MIKAILALSYS
Journal of Multidisciplinary Sciences

e-ISSN : 2987-2286
p-ISSN : 2987-3924
Index: Harvard, Boston, Sydney, Copernicus, Sinta 4, Scilit, Semantic, Google, etc

https://doi.org/10.58578/mikailalsys.v4i3.12485

Visitor Spending Intensity: The Role of Digital Branding Experience and Perceived Risk in Ranupani Tourism Village

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Submitted:	Revised:	Accepted:	Published:
Sep 16, 2026	Oct 15, 2026	Oct 26, 2026	Oct 31, 2026

Abstract

Students' learning outcomes in Informatics remain a challenge when conventional instructional media offer limited interaction, contributing to passive engagement and difficulties understanding learning materials. This study examined changes in Grade X students' learning outcomes after the implementation of Wordwall-assisted interactive learning media for the Computer Systems topic at SMAN 1 Sawahlunto, Indonesia. A quantitative approach was employed using a pre-experimental one-group pretest–posttest design involving 30 students from class X E4. Students completed a multiple-choice achievement test before instruction, participated in Computer Systems learning activities supported by Wordwall, and completed a posttest afterward. The intervention incorporated game-based activities to support practice and engagement; however, the research records did not specify its duration. Data were analyzed using descriptive statistics and a paired-samples t-test, with normalized gain (N-Gain) used to assess the level of improvement. The mean score increased from 53.67 on the pretest to 77.67 on the posttest, a difference of 24.00 points. The paired-samples t-test identified a statistically significant difference between scores ($t = 8.664$, $df = 29$, $p < 0.001$). The mean N-Gain was 0.538, indicating moderate improvement. These results show that students' scores were higher after the Wordwall-assisted learning intervention. Nevertheless, the study did not include a control group, the observed change cannot be attributed to Wordwall alone; instructional or testing-related factors may also have contributed. Wordwall therefore be considered a useful supplementary medium for Informatics instruction, while further studies using

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control groups, larger samples, and documented intervention durations are needed to strengthen conclusions about its effectiveness.

Keywords: Wordwall; Interactive Learning Media; Learning Outcomes; Informatics; Computer Systems.

INTRODUCTION

Education is one of the most important factors in human life, as it enables individuals to develop their inherent potential and become well-rounded, high-quality individuals (Adiyono et al., 2023). Education is a process of interaction between teachers and students aimed at achieving educational objectives. It can also be understood as a process of transferring knowledge from teachers to students, encompassing knowledge, attitudes, and behavioral dispositions, which generally takes place in a specific setting. Through education, individuals are expected to experience changes in behavior, maturity in thinking, and personality development (Eriyanti et al., 2023).

Learning outcomes encompass cognitive (knowledge and intellectual skills), affective (attitudes and values), and psychomotor (practical skills) domains (Nafiati, 2021; Afriani et al., 2024). Contemporary education emphasizes student-centered learning, positioning students as active participants in knowledge construction and learning management (Amiruddin et al., 2023; Cheng & Weatherly, 2025). Accordingly, teachers act as facilitators, while effective learning environments foster active participation and interaction through engaging, challenging, and enjoyable experiences (Al Juhra, 2024; Mao et al., 2022; Checa-Romero & Gimenez-Lozano, 2025). Innovative instructional strategies and appropriate learning media are therefore essential for enhancing engagement and achieving learning objectives. Walidah et al., (2022) found that Wordwall educational games significantly influenced students' learning motivation and mathematics achievement, highlighting the potential of educational games to enhance engagement, although their effects may vary by context, subject matter, and instructional design.

Game-based learning (GBL) integrates games into instructional activities to achieve educational objectives. Maulidina et al., (2018); Novrianti, (2021) demonstrated its potential through the development of a game-based learning application using a scientific approach. Effective GBL requires appropriate applications and the purposeful integration of game

mechanics with learning objectives. Watsjold et al.. (2022) identified four fundamental game components: shared goals, rules, feedback, and voluntary participation, which provide direction, establish boundaries, monitor progress, and encourage willing engagement, respectively. These elements can foster engaging learning experiences when appropriately integrated into instructional design.

