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THE EFFECTIVENESS OF MOBILE LEARNING TO INCREASE THE STUDENTS' READING COMPREHENSION

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Abstract

Mobile learning is an innovative educational technology that enhances teaching and learning by leveraging mobile devices for flexible and interactive experiences. This study evaluated the effectiveness of mobile learning in improving reading comprehension among eighth-grade students at an Islamic junior high school in Garut, West Java, Indonesia. Using a quantitative pre-experimental design, 30 students participated in a mobile learning intervention that included interactive tutorials and quizzes on recount texts. Pre-test and post-test assessments revealed significant improvements, with average scores increasing from 76 to 83. Statistical analysis using the Wilcoxon signed-rank test confirmed the results (Sig. = 0.000). While the normalized gain score (0.292) reflected modest overall improvement, the study underscores the potential of mobile learning as a supplementary tool to enhance educational outcomes. Limitations, including the absence of a control group and convenience sampling, highlight the need for further research. Future studies should explore extended interventions and robust methodologies to maximize mobile learning's impact.

Keywords: Mobile Learning, Reading Comprehension, Pre-experimental Design

INTRODUCTION

The rapid advancement of Information and Communications Technology (ICT) has revolutionized education, introducing innovative teaching and learning strategies. ICT tools enable access to educational resources anytime and anywhere, fostering flexible and interactive learning experiences. Among these innovations, mobile learning stands out as a promising approach that leverages mobile devices, such as smartphones, to optimize learning outcomes. This technological shift reflects the growing importance of ICT in modern education systems worldwide.

The COVID-19 pandemic further highlighted the necessity of integrating mobile technology into education. Across the globe, traditional face-to-face learning was disrupted, forcing students to adapt to remote education. In Indonesia, this transition to home-based learning saw a significant reliance on smartphones, given their affordability and accessibility compared to laptops and computers. However, many educators struggled to fully utilize smartphones as learning tools, leaving an opportunity to explore their potential for addressing specific educational challenges.

Mobile learning applications offer various benefits, especially in promoting student engagement, self-directed learning, and academic performance. Research by Sulisworo et al. (2016) highlighted mobile learning's ability to foster collaboration and active participation, while Rahayu (2017) emphasized its role in enhancing independent learning. Similarly, Haleem et al. (2022) demonstrated how structured mobile platforms could support effective teaching of subject-specific content. These findings underscore mobile learning's capacity to transform traditional instructional methods and provide meaningful learning experiences.

Despite these promising insights, few studies have investigated mobile learning's impact on specific academic skills, such as reading comprehension. For example, Hasanah (2019) explored strategies for improving reading comprehension but focused on peer-

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assisted learning rather than mobile-based interventions. While Dewi et al. (2020) examined correlations between reading interest and comprehension, they did not evaluate mobile learning as a direct instructional tool. This gap highlights the need for focused research on how mobile learning can support the development of critical skills like reading comprehension in diverse educational settings.

This study aims to investigate the effectiveness of a mobile learning application tailored for recount texts in improving reading comprehension among eighth-grade students at an Islamic junior high school in Garut, West Java. Using a pre-experimental design, the research seeks to provide evidence of mobile learning's potential to enhance educational outcomes and offer practical insights for optimizing its use in educational contexts.

RESEARCH METHODS

Research Design

This study employed a quantitative pre-experimental research design to evaluate the effectiveness of mobile learning in improving students' reading comprehension. A one-group pre-test and post-test design was used, where participants were assessed before and after the intervention to measure changes in performance. The research was guided by the following hypothesis:

H_0 : There is no significant difference between students' reading comprehension scores before and after the intervention

H_a : There is a significant difference between students' reading comprehension scores before and after the intervention

Participants

The study involved 30 eighth-grade students from an Islamic junior high school in Garut, West Java, Indonesia. Participants were selected using convenience sampling, which was influenced by accessibility and practical considerations. While this method allowed for quick participant recruitment, it may limit the generalizability of the findings to other contexts

Mobile Learning Application

The intervention utilized an Android-based mobile learning application developed specifically for this study. The application provided interactive tutorial modules on "Recount Text," a key component of the English curriculum. It featured sections on core competencies, learning objectives, explanations of text structures and language features, sample texts, and quizzes designed to assess comprehension. The app was accessible to both students and teachers, enabling its integration into classroom activities.

Data Collection

Data were collected using pre-test and post-test instruments, both consisting of multiple-choice questions tailored to evaluate students' comprehension of recount texts. The pre-test established a baseline for participants' reading comprehension abilities, while the post-test measured their progress following the intervention.

