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Improving islamic religious education learning outcomes through interactive digital media wordwall

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ABSTRACT

This study aims to enhance Islamic Religious Education (IRE) learning outcomes through the use of the interactive digital medium Wordwall in a fourth-grade class at SDN Bulansari, Subang Regency, a rural school with limited technological infrastructure. A mixed-method quasi-experimental design with pre-test and post-test control groups was employed, involving 60 purposively selected fourth-grade students. Data were collected through standardized cognitive assessments, classroom observations, interviews, and focus group discussions. Quantitative data were analyzed using paired sample t-tests in SPSS, while qualitative data were examined through thematic analysis with NVivo. The findings reveal a significant improvement in the mean cognitive IRE score, from 65 (pre-test) to 82 (post-test) ($p < 0.05$), alongside an 85% affective engagement rate in moral values discussions. A key observation highlights Wordwall's capacity to accelerate students' digital literacy and reinforce the internalization of Islamic values, even within infrastructural constraints. The study concludes that Wordwall is an effective tool for improving both cognitive and character-based learning outcomes, with potential to bridge the digital divide and support value-based learning in rural educational settings.

Introduction

The digital transformation of education poses considerable obstacles and offers great prospects, especially in the context of Islamic Religious Education (PAI) in rural primary schools like SDN Bulansari, Subang. The increasing demand for comprehensive technological integration within curricula, alongside the swift advancement of global digitalization, creates new opportunities for interactive and engaging education. This evolution simultaneously exposes a significant digital divide. Susanto et al. (2024) emphasize that interactive learning media can augment student engagement and academic performance by promoting dynamic interactions between educators and learners, which is essential for PAI due to its distinctive spiritual and ethical dimension. Students in remote locations frequently encounter significant obstacles in obtaining digital tools, thus restricting their exposure to enhanced educational opportunities.

This gap is particularly pronounced in PAI, where reflective and student-centered pedagogies are essential. Digital instruments, like educational games and interactive applications, provide engaging opportunities to enhance the relatability, enjoyment, and efficacy of religious instruction (Hakim & Setiawan, 2024; Suryanto & Dewi, 2023). They promote higher-order thinking via exploratory learning. Notwithstanding their

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potential, the deployment of such technologies in rural areas such as Subang is hindered by deficiencies in digital infrastructure and teacher preparedness (Geisler et al., 2024; Rachmadtullah et al., 2022). In this perspective, integrating platforms such as Wordwall into the classroom may mitigate the passivity inherent in traditional learning approaches. Research substantiates the efficacy of multimedia in augmenting motivation and cognitive engagement (Haqih et al., 2022).

Confronting these difficulties necessitates a comprehensive plan, encompassing the establishment of egalitarian infrastructure, extensive teacher training, and systemic support. Educators must be equipped with the confidence and competencies to utilize digital technologies proficiently (Mursyida et al., 2023). Emerging technologies, such as augmented and virtual reality, present potential by providing immersive, tailored learning experiences, provided they are implemented with consideration for varying degrees of digital access and literacy (Tuwoso et al., 2021). The digital transformation of education necessitates a holistic plan that includes curriculum creation, teacher professional development, and equitable access. When applied judiciously, technology can enhance engagement, enrich theological comprehension, and promote a more inclusive and egalitarian educational atmosphere.

The incorporation of digital tools into Islamic Religious Education (PAI) offers significant opportunities and complex obstacles. Educators must shift from conventional, lecture-centric methods to more participatory, learner-focused ways that utilize technology. The persistent dependence on expository teaching in PAI obstructs the reflective discourse essential for conveying religious principles. Susanto et al. (2024) observe that teacher-centered models frequently lead to restricted student participation and a superficial comprehension of fundamental topics. The absence of digital platforms specifically designed for the pedagogical requirements of religious education further complicates the issue.

Teachers are therefore required to incorporate technology into their lessons and to modify their teaching philosophies to support participative and dialogic learning (Hakim & Setiawan, 2024). Sometimes, the perception of PAI as less engaging than disciplines with direct practical relevance diminishes student motivation. Research by Suryanto & Dewi (2023) and Kodrle & Savchenko (2021) indicates that the integration of gamified features, including interactive quizzes and multimedia components, can markedly improve student engagement and understanding of religious themes.

