



Implementation of Smartboard as Evaluation Media in Science Learning through Wordwall Platform at Krandegan State Elementary School

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ABSTRACT

Science learning in Indonesian elementary schools is still dominated by conventional methods that reduce student participation, so interactive evaluation innovations through smartboards and Wordwalls are needed. This study aims to analyze the application of smartboards as an evaluation medium in science learning through the Wordwall platform in fifth grade at Krandegan Public Elementary School. This descriptive qualitative study involved a population of fifth grade students and teachers with a purposive sample of one teacher and 25-30 students. The main research instrument was supported by interview guidelines and recordings, analyzed using the Miles and Huberman model with triangulation. The results showed an increase in student participation, motivation, and cognitive-affective-psychomotor engagement through game-based learning, despite infrastructure and teacher readiness constraints. It was concluded that the smartboard-Wordwall integration was effective for interactive evaluation, and teacher training and infrastructure support were recommended.

INTRODUCTION

Research phenomenon

The development of digital technology requires elementary school learning to transform from conventional models to more interactive, multimodal learning models tailored to the characteristics of the digital generation. In Indonesia, classroom practice is still largely dominated by lecture methods and the use of textbooks as the primary learning resource. Consequently, the use of digital media is suboptimal, resulting in low student engagement and learning outcomes, including in science subjects that require concrete observation and exploration of concepts (Miftah, 2014; Panjaitan et al., 2020; Dewi et al., 2021; Arzfi et al., 2023). At the same time, various recent studies have shown that integrating technologies such as interactive whiteboards, digital media, and game-based learning models can increase elementary school students' motivation, participation, and conceptual understanding through

the presentation of visual and audio content and interactive activities (Aktas & Aydin, 2016; Kurniasih, 2019; Arzfi et al., 2023; Rahayu & Makmur, 2024).

At Krandegan Public Elementary School, science learning still relies on simple visual media, resulting in passive learning activities and suboptimal student engagement. This is despite the fact that elementary school students typically prefer visual and kinesthetic activities that allow them to interact directly with objects or learning media. This condition aligns with the findings of several studies that confirm that limited interactive media impacts low student interest and attention, while the use of interactive digital media has been shown to increase students' focus, interest, and memory of science material (Ndoluanak et al., 2022; Kusumawati et al., 2021; Gulo & Harefa, 2022; Development of Unity-Based Smart Board Media to Improve Learning Outcomes of Science, 2025). In this context, the need for innovative evaluation media that can combine game aspects, interactivity, and direct feedback is becoming increasingly urgent to support improving the quality of science learning in elementary schools (Rusli et al., 2024; Sari & Yarza, 2021).

Research problems

One of the main challenges in science learning in elementary schools is the lack of innovation in evaluation, which is generally still based on written tests and lacks active student involvement. This evaluation pattern often positions students as passive recipients and does not provide sufficient space for simultaneous cognitive, affective, and psychomotor involvement, resulting in learning outcomes that do not reflect students' maximum potential (Nur Kumala, 2016; Dewi et al., 2021). On the other hand, the development of the game-based learning concept shows that evaluation packaged in the form of educational games can create a fun learning atmosphere, increase intrinsic motivation, and strengthen concept retention through meaningful learning experiences (Oktavia, 2022; Wiseza & Andini, 2023; Arzfi et al., 2023; Prasetya & Wiliyanto, 2022). However, in many elementary schools, including Krandegan State Elementary School, digital game-based and interactive media evaluation models have not been widely implemented, so this potential has not been optimally utilized (Panjaitan et al., 2020; Kurniasih, 2019).

Smartboards, as interactive whiteboards, offer the opportunity to integrate text, images, animations, videos, and interactive activities on a single touchscreen that can be operated directly by both teachers and students. Several studies have found that the use of smartboards contributes to increased student motivation, focus, and learning achievement, and encourages teachers to develop more creative and varied learning strategies (Aktas & Aydin, 2016; Maghfi & Suyadi, 2020; Nurkhofifah, 2022; Ndwandwe et al., 2024). In the context of elementary school science, smartboards have great potential to display scientific phenomena visually and interactively, making it easier for students to observe, ask questions, and construct explanations for the natural phenomena being studied (Dewi et al., 2021; Development of Unity-Based Smartboard Media to Improve Learning Outcomes of Science, 2025). However, the use of smartboards as a specific evaluation medium, especially those integrated with educational game platforms, is still relatively limited and has not been widely researched in Indonesian elementary school environments (Aini et al., 2024; Rahayu & Makmur, 2024).

