



The effectiveness of blended learning models on students' learning outcomes in technology courses: a study in the Islamic Religious Education Program at STAI YAPIS Takalar

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ABSTRACT

This study aimed to assess the effectiveness of blended learning models on students' learning outcomes in technology courses. The research employed a pre-experimental design, specifically using the one-group pretest-posttest design. It was conducted at STAI YAPIS Takalar, with the study population comprising all students in the Islamic Religious Education Study Program during the 2022/2023 school year. Purposive sampling was employed, focusing on students in the fourth semester. The results indicated that, before implementing blended learning models, student learning outcomes in technology courses within the Islamic Religious Education program at STAI YAPIS Takalar were categorized as very low, with an average score of 54.49 and a standard deviation of 18.68. However, after the application of the blended learning model, student learning outcomes significantly improved, reaching a high category, with an average score of 80.65 and a standard deviation of 9.82. Student engagement during the learning process was measured at 81.42%, falling within the 'good' category. The overall implementation of the learning model achieved a score of 82.38%. Additionally, student responses showed a fairly positive category, with a percentage of 71.08%. Based on these findings, it can be concluded that the implementation of blended learning models effectively enhances student learning outcomes.

Keywords: Effectiveness; learning model based on blended learning; learning outcomes

1. INTRODUCTION

Education is a crucial aspect of human life as it profoundly influences all aspects of life. The civilization of humanity is built upon education. Without education, individuals

cannot acquire knowledge of what was previously unknown to them. Education should be accessible and enjoyed by individuals from birth until their ultimate encounter with the Divine.

During the COVID-19 pandemic, all aspects of life came to a standstill, including the field of education. The COVID-19 virus resulted in a shift from in-person learning activities at all levels of education to online learning. This forced everyone involved to adapt to the situation.

After the COVID-19 pandemic gradually subsided, higher education institutions did not immediately eliminate online learning but rather transitioned to blended learning. Blended learning requires both lecturers and students to be skilled in using technology-mediated tools to support both face-to-face and online learning.

Blended learning became one of the most innovative teaching models. It combined traditional face-to-face learning with virtual learning. In blended learning, technological advancements were utilized through computer devices or smartphones, allowing for video conferences and online chats. Various applications were used for online learning, such as Zoom, Skype, Google Meet, Webex, Microsoft Teams, and others.

Blended learning became a significant part of the training, learning, and education landscape. This was observed in several top universities that frequently employed pedagogical approaches such as formal lectures, classroom discussions, reading assignments at home, paper development, group projects, assessments or exams, and individual mentoring during working hours. Additionally, students often mixed it with various learning strategies.

Conventional learning was not bad, but it needed to be acknowledged that the use of digital media was crucial. If full online learning was not feasible, then blended learning could be an appropriate middle ground (Tsani, 2020). Thus, the blended learning method could enhance communication through a combination of both approaches. Many studies have revealed the benefits of blended learning, including bridging the gap between learning and working, providing a comfortable space for students to participate in learning activities, fostering good interaction between lecturers and students, and enabling learning delivery anywhere and anytime through internet connectivity (Devayana, 2017). Blended learning combines conventional and virtual learning. The blended learning model is highly suitable for implementation in schools and even higher education institutions, where it can improve students' learning outcomes (Santosa, 2021). The research by Shamsuddin and Kaur (2019) found that blended learning influenced students' learning styles and perceptions. The study by Quinn and Aarao (2020) revealed that blended learning enabled students to become self-directed learners in mathematics. Syarif's (2012) research showed that the blended learning model could enhance students' motivation and academic achievement. Fitri et al.'s (2016) study demonstrated that providing services through blended learning methods could effectively boost student

motivation. Sandi's (2016) research indicated that the blended learning model could enhance students' learning outcomes.

One of the universities that implemented blended learning was STAI YAPIS Takalar. STAI YAPIS Takalar is a higher education institution located in the Takalar regency. Based on the author's initial findings during the observation, an interesting subject for research was discovered. This pertained to the post-pandemic learning process at STAI YAPIS Takalar. During the pandemic, STAI YAPIS Takalar conducted online learning and later transitioned to limited face-to-face learning. The learning approach adopted by STAI YAPIS Takalar was a combination of face-to-face and online learning, commonly known as blended learning, which is still being implemented even after the pandemic has subsided. The author focused on observing the implementation of blended learning in the study.