GBL can promote student motivation, engagement, and learning outcomes by supporting a shift from teacher-centered instruction to student-centered learning. Interactive, goal-oriented gameplay enables students to explore concepts, receive feedback, and assess their understanding. A systematic review by Andika et al., (2025) highlighted the potential of game-based learning media to enhance engagement and learning outcomes, while Byusa et al., (2022); Ningsih et al., (2024) found that educational games improved students' understanding of chemistry concepts and learning motivation. Similarly, Zhang et al., (2022); Ulpa et al., (2024), through a meta-analysis, reported positive effects of GBL on academic achievement and learning motivation, although effect sizes varied across studies. Thus, GBL offers a student-centered approach that encourages active participation, facilitates understanding, and enables students to monitor their learning progress.

Wordwall is a web-based educational platform that enables teachers to create interactive activities, such as quizzes, matching exercises, and educational games, to enhance student engagement and classroom participation (Muflikhah & Kamal, 2024; Indriani et al., 2025). Research indicates that Wordwall-assisted gamification can improve student participation and learning outcomes (Panis et al., 2025). Its printable activities also provide alternatives for settings with limited digital access. By integrating varied and interactive tasks, teachers can create more engaging and less monotonous learning experiences (Annur et al., 2025). However, its effectiveness depends on alignment with learning objectives, student characteristics, and implementation methods.

Preliminary observations conducted by the researcher identified several challenges in Informatics learning, including low student engagement, limited attention, reluctance to read textbooks, difficulties retaining and understanding instructional content, and an inability to summarize lesson materials. Students frequently engaged in off-task activities, such as talking, joking, disturbing peers, and leaving the classroom, which limited their understanding and ability to answer teachers' questions. Classroom observations on February 5, 2025, also

revealed that students struggled to respond to questions and rarely sought answers independently, requiring teachers to repeat explanations.

These challenges were associated with the predominant use of conventional instructional media, particularly whiteboards and PowerPoint presentations, which contributed to monotonous learning experiences and limited student engagement. Students reported difficulties understanding Informatics concepts and expressed a preference for more engaging and interactive learning media. The limited use of such media appeared to reduce students' interest, concentration, participation, and enthusiasm during lessons.

These conditions affected students' learning processes and outcomes. Students tended to participate passively, struggled to express ideas and opinions, and demonstrated limited problem-solving abilities due to inadequate understanding of the material. Consequently, Informatics achievement remained a concern, as reflected in the number of students whose scores fell below the Learning Objective Achievement Criteria (*Kriteria Ketercapaian Tujuan Pembelajaran*, KKTP). Therefore, improving student engagement and learning outcomes through more appropriate instructional media is essential. Students' achievement in Daily Assessment 1, presented in Table 1, further illustrates this problem.

Table 1. Mean Scores of Grade X Classes in Informatics

Number	Class	Number of Students	KKTP	Mean Score
1	X E1	36	75	62
2	X E2	36	75	83
3	X E3	35	75	67
4	X E4	36	75	68
5	X E5	35	75	61
6	X E6	34	75	56
7	X E7	35	75	70

As shown in table 1, the mean scores of most Grade X classes remained below the established KKTP of 75. Only one class, X E2, achieved a mean score above the threshold, with an average of 83. These findings indicate that students' performance in Daily Assessment 1 for Informatics had generally not met the established learning achievement criteria.

Addressing this issue requires instructional media that visualize learning materials, encourage active participation, and provide meaningful learning experiences. One potential solution is the integration of the *Game-Based Learning* (GBL) model with Wordwall, a digital educational platform offering interactive quizzes, puzzles, and other game-based activities.

Previous studies have examined the use of Wordwall in educational settings, including its relationship with students' motivation and mathematics achievement (Walidah et al., 2022), the development of Wordwall-based educational games (Aidana & Gandamana, 2023), and the use of web-based educational games to support learning activities and outcomes (Widiyantara et al., 2023). Although these studies provide useful evidence regarding the potential of game-based learning media, further empirical investigation is needed to understand changes in students' learning outcomes following the implementation of Wordwall-assisted instruction in Informatics education. Specifically, an important question remains: to what extent do students' learning outcomes differ before and after participating in Wordwall-assisted learning activities on the Computer Systems topic, and how substantial is the observed improvement? Addressing this question requires examining both the statistical significance of pretest–posttest differences and the magnitude of learning improvement, rather than relying solely on the general potential of interactive learning media.

