

The Effectiveness of Edmodo-Based Blended Learning in Improving Learning Outcomes in Islamic Religious Education among Indonesian High School Students

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ABSTRACT

The integration of digital technology into education has encouraged the adoption of blended learning to enhance student engagement and academic achievement. However, empirical evidence regarding the effectiveness of Edmodo-based blended learning in Islamic Religious Education and Character Education at the secondary school level remains limited. This study employed a quantitative approach using a quasi-experimental, non-equivalent control group pretest–posttest design. The participants consisted of 34 Grade XI students at SMAN 2 Hiliran Gumanti, Indonesia, selected through purposive sampling. Nineteen students in the experimental group received Edmodo-based blended learning, while 15 students in the control group received conventional instruction. Learning outcomes were measured using a 40-item multiple-choice achievement test. Data were analyzed using descriptive statistics, the Shapiro–Wilk normality test, Levene’s homogeneity test, and an independent-samples *t*-test. The experimental group achieved a higher mean posttest score (82.89) than the control group (66.00). The independent-samples *t*-test revealed a statistically significant difference between the two groups ($p < .05$), indicating that the Edmodo-based blended learning model was more effective than conventional instruction in improving students’ learning outcomes. Edmodo-based blended learning provides a flexible and interactive learning environment that enhances students’ academic achievement in Islamic Religious Education and Character Education. Although the findings support the effectiveness of this instructional approach, the study was limited by its small sample size and single-school setting. Future research should involve larger and more diverse samples while examining additional educational outcomes, including learning motivation, self-regulated learning, and digital literacy.

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1. INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed educational practices worldwide, encouraging schools to integrate technology-enhanced learning into classroom instruction. The emergence of digital learning environments has shifted educational paradigms from teacher-centered approaches toward student-centered learning that emphasizes active engagement, collaboration, critical thinking, and self-directed learning. Consequently, educators are increasingly expected to adopt innovative instructional strategies that effectively integrate digital technologies into teaching and learning processes while fostering the competencies required in the twenty-first century (Fullan & Scott, 2014; Chusna et al., 2024).

Blended learning has emerged as one of the most effective pedagogical approaches for integrating conventional face-to-face instruction with online learning environments. Rather than replacing classroom instruction, blended learning combines the strengths of both learning modes to create a more flexible, interactive, and learner-centered educational experience. Previous studies have demonstrated that blended learning improves students' academic achievement, learning motivation, self-regulated learning, and collaborative skills compared with conventional classroom instruction (Oweis, 2018; Sari, 2021). The flexibility offered by blended learning also enables students to access learning materials beyond classroom hours while encouraging continuous interaction between teachers and learners.

The successful implementation of blended learning largely depends on the selection of appropriate digital learning platforms. Among various learning management systems (LMS), Edmodo has attracted considerable attention because it provides an educational social networking environment that supports communication, assignment distribution, online discussions, quizzes, assessment, and learning resource management. Edmodo facilitates both synchronous and asynchronous learning activities, enabling teachers to monitor students' learning progress while promoting collaborative learning among students (Balasubramanian et al., 2014). Furthermore, Edmodo supports independent learning by allowing students to revisit instructional materials, participate in online discussions, and complete learning activities at their own pace (Al-Said, 2015).

Numerous empirical studies have reported positive impacts of Edmodo-based learning on students' motivation, engagement, and academic performance across various disciplines, including mathematics, science, and language education (Balasubramanian et al., 2014; Helsa & Kenedi, 2019; Solihin & Muhria, 2023). Similarly, blended learning has consistently demonstrated superior effectiveness compared with traditional instruction in improving learning outcomes and student motivation (Sjukur, 2012; Oweis, 2018). These findings indicate that integrating digital learning platforms with face-to-face instruction provides greater opportunities for active learning and meaningful knowledge construction.

Despite the growing body of literature, several research gaps remain. First, previous studies have predominantly focused on general education subjects, while empirical investigations examining the effectiveness of Edmodo-based blended learning in Islamic Religious Education (IRE) and Character Education remain relatively limited. Unlike science or mathematics, Islamic Religious Education emphasizes not only cognitive achievement but also moral reasoning, religious understanding, value internalization, and character development. These distinctive learning objectives require instructional strategies that facilitate interaction, reflection, and continuous engagement beyond conventional classroom settings. Therefore, evidence regarding the effectiveness of blended learning within this educational context remains insufficient.