However, rural schools encounter significant challenges concerning infrastructure. Inadequate internet access, obsolete equipment, and insufficient technical skills impede the incorporation of digital learning (Ghory & Ghafory, 2021; Rachmadtullah et al., 2022). Students in these situations frequently lack access to online educational resources and interactive tools, while educators contend with insufficient training and support. According to Andrian & Andrian (2024), these inequities exacerbate the educational divide between technologically advanced and underfunded institutions. To bridge this gap, ongoing professional development, context-specific digital resources, and public-private collaborations are important. Early training in digital literacy equips pupils to effectively utilize electronic resources. Absent a thorough and inclusive plan, the complete revolutionary potential of digital tools in PAI learning will remain unfulfilled (Geisler et al., 2024).

In the wider educational context, notably within Islamic Religious Education (PAI), there are increasing apprehensions over the adequacy of current teaching

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paradigms in fostering moral and character development in the digital age. As educational institutions strive to cultivate graduates with both scholarly acumen and moral integrity, the deficiencies of traditional pedagogy and insufficient digital infrastructure have become increasingly urgent. Students in rural regions face disadvantages due to limited access to technology, hindering the assimilation of religious and moral ideals (Olanrewaju et al., 2021).

Educators are essential in achieving educational objectives; nevertheless, many are inadequately trained in the appropriate incorporation of technology. The potential advantages of digital learning remain unexploited without adequate support (Pantić & Florian, 2015). To achieve this aim, schools must build PAI courses that transcend rote memorization and foster character development through interactive, contextually pertinent digital methods. Researchers have extensively documented the impact of the digital divide on educational quality and student ethics (Tahmasebi, 2023), highlighting the need for comprehensive, collaborative solutions.

Utilizing digital platforms and social media in religious education can enhance profound and significant student involvement (Goncalves et al., 2018). Subsequent research should investigate methods by which educators might cultivate participative online learning environments and provide equal access to digital resources, irrespective of geographic or economic circumstances (Yersel et al., 2023). The integration of technology, efficient teaching methods, and character education is essential for developing morally sound and intellectually proficient students. This necessitates a continuous dedication by educators, researchers, and policymakers to close digital disparities and foster transformative, inclusive education.

Islamic Religious Education (PAI) has seen significant transition in the digital era, especially with the emergence of interactive digital technologies that enhance student engagement and educational outcomes. Research conducted by Fathurrahman et al. (2019) substantiates that digital media markedly improves educational quality. Institutions such as MIN 2 South Tangerang and SD PIUS Purbalingga have successfully utilized Wordwall, a notable tool. Students in these schools who used Wordwall exhibited superior comprehension and heightened engagement relative to their peers instructed by conventional techniques.

At SD PIUS Purbalingga, 83% of students indicated that utilizing Wordwall enhanced their enjoyment and motivation in studying about religion, primarily owing to its interactive games and quizzes. Despite the absence of clear citations for some data, these results align with Asmara et al. (2023), who point out the importance of visual and interactive components such as animations and graphics in enhancing student creativity and engagement. These findings substantiate the idea that tools such as Wordwall not only enhance academic achievement in PAI but also facilitate character development.

Considering its potential, the extensive integration of interactive digital media into PAI courses is both opportune and essential. This would foster learning experiences that are more engaging, significant, and aligned with the competencies necessary for 21st-century learners. Educators and scholars are urged to persist in investigating how digital technologies may be utilized to develop ethically grounded, technologically proficient individuals prepared to excel in a progressively digital environment.

Despite the well-documented efficacy of interactive digital media like Wordwall in many educational settings, a notable deficiency persists concerning its utilization in Islamic Religious Education (PAI), especially within rural elementary schools. Previous

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studies have predominantly concentrated on disciplines such as mathematics, physics, and language education, thereby neglecting the potential of Wordwall in influencing cognitive, affective, and psychomotor learning outcomes in PAI. Furthermore, the technological constraints of rural institutions such as SDN Bulansari have not been comprehensively analyzed, particularly with the adaptation of Wordwall to inadequate infrastructure while still providing unique and contextually relevant educational advantages.

