Jurnal Ilmiah Mandala Education (JIME)
Vol 12 No.3 Agustus 2026
p-ISSN : 2442-9511, e-2656-5862
DOI: *10.58258/jime.v12i3.11220/http://ejournal.mandalanursa.org/index.php/JIME*

Analysis Of The Implementation Of Educational Games (Wordwall) On The Cognitive Abilities Of Grade I Students At State Elementary School 5 Tanjung

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Article Info

Article history:
Accepted: 18 July 2026
Publish: 07 Agustus 2026

Keywords:
Educational Game,
Digital Media,
Cognitive Development.

Abstract

Cognitive ability is an important aspect that should be developed from the first grade of elementary school. However, conventional learning often makes students easily bored and less able to understand the learning materials. This study aimed to describe the implementation of the Wordwall educational game on the cognitive abilities of first-grade students at SD Negeri 5 Tanjung. This study employed a qualitative approach with a descriptive research design. The research subjects consisted of 15 first-grade students and their classroom teacher. Data were collected through non-participant observation, semi-structured interviews, and documentation. Data were analyzed using the Miles and Huberman model, while data validity was ensured through source and technique triangulation. The findings showed that the implementation of Wordwall was carried out through three stages: (1) planning, in which the teacher adjusted the game to the learning materials; (2) implementation, where the teacher first explained the material and then divided the students into groups; and (3) evaluation and reflection, by asking questions to assess students' understanding. Supporting factors included teacher creativity, attractive Wordwall features, the availability of learning facilities, and students' cooperation. The inhibiting factors included limited internet access, students' limited technological skills, and the time required to prepare learning materials. The implementation of Wordwall positively improved students' memory, understanding, application of learning materials, learning motivation, and classroom participation.

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1. INTRODUCTION

Elementary school education plays a crucial role as the primary foundation for developing the quality of future human resources [1]. At the elementary school level, particularly in the early grades such as grade I, students not only learn the basic competencies of reading, writing, and arithmetic (calistung), but also face a critical transition period where various other basic skills begin to develop. One of the most essential abilities that must be developed in a structured manner at this phase is cognitive ability. This cognitive aspect encompasses a series of highly complex mental processes, ranging from the ability to think logically, remember information, understand concepts, solve everyday problems, and make the right decisions. Referring to the view of [2],

these cognitive abilities are an absolute requirement for students to be able to respond well to learning and achieve optimal intellectual development at the next level of education. Considering that children in grade I of elementary school (around 6-7 years old) are in the transition stage from the pre-operational stage to the concrete operational stage, the learning process should no longer be carried out rigidly and abstractly. They rely heavily on learning experiences that are real, interactive, and tied to visual objects.

Based on this urgency, approaches that are solely oriented towards delivering material (teacher-centered) and achieving final grades are considered no longer relevant. Learning must be designed innovatively to encourage students to be physically and cognitively active, to dare to ask questions, and to find understanding independently. According to [3], this integrated effort is crucial to ensure that students' cognitive capacities are continuously honed through targeted stimulation. Empirical conditions in the field, particularly at Tanjung 5 Elementary School, indicate that the cognitive development process in first-grade students still faces several structural and pedagogical obstacles. The results of observations and initial interviews with the first-grade homeroom teacher, Mrs. Purni Puspita Wati, S.Pd., revealed that students' cognitive abilities in the class are still very heterogeneous. A small number of students have been able to demonstrate simple reading skills, but the majority still experience significant difficulties in recognizing letter and number shapes and have difficulty absorbing basic learning concepts. These difficulties are exacerbated by the application of conventional learning models that predominantly rely on lecture methods, resulting in students becoming bored more quickly, becoming passive, and losing concentration. Furthermore, the limited availability of interactive and visual learning media is increasingly becoming a significant obstacle. Furthermore, early childhood's strong interest in games has not been optimally integrated as a learning tool [4].

Responding to the dynamics of these issues and the technological disruption in education, educators are required to possess digital literacy and the ability to utilize interactive, technology-based learning media. Technology integration goes beyond simply changing tools; it also transforms the classroom atmosphere into an environment that stimulates active student participation. One of the most effective pedagogical innovations, aligned with the characteristics of early grade students, is Game-Based Learning, or the use of educational games. Educational games successfully combine engaging entertainment elements with academic learning outcomes, allowing students to experience the learning process organically without feeling evaluated or pressured [5]. Among the various existing digital education platforms, Wordwall has emerged as a highly promising and flexible web-based medium [6]. The Wordwall platform facilitates teachers to design a variety of games tailored to the curriculum, such as match-up quizzes, random wheels, and engaging visual puzzles.