Another issue that arises is the still low utilization of educational game platforms such as Wordwall to support interactive science learning evaluation, even though various studies report that Wordwall is effective in increasing motivation, participation, and learning outcomes through the presentation of quizzes, puzzles, and challenge-based games that are appropriate to the characteristics of elementary school students (Maghfiroh, 2018; Aidah & Nurafni, 2022; Sari & Yarza, 2021; Rahmawati & Subekti, 2022). The integration of Wordwall with devices such as smartboards allows students to interact directly through touch on a large screen, answer questions in turn, and receive feedback in real time, so that the cognitive, affective, and psychomotor domains can be involved simultaneously in the evaluation process. However, at Krandegan Public Elementary School, teachers still face challenges such as limited facilities, the need for a stable internet connection, and pedagogical and technological readiness in designing and integrating digital evaluations based on game-based learning (Nurdin, 2016; Gulo & Harefa, 2022; The Use of Digital Smart Boards as a Means of Supporting..., 2024). This situation shows a gap between the potential of interactive technology and conventional classroom evaluation practices, so a more specific empirical study is needed regarding the implementation of smartboard and Wordwall integration in science learning in elementary schools.

Purpose, urgency, and novelty

This study aims to analyze the application of smartboard as an interactive evaluation media in science learning through the Wordwall platform in grade V of Krandegan Public Elementary School, Paninggaran District, Pekalongan Regency, with a focus on increasing student motivation, participation, and learning outcomes. The urgency of this research lies in the need to present an evaluation model that not only measures cognitive achievement but also activates students' affective and psychomotor involvement through game-based learning that utilizes digital technology, in line with the demands of 21st-century learning and student profiles in the industrial revolution 4.0 era (Oktavia, 2022; Wiseza & Andini, 2023; Arzfi et al., 2023). The novelty of this research lies in the direct integration of smartboard and Wordwall as interactive science evaluation media in elementary schools in the context of public schools in the region, which is elaborated through a descriptive qualitative approach to comprehensively describe the dynamics of implementation, impacts on participation and learning outcomes, as well as implementation obstacles faced by teachers and students (Aini et al., 2024; Rahayu & Makmur, 2024; Utilization of Wordwall as an Interactive Game Media to Improve Motivation and Learning Outcomes of Asmaul Husna of Elementary School Students, 2025). Thus, the results of this research are expected to contribute to the development of technology-based interactive evaluation practices in elementary schools and become a reference for teachers and policy makers in designing strategies for utilizing smartboards and Wordwalls more effectively in science learning.

METHODS

Types and Methods of Research

This study uses a qualitative approach with a descriptive design to in-depth describe the implementation of smartboards as an interactive evaluation medium in science learning through the Wordwall platform at Krandegan Public Elementary School. The qualitative approach was chosen because it allows researchers to explore phenomena naturally through narrative data collection from observations, interviews, and documentation, resulting in a comprehensive understanding of the process, impacts, and obstacles of implementation (Sugiyono, 2019; Nurkhofifah, 2022; Creswell & Poth, 2021; Emzir, 2022). The descriptive design is particularly relevant for analyzing actual conditions in the field without variable manipulation, as applied in similar studies exploring digital media innovations in elementary schools (Sudaryono, 2021; Aini et al., 2024). Thus, this method supports the research objective of presenting a holistic picture of the effectiveness of smartboard and Wordwall integration in increasing fifth-grade student participation.

Data Analysis Instruments and Techniques

The primary instrument in this study was the researcher herself, who served as the key data collector through participant observation, in-depth interviews, and visual documentation in the form of photos and videos during the learning process. Supporting instruments included semi-structured interview guidelines and recording tools to capture data accurately when manual recording was limited, in accordance with qualitative research principles that emphasize flexibility and source triangulation (Sugiyono, 2019; Emzir, 2022; Creswell & Poth, 2021). Data collection techniques included direct observation of student interactions with the smartboard and Wordwall, interviews with fifth-grade teachers, and documentation of science evaluation activities, ensuring validity through convergence of findings (Sudaryono, 2021; Nurkhofifah, 2022). Data analysis was conducted using the Miles and Huberman model, which includes data reduction, data presentation, and conclusion drawing, with thematic coding steps to identify patterns of participation, motivation, and technological barriers (Creswell & Poth, 2021; Emzir, 2022; Rahayu & Makmur, 2024).