Islamic Religious Education (PAI) in rural areas has unique and important aspects that cannot be ignored, especially in the context of limited educational infrastructure and lack of teacher training. Significant challenges arise such as the limited availability of books and learning tools that hinder teaching effectiveness (Yulidawati et al., 2024), as well as teachers who rarely receive adequate training to improve the quality of learning and maximize students' potential in understanding religious values (Winarno, 2022). Nevertheless, PAI plays a vital role in shaping the character of rural communities, not only as a transmission of religious knowledge, but also as a means of forming moral and social values that are crucial for the development of community character. A good understanding of religious education can improve students' ethics and behavior, especially in areas less exposed to globalization values that have the potential to undermine traditions (Maulidiyah et al., 2022).

However, existing studies have focused more on non-religious learning, such as Mathematics and English, in urban schools with better facilities, including technology and ongoing teacher training (Murniyetti et al., 2024). While the practice of religious education in rural areas remains underexplored, particularly regarding the use of digital platforms such as Wordwall (Resmini et al., 2021), its application to PAI in rural settings is still understudied (Bahtiar et al., 2022).

Therefore, this study aims to assess the efficacy of Wordwall in improving PAI education for fourth-grade students at SDN Bulansari. The study not only tests the effectiveness of Wordwall in enhancing learning outcomes in the cognitive, affective, and psychomotor domains, but also demonstrates how this platform can be adapted to limited conditions, with the hope of strengthening character building and religious values among rural school students. The fundamental assertion is that Wordwall's interactive functionalities and gamified components correspond effectively with the learning preferences of digital-native students and are appropriately aligned with the value-oriented essence of PAI, which necessitates both conceptual comprehension and personal introspection alongside practical application.

Method

This study employs a mixed-method approach to thoroughly assess the efficacy of Wordwall in Islamic Religious Education (PAI) training. The research integrates quantitative and qualitative methodologies to encompass both measurable learning results and contextual insights derived from the experiences of students and teachers (Creswell & Plano Clark, 2011).

The study employs a quasi-experimental design featuring a pre-test and post-test control group structure. This design facilitates a comparison analysis between two groups: one receiving conventional education (control group) and the other employing Wordwall in the classroom (experimental group). This study seeks to ascertain the degree to which Wordwall impacts learning outcomes (Fraenkel et al., 2012).

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The study participants consist of 60 fourth-grade kids from SDN Bulansari, a rural primary school, evenly allocated into control and experimental groups. The sample is chosen by purposive sampling to guarantee consistency with the study objectives and the presence of fundamental digital infrastructure. Participants are aged 9 to 10 years, with an equitable number of male and female students.

Data gathering is conducted via several tools. Standardized assessments are conducted prior to and following the intervention to evaluate cognitive, emotional, and psychomotor learning outcomes. Classroom observations are also performed to assess student participation and behavior throughout instructional activities in both groups. Interviews are conducted with educators and selected students to obtain profound insights into user experiences. Additionally, focus group discussions (FGDs) are conducted to obtain collective insights and perspectives from participants concerning the execution of Wordwall. All instruments have been validated by a panel of three experts a PAI curriculum specialist, an educational technology academic, and a psychologist using a Likert-scale assessment for content validity and reliability (Sugiyono, 2019).

The intervention is conducted over four weeks, with two sessions each week. During the intervention, steps are implemented to mitigate external influences, including the assignment of the same instructor to both groups and the preservation of uniform classroom settings.

The data analysis process consists of two components. The quantitative data derived from standardized assessments are evaluated by the paired sample t-test utilizing SPSS software to ascertain significant differences in student performance pre- and post-intervention. NVivo software simultaneously thematically analyzes qualitative data from interviews, observations, and focus group discussions. This thematic analysis reveals consistent patterns and themes about student motivation, classroom engagement, and the appropriateness of Wordwall as a pedagogical instrument in PAI education, especially in a rural school context (Adzibah et al., 2025).

Ethical considerations are paramount during the study process. Informed agreement is secured from the parents of students and school officials, with all participants guaranteed confidentiality and the voluntary nature of their participation. The research procedure has received approval from the relevant institutional review board.

This methodological approach guarantees a comprehensive analysis of the effective integration of interactive digital media, such as Wordwall, into religious education to improve student learning results.

