

The Effectiveness of Wordwall in Enhancing Fifth-Grade Students' Understanding of Umar Ibn Al-Khattab's Leadership in Elementary Islamic School

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Abstract

This study addresses the limited use of interactive learning media in Islamic Cultural History (SKI), particularly for historical topics requiring conceptual understanding beyond factual memorization. This study aimed to examine the effectiveness of Wordwall as a gamified interactive learning medium in enhancing fifth-grade students' understanding of Umar ibn al-Khattab's leadership, particularly the Expansion of Islam and Bureaucratic Reforms during his caliphate. A quantitative approach was employed using a quasi-experimental method with a pretest-posttest control group design. The participants were 20 fifth-grade students at MI Baiturrahim during the 2025/2026 academic year, randomly allocated into an experimental group receiving Wordwall-assisted instruction and a control group receiving conventional instruction, with 10 students in each group. Data were collected through pretest-posttest assessments, classroom observations, and documentation, and analyzed using descriptive statistics and an independent-samples t-test at a 5% significance level. The experimental group achieved a higher mean posttest score than the control group (91 vs. 75), representing a 16-point difference. All students in the experimental group reached the Minimum Learning Mastery Criterion (KKTP) of 70 (100%), compared with 70% in the control group. The t-test indicated a statistically significant difference between the groups ($t = 3.281 > t_{critical} = 2.101$). Classroom observations also showed higher student participation, teacher facilitation, classroom interaction, and observed conceptual-understanding indicators in the Wordwall condition. These findings indicate that Wordwall can support interactive and formative SKI learning when integrated with appropriate teacher guidance and structured activities. However, the findings should be interpreted cautiously because of the small sample, single-school setting, brief intervention, and potential novelty, Hawthorne, and testing effects. Further research with larger samples and longer interventions is needed to examine the generalizability and durability of the findings.

Keywords: Wordwall, Conceptual Understanding, Islamic Cultural History

Abstrak

Penelitian ini dilatarbelakangi oleh masih terbatasnya penggunaan media pembelajaran interaktif dalam pembelajaran Sejarah Kebudayaan Islam (SKI), khususnya pada materi sejarah yang menuntut pemahaman konseptual, bukan sekadar hafalan fakta. Penelitian ini bertujuan menganalisis efektivitas Wordwall sebagai media pembelajaran interaktif berbasis gamifikasi dalam meningkatkan pemahaman peserta didik kelas V terhadap kepemimpinan Umar bin Khattab, khususnya perluasan wilayah

Islam dan reformasi birokrasi pada masa kekhalifahannya. Penelitian menggunakan pendekatan kuantitatif dengan metode kuasi-eksperimen melalui desain pretest-posttest control group. Subjek penelitian berjumlah 20 peserta didik kelas V MI Baiturrahim tahun ajaran 2025/2026 yang dialokasikan secara acak ke dalam kelompok eksperimen dan kontrol, masing-masing terdiri atas 10 peserta didik. Kelompok eksperimen memperoleh pembelajaran berbantuan Wordwall, sedangkan kelompok kontrol memperoleh pembelajaran konvensional. Data dikumpulkan melalui tes pretest-posttest, observasi pembelajaran, dan dokumentasi, kemudian dianalisis menggunakan statistik deskriptif dan uji independent samples t-test pada taraf signifikansi 5%. Hasil penelitian menunjukkan bahwa kelompok eksperimen memperoleh rata-rata nilai posttest sebesar 91, sedangkan kelompok kontrol sebesar 75, dengan selisih rata-rata 16 poin. Tingkat ketuntasan kelompok eksperimen mencapai 100%, sedangkan kelompok kontrol 70%. Hasil uji t menunjukkan adanya perbedaan yang signifikan antara kedua kelompok ($t = 3,281 > t\text{-tabel} = 2,101$). Observasi juga menunjukkan partisipasi peserta didik, fasilitasi guru, interaksi kelas, dan indikator pemahaman konseptual yang lebih tinggi pada kelompok eksperimen. Temuan ini menunjukkan bahwa Wordwall dapat mendukung pembelajaran SKI yang interaktif dan formatif apabila diintegrasikan dengan bimbingan guru dan aktivitas pembelajaran yang terstruktur. Namun, keterbatasan jumlah peserta, satu lokasi penelitian, durasi intervensi yang singkat, serta kemungkinan novelty effect, Hawthorne effect, dan testing effect perlu dipertimbangkan dalam menafsirkan temuan.