Second, many previous studies have primarily reported statistical significance without adequately discussing the practical significance of instructional interventions. Statistical significance alone cannot fully explain the educational impact of an intervention because significant results may simply reflect sample characteristics rather than meaningful improvements in learning. Educational research increasingly recommends reporting both statistical significance and practical significance through effect size measures to provide a more comprehensive evaluation of instructional effectiveness. Consequently, incorporating effect size analysis strengthens the interpretation of research findings and enhances their practical implications for educational practice.

Third, although Indonesia has experienced rapid digital transformation in education, many secondary schools, particularly those located outside metropolitan areas, continue to face challenges in integrating educational technology into classroom instruction. These challenges include limited technological

infrastructure, varying levels of teachers' digital competence, and students' readiness to engage in online learning. As a result, empirical evidence concerning technology-supported learning models in rural or semi-rural Indonesian schools remains relatively scarce. Understanding how blended learning performs under such contextual conditions is important for informing educational policy and instructional practice.

SMAN 2 Hiliran Gumanti represents one of the secondary schools attempting to integrate technology into classroom instruction. Preliminary academic records indicated that students' achievement in Islamic Religious Education had not yet reached the school's Minimum Mastery Criterion (KKM) of 75. The average achievement of Grade XI Science students was 70.05, while Grade XI Social Science students obtained an average score of 61.25, indicating the need for more effective instructional strategies to improve learning outcomes. These findings suggest that conventional classroom instruction may not sufficiently facilitate students' understanding of Islamic Religious Education concepts and values, thereby necessitating instructional innovation.

Considering these conditions, implementing an Edmodo-based blended learning model may provide a promising alternative. Through the integration of face-to-face instruction and online learning activities, students are expected to engage more actively with learning materials, participate in collaborative discussions, complete assignments independently, and receive continuous feedback from teachers. Such learning experiences are expected to improve both students' conceptual understanding and overall academic achievement.

Accordingly, this study contributes to the existing literature in three important ways. First, it extends previous blended learning research by examining the effectiveness of Edmodo-based blended learning within the context of Islamic Religious Education and Character Education at the senior high school level, an area that has received relatively limited empirical attention. Second, this study evaluates instructional effectiveness through both statistical significance and practical significance, thereby providing a more comprehensive assessment of the educational intervention. Third, the study offers empirical evidence from an Indonesian public secondary school, contributing to the broader understanding of technology-enhanced learning implementation in developing educational contexts.

Based on these considerations, this study aims to investigate whether the implementation of an Edmodo-based blended learning model significantly improves students' learning outcomes in Islamic Religious Education and Character Education compared with conventional classroom instruction among Grade XI students at SMAN 2 Hiliran Gumanti.

2. METHOD

This study employed a quantitative approach using a quasi-experimental research design with a non-equivalent control group pretest–posttest design. The design was selected because the existing classroom structure did not permit random assignment of participants to experimental and control groups. Two intact classes were assigned as the experimental and control groups, respectively. Both groups completed a pretest before the intervention and a posttest after the intervention to measure changes in students' learning outcomes.

The research design can be illustrated as follows:

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experimental	O ₁	X	O ₂
Control	O ₃	–	O ₄

Where:

- O₁ and O₃ = Pretest
- X = Edmodo-based blended learning
- O₂ and O₄ = Posttest

The independent variable in this study was the implementation of an Edmodo-based blended learning

model, while the dependent variable was students' learning outcomes in Islamic Religious Education and Character Education.

The intervariable relationships in this study are illustrated in the conceptual framework below:

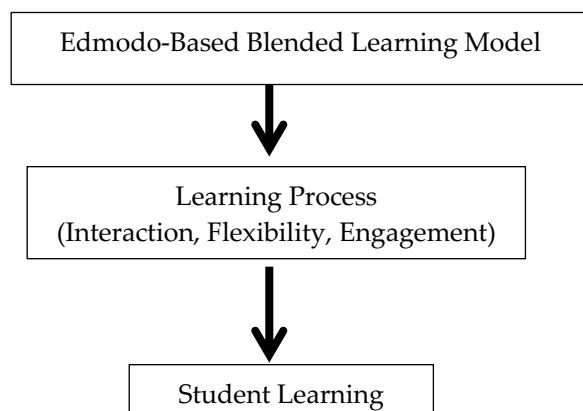


Figure 1. Conceptual Framework

The implementation of the Edmodo-based blended learning model, serving as the independent variable, is hypothesized to influence student learning outcomes as the dependent variable. To evaluate these effects, a series of statistical analyses was performed, beginning with diagnostic tests for normality and homogeneity, followed by hypothesis testing utilizing an independent samples t-test and the determination of effect sizes.

