, T. (2022). The Shift in Educational Paradigm in the Digital Era: Challenges and Opportunities. *Jurnal Pendidikan dan Kebudayaan*, 7(1), 1-14. https://doi.org/10.24832/jpnk.v7i1.2543

Suryani, N., & Setiawan, A. (2020). Analysis of Teachers' Difficulties in Implementing Higher Order Thinking Skills (HOTS)-Based Learning in Elementary Schools. *Jurnal Basicedu*, 4(4), 886-894. https://doi.org/10.31004/basicedu.v4i4.456

Susanto, A., & Pratiwi, I. (2023). Implementation of the Merdeka Curriculum: From LOTS-Oriented Learning to HOTS. *Jurnal Basicedu*, 7(2), 1123-1132. https://doi.org/10.31004/basicedu.v7i2.4890

Yolanda, D. S. (2021). The Effect of Using Wordwall Learning Media on Students' Learning Motivation. *Jurnal Pendidikan dan Konseling (JPDK)*, 3(2), 123-130. https://doi.org/10.31004/jpdk.v3i2.2876

Zainuddin, Z., Shujahat, M., Haruna, H., & Chu, S. K. W. (2020). The role of gamification in improving students' learning outcomes: A systematic review. *Journal of Educational Computing Research*, 57(8), 2005-2031. https://doi.org/10.1177/0735633119870294

Zichermann, G., & Cunningham, C. (2021). *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly Media.