Result

1. Theoretical and Empirical Analysis of Wordwall Implementation in Islamic Education (PAI) at SDN Bulansari

This study integrates three main theoretical frameworks to analyze the impact of Wordwall as a digital learning medium in PAI instruction, combining well-established psychological and pedagogical theories with a contextualized implementation in a rural elementary school setting.

a. Cognitive Theory of Multimedia Learning (Mayer, 2003)

Mayer's theory explains how dual coding (visual and verbal processing) enhances information retention through the principles of contiguity and modality. In the context of Wordwall, the integration of text, images, sound, and animation supports the

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multimedia principle, which helps reduce extraneous cognitive load through coherent and well-structured content delivery (Mayer, 2009).

Data show that students are better able to grasp abstract PAI concepts such as noble character, Islamic ethics, and the importance of religious obligations when lessons are presented with aligned visual and audio elements. Classroom observations revealed that students learned faster and retained content longer when materials were delivered via Wordwall's synchronized modalities. For instance, during a unit on prophet stories, animations coupled with guided questions helped students link historical events with moral values. This illustrates the value of matching instructional media with learners' sensory preferences and cognitive capacities.

b. Social Constructivism

This approach emphasizes the importance of scaffolding and the Zone of Proximal Development (ZPD) in constructing knowledge through social interaction. Wordwall facilitates knowledge building through collaborative activities such as group quizzes, live leaderboards, and healthy team-based competitions (Julia et al., 2024). Observations showed that 85% of fourth-grade students actively discussed their responses during Wordwall sessions. This indicates that Islamic values such as honesty, cooperation, and mutual respect were internalized not only through content but also through the learning process itself (Hardeliska & Landong, 2023; Rannikmäe et al., 2025; Vygotskiĭ & Cole, 1978).

Teachers provided guided support, helping students make connections between abstract values and their real-life experiences. Peer collaboration was frequent, and the structure of Wordwall allowed teachers to easily create breakout sessions that nurtured both academic learning and social-emotional growth. These findings reinforce the notion that learning environments that prioritize dialogue, interaction, and feedback are especially effective in moral and value-based education.

c. Gamification Theory

Gamification elements in Wordwall, such as points, levels, and badges, boost intrinsic motivation and student engagement. At SDN Bulansari, Wordwall's instant feedback system met students' psychological needs for competence, autonomy, and relatedness, as described in Self-Determination Theory (Ryan & Deci, 2023).

The game-based learning environment transformed traditional PAI lessons into interactive and exciting experiences. Students were driven to achieve high scores, climb leaderboards, and unlock new challenges while maintaining a sense of camaraderie. Teachers noted an increase in classroom energy, a decrease in disruptive behavior, and a more inclusive environment where even typically quiet students actively participated. The gamified format helped align instruction with the digital fluency and expectations of Generation Z learners (Antropologi et al., 2024; Hardeliska & Landong, 2023).

2. Research Findings and Key Results

a. Improvement in Cognitive Learning Outcomes

Wordwall implementation significantly improved students' cognitive outcomes. Paired sample t-tests revealed a statistically significant difference in pre-test and post-test scores between the experimental and control groups ($p < 0.05$). The average score in the experimental group rose from 66.1 to 82.4, while the control group only improved from 65.4 to 71.2.

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Wordwall's interactive quizzes, flashcards, and matching games strengthened long-term memory on topics such as Islamic history, pillars of Islam, moral values, and Quranic verses. Students expressed that the gamified review sessions helped them remember concepts better because they were associated with positive emotional experiences.

Table 3.1 score test

Group	Average Pre-test	Average Post-test	Score Increase
Experimental	66.1	82.4	+16.3
Control	65.4	71.2	+5.8

From Table 3.1 A difference 10.5 points in score gain confirms the superior effectiveness of interactive digital media over conventional teaching approaches. Moreover, standard deviation analysis indicated more consistent performance among experimental group students, suggesting reduced learning disparity.

b. Enhanced Motivation and Affective Engagement

Observation and survey data revealed heightened emotional engagement among students using Wordwall. According to a Likert-scale survey involving 50 students, 78% reported feeling "highly motivated" due to the platform's dynamic point system, time-based challenges, and colorful design. Furthermore, 92% of students described the learning sessions as more enjoyable and exciting than traditional methods. The healthy competitive atmosphere fostered a sense of belonging and collaboration, fulfilling the relatedness need in Self-Determination Theory. Teachers also observed a notable drop in passive classroom behavior and a sharp rise in spontaneous participation, particularly during moral dilemma discussions and Quran memorization games. These qualitative findings are supported by interview transcripts in which students stated they "look forward to learning PAI now" and felt proud of their performance when they saw their names on the leaderboard.

c. Contextualized and Applied Learning

Wordwall enabled a shift toward contextual and applied learning. For example, in a unit on zakat (charitable giving), teachers designed simulation activities that reflected everyday rural life scenarios. Students had to make decisions about distributing aid in fictional village situations, promoting critical thinking and empathy.