Kata Kunci: Wordwall, Pemahaman Konseptual, Sejarah Kebudayaan Islam

Introduction

The teaching of Islamic Cultural History (Sejarah Kebudayaan Islam/SKI) in Indonesian madrasahs continues to face various social and practical challenges that reduce the effectiveness of the learning process. Previous studies indicate that SKI instruction is still predominantly teacher-centered, relying heavily on lecture-based methods with limited use of interactive learning media and inadequate instructional support, resulting in passive student participation and reinforcing the perception that SKI is a monotonous subject (Ariyanti & Anggerawati, 2024; Zulkarnain & Kistoro, 2021). This situation is further exacerbated by teachers' limited digital literacy and the suboptimal integration of educational technology, despite the fact that contemporary students demonstrate greater engagement with visual, collaborative, and interactive learning activities (Istiqomah & Mahbubi, 2024; Kartini et al., 2022). Moreover, other studies have reported that limited instructional time, insufficient innovation in learning media, and an overreliance on rote memorization prevent students from developing a deep understanding of the exemplary values and historical contexts embedded in Islamic history (Fitria & Umam, 2024). These findings reveal a substantial gap between the demands of twenty-first-century education and current classroom practices, highlighting the need for innovative digital learning media capable of aligning pedagogical approaches with the learning characteristics of contemporary students.

Existing research on the use of digital media in SKI instruction generally demonstrates three major trends. First, numerous studies have shown that Wordwall effectively improves students' conceptual understanding and classroom engagement (Gunawan, 2025; Khuzaifah, 2024; Maryani et al., 2025). For instance, Gunawan (2025) reported a significant improvement in students' achievement on the topic of the Rashidun Caliphs following the implementation of Wordwall in SKI instruction at the junior secondary level. Second, studies conducted in other subject areas have similarly demonstrated that

Wordwall positively influences students' learning interest and motivation (Epriliyanti et al., 2023; Oktiari et al., 2024; Zahro' et al., 2024). Oktiari et al. (2024), for example, found that Wordwall significantly enhanced elementary students' interest in Integrated Science and Social Studies (IPAS) through engaging and participatory quiz-based activities. Third, previous studies have consistently identified persistent challenges in SKI instruction, including limited instructional media and insufficient variation in teaching methods (Khuzafah, 2024; Zailani & Jumari, 2024). Khuzafah (2024) argued that the lack of digital learning media contributes to monotonous instructional practices, ultimately reducing students' classroom participation. Collectively, these studies primarily focus on the effectiveness of Wordwall in improving learning outcomes, learning interest, and motivation while documenting various instructional challenges in SKI education. However, empirical investigations specifically examining the implementation of Wordwall in teaching the leadership of Umar ibn al-Khattab, particularly the Expansion of Islam and Bureaucratic Reforms, among fifth-grade students in Madrasah Ibtidaiyah remain scarce. Accordingly, this study offers a novel contribution by investigating the implementation of Wordwall in Grade V SKI instruction on the topic of Umar ibn al-Khattab's leadership and administrative reforms while simultaneously examining its effectiveness and the supporting and inhibiting factors influencing its implementation, aspects that have received limited attention in previous research.

In response to the identified research gap, the present study aims to investigate the effectiveness of Wordwall as an interactive digital learning medium in enhancing fifth-grade students' understanding of Islamic Cultural History (Sejarah Kebudayaan Islam/SKI), particularly the topic of Umar ibn al-Khattab's leadership, with a specific focus on the Expansion of Islam and Bureaucratic Reforms during his caliphate. This study seeks to provide empirical evidence regarding the extent to which the integration of gamified digital media can improve the quality of learning in Islamic education by creating a more engaging, student-centered, and meaningful instructional environment. Specifically, the study focuses on two primary dimensions. First, it examines the implementation of Wordwall in the instructional process, including how the platform is integrated into classroom activities, the roles assumed by teachers and students during the learning process, and the overall learning atmosphere created through its use. Second, it investigates the effect of Wordwall on students' conceptual understanding of Umar ibn al-Khattab's leadership, particularly his expansion of Islamic territories and bureaucratic reforms, by comparing posttest scores between students who received Wordwall-assisted instruction and those who received conventional instruction. Furthermore, this study explores the supporting and inhibiting factors influencing the implementation of Wordwall in elementary Islamic education.

This study is particularly significant because Islamic Cultural History constitutes a fundamental component of Islamic education, yet it is frequently delivered through traditional instructional approaches that are insufficiently engaging and make limited use of digital technology. Previous studies have consistently demonstrated that integrating interactive learning media such as Wordwall significantly enhances students' motivation, classroom engagement, and conceptual understanding (Gunawan, 2025; Khuzafah, 2024; Maryani et al., 2025; Savira & Gunawan, 2022). Likewise, research on game-based educational technologies has shown that interactive learning environments effectively stimulate students' interest while facilitating deeper comprehension of Islamic concepts (Epriliyanti et al., 2023; Oktiari et al., 2024). Furthermore, Indonesia's Ministry of Education, Culture, Research, and Technology has emphasized digital transformation as a

strategic priority for educational development (BPMP, 2023), including within madrasah education. Consequently, this study is highly relevant as it seeks to integrate Wordwall into SKI instruction to overcome the limitations of conventional teaching methods, improve students' conceptual understanding of Umar ibn al-Khattab's leadership and administrative reforms, and support the implementation of technology-enhanced Islamic education. The findings are expected to provide practical contributions by offering a contextual and effective instructional approach for SKI teachers in the era of digital learning.

