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Blended learning as an alternative learning method to support the digital education era

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Abstract
Learning has now transformed dynamically through the application of technology. This study seeks to determine whether blended learning is an alternative method to support current technological developments. The aim is to analyze the application of blended learning to support the advancement of education through technology. Blended learning will support effective and efficient learning while still paying attention to students' cognitive and critical thinking. This study uses experimental quantitative methods. The researcher developed 15 custom-made questionnaires to be responded to by 20 teachers. Based on the questionnaires, the validity and reliability of blended learning effectiveness were analyzed with SPSS software. The results showed that the questionnaire was valid and reliable, and the fifteen questionnaires analyzed achieved high scores for implementing blended learning. The implications of this research can become a learning option that applies technology so that it is dynamic and supports the digitalization of education.

Keywords: *blended learning; education; learning methods.*

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INTRODUCTION

Education is dynamic and adapts to the existing circumstances. Changes in the implementation of education will impact the fabric of society. Education changes can impact societal values, attitudes, and behavior (Tricahyono, 2021). Education aims to form intelligent,

independent, skilled individuals (Azizah et al., 2024). The education process is flexible, which encourages dynamic learning (Yeung, 2024). The current dynamic educational process must be supported by an innovation that follows the changing times. Dynamic education requires innovation in its implementation (Gellisch et al., 2024). Innovation in education is a form of problem-solving that includes components of the education system (Rahmi et al., 2024; Shah et al., 2024). Innovation in education can be a form or a system (Sutherland et al., 2024). Educational innovation can be in the form of media products used in the learning process, while the system can be in the form of methods used by teachers.

The COVID-19 virus, deemed a pandemic by the World Health Organization on 11 March 2020, is the reason for the changes occurring in cultures worldwide today. People's lives are impacted by these developments in the areas of the economy, society, politics, and education (Chew et al., 2021; Sawan et al., 2024; Merwe et al., 2024). To break the chain of COVID-19 transmission, the government has implemented several measures, including educational measures. To give students meaningful experiences, the policy was established in Circular Letter Number 4 of 2020 regarding implementing education policies during the emergency period of COVID-19 spread (Suson, 2024). It includes recommendations for conducting learning processes from home or distance learning (Alqabbani et al., 2020; Chilton et al., 2024).

Blended learning is a learning process carried out by educators and learners by not having to be in the same place by utilizing technology (Kopzhassarova & Izotova, 2024). Blended learning can be used as an option to implement the learning process. Blended learning can be used to develop educational innovation to answer varied learning challenges (Fabian et al., 2024). Educators have an essential role in the innovation of the learning process. Educators' readiness for learning determines the success of the learning process for students. The main difficulty in blended learning is in the learning process (Alammary, 2024). The process of this learning requires support from media and learning support tools.

Teachers have widely studied blended learning as a new interactive method during the COVID-19 pandemic (Arifani et al., 2020). However, the blended learning method has not been widely developed since the COVID-19 pandemic ended. Blended learning is a method to encourage technology-based learning (Panigrahi et al., 2024). Current learning problems show that many teachers are unaware of the importance of digitizing learning. This study will provide recommendations for teachers to develop digital learning through blended learning. The increased accessibility of blended learning will promote higher-quality education (Aboagye, 2020; Ali et al., 2024; Boateng & Marwanqana, 2024; Tran et al., 2024). During the COVID-19 pandemic, blended learning has been widely studied, but there has been no sustainability for developing blended learning methods. Therefore, more studies are needed to support the digitalization of learning through alternative blended learning methods. Blended learning can be seen as a way to improve the quality of the educational system in the modern day by fostering innovative, practical learning that facilitates the use of technology. This study aims to find alternative teaching strategies that promote digitalization learning for students.

METHOD

This study uses quantitative and experimental methods to analyze teachers using a one-shot case study. This design measures an experimental study design's power and scientific value (Kariman et al., 2019). This study aims to determine the effectiveness of blended learning to encourage the digitization of learning in the school. Studies that several researchers have conducted encourage learning to change following technological developments to be dynamic.

The observation process is conducted by the teacher who implements blended learning in the classroom through observation and distribution of questionnaires using a 5 Linkert scale (1=very low to 5=very high) distributed to teachers to determine the application of blended learning methods. Aspects of this questionnaire were developed based on learning methods, flexibility of time and place, use of technology, and cognitive level enhancement (Horn & Staker, 2017). Respondents consisted of 20 teachers and were distributed through a sample random sampling technique in junior high schools in the Rembang area. Next, the analysis will start with the feasibility of the questionnaire through validity and reliability. Validity analysis was tested through product moment person correlation, while reliability was tested using Cronbach alpha. This study analyzes data that aims to determine the effectiveness of blended learning in supporting the digitization of the learning process. Learning can be indicated as effective and efficient if it has an interval of 80-100%, which means high value, while if the value obtained is 70-79%, it will be in the medium category; then, if the value produced is below 70%, it will be categorized as low (Deschacht & Goeman, 2015). The next step is to use regression analysis with the help of SPSS software. It will be known that the value of blended learning in learning will fall into the high, medium, and low categories. After that, an aspect of learning before and after blended learning can be analyzed.