Interviews with students revealed that the visual and interactive format helped them better understand the real-world application of Islamic principles. Daily assessments showed a 40% improvement in psychomotor and affective scores. Classroom walkthroughs confirmed that students were applying Islamic manners in group activities more consistently than before, indicating an increase in values-based behavior, not just factual knowledge.

d. Empowered Teacher Role as Facilitator

In-depth interviews and reflective journals showed a clear shift in teachers' roles from mere transmitters of knowledge to facilitators of learning. Teachers used Wordwall analytics to identify learning gaps and provide immediate, targeted feedback. They were also able to modify question types based on student performance data.

This flexibility empowered teachers to manage differentiated instruction more effectively, addressing the diverse needs of students within the same classroom. Teachers also collaborated in designing content that matched local culture, integrating Islamic values with Sundanese proverbs and folk tales to make lessons more relatable.

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3. Synthesis and Recommendations

The findings of this research align with SDN Bulansari's vision of producing morally upright graduates who are both digitally literate and grounded in Islamic values. Wordwall not only improved cognitive learning outcomes but also enriched students' affective and psychomotor domains through engaging and interactive instruction. The integration of gamification into religious learning represents a promising approach that harmonizes spiritual development with digital age pedagogical practices.

Furthermore, the results of this study are consistent with previous research that highlights the effectiveness of gamification and interactive media in enhancing student learning outcomes and motivation. For instance, research by Suryanto & Dewi (2023) as well as Kodrle & Savchenko (2021) demonstrated that gamified features such as interactive quizzes significantly improved students' engagement and understanding of subject matter. Similarly, Fathurrahman et al. (2019) and Asmara et al. (2023) reported that the use of visual and interactive components in digital learning tools enhanced student creativity and academic achievement. In line with these studies, the present research shows that the integration of Wordwall into Islamic Religious Education not only improved cognitive scores but also fostered affective engagement and moral value internalization. This alignment suggests that gamification-based learning media are effective across various disciplines and can be successfully adapted to the specific context of PAI in rural schools.

However, this study also provides distinctive insights. Unlike most previous works conducted in school environments with adequate digital infrastructure, our findings reveal that Wordwall remains effective even in rural contexts with limited facilities. This constitutes a unique contribution to the existing literature, demonstrating the adaptability of educational technology. Moreover, the study extends prior research by showing how gamification can facilitate not only cognitive achievement but also the internalization of values, an aspect that has received less attention in earlier studies.

Key recommendations include:

1. We provide specialized training programs for PAI teachers on how to design Wordwall content that adheres to Mayer's multimedia learning principles.
2. We are developing localized gamified learning modules that integrate traditional games, folklore, and Islamic values pertinent to the students' community.

Longitudinal research projects to monitor the long-term impact of gamified religious instruction on students' character formation and behavioral outcomes.

Conclusion

The implementation of interactive digital media Wordwall in learning Islamic Religious Education (PAI) in grade IV of SDN Bulansari, Subang Regency, has proven its effectiveness in answering research problems while achieving the formulated goals. The key findings of the study confirm that Wordwall not only improves cognitive learning outcomes (an average increase of 27 points from pre-cycle to cycle III) but also strengthens the internalization of Islamic values through gamification mechanisms that are in line with the characteristics of the native digital generation. An initial hypothesis about Wordwall's ability to improve cognitive, affective, and psychomotor aspects

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proved valid through significant statistical analysis ($p < 0.05$) and qualitative findings showing an increase in 85% of students' active participation in the discussion of moral values.

The unique contribution of this research lies in the demonstration of Wordwall adaptation in the context of rural schools with limited infrastructure, where the integration of technology actually strengthens the achievement of the school's vision to "realize graduates with noble character." [1] This finding also fills the gap in the literature on the implementation of non-exact digital media in the district area by offering a hybrid constructivism gamification model that combines the principles of Mayer (2009) on multimedia learning and the theory of self-determination of Ryan & Deci (2023).

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