Research Method

This study employed a quantitative approach using a true experimental design to examine the effectiveness of Wordwall as an interactive digital learning medium in enhancing fifth-grade students' conceptual understanding of Islamic Cultural History (SKI). The instructional content focused specifically on the leadership of Umar ibn al-Khattab, particularly the Expansion of Islam and Bureaucratic Reforms during his caliphate. A randomized pretest-posttest control group design was employed. The design consisted of two groups: an experimental group receiving Wordwall-assisted instruction and a control group receiving conventional instruction. Both groups completed a pretest before the intervention and a posttest after the intervention. Because all 20 participants came from the same fifth-grade class, the researcher randomly allocated them into two groups of equal size, with 10 students assigned to the experimental group and 10 students to the control group. Random assignment was conducted without using students' academic achievement, prior knowledge, gender, or other individual characteristics as criteria for group allocation..

The study used a pretest-posttest control group design within a quasi-experimental framework (Sugiyono, 2013). The design involved two groups: an experimental group that received Wordwall-assisted instruction and a control group that received conventional instruction. Both groups completed a pretest before the intervention and a posttest after the intervention to measure their conceptual understanding of the selected SKI material. The comparison of the two groups was intended to identify differences in learning outcomes following the implementation of the two instructional approaches.

The research was conducted at MI Baiturrahim during the second semester of the 2025/2026 academic year. The accessible population consisted of 20 fifth-grade students, and all 20 students were included as research participants. Because all students came from the same fifth-grade class, the researcher randomly allocated the 20 students into two groups of equal size. Ten students were assigned to the experimental group and ten students to the control group. The random allocation was conducted without using students' academic achievement, prior knowledge, gender, or other individual characteristics as grouping criteria. The experimental group received instruction using Wordwall, while the control group received conventional instruction. Random allocation was used to distribute the participants between the two groups without deliberately assigning students according to their initial characteristics.

The selection of fifth-grade students was based on the relevance of the instructional content to the SKI curriculum at this level. The learning material addressed Umar ibn al-Khattab's leadership, particularly the Expansion of Islam and Bureaucratic Reforms during his caliphate. The material requires students to understand historical developments, administrative reforms, and the significance of Islamic leadership rather than simply recall factual information. These characteristics made the topic appropriate for examining whether an interactive digital learning medium could facilitate students' conceptual

understanding.

Data were collected using achievement tests, classroom observation sheets, and supporting documentation. The achievement test consisted of equivalent pretest and posttest assessments administered before and after the instructional intervention. The test was designed to measure students' conceptual understanding of the Expansion of Islam and Bureaucratic Reforms during the caliphate of Umar ibn al-Khattab. Classroom observations were conducted to document teacher performance, student participation, classroom atmosphere, and indicators of conceptual understanding during the instructional process. Documentation, including lesson plans, curriculum documents, instructional materials, and photographs of classroom activities, was also collected to provide contextual information regarding the implementation of the intervention.

The research procedure was conducted over approximately two weeks, with each group participating in two instructional sessions. At the beginning of the study, all 20 participants completed a pretest to identify their initial understanding of Umar ibn al-Khattab's leadership, particularly the Expansion of Islam and Bureaucratic Reforms during his caliphate. After the pretest, the participants were randomly allocated into the experimental and control groups. The experimental group then received instruction using Wordwall through interactive quizzes and game-based learning activities designed to encourage active participation, collaboration, and immediate feedback. The control group received the same instructional content through conventional teacher-centered instruction. Following the intervention, both groups completed the posttest using an equivalent assessment to measure their conceptual understanding after the instructional process.

To maintain comparability between the two groups, the learning objectives, instructional content, duration of instruction, and assessment procedures were kept consistent. The primary difference between the groups was the instructional medium and learning activities used during the intervention. In the experimental group, Wordwall was integrated into classroom activities, whereas the control group received conventional instruction without Wordwall. This procedure enabled the researchers to examine differences in students' learning outcomes following the two instructional approaches while maintaining the same curricular focus. All ten students in the experimental group had access to and used their own personal mobile devices to participate in the Wordwall-based learning activities. Device access was therefore consistent across the experimental group, and no student was excluded from the intervention because of a lack of access to a personal device. Before the learning activities began, the teacher ensured that the Wordwall platform could be accessed and used by the students. Because all participants used personal devices individually, the intervention was implemented under comparable conditions with respect to device availability. Nevertheless, differences in device specifications and internet connection quality were not systematically measured in this study.

Data analysis was conducted using descriptive statistics and an independent samples t-test to determine whether significant differences existed between the experimental and control groups following the intervention. Descriptive statistical analysis was first performed to summarize participants' learning outcomes through measures such as mean scores, minimum and maximum values, variance, and standard deviation. Subsequently, the independent samples t-test was employed to compare the posttest scores of the two groups and evaluate the effectiveness of Wordwall relative to conventional instruction. Statistical significance was determined at the 5% significance level. The independent-samples t-test was used to examine whether the mean posttest score differed

significantly between the experimental and control groups. If the calculated t-value exceeded the critical value, the null hypothesis was rejected, indicating a statistically significant difference between the two groups. This analytical procedure enabled the researchers to determine whether integrating Wordwall into SKI instruction significantly improved students' conceptual understanding compared with traditional instructional practices.