The study was conducted at SMAN 2 Hiliran Gumanti, Solok Regency, West Sumatra, Indonesia, during the first semester of the 2023/2024 academic year. The target population consisted of all Grade XI students enrolled at the school, totaling 108 students. Participants were selected using purposive sampling. Two existing classes were chosen based on the school's academic organization. Grade XI Science, consisting of 19 students, served as the experimental group and received instruction using the Edmodo-based blended learning model. Grade XI Social Science, consisting of 15 students, served as the control group and received conventional classroom instruction. Therefore, the total sample comprised 34 students.

The experimental group received instruction through an Edmodo-based blended learning model that integrated face-to-face classroom learning with online learning activities. During classroom sessions, the teacher explained the learning materials, facilitated discussions, and provided direct guidance. The online component was conducted through the Edmodo learning platform, where students accessed learning materials, participated in online discussions, submitted assignments, completed quizzes, and received feedback from the teacher.

In contrast, students in the control group received conventional face-to-face instruction using lecture-based teaching, classroom discussions, and printed learning materials without integrating online learning platforms.

Students' learning outcomes were measured using a multiple-choice achievement test consisting of 40 items covering the learning objectives of Islamic Religious Education and Character Education taught during the study. Each item had five answer alternatives (A–E), with one correct answer. The same instrument was administered as both the pretest and posttest. Before implementation, the instrument underwent item analysis, including validity testing, reliability testing, item difficulty analysis, and discrimination index analysis to ensure the quality of the measurement instrument.

The study was conducted in four stages. First, students in both groups completed the pretest to identify their initial level of knowledge. Second, the experimental group received instruction using the Edmodo-based blended learning model, while the control group received conventional classroom instruction covering the same learning materials. Third, after the instructional period had been completed, both groups were administered the posttest using the same achievement test. Finally, students' pretest and posttest scores were compiled for statistical analysis to evaluate the effectiveness of the instructional intervention.

Data analysis was performed using IBM SPSS Statistics version 20. Descriptive statistics were first calculated to determine the mean scores and percentage of learning mastery for both groups. Prior to hypothesis testing, the assumptions of parametric statistics were examined through tests of normality and homogeneity. Normality was assessed using the Shapiro–Wilk test because of the relatively small sample size. A significance value greater than 0.05 indicated that the data were normally distributed.

Homogeneity of variance between groups was examined using Levene's test. Data were considered homogeneous when the significance value exceeded 0.05. After satisfying these assumptions, the research hypothesis was tested using an independent-samples *t*-test to determine whether a statistically significant difference existed between the posttest scores of the experimental and control groups. Statistical significance was determined at the 0.05 level.

After the assumptions of normality and homogeneity were satisfied, the research hypothesis was tested using an independent-samples *t*-test to compare the posttest scores between the experimental and control groups. Statistical significance was determined at the 0.05 level. In addition, Cohen's *d* was calculated to determine the practical significance of the intervention.

Permission to conduct the study was obtained from the administration of SMAN 2 Hiliran Gumanti before the research was carried out. Students participated as part of their regular classroom learning activities, and all data collected were used exclusively for academic research purposes. Participants' identities were kept confidential during data analysis and reporting.

3. FINDINGS AND DISCUSSION

3.1 Overview of Pre-Test Results

a. Pre-test of the Experiment for Grade XI Science Students at SMAN 2 Hiliran Gumanti

To obtain an overview of *the pre-test* for the experimental class of Grade XI IPA, a test consisting of 40 questions was conducted. There were 19 students who took the test. After the pretest, the results of *the pretest* for the experimental class in islamic education and ethics for class XI IPA were obtained, which were classified as very high for 4 students or 21.05% in the 70-81 interval, high classification of 4 students or 21.05% located in the interval 58-69, low classification of 5 students or 26.31% located in the interval 46-57, very low classification of 6 students or 31.57% located in the interval 34-45. After adding up the total scores of 1,055, a mean of 55.52 was obtained, located in the 46-57 interval. Thus, it can be concluded that the *pretest* learning outcomes of the experimental class in islamic education and ethics for grade XI IPA were low. To make it easier to compare the distribution, it can be illustrated in the following histogram:

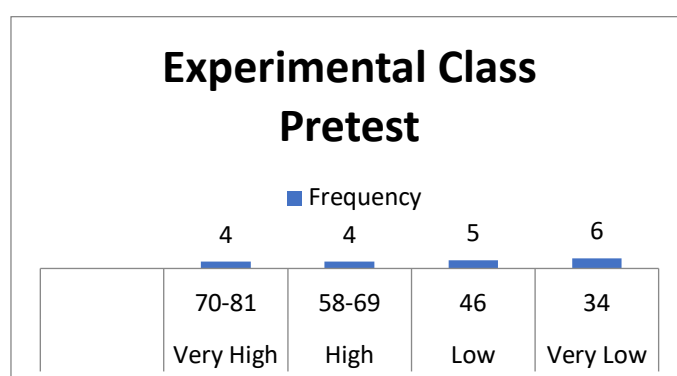


Figure 2. Histogram of *the Pre-test* Results of the Experimental Class in Islamic Religious Education and Ethics for Grade XI IPA

b. Pre-test Results of Control Students in Grade XI Social Studies

To obtain an overview of *the pre-test* for the control class of grade XI IPS, a test consisting of 40 questions was conducted. There were 15 students who took the test. After the pretest was conducted,

the pretest learning outcomes for the control class in islamic education and ethics for class XI IPS were classified as very high for 4 students or 26.66% who were in the 55-65 interval, high classification of 3 students or 20% located in the interval 45-54, low classification of 5 students or 33.33% located in the interval 35-44, very low classification of 3 students or 20% located in the interval 25-34. After adding up the total score of 640, a mean of 42.66 was obtained, located in the 35-44 interval. Thus, it can be concluded that the pretest learning outcomes of the control class in islamic education and ethics for grade XI IPS were low. To make it easier to compare the distribution, it can be illustrated in the following histogram:

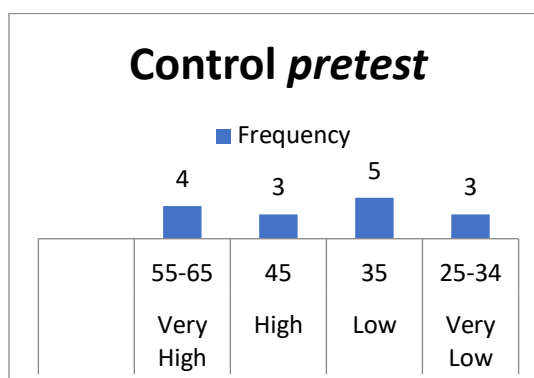


Figure 3. Histogram of the Pretest Results of the Control Class in Islamic Religious Education and Ethics for Grade XI IPS

3.2 Overview of Learning Outcomes in the Experimental Class by Applying a Blended Learning Model Using the Edmodo Application in Grade XI Science

The description of the posttest results of the experimental class of islamic education and ethics for class XI IPA shows that 6 students or 31.57% were classified as very high, with scores in the 89-96 interval, high classification of 7 students or 36.84% in the interval 81-88, low classification of 3 students or 15.78% in the interval 73-80, and very low classification of 3 students or 15.78% in the interval 65-72. After adding them up, the total score of 1,575 resulted in an average score of 82.89, which is in the 81-88 range. Therefore, it can be concluded that the post-test results of the experimental class for the islamic education and Ethics subject for grade XI IPA are classified as high.

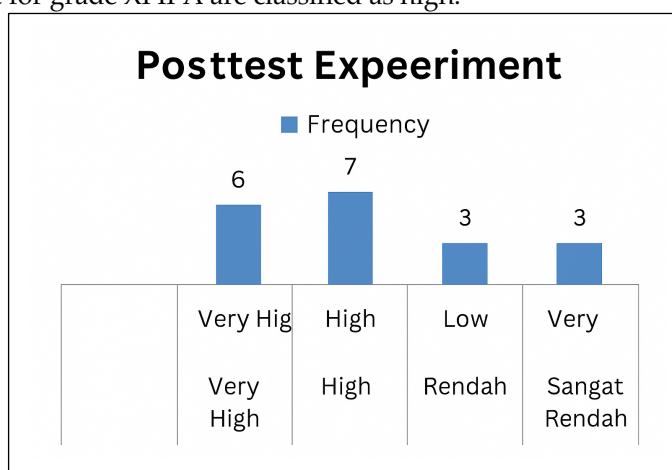


Figure 4. Post-test Histogram of the Experimental Class

3.3 Overview of Learning Outcomes in the Control Class Without the Application of a Blended Learning Model Using the Edmodo Application in Grade XI Social Studies

The learning outcomes of the control class on the final test for the Islamic education and ethics subject for grade XI IPS were classified as very high for 3 students or 20% who scored between 76 and 83, high classification for 2 students or 13.33% located in the interval 68-75, low classification for 6 students or 40% located in the interval 60-67, and very low classification for 4 students or 26.66% located in the interval 52-59. After adding up the total score of 990, the average of 66 was located in the 60-67 interval, so it can be concluded that the learning outcomes of the control class in the final test of the Islamic Education and Morality subject for class XI IPS were classified as low.