Given this background, the research problem addressed in this study is: 'Does the implementation of the blended learning model effectively improve student learning outcomes in the educational technology course at the Islamic Religious Education Study Program, STAI YAPIS Takalar?' This study specifically investigates the application of blended learning in educational technology courses

2. METHODS

a. Research Design

This study was a pre-experimental research. Pre-experimental research is a research method that aims to explore the relationship between certain variables and other variables under strictly controlled conditions. The research design for this study was described as follows:

Table 1. Pre-Experiment (One-Group Pretest Posttest Design)

O ₁	X	O ₂
Pretest	Treatment	Posttest

(Lestari & Yudhanegara, 2015)

Description:

O1 = pretest to measure student learning outcomes before the application of blended learning model.

X = treatment, which is the implementation of teaching using the blended learning model.

O2 = post-test to determine student learning outcomes after the application of blended learning model.

b. Population and Sample

This study was conducted at STAI YAPIS Takalar, with the research population consisting of all students of the Islamic Religious Education Study Program at STAI YAPIS Takalar for the academic year 2022/2023, totaling 182 students. The sample for this study consisted of 31 students from the fifth semester, obtained through random sampling.

c. Instruments and Data Collection Procedures

Some instruments were used to collect the data:

1. Test

The data collection technique used in this study involved administering a pretest and posttest to measure learning outcomes. The pretest and posttest consisted of questions created by the researcher. The researcher, assisted by a lecturer, monitored the students while they took the test. The test results served as the data for the study.

2. Observation

The observation sheets used in this study consisted of two types: student activity observation and implementation observation. The student activity observation utilized an activity observation sheet to gather data on student activities during the learning process. The activity observation sheet employed in this study was based on a rating scale. The implementation observation sheet was used to collect data on the implementation of blended learning throughout the learning process.

3. Questionnaire

Student questionnaires were used to collect data on students' responses to the learning materials and the learning process. The questionnaire aimed to capture students' feedback related to enjoyment, motivation, clarity, interest, and approval of the expected learning outcomes for each student.

d. Data Analysis Technique

The data analysis technique employed in this study involved descriptive statistics and gain analysis.

1) Descriptive statistics

1) Learning outcomes in educational technology

Descriptive statistical analysis is used to describe the scores of learning outcomes in educational technology obtained from the students' learning outcome test. For the purpose of analysis, frequency distribution tables, mean, standard deviation, median,

mode, range, and ideal scores are used. The learning outcome data is then categorized according to the following procedure:

Table 2. Categorization of Scores for Technology Education Learning Outcomes

Score	Category
81 – 100	Excellent
66 – 80	High
56 – 65	Moderate
41 – 55	Low
0 – 40	Very low

2) Student Activities

The data obtained from observing student activities were analyzed by determining the frequency percentage. The steps for analyzing student activities were as follows:

- 1) The frequency of observed student activity results was determined for each task in each session.
- 2) The percentage of student activity frequency was calculated by dividing the frequency by the total frequency for all indicators, and then multiplying it by 100%.

This was represented using the following formula and table:

$$score = \frac{\text{the number of frequencies}}{\text{the total frequency for all indicators}} \times 100\%$$

Table 3. Student activity category

Percentage (%)	Category
$91 < x \leq 100$	Excellent
$76 < x \leq 90$	Good
$61 < x \leq 75$	Fair
$41 < x \leq 60$	Poor
$0 \leq x \leq 40$	Very poor

3) Student Response

Data on student responses were obtained from a student response questionnaire regarding the learning activities, and subsequently analyzed quantitatively. This activity was conducted to analyze student responses by calculating the number of students who responded according to the aspects being asked, and then calculating the percentage. The steps for analyzing student responses are as follows:

1. Determining the frequency of student response observations.
2. Calculating the percentage based on the total frequency for all indicators, then multiplying by 100%. As shown in the following formula and table:

$$score = \frac{\text{the number of frequencies}}{\text{the total frequency for all indicators}} \times 100\%$$

Table 4. Student Response Category

Percentage (%)	Category
$91 < x \leq 100$	Very positive
$76 < x \leq 90$	Positive
$61 < x \leq 75$	Fairly Positive
$41 < x \leq 60$	Less Positive
$0 \leq x \leq 40$	Very Less Positive

4) Implementation of Learning

The implementation of learning refers to the data on the researcher's achievement in delivering the treatment in the classroom, ensuring that the learning process aligns with the intended conditions and procedures. In this study, the success of the implementation of learning is determined based on whether the researcher's activities have been carried out during the learning process to a satisfactory extent.