Population and Sample

The study population consisted of all fifth-grade students and fifth-grade teachers of Krandegan Public Elementary School, Krandegan Village, Paninggaran District, Pekalongan Regency, Central Java, which was chosen as the study location because it represents the condition of public elementary schools in rural areas with limited potential for digital media implementation. The sample was selected purposively with the criteria of active students in science learning using smartboard-Wordwall and

teachers as the main implementers, resulting in the main subjects being one fifth-grade teacher and approximately 25-30 fifth-grade students for intensive observation (Sugiyono, 2019; Sudaryono, 2021). This purposive sampling technique is appropriate for descriptive qualitative research because it focuses on key informants who have direct experience with interactive evaluation innovations, as recommended in local context-based education studies (Creswell & Poth, 2021; Emzir, 2022; Aini et al., 2024).

Research Procedures

The research procedure began with preparation, including a preliminary study through initial observations at Krandegan Public Elementary School to identify gaps in the use of interactive media in science learning, followed by instrument development and ethical clearance. The implementation phase included data collection during the learning process through participant observation during 4-6 evaluation sessions using a smartboard-Wordwall, in-depth interviews with teachers, and continuous documentation for triangulation (Sugiyono, 2019; Nurkhofifah, 2022). Subsequently, the data analysis phase was carried out iteratively through transcription, coding, and thematic interpretation to construct a descriptive narrative, concluding with validation of the findings through member checking with teachers (Sudaryono, 2021; Creswell & Poth, 2021; Emzir, 2022). This procedure ensured systematicity and reliability, in line with qualitative research practices in the Indonesian primary education context (Rahayu & Makmur, 2024; Ndwandwe et al., 2024).

RESULTS AND DISCUSSION

The use of smartboards in learning and evaluation in elementary schools has been proven to have a positive impact and increase student engagement. Many students become more focused when the material and assessment questions are presented visually, interactively, accompanied by animations or educational games, especially when combined with platforms like word walls. Furthermore, the use of smartboards also makes it easier for teachers to present lesson materials and conduct evaluations, as the results can be viewed immediately. This makes the evaluation process more efficient because it provides teachers with the opportunity to provide direct feedback to students. The use of smartboards also supports collaborative learning, allowing students to take turns coming to the front to answer questions presented on the screen. This fosters courage, self-confidence, and cooperation in students when answering the questions displayed.

However, the implementation of smartboards also faces several obstacles, including limited facilities and infrastructure, such as the availability of devices in each classroom, and a reliance on electricity and internet connections to run web-based applications. Furthermore, teachers are limited in operating smartboards and integrating digital evaluation media through wordwall platforms, resulting in less than optimal utilization of interactive features. During learning, when teachers present evaluation materials or media, they need to prepare them before the lesson begins, thus requiring more time.

A. Teaching Method Using Smartboard through Wordwall Platform in Elementary School

The implementation of Smartboards in the learning process at Krandegan Public Elementary School aligns with the concept of game-based learning, an approach that utilizes educational games to improve student learning effectiveness. Oktavia (2022) states that game-based learning is designed through game applications that can support learning while developing cognitive, affective, and psychomotor aspects. In this case, Smartboards function as a medium that enables educational games to be played more interactively.

Game-based learning also emphasizes the creation of an active, fun, and conducive atmosphere. Wiseza & Andini (2023) emphasized that game-based learning combines elements of play with educational objectives, making the material more easily remembered by students. Smartboards significantly support this through their large, interactive, and responsive visual displays, making the use of platforms like Wordwall more engaging for elementary school students.