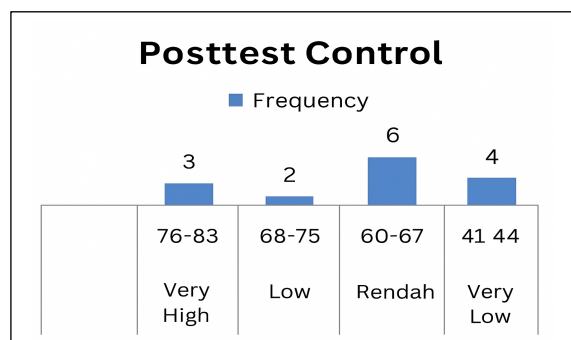


Figure 5. Histogram of Post-Class Control Test Results

3.4 Differences in Learning Outcomes between the Experimental Class and the Control Class

Based on the frequency distribution of the post-test scores, a distinct variance in learning outcomes was observed between the experimental and control cohorts. The experimental group achieved a mean score of 82.89, falling within the 81–88 interval, with the plurality concentrated in the high category (36.84%). Conversely, the control group recorded a mean score of 66, situated within the 60–67 range, with the highest concentration in the low category (40%). These descriptive metrics demonstrate that the experimental cohort exhibited superior academic performance compared to the control group.

To test this difference statistically, data analysis was performed on the posttest scores for Islamic education and ethics from both groups. Before testing the hypothesis, the data was tested through a prerequisite analysis test. The Shapiro–Wilk test showed that the data were normally distributed (Sig. > 0.05), while the Levene's test for homogeneity showed a significance value of 0.536 (> 0.05). Thus, the data met the assumptions for parametric testing.

Hypothesis testing was executed utilizing an independent samples t-test. The statistical analysis yielded a two-tailed significance value (p-value) of 0.000 ($p < 0.05$), thereby warranting the rejection of the null hypothesis. This outcome demonstrates a statistically significant discrepancy in academic performance between students exposed to the Edmodo-based blended learning model and those subjected to conventional instructional methods.

Discussion

The findings of this study demonstrate that students who participated in the Edmodo-based blended learning model achieved significantly higher learning outcomes than those who received conventional instruction. The experimental group obtained a higher mean posttest score (82.89) than the control group (66.00), and the independent-samples *t*-test confirmed that this difference was statistically significant ($p < .05$). These findings indicate that integrating face-to-face instruction with online learning through Edmodo contributes positively to students' academic achievement in Islamic Religious Education and Character Education.

One possible explanation for these findings is that blended learning creates a more flexible learning environment that extends learning beyond the classroom. Unlike conventional instruction, where learning

activities are generally limited to classroom meetings, the Edmodo platform enabled students to access learning materials, submit assignments, participate in online discussions, and receive feedback regardless of time and location. This flexibility encouraged students to revisit instructional materials independently and provided additional opportunities for learning reinforcement. Such learning conditions are consistent with the concept of blended learning, which combines the strengths of face-to-face interaction and online learning to improve learning effectiveness (Graham, 2019).

The superior performance of the experimental group may also be explained by increased student engagement during the learning process. Edmodo encourages continuous interaction between teachers and students through discussion forums, quizzes, announcements, and collaborative activities. These features create a more interactive learning environment compared with conventional classroom instruction, where communication is often limited to scheduled class sessions. Active engagement is widely recognized as an important determinant of meaningful learning because students who actively participate in learning activities are more likely to construct knowledge, retain information, and apply concepts in different contexts (Prince, 2004).

From a constructivist perspective, the findings support the view that learning occurs most effectively when students actively construct knowledge through interaction, collaboration, and reflection. Rather than functioning solely as recipients of information, students in the experimental group participated in discussions, completed online assignments, and interacted with learning resources both inside and outside the classroom. These activities promoted active knowledge construction and encouraged students to become responsible for their own learning. According to constructivist learning theory, such learner-centered environments facilitate deeper conceptual understanding than traditional teacher-centered instruction (Bransford et al., 2000).