Data Analysis

Scores from the pre-test and post-test were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize the data, and a Wilcoxon signed-rank test was performed to determine the statistical significance of score improvements. Additionally, the normalized gain score was calculated to assess the magnitude of learning gains. The formula used for calculating the normalized gain score is:

$$Normalized\ Gain \frac{Post - Test\ Score - Pre - Test\ Score}{Maximum\ Possible\ Score - Pre - Test\ Score}$$

This measure evaluates the relative improvement achieved through the intervention, providing a standardized framework to categorize learning gains as low, medium, or high. These classifications are derived from established benchmarks commonly used in educational research (Hake, 1998).

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Ethical Considerations

The study adhered to ethical research practices. Informed consent was obtained from all participants, ensuring they understood the purpose and scope of the study. Ethical approval was also secured from the relevant institutional review board. Privacy and confidentiality of participants were maintained throughout the research process.

Limitations

This study faced several limitations. The absence of a control group restricted comparative analysis, and the use of convenience sampling may affect the generalizability of the findings. These factors highlight the need for future research to adopt robust designs to validate the results furthers.

RESULT

Pre-Test and Post-Test Performance

The effectiveness of the mobile learning intervention was assessed through pre-test and post-test evaluations of students' reading comprehension. The pre-test results revealed scores ranging from 60 to 90, with an average score of 76. These scores provided a baseline measurement of students' reading abilities before the intervention. The post-test results, collected after the implementation of the mobile learning application, showed an increase in scores, ranging from 70 to 100, with an average score of 83. This improvement highlights the positive impact of the intervention on students' comprehension skills.

To gain deeper insight into the data, key statistics from the pre-test and post-test assessments were calculated, summarized, and compared. These statistics include the mean, median, standard deviation, minimum, and maximum scores, which collectively provide a detailed understanding of the students' performance. Table 1 below presents a comprehensive overview of these metrics, highlighting the differences between the assessments and offering valuable insights into the effectiveness of the intervention.

Table 1. Summary of Pre-Test and Post-Test Performance

Statistic	Pre-Test	Post-Test
Mean	76	83
Median	75	85
Standard Deviation	6.74	7.14
Minimum Score	60	70
Maximum Score	90	100

The data in Table 1 illustrate a clear improvement in students' reading comprehension scores following the intervention. The average score increased by 7 points, from 76 to 83, while the median score rose from 75 to 85, indicating that the majority of students showed improvement. Notably, the minimum score increased from 60 to 70, reflecting progress among the lower-performing students, and the maximum score improved from 90 to 100, showing gains even among the highest-performing participants.

In summary, the results demonstrate that the mobile learning application effectively enhanced reading comprehension across varying levels of initial ability. The increase in scores highlights its potential as a valuable tool for supporting students' learning outcomes.

Statistical Analysis

To determine the significance of the improvement in students' reading comprehension, the Wilcoxon signed-rank test was performed. This non-parametric test is appropriate for comparing paired data, such as the pre-test and post-test scores, to evaluate the impact of the mobile learning intervention. The test examines whether the median of the differences between the paired scores is significantly different from zero.

Key statistics from the Wilcoxon test are shown in Table 2, detailing the Z-value and significance value (Sig.). These results offer critical evidence to determine whether the improvement in scores observed between the pre-test and post-test assessments is statistically significant and meaningful for the study's findings.

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Table 2. Results of the Wilcoxon Signed-Rank Test

Statistic	Value
Z-value	-4.782
p-value (Sig.)	0.000

As shown in Table 2, the Z-value of -4.782 and the p-value (Sig.) of 0.000 indicate a statistically significant improvement in post-test scores compared to pre-test scores. Since the p-value is below the significance threshold of $\alpha = 0.05$, the null hypothesis (H_0)—that there is no difference between pre-test and post-test scores—can be rejected. This confirms that the mobile learning application had a significant positive effect on students' reading comprehension.

In summary, the statistical analysis strongly supports the effectiveness of the intervention. The significant results validate the improvement observed in the pre-test and post-test scores, emphasizing the role of the mobile learning application in enhancing educational outcomes.

Normalized Gain Score

The normalized gain score was calculated to evaluate the magnitude of improvement in students' reading comprehension following the mobile learning intervention. This score provides a measure of the effectiveness of the intervention relative to the potential maximum improvement. The formula used for the calculation is:

$$Normalized\ Gain \frac{Post - Test\ Score - Pre - Test\ Score}{Maximum\ Possible\ Score - Pre - Test\ Score}$$

Using this formula, the overall normalized gain score for the study was determined to be 0.292, indicating a "low" gain category according to Hake's (1998) interpretation. A low gain suggests modest overall improvement in comprehension skills during the intervention.

To provide additional context, Table 3 summarizes the distribution of normalized gain scores across the participants, highlighting the variability in individual learning gains.

Table 3. Distribution of Normalized Gain Scores

Gain Category	Normalized Gain Range	Percentage of Students
High	> 0.7	10%
Medium	0.3 – 0.7	40%
Low	> 0.3	50%

As shown in Table 3, the majority of students (50%) experienced "low" gains, while 40% achieved "medium" gains and 10% reached the "high" gain category. This distribution reflects variability in how students responded to the mobile learning intervention.