Several recent studies have provided empirical justification for the effectiveness of Wordwalls. Research by [7] confirms that the use of Game-Based Learning assisted by Wordwalls successfully boosts students' learning outcomes and cognitive understanding significantly. In line with this, a study conducted by [8] shows that Wordwalls can change the classroom climate to be more dynamic, interactive, and full of enthusiasm, which builds students' cognitive focus. Similarly, [9] and [10] prove that interactive Wordwall games have a direct impact on improving the quality of learning processes and outcomes. Although various studies consistently support the use of Wordwalls, a fundamental research gap remains. The majority of previous publications, such as [11], [12], and [13], focus more on quantitative measurements of motivation and learning outcomes. Investigations into how exactly the stages of Wordwall implementation are processed in the classroom, the dynamics of interactions, and in-depth analysis of qualitative inhibiting factors in lower grades (grade I) are still very rare. [4]

recommends the need for a holistic study that focuses on the phenomenon of digital media intervention in natural classrooms.

Based on the urgency and phenomena mentioned above, this study aims to fill the gap in the literature by conducting a comprehensive and in-depth study using a descriptive qualitative approach. This study does not focus solely on final achievement figures, but rather explores the process of implementing Wordwall, empirically identifying supporting and inhibiting factors, and analyzing its substantial impact on students' cognitive abilities (specifically remembering, understanding, and applying). The research focused on Grade I of SD Negeri 5 Tanjung in the 2025/2026 academic year. These findings are expected to provide theoretical references and practical guidelines for educators and policymakers in optimizing the integration of technology-based educational games to advance basic education in Indonesia.

More specifically, the research gap addressed here can be stated as follows: while prior Wordwall studies (e.g., [11], [12], [13]) have established that the medium can raise motivation and learning outcomes at an aggregate, quantitative level, none of them have examined, through sustained qualitative observation, how a single first-grade teacher operationally sequences planning, delivery, and evaluation when using Wordwall specifically to build the foundational cognitive processes of remembering, understanding, and applying—processes that are developmentally distinct from, and prerequisite to, the higher-order outcomes measured in most existing research. The novelty of this study therefore lies in three interlocking contributions: (1) a process-level, stage-by-stage account of Wordwall implementation in the specific context of grade I, where students are only beginning to transition from pre-operational to concrete-operational thinking; (2) an empirically grounded mapping of supporting and inhibiting factors as they naturally emerge in a single classroom over an extended period, rather than as researcher-manipulated variables; and (3) a cognitive-taxonomy-based analysis (C1–C3) of Wordwall's impact, which has rarely been used as an explicit analytical lens in prior Wordwall research on early-grade students. Taken together, these contributions position the study as a qualitative complement to the predominantly quantitative body of Wordwall literature, offering process-oriented insight that outcome-focused studies are not designed to capture.

2. RESEARCH METHODS

To achieve a comprehensive understanding, this study was designed using a qualitative approach with a descriptive approach. This method was chosen based on the primary objective of the study, namely to describe the phenomenon of the implementation of the educational game media Wordwall and its impact on students' cognitive development in a natural, complete, and in-depth manner. Through this qualitative approach, the researcher positioned himself as the primary instrument, directly exploring the dynamics of interactions, teacher perceptions, and student responses within the classroom context without providing interventions or manipulated treatments.

This research was conducted at Tanjung 5 Elementary School, located in Tanjung Village, Tanjung District, North Lombok Regency, West Nusa Tenggara Province. The research took place in the even semester of the 2025/2026 Academic Year, specifically from March to July 2026. The location was chosen based on the fact that this school has attempted to integrate technological innovation in the form of the Wordwall educational game into its learning curriculum to address cognitive problems in early grade students. The subjects determined purposively in this study consisted of two main components, namely 15 first-grade students and 1 first-grade homeroom teacher (Mrs. Purni Puspita Wati, S.Pd.) who played a dual role as key informants and facilitators of learning implementation.