To address this issue, the present study examines changes in the learning outcomes of Grade X students at SMAN 1 Sawahlunto following the implementation of Wordwall-assisted interactive learning media for Computer Systems. Using a one-group pretest–posttest design, the study evaluates differences in achievement scores and measures improvement through normalized gain (N-Gain). Its contribution lies in providing context-specific empirical evidence that combines statistical testing with an assessment of improvement magnitude. Unlike studies primarily concerned with media development or other learning outcomes, this study focuses on the observed changes in Informatics achievement after the intervention. However, because the study does not include a control group, its findings establish an association between the intervention period and changes in achievement rather than definitive causal evidence of Wordwall's effectiveness.

The findings are expected to provide empirical evidence on the potential of Wordwall as an alternative instructional medium and inform teachers' selection of interactive learning resources aligned with instructional objectives and students' needs.

METHODS

This study employed a quantitative approach using a pre-experimental design with a one-group pretest-posttest model. The design was selected to examine differences in students' learning outcomes before and after the implementation of interactive learning

media assisted by the Wordwall application. The study involved a single group without a control group. Students were administered a pretest to measure their initial learning outcomes, received instruction using Wordwall-assisted learning media on the Computer Systems topic, and subsequently completed a posttest to measure their learning outcomes after the intervention. The research design is represented as follows: O_1–X–O_2, where O_1 represents the pretest, X represents the intervention using Wordwall, and O_2 represents the posttest.

The study population comprised Grade X students at SMAN 1 Sawahlunto, Indonesia, distributed across seven classes. The research sample consisted of 30 students from class X E4. The thesis describes the sampling procedure as simple random sampling, with a class selected from the seven Grade X classes. The selected students participated in the pretest, the learning intervention, and the posttest. The study focused on the Computer Systems topic within the Informatics subject.

The primary research instrument was a multiple-choice learning achievement test administered before and after the intervention. The intervention was conducted during Informatics instruction on the Computer Systems topic involving 30 students from class X E4 at SMAN 1 Sawahlunto. The procedure consisted of three stages: pretest, Wordwall-assisted instruction, and posttest. Before the intervention, students completed a multiple-choice pretest to assess their initial understanding. The teacher then delivered the learning material supported by interactive Wordwall activities, facilitated student participation, and provided explanations to clarify students' responses. After the intervention, students completed a posttest to measure changes in their learning outcomes. The pretest and posttest scores were analyzed using a paired-samples t-test and normalized gain (N-Gain). Details regarding the number and duration of instructional sessions and the specific Wordwall activity formats were not specified in the research records.

The test was designed to measure students' understanding of the Computer Systems topic. The research documentation reports that the instrument initially comprised 30 items, of which 25 were declared valid, while five were classified as invalid. The instrument reliability coefficient was 0.870, indicating high internal consistency according to the reported analysis. Data were collected by administering the pretest, implementing the Wordwall-assisted learning activities, and administering the posttest to the same participants.

Observation and documentation were also identified as supporting data collection techniques in the research instrument section.

The collected data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to summarize students' pretest and posttest scores, including the mean and score distribution. A normality test using the Lilliefors procedure was reported as part of the preliminary analysis. The research also reported homogeneity testing as a supplementary analysis. To examine differences between students' learning outcomes before and after the intervention, a paired-samples t-test was employed because both measurements were obtained from the same participants. Statistical significance was evaluated at the 0.05 level. In addition, normalized gain (N-Gain) was calculated to assess the level of improvement in students' learning outcomes following the intervention.

The study was conducted at SMAN 1 Sawahlunto, Indonesia, involving 30 students from class X E4. Data collection consisted of three stages: pretest on (16 September 2026), Wordwall-assisted instruction conducted from (22 September 2026) to (22 September 2026), and posttest on (2 Oktober 2026). The implementation dates were determined based on the original research documentation.

RESULTS

1. Preliminary Statistical Analysis Tests

a. Normality Test

Table 2. Data Normality Test

Data	N	Mean	$L_{calculated}$	L_{table} ($\alpha = 0.05$)	Conclusion
Pretest	30	53.67	0.112639	0.161761	Normally distributed
Posttest	30	77.67	0.112061	0.161761	Normally distributed

Based on the results presented in Table 2, the calculated L value for the *pretest* data (0.112639) is lower than the critical L value (0.161761). Similarly, the calculated L value for the *posttest* data (0.112061) is lower than the critical L value (0.161761). Therefore, both the *pretest* and *posttest* data are considered normally distributed at the 0.05 significance level. These results indicate that the data satisfy the normality assumption, which is one of the prerequisites for conducting parametric statistical analyses.

b. Homogeneity Test

Table 3. Summary of the Homogeneity Test Results

Data	N	Variance	χ^2 calculated	χ^2 table ($\alpha = 0.05$)	Conclusion
Pretest	30	487.625	1.212559	3.841459	Homogeneous
Posttest	30	323.487	—	—	Homogeneous

The calculation results on table 3 indicate that the calculated chi-square value (χ^2 = 1.212559) is lower than the critical chi-square value (χ^2 = 3.841459). Therefore, based on Bartlett's test, the *pretest* and *posttest* data are considered homogeneous.