In summary, the normalized gain score suggests that while the intervention was effective, the degree of improvement was modest overall. The findings emphasize the need to explore additional factors, such as intervention duration or supplemental strategies, to maximize the potential of mobile learning applications.

Score Distribution Trends

The distribution of scores in the pre-test and post-test assessments provides insights into how the mobile learning intervention impacted students with varying levels of initial ability. In the pre-test, scores were distributed between 60 and 90, with a majority of students scoring between 70 and 80. This pattern suggests a relatively uniform starting point for most participants, with only a few scoring at the extremes.

Following the intervention, the post-test scores shifted upward, ranging from 70 to 100. The largest concentration of students scored between 80 and 90, reflecting a noticeable improvement in overall performance. Table 4 below summarizes the frequency distribution of scores for both the pre-test and post-test evaluations.

Table 4. Frequency Distribution of Pre-Test and Post-Test Scores

Score Range	Pre-Test Frequency	Post-Test Frequency
60–69	5	0
70-79	15	5
80-89	8	15
90-100	2	10

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The data in Table 4 highlight several key trends. First, no students scored below 70 in the post-test, indicating improvement among the lowest-performing participants. Second, there was a significant increase in the number of students scoring in the 90–100 range, rising from 2 in the pre-test to 10 in the post-test. These trends suggest that the intervention benefited students across the performance spectrum, with particularly strong gains among middle and higher achievers.

In summary, the score distribution trends reinforce the effectiveness of the mobile learning intervention. The upward shift in scores and the reduced frequency of low-performing students underscore its role in enhancing reading comprehension across diverse ability levels.

DISCUSSION

The results of this study revealed significant improvements in students' reading comprehension following the mobile learning intervention. The increase in mean scores from 76 (pre-test) to 83 (post-test), coupled with a statistically significant Wilcoxon signed-rank test result ($p = 0.000$), demonstrates the intervention's effectiveness. These findings are consistent with Sulisworo et al. (2016), who emphasized the ability of mobile learning applications to foster active engagement and collaborative learning. Similarly, Rahayu (2017) found that mobile learning improved students' independence in learning, which may have contributed to the positive outcomes in this study.

However, the normalized gain score (0.292) suggests that the overall magnitude of improvement was modest. This result contrasts with Prasetyo et al. (2019), who reported higher gains when mobile learning was integrated with physical classroom activities. The discrepancy may stem from differences in the study design, as Prasetyo's intervention included teacher-led guidance, while this study relied solely on mobile learning. Additionally, the duration of this study's intervention was relatively short, which might have limited its potential impact, aligning with findings by Christensen and Knezek (2017), who noted that sustained use of mobile learning yields more significant outcomes.

The distribution of score improvements further highlights interesting patterns. Lower-performing students showed marked progress, with no post-test scores below 70, indicating that the mobile learning intervention effectively addressed foundational comprehension challenges. This result aligns with Hasanah (2019), who observed similar benefits for low-performing students when using structured learning strategies. Conversely, high-performing students in this study exhibited smaller, yet consistent, improvements, contrasting with Mohamed (2021), who found that advanced learners benefitted more from peer-assisted strategies than from independent mobile learning.

Despite these encouraging findings, the study had limitations that should be addressed in future research. The lack of a control group restricts the ability to attribute observed improvements solely to the mobile learning intervention. Additionally, the use of convenience sampling may limit the generalizability of the results. Incorporating control groups and randomized sampling methods in future studies could enhance the robustness of the findings and provide clearer comparisons.

This study contributes to the growing body of evidence supporting mobile learning as an effective educational tool. However, it also underscores the importance of refining mobile learning strategies to maximize their impact. Integrating mobile learning with teacher-led activities or peer collaboration, as suggested by Aubusson et al. (2009), could yield more substantial improvements. Furthermore, exploring its application across diverse subjects and learner profiles will help generalize its benefits and address varied educational needs.

CONCLUSION

This study demonstrated the potential of mobile learning to enhance reading comprehension among eighth-grade students at

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an Islamic junior high school in Garut, West Java. The findings revealed significant improvements in students' comprehension scores, with a statistically significant increase from pre-test to post-test scores and a shift in score distribution favoring higher performance levels. While the normalized gain score indicated modest overall improvement, the results align with prior research highlighting mobile learning's effectiveness in promoting engagement and independent learning. However, limitations such as the absence of a control group and the use of convenience sampling suggest the need for caution in generalizing the findings. Future research should explore extended intervention periods, include control groups for comparative analysis, and integrate mobile learning with complementary instructional strategies to maximize its impact. Despite these constraints, this study reinforces the promise of mobile learning as a valuable tool for supporting educational outcomes in diverse contexts.

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