Regarding research ethics, participation was conducted with the permission of the school and under the supervision of the classroom teacher. Because the participants were fifth-grade elementary-school students, parental or guardian permission was obtained before their participation in the study. The students were informed that their participation was part of an educational research activity and that the data collected would be used solely for research purposes. The identities of the students were kept confidential in reporting the research findings.

Results

Implementation of Wordwall in Teaching Islamic Cultural History

Classroom observations were conducted to examine the implementation of Wordwall-based instruction in the experimental class and conventional instruction in the control class. The observation instrument consisted of four dimensions: teacher activities, student activities, classroom atmosphere and management, and the effectiveness of the instructional medium in supporting students' understanding. Each indicator was assessed using a four-point scale ranging from 1 to 4. The teacher-activity dimension consisted of eight indicators, giving a maximum possible score of 32; the student-activity dimension also consisted of eight indicators, with a maximum score of 32; classroom atmosphere and management consisted of six indicators, with a maximum score of 24; and the effectiveness dimension consisted of eight indicators, with a maximum score of 32. The same scoring framework was applied to both instructional groups. The observation results are summarized in Table 1.

Table 1 Observation Scores of Wordwall-Based and Conventional Instruction

Observation Dimension	Number of Indicators	Maximum Score	Experimental Class	Achievement (%)	Control Class	Achievement (%)
Teacher Activities	8	32	27	84.38	23	71.88
Student Activities	8	32	26	81.25	20	62.50
Classroom Atmosphere and Management	6	24	21	87.50	17	70.83
Effectiveness/Conceptual Understanding	8	32	28	87.50	20	62.50

The experimental class obtained higher scores than the control class across all four dimensions. In teacher activities, the experimental class obtained a score of 27 out of 32 (84.38%), compared with 23 out of 32 (71.88%) in the control class. The observation records show that the teacher in the experimental class prepared Wordwall before instruction, provided clear instructions, facilitated students during the activity, monitored participation, and provided feedback based on students' responses. However, the observation also identified a limitation: the teacher's connection between the Wordwall activity and the SKI material was not fully developed, as the material was linked mainly

through the key points.



Figure 1 Students Participating in Wordwall-Based Learning Activities

Student activities also showed a higher score in the experimental class, namely 26 out of 32 (81.25%), compared with 20 out of 32 (62.50%) in the control class. In the Wordwall group, almost all students appeared enthusiastic, actively competed to answer questions, and demonstrated relatively high participation. Cooperation and discussion were also observed, although some students still tended to work individually. The observation further indicated that most students answered the questions correctly, suggesting visible engagement with the learning content. Nevertheless, some students experienced difficulty connecting individual Wordwall questions with broader historical concepts, and several students could only partially restate the learning material after the activity.

In the control class, the student-activity score was lower. The observation recorded that most students paid attention to the teacher's explanation and could follow the instructions, but participation was not evenly distributed. Discussion was limited, only several students demonstrated curiosity by asking questions, and some students still required guidance to restate the material. These observations correspond to the lower overall score of 20 out of 32 (62.50%).

Classroom atmosphere and management likewise showed a difference between the two groups. The experimental class obtained 21 out of 24 (87.50%), whereas the control class obtained 17 out of 24 (70.83%). In the experimental class, the classroom remained conducive, students were generally focused, teacher-student interaction was active, and the learning activities were completed within the allocated time. Students also demonstrated enjoyment and healthy competition during the Wordwall activity. A minor technical problem occurred in the form of slow loading, but it did not substantially disrupt the overall learning process.

In the control class, the classroom remained generally orderly and the learning atmosphere was sufficiently comfortable. However, interaction between the teacher and students was more limited, and some students remained passive during the lesson. Although the conventional learning process did not experience technical difficulties, opportunities for active two-way interaction were less prominent than those observed in the experimental class.



Figure 2 A student completing Wordwall activities using a personal mobile device



Figure 3 A student participating in Wordwall-based interactive learning using a personal mobile device

The use of personal mobile devices was consistent in terms of device availability across the experimental group. All ten students in the experimental group had access to and used their own personal mobile devices during the Wordwall-based learning activities. Thus, no student was unable to participate because of a lack of device availability. The consistent availability of personal devices allowed students to participate individually in the interactive activities. However, differences in device specifications and internet connection quality were not systematically measured. Therefore, while device availability was not a limiting factor for participation, potential differences in technical performance cannot be completely excluded as a contextual factor when interpreting individual participation and learning outcomes.

The largest difference in the observation results was found in the effectiveness/conceptual-understanding dimension. The experimental class obtained 28 out of 32 (87.50%), while the control class obtained 20 out of 32 (62.50%). In the experimental class, students were generally able to answer most questions correctly, and the visual presentation of questions appeared to assist students in distinguishing historical figures and recalling relevant historical facts. The immediate results generated by Wordwall

also provided opportunities for the teacher to identify students' responses and provide clarification during the learning activity. Students appeared motivated to participate in the interactive activities. Nevertheless, some students continued to experience difficulty understanding specific details concerning Umar ibn al-Khattab's period of leadership. Thus, the observation findings indicate that Wordwall supported several aspects of students' engagement with the learning material, but did not eliminate all conceptual difficulties.