2. t-Test

Table 4. Results of the Paired-Samples t-Test

Aspect	Results
Number of respondents (N)	30
Mean pretest score	53.67
Mean posttest score	77.67
Mean difference ((\bar{D}))	24.00
Standard deviation of the differences	15.172
Calculated t-value	8.664
Degrees of freedom (df)	29
Critical t-value ($\alpha = 0.05$; two-tailed)	2.045
p-value	< 0.001
Decision	Reject H_0
Conclusion	A statistically significant difference exists between the pretest and posttest scores.

Based on table 4 the paired-samples t-test results, the calculated t-value was 8.664, whereas the critical t-value at the 0.05 significance level with 29 degrees of freedom was 2.045. Since the calculated t-value exceeded the critical t-value (8.664 > 2.045), the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. This finding was further supported by the p-value of less than 0.001, which was below the significance threshold of 0.05. Therefore, a statistically significant difference was found between students' learning outcomes before and after the implementation of Wordwall-assisted interactive learning media.

Based on these findings, it can be concluded that the use of Wordwall-assisted interactive learning media had a statistically significant effect on the learning outcomes of Grade X students in the Informatics subject at the senior high school level.

DISCUSSION

The findings indicate an improvement in students' learning outcomes following the implementation of Wordwall-assisted interactive learning media in Informatics, specifically on the topic of Computer Systems. Based on the assessment of 30 Grade X E4 students at SMAN 1 Sawahlunto, the mean pretest score of 53.67 increased to 77.67 in the posttest, representing a mean difference of 24.00 points. This increase indicates that students achieved higher learning outcomes after the intervention than before it. The improvement was also reflected in the maximum score, which increased from 90.00 to 100.00, and the minimum score, which rose from 13.33 to 33.33. Nevertheless, the variation in posttest scores indicates that learning achievement was not yet evenly distributed among all students.

The difference in learning outcomes was further supported by the paired-samples t-test, which yielded a t-value of 8.664 with 29 degrees of freedom and a significance level of $p < 0.001$. Since the p-value was below the 0.05 significance threshold, the null hypothesis was rejected. Therefore, a statistically significant difference was found between students' learning outcomes before and after participating in learning activities using Wordwall. This finding indicates a statistically significant improvement in learning outcomes among the students involved in the study.

Furthermore, the mean normalized gain (N-Gain) score of 0.538 fell within the medium category. This result indicates that learning outcomes improved, although the level of improvement did not reach the high category. Accordingly, Wordwall shows potential as a supplementary medium for Informatics instruction. However, instructional effectiveness still depends on the alignment of the learning materials, the quality of learning activities, teacher explanations, and students' learning needs. These findings also suggest that the use of interactive media does not automatically ensure that all students achieve the same level of mastery.

The findings of this study are consistent with research on the use of interactive learning media that positions students as active participants in the learning process. Wordwall provides game-based educational activities that can be used to present questions, deliver practice exercises, and assess students' understanding. These features are relevant to Informatics instruction, which requires conceptual understanding and the ability to apply knowledge to solve problems. In this study, the implementation of Wordwall in teaching

Computer Systems was accompanied by an increase in mean learning outcomes and a statistically significant difference between pretest and posttest scores.

This consistency can also be observed in previous studies discussed in the thesis. For example, Wildan et al., (2023) examined the development of a Wordwall-based educational game for the Computer Systems topic and reported that the developed medium was valid, practical, and effective in improving learning outcomes. Meanwhile, Jannah & Rusijono, (2026) compared learning outcomes achieved through Wordwall-based educational games and conventional teaching methods in basic algorithms, reporting higher achievement among students who used Wordwall. Both studies are relevant to the present research in terms of their use of Wordwall and their focus on learning outcomes, although their subject matter and research designs differ.