The data collection strategy was pursued through three main techniques: non-participatory observation, semi-structured interviews, and documentation. Non-participatory observation focused on systematic observation of the teacher's planning stages, the implementation of Wordwall-assisted learning, and student participation, emotional expression, and problem-solving processes. The researcher was not directly involved in the teaching interactions, thus ensuring a high degree of objectivity and naturalness in the collected data. In-depth semi-structured interviews were conducted with the first-grade homeroom teacher to explore pedagogical strategies, technical barriers, and evaluate students' cognitive progress. In addition, simple interviews were also conducted with several representative students (such as Suci Adira, Bunga Putri Nawra, Zingga Varista Wijaya, and Endruw Alzair Nugraha) to capture their learning experiences and the appeal of the media from their perspectives. Meanwhile, documentation included a review of the Lesson Implementation Plan (RPP)/Teaching Module, screenshots of Wordwall displays, visual evidence of classroom activities, and learning evaluation results.

All data collected from the field were then analyzed using Miles and Huberman's interactive analysis model. These analysis stages included data condensation (sorting, focusing, and summarizing essential information from interview transcripts and field notes), data presentation (composing descriptive narratives and logical tables to facilitate understanding of the construction of meaning), and drawing conclusions and verification, which were carried out continuously throughout the research process. To ensure the credibility and validity of the findings, the researcher applied source triangulation techniques (comparing the alignment of information from the principal, teachers, and students) and technical triangulation (testing the consistency of data from observations, interviews, and documents). This validation step was completed by member checking with the first-grade homeroom teacher to confirm the researcher's interpretation of the data presented.

3. RESULTS AND DISCUSSION

3.1 Research result

Based on a series of data collection processes involving intensive classroom observations, in-depth interviews with informants, and analysis of administrative and visual documentation in the first grade of SD Negeri 5 Tanjung, this study successfully mapped three main aspects. These aspects include the process of implementing the Wordwall media, the factors that support and hinder its implementation, and the actual impact experienced by students on their cognitive abilities.

3.1.1 Wordwall Educational Game Implementation Process

Based on observations on May 19 and 21, 2026, the implementation stages of the Wordwall educational game were categorized into three systematic phases: Planning, Implementation, and Evaluation and Reflection.

1. **Planning Stage:** In this preparation phase, the fundamental steps teachers take are analyzing the cognitive characteristics of first-grade students and determining learning objectives. They develop basic tools and materials closely related to the world around them (e.g., letter recognition, simple words, numbers, and animal pictures). Next, they design quizzes through a Wordwall account using child-friendly templates, such as Match Up. Ms. Purni Puspita Wati stated,*"Before using Wordwall, I first prepared the material to be taught and then created questions that were appropriate to the abilities of first-grade students. I chose simple games so that students could easily understand how to play them."*. Colorful visuals and large text are key at this stage.

2. **Implementation Stage:** Learning begins with conducive introductory activities, including greetings, prayers, and apperception. The teacher instills the basic concepts of the material verbally before introducing the Wordwall media [14]. After the concepts are conveyed, the teacher displays the Wordwall interface via a projector/laptop screen. Students are strategically divided into heterogeneous groups, mixing students with quick-response abilities and those who still need guidance, to build a peer tutoring ecosystem. When the game is run, student enthusiasm soars dramatically. Students compete to move forward, touch, and answer questions on the screen with enthusiasm. The teacher describes this moment: *"When using Wordwall, students appear more engaged than in regular learning. They are very enthusiastic and always eager to try to answer questions..."*
3. **Evaluation and Reflection Stage:** After the game, the teacher didn't just stop at the score display on the screen, but also conducted ongoing formative assessment through verbal question and answer sessions. The teacher explored whether the visual information in the game had been internalized into the students' cognitive schemas. Students were encouraged to reflect on what they had learned and which parts they found challenging. Observations validated that the majority of students were able to respond to the teacher's verbal questions very accurately immediately after using the Wordwall.

3.1.2 Supporting and Inhibiting Factors

The success of Wordwall's digital media integration is inextricably linked to operational dynamics in the field. The following table summarizes the supporting and inhibiting factors identified from field data.

Category	Identified Factors
Supporting Factors	• **Teacher Creativity:** High initiative from educators in packaging learning, selecting game templates, and organizing the flow of group competitions. • **Wordwall Visual Appearance:** The bright, animated interface and sound feature immediately captivate the psychology of first-grade students. • **Hardware Facilities:** Availability of adequate laptop devices to project learning media to students. • **Collaborative Synergy:** The existence of a heterogeneous group division structure facilitates solid cooperation between students.