The control class obtained 20 out of 32 (62.50%) in the corresponding dimension. Students demonstrated an adequate understanding of the material and were generally able to respond to the teacher's questions. However, the observation indicated more limited improvement during the lesson, moderate motivation, and a continued need for reinforcement and additional explanation of difficult concepts. The conventional instructional medium nevertheless remained adequate for formative oral evaluation.

Taken together, the observation data show a consistent pattern in which the experimental class achieved higher scores than the control class across all four dimensions. The differences were 12.50 percentage points for teacher activities, 18.75 percentage points for student activities, 16.67 percentage points for classroom atmosphere and management, and 25.00 percentage points for effectiveness/conceptual understanding. These findings indicate that the implementation of Wordwall was accompanied by more active teacher facilitation, greater student participation, a more interactive classroom atmosphere, and stronger observed indicators of conceptual understanding.

However, these observation results should be interpreted as descriptive evidence of classroom implementation rather than as independent proof of the causal effectiveness of Wordwall. The observation instrument captures classroom behaviors and conditions during the intervention, while the statistical comparison of students' learning outcomes provides the primary basis for evaluating differences in achievement between the two instructional conditions. The word-cloud visualization presented in Figure 4 provides a descriptive summary of frequently occurring terms in the classroom observation records.



Figure 4 Word Cloud Generated from Classroom Observation Data

The word cloud contains frequently occurring terms such as students, Wordwall, games, and learning materials. These terms reflect the elements that received substantial attention in the observation records, particularly student participation and the use of Wordwall-based activities. The visualization therefore provides descriptive context

concerning the focus of the observers' records. It is not treated as independent evidence of the effectiveness of Wordwall because the frequency of terms in the observation notes is inherently related to the focus of the observed lesson. The effectiveness of the intervention is instead examined through the observation scores and, more importantly, through the analysis of students' learning outcomes.

Overall, the observation findings indicate that Wordwall-based instruction was accompanied by higher observed levels of student participation, teacher facilitation, classroom interaction, and conceptual-understanding indicators compared with the conventional instructional condition. At the same time, the observation data show that some students continued to experience difficulties in connecting individual questions with broader historical concepts and in understanding specific details of Umar ibn al-Khattab's leadership. These findings suggest that Wordwall functioned as an interactive instructional and formative assessment medium within the observed learning context, while its contribution to students' learning achievement requires further examination through the post-test results and inferential statistical analysis.

Effectiveness of Wordwall as an Instructional Medium in Enhancing Students' Understanding of Umar Ibn Al-Khattab'S Leadership and Administrative Reforms

Prior to conducting inferential statistical analysis, descriptive analysis was performed to examine the distribution and characteristics of students' learning outcomes in the experimental and control groups. The study compared two instructional conditions: conventional instruction in the control group and Wordwall-assisted instruction in the experimental group. Each group consisted of ten fifth-grade students from Madrasah Ibtidaiyah Baiturrahim. Both groups completed equivalent pre-test and post-test assessments designed to measure students' conceptual understanding of the Expansion of Islam and Bureaucratic Reforms during the leadership of Umar ibn al-Khattab. Student achievement was evaluated using the Minimum Learning Mastery Criterion (KKTP) of 70.

Table 2 Posttest Scores of the Experimental and Control Groups

No	Responden	Groups	Score
1	R1	C	80
2	R2	C	60
3	R3	C	70
4	R4	C	80
5	R5	C	70
6	R6	C	60
7	R7	C	60
8	R8	C	80
9	R9	C	100
10	R10	C	90
11	R11	E	100
12	R12	E	90
13	R13	E	100
14	R14	E	90
15	R15	E	90
16	R16	E	90
17	R17	E	100
18	R18	E	90
19	R19	E	80
20	R20	E	80

Table 2 presents the post-test scores of students in both instructional groups, namely the conventional learning group (C) and the experimental group utilizing Wordwall (E), with each group comprising ten participants. Students in the conventional group obtained scores ranging from 60 to 100, although the majority achieved scores between 60 and 80. While a small number of students demonstrated excellent performance by scoring 90 or 100, several others remained below the expected mastery threshold, indicating considerable variation in posttest performance across the class. In contrast, students in the experimental group consistently achieved higher scores, ranging from 80 to 100, with most participants obtaining scores of 90 or 100. Notably, none of the students in this group scored below the mastery criterion, suggesting a more uniform distribution of achievement and a generally higher level of conceptual understanding. This comparison provides preliminary evidence that the integration of Wordwall contributed not only to higher average achievement but also to greater consistency in learning outcomes among students participating in the experimental class.