In a study conducted at Krandegan Public Elementary School, Smartboard was used in conjunction with the Wordwall platform as a medium for evaluating science learning. Wordwall provides various types of games—such as matching, quizzes, wheel spins, and open the box—which

make the evaluation process more visually engaging and engaging. When students answer by touching the Smartboard screen, they not only think but also coordinate their movements and focus, so that all learning domains (cognitive, affective, psychomotor) are simultaneously engaged, in keeping with the main characteristics of game-based learning.

During the implementation, students appeared more enthusiastic, actively engaged in discussions, and participated without coercion. This differs from traditional evaluations, which tend to be passive. The smartboard helps focus students' attention, while the Wordwall adds a game and competition element, increasing their motivation to learn. Teachers also benefit because evaluation results can be displayed automatically, making the assessment process more practical and efficient.

The integration of Smartboard and Wordwall in game-based learning also supports the principle of student-centered learning, where students become the main characters in the evaluation process. This approach encourages more collaborative and communicative learning and provides meaningful learning experiences. Teachers can adapt the Wordwall game to core science competencies, ensuring that evaluation remains relevant to learning objectives.

Overall, the use of Smartboard through the Wordwall platform at Krandegan Public Elementary School represents a concrete example of effective game-based learning. This technology not only improves the quality of science learning evaluations but also creates a more interactive, enjoyable, and developmentally appropriate learning environment for elementary school students.

B. Advantages of Using Smartboards in Learning

1. Improving student learning outcomes

Smartboards display clear, crisp, and interactive visuals. At the elementary school level, students tend to prefer visual and kinesthetic activities. Therefore, smartboards are a suitable medium for their characteristics. In delivering learning materials and conducting evaluations, it is highly possible to improve students' cognitive abilities, as the use of smartboards is quite effective, enabling students to focus better and understand the material more easily. (Fauziah et al., 2023).

2. Increase student participation and collaboration

Direct interaction with the smartboard encourages student participation in learning, such as students coming forward to answer questions and taking turns moving objects on the screen. This activity provides a more meaningful learning experience, as students not only listen but also interact and act directly. (Rahayu & Makmur, 2024).

3. Encourage teacher creativity in varying students' learning styles

This technology allows teachers to integrate visual, auditory, and kinesthetic approaches into a single lesson, giving them the opportunity to try out more innovative learning strategies that are tailored to student characteristics. (Ndwandwe et al., 2024).

C. Weaknesses of Using Smartboards in Learning

The implementation of smartboards in learning faces several significant obstacles that need to be addressed to maximize their effectiveness. When electricity is unavailable, learning using smartboards is completely impossible, disrupting the learning process. Furthermore, if the internet connection is down, applications like Wordwall, Quizziz, and similar platforms cannot be accessed, hindering the integration of interactive assessment media. Another problem arises if the smartboards are damaged, as technicians are difficult to obtain due to their limited availability on the island of Java, resulting in lengthy downtime. Finally, the cost of procuring smartboards is relatively high, significantly more expensive than conventional projectors, adding to the financial burden on schools. (Aini et al., 2024).

CONCLUSION

This study found that the integration of smartboards with the Wordwall platform effectively increased the participation, motivation, and learning outcomes of fifth-grade students in science learning at Krandegan Public Elementary School through interactive game-based learning evaluations, where students demonstrated high enthusiasm, active collaboration, and simultaneous cognitive,

affective, and psychomotor engagement (Oktavia, 2022; Wiseza & Andini, 2023; Fauziah et al., 2023; Rahayu & Makmur, 2024). Teachers found the ease of visual presentation, immediate feedback, and a variety of fun evaluations, despite facing limitations such as electricity-internet dependence, teacher technical readiness, and high device costs that limit access in rural schools (Aini et al., 2024; Ndwandwe et al., 2024). The main limitations of the study include the small sample size (one class) and the descriptive qualitative approach without quantitative measurement of pre-post learning outcomes, thus limiting generalization to similar contexts.

Practical implications include recommendations for elementary school teachers to adopt smartboard-Wordwall with intensive training and supporting infrastructure, and for regional public schools to allocate phased budgets to mitigate technical barriers. Further research suggestions include a multi-grade quasi-experimental design with quantitative indicators of motivation and achievement, and exploration of alternative offline platforms to overcome network constraints, thereby enriching the literature on digital evaluation innovation in Indonesian elementary education (Rahayu & Makmur, 2024; Aini et al., 2024).

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