Inhibiting Factors	• **Internet Network Fluctuations:** Cloud/web-based platforms require a stable signal; occasional connection interruptions slow down the loading of questions. • **Student Technology Literacy:** As early learners, some children are still unfamiliar with operating navigation on devices, so they need extra instruction. • **Preparation Time Investment:** Designing special questions, adjusting images, and arranging the game format in Wordwall takes longer to prepare (lesson planning) than preparing for the lecture method.

3.1.3 Impact on Students' Cognitive Abilities

The analysis of the impact of the Wordwall implementation focused on three basic levels of the cognitive taxonomy developed for lower elementary school students. The details of these cognitive findings are outlined below:

1) **Impact on Memory Ability (C1/Knowledge):** Educational games have been shown to stimulate visual and auditory repetition. First-grade students spontaneously repeated a series of numbers, initial letters, and vocabulary names of objects that appeared on the screen. As empirical evidence, a student named Suci Adira stated, *"I still remember the letters and pictures in the game,"* while Zingga Varista added, *"I still remember the numbers and names of the pictures from earlier"* This was confirmed by the teacher, who was aware that the memory retention power of the children persisted until the next day's meeting.
2) **Impact on Comprehension Ability (C2):** In this indicator, students are validated beyond mere memorization. They are able to articulate the material's concepts in simple language, match image silhouettes to text, and categorize similar objects. Endruw Alzair Nugraha explained, *"I understand the lesson better,"* and Bunga Putri emphasized, *"If I use games, it's easier for me to understand."*
3) **Impact on Ability to Apply (C3/Application):** The most significant impact was seen when students used the newly constructed information from the Wordwall to complete oral and written practice questions. The homeroom teacher explained that confusion when working on the questions decreased drastically. *After using Wordwall, most students found it easier to answer questions and complete the problems given.* Students dared to draw correlations of knowledge from the game to student worksheets in the real world.
4) **Affective Impact (Motivation and Participation):** Although not the primary focus of the cognitive domain, motivation is a powerful intermediary variable [15]. The learning environment evolves into a dynamic space with minimal boredom. Students explicitly state that they consider the activity *"like playing a game"* And *"exciting,"* which ultimately doubles their level of focus.

3.1.4 Discussion

The field findings revealed above confirm the paradigm that the application of pedagogical technology in the form of the Wordwall educational game has absolute

advantages compared to conventional learning in grade I of elementary school. In the process dimension, the stages ranging from planning, implementation, to evaluation reflect an integrative learning design [16]. The fact that teachers mix media in detail, from material selection, gradation of problem difficulty, to integration of group work, is very much in line with the principles of modern pedagogy. The results of this research align with and strengthen the conclusions of the research of [12], which stated that Wordwall is not merely an instant medium, but requires thorough preparation and elaboration for the intervention to be academically meaningful. The group heterogeneity approach (mixing slow and fast-learning children) during Wordwall play also addresses the challenges identified by [17], namely the need for extensive collaboration and mentoring in integrating digital media.

When situated against other digital learning media commonly used in early-grade classrooms, several distinguishing advantages of Wordwall become apparent. Compared to static presentation-based media such as PowerPoint slides or printed digital worksheets, Wordwall's game-based interactivity requires active student response—touching, dragging, or selecting—rather than passive viewing, which more directly engages the sensorimotor-linked learning preferences of six- to seven-year-old children. Compared to single-purpose quiz applications such as Quizizz, which primarily support summative, individually-scored assessment, Wordwall offers a broader template repertoire (match-up, random wheel, image-based puzzles) that allows the same content to be reused in different game formats across the planning-implementation-evaluation cycle, reducing novelty fatigue while keeping the underlying material constant. Furthermore, unlike offline manipulative media (e.g., flashcards or physical puzzles), Wordwall's cloud-based accessibility allows teachers to modify, update, or differentiate question sets rapidly between sessions without needing to physically recreate materials, which is particularly valuable given the heterogeneous ability levels observed among the first-grade students in this study. However, this advantage is also Wordwall's principal limitation relative to offline media: its dependency on stable internet connectivity and functioning hardware introduces a point of failure that flashcards or printed media do not share, meaning that in infrastructure-limited settings, Wordwall's pedagogical advantages must be weighed against this practical fragility.