The present findings are consistent with previous empirical studies investigating the effectiveness of Edmodo-based learning. Balasubramanian et al. (2014) reported that Edmodo provides a collaborative online learning environment that enhances communication between teachers and students while increasing students' motivation to learn. Similarly, Al-Said (2015) found that students perceived Edmodo as an effective learning platform because it supported independent learning, facilitated communication, and increased accessibility to learning resources. These characteristics enable students to engage with learning materials more frequently than in conventional classroom settings, thereby contributing to improved academic performance.

The findings also support earlier studies examining blended learning in broader educational contexts. Oweis (2018) concluded that blended learning significantly improves students' academic achievement and learning motivation compared with traditional instruction. Likewise, Sjukur (2012) demonstrated that blended learning positively influences both students' motivation and learning outcomes in vocational education. Collectively, these studies indicate that combining online and face-to-face instruction provides educational advantages that cannot be achieved through either learning mode alone. The present study extends these findings by demonstrating that similar benefits can also be observed in Islamic Religious Education and Character Education at the senior high school level.

An important contribution of this study lies in its educational context. Most previous studies investigating Edmodo have focused on mathematics, science, language learning, or higher education settings. In contrast, this study examined Islamic Religious Education and Character Education, subjects that emphasize not only cognitive achievement but also the development of religious understanding, ethical values, and character formation. Learning in these subjects requires opportunities for reflection, discussion, and continuous interaction. The integration of Edmodo into blended learning appears to facilitate these learning processes by providing students with additional opportunities to discuss religious concepts, ask questions, and receive feedback outside regular classroom hours.

Furthermore, the findings suggest that technology-enhanced learning can be successfully implemented in secondary schools located outside major urban areas. Educational technology adoption is frequently associated with infrastructure limitations and varying levels of digital literacy, particularly in developing regions. Nevertheless, the successful implementation observed in this study indicates that appropriately designed blended learning can improve learning outcomes even within schools that have relatively limited

educational resources. This finding supports the broader objective of digital transformation in Indonesian education, where technology is expected to enhance educational quality and learning accessibility.

Although the results are encouraging, several limitations should be acknowledged. First, the study involved only 34 students from a single senior high school, limiting the generalizability of the findings to broader educational contexts. Second, the intervention focused exclusively on Islamic Religious Education and Character Education; therefore, the effectiveness of Edmodo-based blended learning in other disciplines remains uncertain. Third, the study measured learning outcomes primarily through cognitive achievement tests, while important educational outcomes such as learning motivation, digital literacy, self-regulated learning, and critical thinking were not examined. Future studies should include larger samples from multiple schools, investigate additional learning variables, and evaluate the long-term sustainability of blended learning interventions.

Overall, the present findings provide empirical evidence that Edmodo-based blended learning is more effective than conventional instruction in improving students' learning outcomes in Islamic Religious Education and Character Education. The integration of classroom instruction with online learning activities creates a more flexible, interactive, and student-centered learning environment that supports active participation and independent learning. These findings contribute to the growing literature on technology-enhanced learning and provide practical implications for teachers seeking effective instructional strategies to improve students' academic achievement in secondary education.

4. CONCLUSION

This study demonstrates that the implementation of an Edmodo-based blended learning model significantly improves students' learning outcomes in Islamic Religious Education and Character Education compared with conventional classroom instruction. Students in the experimental group achieved substantially higher posttest scores, indicating that integrating face-to-face learning with online activities through Edmodo provides a more flexible, interactive, and student-centered learning environment that supports active participation and independent learning. These findings reinforce the potential of blended learning as an effective instructional strategy for enhancing academic achievement in secondary education, particularly in subjects that require both conceptual understanding and meaningful student engagement. Nevertheless, this study has several limitations. The research was conducted in a single public senior high school with a relatively small sample size, limiting the generalizability of the findings to broader educational contexts. Furthermore, the study focused exclusively on students' cognitive learning outcomes and did not examine other important educational variables, such as learning motivation, digital literacy, self-regulated learning, critical thinking, or long-term knowledge retention. Future research is therefore recommended to involve larger and more diverse samples across multiple educational institutions, employ more robust analytical approaches, such as ANCOVA or longitudinal designs, and investigate the influence of Edmodo-based blended learning on broader cognitive, affective, and behavioral outcomes. Comparative studies involving different learning management systems and educational settings would also contribute to a deeper understanding of technology-enhanced learning and support the development of more effective digital pedagogical practices.

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