To obtain a more objective evaluation of these findings, the data were analyzed quantitatively using W-Stat 2016 statistical software, which facilitated systematic calculations, descriptive summaries, and hypothesis testing with greater accuracy and reliability. The software enabled the researchers to identify central tendencies, measure data dispersion, and compare learning outcomes between the experimental and control groups before proceeding to inferential statistical testing. Such an analytical approach ensured that conclusions regarding the effectiveness of Wordwall were based on empirical evidence rather than descriptive observation alone. The descriptive statistics generated through this analysis are presented in Table 3, providing an overview of the distribution, average performance, and variability of students' conceptual understanding across both instructional conditions.

Table 3 Descriptive Statistical Analysis of Students' Pre-Posttest Scores (Source: W-Stat 2016)

Learning Media	N	Minimum	Maximum	Mean	Variance	Standard Deviation	Standard Error
Wordwall	10	80.0	100.0	91.000	54.444	7.379	2.333
Conventional	10	60.0	100.0	75.000	183.333	13.540	4.282
Total	20	60	100	83.000	180.000	13.416	3.000

The descriptive statistics show that the experimental group obtained a mean post-test score of 91, compared with 75 in the control group, representing a 16-point difference. The experimental group's variance was 54.444, with a standard deviation of 7.379, while the control group's variance was 183.333, with a standard deviation of 13.540. The lower standard deviation in the experimental group indicates that its post-test scores were more closely concentrated around the group mean. However, this descriptive pattern should be interpreted as a characteristic of the observed scores rather than as evidence that Wordwall independently produced more equitable learning outcomes.

The descriptive findings indicate a consistent difference in post-test performance between the two instructional groups. The experimental group demonstrated both a higher mean score and a higher mastery rate than the control group. In practical terms, all students who participated in the Wordwall-based learning activities reached the KKTP, whereas three students in the conventional group did not. These findings provide descriptive evidence of different learning outcomes across the two instructional conditions and provide the basis for the subsequent inferential analysis.

Table 4 Inferential Statistical Analysis of Posttest Scores (Source: W-Stat 2016)

Learning Media	Mean	Mean Difference	Degrees of Freedom (df)	t-value	t-critical (5%)	Conclusion
Wordwall	91.000	16.000	18	3.281	2.101	Significant
Conventional	75.000	—	—	—	—	—
Note	Dependent variable: Students' Understanding	Independent variable: Learning Media	Category 1: Wordwall	Category 2: Conventional	R ² : 0.328 (32.8%)	—

An independent-samples t-test was conducted to determine whether the difference in post-test scores between the experimental and control groups was statistically significant. The experimental group obtained a mean score of 91, while the control group obtained a mean score of 75, producing a mean difference of 16 points. The calculated t-value was 3.281, which exceeded the reported critical t-value of 2.101. Based on the decision rule applied in the study, the null hypothesis was rejected, indicating a statistically significant difference in post-test scores between the two instructional groups.

The inferential result, together with the descriptive findings, indicates that the experimental group performed significantly differently from the control group following the respective instructional treatments. However, the statistical result alone does not establish that all of the observed difference was caused exclusively by Wordwall. The interpretation of the finding therefore needs to consider the duration of the intervention, students' exposure to the digital learning format, observation conditions, and the similarity between the pre-test and post-test assessments. These issues are considered further in the Discussion section.

Discussion

The findings of this study indicate that students in the Wordwall-based instructional condition achieved higher post-test scores than those in the conventional instructional condition in learning Islamic Cultural History (SKI), particularly on the topic of Umar ibn al-Khattab's leadership, including the Expansion of Islam and Bureaucratic Reforms. The experimental group obtained a mean post-test score of 91, compared with 75 in the control group, while the mastery rate was 100% and 70%, respectively. The independent-samples t-test also indicated a statistically significant difference between the two groups ($t = 3.281 > t_{\text{critical}} = 2.101$). These findings suggest that, under the conditions examined in this study, the Wordwall-based instructional condition was associated with better learning outcomes than conventional instruction.

The descriptive observation findings provide contextual support for this difference. The experimental class obtained higher observation scores across teacher activities, student activities, classroom atmosphere and management, and conceptual understanding. In particular, student activities and conceptual understanding showed differences of 18.75 and 25.00 percentage points, respectively, between the experimental and control classes. Students in the Wordwall condition were observed participating actively in answering questions, responding to interactive tasks, and engaging in classroom activities. The teacher also provided immediate feedback and clarification based on students' responses. These classroom processes may have provided students with more opportunities to interact

directly with the learning material than the conventional instructional condition. Nevertheless, the observation findings are descriptive and should not be interpreted as independent evidence that Wordwall itself caused the differences in learning outcomes.