Analysis of supporting factors, particularly teacher creativity and Wordwall visualization, highlights the psychological aspects of children's learning. Salsabela [11] in her study found that an attractively designed and visually rich learning environment will automatically reduce academic anxiety and catalyze the intrinsic motivation of first-grade students. The intersection between this research and Salsabela's study and the findings of [18] is confirmation that the characteristics of elementary school students who are identical to play can be fully accommodated without sacrificing curriculum material [5]. The visual display in Wordwall manifests the concept of Jean Piaget's Cognitive Theory, where 7-year-old children are on the threshold of the concrete operational period. They are not yet able to manipulate pure abstract ideas, so the intake of color, animation, and object movement in Wordwall acts as a "concrete bridge" that facilitates the process of schematization of knowledge [2]. Classic obstacles such as internet connection [19] and technology adaptation in children are technical residues that can be empirically handled through targeted assistance from facilitators.

In essence, the impact of Wordwall on cognitive taxonomy (remembering, understanding, applying) indicates an improvement in information processing

mechanisms. The remembering process occurs not through forced instruction (manual drilling), but rather through repetition disguised as a game mission. As children strive to "win" or "get a star," the brain simultaneously records the configuration of letters and numbers. Understanding is expanded through the assimilation of visual objects into the child's cognitive structure. When students can retell and provide new examples, this confirms the hypothesis of [7] that Game-Based Learning transforms short-term information into meaningful memory. Meanwhile, the competence Apply is reflected in cognitive equilibrium, which is when students transfer knowledge from the laptop screen to solving real-life problems or test sheets.

These applicative and analytical impacts positively correlate with recent research such as [13] and [20], which demonstrate that Wordwall interactivity can train students' critical thinking flexibility. Holistically, this research confirms that the use of Wordwall is not merely a cosmetic technological shift phenomenon, but rather a learning architecture that fundamentally revolutionizes the way early grade students process, retain, and apply knowledge.

4. CONCLUSION

Based on the results of the presentation and in-depth analysis, this qualitative study concluded several strategic points. First, the process of implementing the Wordwall educational game media in the first grade of SD Negeri 5 Tanjung was effective through student-centered design, interactive implementation based on group collaboration, and evaluation that emphasized formative assessment of understanding. Second, the success of Wordwall's use was strongly supported by the teacher's level of creativity in concocting the game, the application's visual aesthetics, supporting facilities, and cohesion among students. However, elements such as internet disruption and early technology skill deficits remain challenges that require anticipation. Third, the implementation of Wordwall had a transformative impact on students' cognitive capacity. There was a significant increase in basic cognitive abilities, namely fluency in remembering facts/letters/numbers, ease in understanding concrete meanings, and accuracy in applying these concepts to problem-solving exercises. This media also radically reduced boredom and replaced it with active participation and high learning motivation.

5. SUGGESTIONS

Based on these findings, several practical recommendations are proposed. For schools, it is recommended that the institution allocate a dedicated operational budget for internet connectivity upgrades and maintain a backup offline-media contingency (e.g., printed match-up cards mirroring the Wordwall templates) for use during network disruptions, so that learning continuity does not depend entirely on connectivity. Schools are also encouraged to schedule regular peer-learning sessions among teachers to share Wordwall templates and question banks, reducing the individual time burden of material preparation identified as an inhibiting factor in this study. For the government and local education authorities, it is recommended that digital infrastructure support—particularly stable internet access and adequate hardware such as laptops or tablets—be prioritized for early-grade classrooms in under-resourced schools such as SD Negeri 5 Tanjung, given that first-grade cognitive stimulation has long-term implications for subsequent learning trajectories. In addition, structured, ongoing professional development programs on digital pedagogy and platforms such as Wordwall should be provided to in-service teachers, rather than relying on individual teacher initiative and self-directed learning, so that the sustainability and quality of technology-based educational game implementation can be maintained across

schools and not depend solely on the creativity of individual educators. Future researchers are encouraged to extend this qualitative account with longitudinal or comparative designs across multiple classrooms to examine whether these implementation patterns and their cognitive impacts generalize beyond a single-teacher, single-classroom setting.

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