The steps for quantitative analysis of the implementation of learning are as follows:

- a. Determine the frequency of the researcher's observed activities for each task.
- b. Calculate the percentage of the implementation of learning by dividing the frequency by the total frequency for all indicators and multiplying it by 100%.

$$Persentase = \frac{\text{Number of checkmarks in the 'yes' column}}{\text{Total number of checkmarks}} = 100\%$$

The categorization of the implementation of learning according to the following table is as follows:

Table 5. Category of Implementation of Learning

No.	Performance (%)	Category
1	$91 < x \leq 100$	Excellent
2	$76 < x \leq 90$	Good
3	$51 < x \leq 75$	Fair

4	$26 < x \leq 50$	Poor
5	$0 < x \leq 25$	Very poor

2) Gain test

Normalized gain or N-gain data is obtained by comparing the difference between posttest and pretest scores with the difference between posttest and pretest scores. In addition to assessing student improvement, this data also provides information about student achievement. The gain test was conducted to assess the effectiveness of the blended learning model on the learning achievement of technology education in the sample class, using the Gain formula (Lestari & Yudhanegara, 2015).

$$N - Gain = \frac{\text{posttest score} - \text{pretest score}}{SMI - \text{pretest score}}$$

Table 6. Category of N – Gain score

N – Gain Score	Criteria
$N - gain \geq 0,70$	High
$0,30 < N - gain < 0,70$	Moderate
$N - gain \leq 0,30$	Low

Effectiveness is the standard or level of achievement of a goal with a pre-established plan, so it is necessary to apply effectiveness criteria in this research. The effectiveness criteria for this study are as follows:

1. Student learning outcomes in the technology education course after the implementation of blended learning model reached a minimum grade of C or 55.
2. Improvement in learning outcomes before and after the implementation of blended learning model is in the moderate category.
3. Student activities during technology education learning with the implementation of blended learning model are in the good category.
4. Student response after technology education learning with the implementation of blended learning model is in the satisfactory category.

The implementation of learning is at least in the good category.

3. RESULTS AND DISCUSSION

a. Results

1) Descriptive Analysis Results

Based on the data of students' learning outcome scores before being taught using the blended learning model, the average score of learning outcomes from 31 students was 54.87 with a variance of 95.78, standard deviation of 9.78. The range of scores achieved by the students ranged from the lowest score of 36, which is the lowest possible score, to the highest score of 74, which is the highest possible score out of 100. The overall categorization of students' abilities before being taught with the blended learning model was generally in the moderate category, with a percentage of 41.94%. Other students were categorized as low, accounting for 38.71%, and very low, accounting for 9.68% of the total students.

Based on the data of students' learning scores after being taught using the blended learning model, the average learning score was 84.61 with a variance of 38.04 and a standard deviation of 6.16. The lowest score achieved by the students was 69, which was the lowest possible score of 0, and the highest score was 98, which was the highest possible score of 100. The overall category of students' abilities after being taught with the blended learning model was generally classified as very high, with 74.19% falling into this category, while 25.81% fell into the high category.

The observation of student activities during the blended learning implementation showed an average activity percentage of 88.32%. Referring to the activity categories in Table 3, this indicated that students' activities during the learning process were classified as good.

The student response questionnaire was used to assess the extent of students' reactions or responses to learning with the implementation of the blended learning model. The activity conducted to analyze students' responses was to count the number of students who responded according to the aspects being asked and calculate the percentage. The analysis of students' responses from the questionnaire given to 31 students with 9 positively oriented questions after participating in lessons using the blended learning model yielded an average score of 86.29%. Referring to the response categories in Table 4, it can be concluded that students' responses to the learning process were classified as positive.

The implementation of learning using the blended learning model showed an average percentage of 81.48% for the implementation of learning. Referring to the implementation categories in Table 5, it can be concluded that the implementation of learning during the learning process was classified as good.