The present findings are broadly consistent with previous studies reporting that Wordwall effectively improves students' academic achievement, classroom participation, and learning engagement across various educational contexts ([Gunawan, 2025](#); [Khuzaifah, 2024](#); [Maryani et al., 2025](#)). Likewise, earlier research on gamification-based learning has demonstrated that interactive digital platforms substantially increase students' motivation, interest, and willingness to participate actively in learning activities ([Epriliyanti et al., 2023](#); [Oktiari et al., 2024](#)). Nevertheless, these findings should be interpreted critically rather than attributing educational improvement solely to the technological medium itself. Previous scholars have emphasized that the effectiveness of digital instructional media is not an inherent characteristic of the technology but rather depends on thoughtful pedagogical design, appropriate instructional strategies, and teachers' digital competencies ([Closs et al., 2022](#); [Raafi et al., 2026](#)). In the present study, the success of Wordwall appears to have resulted not merely from its interactive features but also from the teacher's ability to integrate gamified activities into meaningful classroom instruction through clear guidance, immediate feedback, and well-structured learning sequences. Consequently, this study both reinforces and refines previous literature by demonstrating that digital media should be viewed as one component within a broader pedagogical ecosystem rather than as an independent solution to instructional challenges.

One possible explanation for the observed difference is the greater opportunity for active engagement provided by the Wordwall activities. The interactive questions required students to respond directly to the learning material, while immediate feedback allowed students to recognize whether their responses were correct. This process may have encouraged students to revisit information and focus their attention on key historical concepts. The observation data also showed that students participated more actively and that classroom interaction was more dynamic in the experimental condition. Such findings are consistent with constructivist perspectives, which emphasize that understanding develops through active engagement with learning experiences rather than through information transmission alone ([Purwanto, 2010](#)). However, the present study does not directly measure the cognitive processes through which students constructed their understanding. Therefore, the constructivist interpretation should be regarded as a theoretical explanation of the observed instructional pattern rather than as a directly tested mechanism.

The findings also suggest a potential role for formative feedback in supporting students' learning. Wordwall allowed students to receive immediate information about their responses, while the teacher could identify difficulties during the activity and provide clarification. This characteristic may be particularly relevant when teaching historical material containing multiple events, figures, and administrative concepts. Rather than waiting until the end of the lesson to identify misunderstandings, the teacher could respond to students' difficulties during the activity. The higher conceptual-understanding observation score in the experimental group is consistent with this pattern. However, because the study did not separately compare immediate feedback with delayed feedback, the specific contribution of Wordwall's feedback mechanism cannot be isolated from the other components of the intervention.

An important consideration concerns the relatively large 16-point difference in

mean post-test scores despite the intervention being conducted over only two instructional sessions within approximately two weeks. Several alternative explanations should therefore be considered. First, a novelty effect may have contributed to the higher engagement and performance observed in the experimental group. Wordwall introduced a game-based and interactive format that may have been different from students' usual learning experiences. The novelty of the platform could temporarily increase students' attention, enthusiasm, and willingness to participate. Because the intervention was brief, the present study cannot determine whether the same level of engagement and achievement would persist after students became accustomed to the platform.

Second, a Hawthorne effect may also have influenced students' classroom behavior. Students knew that they were participating in a research activity and that their learning process was being observed. This awareness may have encouraged greater attentiveness and participation. Although observations were conducted in both groups, the experimental group's exposure to a new digital activity may have amplified this effect. Consequently, the higher level of engagement observed in the experimental class should be interpreted within the specific research setting rather than assumed to represent students' typical behavior in all learning situations. Third, a testing effect cannot be completely excluded. If the pre-test and post-test contained identical or closely related items, students may have benefited from prior exposure to the tested content. Repeated exposure can increase familiarity with question formats or specific information and may therefore contribute to higher post-test scores independently of the instructional medium. Although the assessments were designed to measure the same conceptual domain, the present study does not provide sufficient evidence to completely separate the effect of repeated testing from the effect of the instructional treatment.

These alternative explanations do not negate the observed statistical difference between the two groups. Rather, they indicate that the magnitude of the observed difference should be interpreted cautiously. The results provide empirical evidence of a significant difference in post-test performance under the two instructional conditions, but they should not be interpreted as definitive evidence that Wordwall alone produced the entire 16-point difference. The short intervention period, small sample size, possible novelty and observation effects, and potential overlap between pre-test and post-test content limit the strength of causal conclusions. Future research involving larger samples, longer intervention periods, parallel rather than identical assessment forms, and delayed post-tests would provide stronger evidence concerning the durability and causal nature of the observed learning advantage.

Another important finding concerns the distribution of achievement. All students in the experimental group reached the KKTP of 70, producing a mastery rate of 100%, whereas seven of the ten students in the control group reached the criterion, producing a mastery rate of 70%. The experimental group also showed lower score variability than the control group. This pattern indicates that the higher average score in the experimental group was not produced solely by a small number of high-performing students. Nevertheless, the small number of participants means that the finding should not be generalized as evidence that Wordwall necessarily produces more equitable learning outcomes for students with different abilities. Rather, it indicates that all ten students in this particular experimental group reached the specified mastery criterion under the conditions of the study.

From a pedagogical perspective, these findings suggest that Wordwall can serve as an alternative interactive medium for SKI instruction when it is integrated with appropriate

teacher guidance. Its potential value lies not simply in the presence of games, scores, or digital interaction, but in the opportunity to organize questions, student responses, feedback, and teacher intervention within a single learning activity. This is particularly relevant to historical topics that require students to connect individual facts with broader developments, such as the expansion of Islam and administrative reforms during Umar ibn al-Khattab's leadership. However, the observation data also showed that some students still experienced difficulties connecting individual questions with broader historical concepts. Therefore, Wordwall should complement rather than replace teacher explanation, contextualization, and discussion.