The contribution of this study lies in providing empirical evidence of changes in the learning outcomes of Grade X students studying Computer Systems at SMAN 1 Sawahlunto using a one-group pretest–posttest design. The mean improvement of 24.00 points, the statistically significant test results, and the medium N-Gain category indicate that Wordwall merits consideration as an alternative interactive learning medium. However, the consistency of these findings with previous research does not imply that all the studies share identical characteristics. Differences in subject matter, learning content, student characteristics, assessment instruments, and research designs must be considered when interpreting the extent to which the findings align. Therefore, the results of this study are best understood as supporting evidence within the specific instructional context investigated, rather than as grounds for concluding that Wordwall is always more effective in every learning situation.

The findings have practical implications for Informatics instruction, particularly when teaching Computer Systems. The improvement in learning outcomes following the use of Wordwall suggests that teachers may consider this medium as a supplementary tool for presenting learning materials, providing practice exercises, and evaluating students' understanding. Learning activities can be designed around quizzes or educational games that align with the learning objectives, the difficulty level of the material, and students' abilities.

The use of Wordwall should not focus solely on completing games or achieving high scores; rather, it should be integrated with conceptual explanations and discussions of answers. Teachers need to provide feedback on both correct and incorrect responses so that students understand the reasoning behind each answer. In this way, interactive activities can

serve as part of the conceptual reinforcement process rather than merely as additional activities intended to create an enjoyable learning environment.

Another implication is the importance of using assessment results to identify students who continue to experience learning difficulties. Although the mean posttest score increased, the minimum score of 33.33 indicates that some students still require additional guidance and reinforcement. Teachers can use this information to design remedial activities, provide additional exercises, or revisit concepts that students have not yet fully understood. Through this targeted approach, Wordwall can be used more strategically to support diverse learning needs.

From a research perspective, this study adds empirical evidence concerning the implementation of Wordwall-assisted interactive learning media in Informatics instruction on the topic of Computer Systems. These findings can provide a basis for further research evaluating Wordwall across different learning topics, educational levels, and student characteristics. Future studies could also investigate other outcomes, such as learning motivation, student engagement, and knowledge retention, to develop a more comprehensive understanding of the benefits of this medium.

This study has several limitations that should be considered when interpreting its findings. First, it employed a pre-experimental one-group pretest–posttest design without a control group. Consequently, the observed improvement in learning outcomes cannot be attributed entirely to the use of Wordwall, as other factors may also have influenced students' performance during the study, including their learning experiences, teacher explanations, and potential testing effects associated with taking the pretest. Second, the study involved 30 students from a single class, namely Grade X E4 at SMAN 1 Sawahlunto, and focused exclusively on Computer Systems within the Informatics subject. These conditions limit the generalizability of the findings to other classes, schools, or learning topics with different characteristics. Third, learning outcomes were measured using pretest and posttest assessments. If the same test items or instruments were used for both assessments, students' prior exposure to the questions during the pretest may have influenced their posttest performance.

In light of these limitations, future research is recommended to employ experimental designs that include a control group, expand the sample size and scope, and consider using equivalent assessment instruments for measurements taken before and after the intervention.

Further studies should also document the duration and stages of Wordwall implementation in greater detail to facilitate replication of the instructional procedures and more accurate comparisons of findings. Such efforts would help establish stronger evidence regarding the effectiveness of Wordwall in improving Informatics learning outcomes.

CONCLUSION

This study demonstrates that the learning outcomes of Grade X E4 students at SMAN 1 Sawahlunto in Informatics, specifically on the topic of Computer Systems, improved following the implementation of Wordwall-assisted interactive learning media. The students' mean score increased from 53.67 on the pretest to 77.67 on the posttest, representing a difference of 24.00 points. The paired-samples t-test revealed a statistically significant difference ($t = 8.664$, $df = 29$, $p < 0.001$), while the mean normalized gain (N-Gain) score of 0.538 fell within the medium category. These findings contribute empirical evidence to the literature on technology-based interactive learning media in Informatics education and suggest that Wordwall may be considered a supplementary learning medium to support improvements in student learning outcomes. However, because the study employed a one-group pretest–posttest design without a control group and involved participants from a single class, the findings should be interpreted with caution. Future research should include a control group, expand the sample size and scope, and investigate the implementation of Wordwall across different learning topics and instructional contexts to establish stronger evidence of its effectiveness.

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