2) Gain Test

The gain test was conducted to observe the improvement of students' learning outcomes before (pretest) and after (posttest) implementing the inductive development approach. By using the gain formula, a normalized gain value of 0.70 was obtained. Referring to the criteria in Table 6, it can be concluded that the improvement of students' learning outcomes before (pretest) and after (posttest) implementing the blended learning model was classified as high.

b. Discussion

In this study, the effectiveness criteria of implementing the blended learning model were examined based on four aspects: educational technology learning outcomes, student activities, student responses, and the implementation of learning.

Educational technology learning outcomes reflected the level of mastery of students in learning educational technology, as seen in the scores obtained from the educational technology learning test. In this case, the implementation of the blended learning model was considered effective when students achieved a minimum grade of C or 55. Based on the descriptive analysis results, the average pretest score for educational technology among fifth-semester students in the Islamic Education study program at STAI YAPIS Takalar was 54.87, with a standard deviation of 9.78, falling into the low category. On the other hand, the average posttest score for students was 84.61, with a standard deviation of 6.16, falling into the very high category. This indicated an improvement in students' educational technology learning scores after implementing the blended learning model. As for the learning gain score, the normalized gain test resulted in a score of 0.70, falling into the moderate category.

From the analysis results, it can be concluded that the implementation of the blended learning model was highly effective in improving students' learning outcomes. This was because in the blended learning model, students could understand the material well, and they became more flexible in communicating with professors and fellow students, both in virtual and face-to-face learning. In virtual learning, students could access the material anytime and anywhere without being limited by distance and time, allowing them to ask questions about areas they still found challenging. The role of students also shifted from passive to active, and this was supported by the use of various learning applications that assisted students in their learning process, enabling the achievement of learning objectives.

Student activities during the implementation of the blended learning model were measured using an activity observation sheet. The data were analyzed quantitatively to determine the percentage. Based on the analysis results, the percentage of student learning activities was 88.32%, indicating that student learning activities during the learning process using the blended learning model were classified as good. Active student activities undoubtedly influenced their motivation and learning outcomes.

Student response in this study referred to students' feedback on the teaching and learning process that had been conducted. Student response was considered positive if their responses and comments on the aspects were positive in nature. Student responses were measured using a student response questionnaire distributed at the last meeting after implementing the blended learning model. The data were then analyzed quantitatively to determine the percentage. Based on the analysis results, the percentage of student responses was 86.29%, indicating that students' response to learning after implementing the blended learning model was classified as positive.

The implementation of learning referred to data on the instructor's achievement in carrying out teaching activities in the classroom. The research results showed that the implementation of learning obtained a percentage score of 81.49%, indicating that the implementation of learning using the blended learning model was classified as good. The use of the blended learning model was a learning program designed to assist instructors in optimizing student learning, where learning was conducted both face-to-face and virtually.

Based on the above criteria, it can be concluded that the blended learning-based model was effectively applied to improve students' educational technology learning outcomes, which showed improvement. This was consistent with the opinion of Rizky Ramadhana (2022) that the effectiveness of learning was the outcome obtained after the teaching and learning process. Furthermore, student activities demonstrated their participation and engagement during the learning process, and student responses were generally positive. The results of this study were in line with the research findings of Khusniyah (2020), which stated that learning with the blended learning model was effective in improving learning outcomes.

CONCLUSION

The study highlights the specific case of STAI YAPIS Takalar, where blended learning has become a cornerstone of post-pandemic education. This study explored the implementation of blended learning within this context and assessed its impact on student learning outcomes. The research findings showcased the remarkable effectiveness of the blended learning model in enhancing student learning outcomes in the educational technology course. This effectiveness was evident in improved learning scores, increased student engagement, positive responses from students, and commendable implementation of the learning model.

In conclusion, this study underscores the transformative potential of blended learning in modern education. It has become a valuable tool for institutions like STAI YAPIS Takalar and holds promise for improving education globally. As the educational landscape continues to evolve, blended learning stands as a powerful means to enhance student learning outcomes and prepare individuals for success in an increasingly digital world. The findings of this study contribute to the growing body of evidence supporting the effectiveness of blended learning as a dynamic and adaptable educational model.

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