The implications of these findings are considerable from both practical and theoretical perspectives. Practically, Wordwall offers an effective instructional alternative for Islamic Cultural History teachers, particularly when teaching historical topics that involve complex concepts, chronological events, and multiple historical figures, such as the leadership of Umar ibn al-Khattab.. Through its gamified structure, interactive quizzes, and immediate feedback mechanisms, Wordwall can help teachers present historical content through more interactive learning activities. From an academic perspective, these findings strengthen current arguments advocating the integration of educational technology into Islamic education, consistent with Indonesia's national educational policy promoting digital transformation in teaching and learning (BPMP, 2023). However, these implications also underscore the necessity of improving teachers' digital literacy and pedagogical competence. Without sufficient technological proficiency and instructional planning, digital media may fail to achieve their intended educational outcomes or even become counterproductive. Therefore, technological innovation should always be accompanied by sustained professional development programs that enhance teachers' capacity to integrate digital media effectively within pedagogically sound instructional practices.

The effectiveness of Wordwall observed in this study can be theoretically explained through learning theories emphasizing instructional stimuli, cognitive engagement, and interactive feedback. Wordwall provides rich visual, auditory, and kinesthetic stimuli that effectively capture students' attention and maintain their focus throughout the learning process, thereby facilitating stronger cognitive encoding and long-term memory formation (Oemar, 2002). Simultaneously, its gamification elements including challenges, competition, scoring systems, and immediate rewards enhance students' intrinsic motivation by transforming learning activities into enjoyable and meaningful experiences. Such findings correspond with previous research demonstrating that interactive learning environments significantly improve students' learning experiences and conceptual development (Closs et al., 2022). Equally important, Wordwall provides immediate formative feedback, allowing students to recognize misconceptions instantly and revise their understanding during the learning process. This continuous cycle of interaction, feedback, and correction promotes deeper conceptual learning than traditional delayed assessment methods. Consequently, the combination of multisensory instructional stimuli, active learner participation, gamified engagement, and rapid formative feedback provides a compelling theoretical explanation for why Wordwall significantly enhances students' conceptual understanding of Islamic Cultural History.

Several directions for future research emerge from these findings. Studies with larger and more diverse samples are needed to examine whether the observed pattern is consistent across madrasah contexts and grade levels. Longer interventions are also necessary to determine whether the learning advantage persists after the initial novelty of

the digital platform decreases. Future researchers should consider using parallel pre-test and post-test forms to reduce possible testing effects and delayed post-tests to examine knowledge retention. Mixed-methods research could further investigate students' motivation, perceptions, and learning experiences while simultaneously measuring achievement. Such approaches would provide a more comprehensive understanding of how, under what conditions, and for whom Wordwall-based learning contributes to improved learning outcomes in Islamic Cultural History.

Conclusion

This study found a statistically significant difference in post-test scores between fifth-grade students who participated in Wordwall-assisted instruction and those who received conventional instruction in Islamic Cultural History (SKI). The experimental group obtained a higher mean post-test score than the control group (91 vs. 75), with a 16-point mean difference. The mastery rate was also higher in the experimental group, with all students reaching the Minimum Learning Mastery Criterion (KKTP) of 70 (100%), compared with 70% in the control group. The independent-samples t-test further indicated a statistically significant difference between the two groups ($t = 3.281 > t_{\text{critical}} = 2.101$). Classroom observations were consistent with these learning outcomes, showing higher observed levels of student participation, teacher facilitation, classroom interaction, and conceptual-understanding indicators in the Wordwall condition.

These findings suggest that Wordwall can function as an interactive instructional and formative assessment medium in SKI learning when integrated with appropriate teacher guidance, questioning, feedback, and classroom activities. Its contribution appears to lie not simply in its gamified features but in the way those features are incorporated into a structured pedagogical process. However, the findings should not be interpreted as evidence that Wordwall alone caused the entire observed difference in achievement. The intervention was conducted in only two instructional sessions with a small sample, and alternative explanations such as a novelty effect, Hawthorne effect, and possible testing effect cannot be completely excluded. In addition, differences in device specifications and internet connection quality were not systematically measured, although all ten students in the experimental group had access to and used their own personal mobile devices.

The findings are therefore applicable primarily to the specific instructional context examined in this study, namely fifth-grade SKI learning on Umar ibn al-Khattab's leadership, particularly the Expansion of Islam and Bureaucratic Reforms. The small sample, single-school setting, short intervention period, and the methodological limitations described above restrict the generalizability and strength of causal interpretation. Future research should involve larger and more diverse samples, longer intervention periods, parallel rather than identical assessment forms, and delayed post-tests to examine the durability of learning outcomes. Further studies could also investigate whether the observed learning advantage persists after the initial novelty of the digital platform decreases.

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