RESULTS AND DISCUSSION

Blended learning presents new challenges for both educators and students. Blended learning requires several components, such as students, teachers, and technology, for the learning process to be carried out effectively (Yu et al., 2024). Technology plays a crucial role in the implementation of blended learning. Technology is a learning medium for students and teachers (Sulfemi, 2023). Of course, the media is not exempt from the contributions of digital tools essential for teachers and students. Blended learning must be supported by mobile devices such as smartphones, tablets, and laptops with internet access to conveniently access information anytime and anywhere (Kilipiris et al., 2024). These mobile devices play a significant role in achieving the goals of blended learning (Versteijlen & Wals, 2023).

Based on the data from the questionnaire distributed in this study, the validity analysis was obtained through the Pearson product-moment correlation test. The validity test results showed that the r-value table is above the table value, which for n equals 15 is 0.36. Therefore, the data is valid. The correlation values indicate that each item is above 0.8, with the lowest being 0.884 (table 1).

Table 1. Validity test results

Instruments	Correlation	Significance level	Interpretation
1	0.97	0.05	Valid
2	0.95	0.05	Valid
3	0.94	0.05	Valid
4	0.93	0.05	Valid
5	0.97	0.05	Valid
6	0.89	0.05	Valid
7	0.88	0.05	Valid
8	0.97	0.05	Valid
9	0.90	0.05	Valid
10	0.97	0.05	Valid
11	0.95	0.05	Valid
12	0.94	0.05	Valid
13	0.94	0.05	Valid
14	0.94	0.05	Valid
15	0.92	0.05	Valid

Source: Analyze data

This study used the reliability test as a measurement instrument, employing Cronbach's alpha analysis. Based on the data analysis results, an alpha coefficient value of more than 0.60 was obtained, indicating that it can be considered reliable. The reliability value of the questionnaire is 0.988, which is greater than 0.60, thus falling into the acceptable category (table 2).

Table 2. Reliability test results

Reliability statistics	
Cronbach's Alpha	N of items
0.98	15

Source: Analyze data

Valid values were obtained based on the results of the validity and reliability tests. Then, an analysis will be conducted to measure the efficiency of the blended learning method and whether it can positively impact school learning. The following table determines this percentage.

Table 3. Analyze Blended learning model results

Before applying blended learning		Aspects assessed	After applying blended learning	
Value	Percentage (%)		Value	Percentage (%)
258	73.7	Oriented to educational goals	326	93.1
245	70.0	Student satisfaction in the learning process	331	94.5

Before applying blended learning		Aspects assessed	After applying blended learning	
Value	**Percentage (%)**		**Value**	**Percentage (%)**
256	73.1	Student creativity during learning	333	95.1
262	74.8	Application of technology in the learning process in the school	337	96.2
253	72.2	Student understanding during the learning process	332	94.8
256	73.1	Student accessibility during school learning	330	94.2
252	72.0	Student activity during learning	329	94.0
259	74.0	Good results during the learning process in class	336	96.0
258	73.7	Supports more interesting learning	335	95.7
259	74.0	Diversity Methods for Student Learning	332	94.8
256	73.1	More comprehensive access to information	334	95.4
254	72.5	Support students' critical thinking	333	95.1
259	74.0	Support environmentally friendly learning materials	333	95.1
257	73.4	Students' activeness when learning in class	334	95.4
261	74.5	Support the application of technology during learning	335	95.7

Source: Analyze data

Based on the data analysis conducted in this study, blended learning is a teaching method that supports the digitalization of school learning. The distributed questionnaires are valid and reliable, and the survey, as an indicator of learning efficiency, demonstrates the feasibility of blended learning as a method that supports the digitalization of education.

Table 4. Analyze the effectiveness of Blended learning

R	R Square	Adjusted R Square	Std. error of the estimate	Statistik		
				R Square dif	**F dif**	**Sig F dif**
.923	.852	.810	7.764	.611	3.291	.006

Source: Analyze data

The regression test results for blended learning showed R=.923 and R2=.852. This indicates that blended learning during the learning process is worth 85.20 and the other 14.80 due to different aspects. Then, HA can be used because it has a smaller significant level equal to 0.05. Therefore, the application of blended learning shows promising results as a new learning process.

This study was conducted using an experiment using a one-shot case study. It was used to find blended learning as one of the implementations of learning with a new model through the questionnaire given. The questionnaire was adopted directly by the researcher and is valid and reliable. The aspects of the questionnaire can be used to measure the effectiveness of blended learning. The feasibility of the measurement results shows that this study can be continued to

the following process. The feasibility generated during the measurement process can contribute to future research using relevant methods to measure the learning process.

The scores obtained before blended learning were 70.00- 74.00 in the initial stages. Significant results were obtained after applying blended learning based on the score findings, which showed a value of 93.14- 95.00. This indicates that blended learning is an option for an effective learning process. The variety provided during the learning process shows promising results and can be accepted by the learners. Students certainly see the need for a variety of learning that is not boring (Seo et al., 2023). The high percentage of scores found shows that blended learning is a relevant choice of learning method.

Based on the results of the distributed questionnaire, fifteen points of blended learning indicators support the digitization of learning. The indicators are oriented to educational goals, student satisfaction in the learning process, student creativity during learning, application of technology in the school learning process, student understanding during the learning process, student accessibility during school learning, student activeness during learning, good results during the learning process in the school, supporting more interesting learning, diversity of learning methods for students, access to more comprehensive information, supporting student critical thinking, supporting environmentally friendly learning materials, active students when learning in class, supporting the application of technology when learning produces high scores. Many of these aspects indicate that blended learning can be applied as a new learning process. Remembering that learning must align with technological development (Al-Fodeh et al., 2021) is essential. Blended learning supports dynamic learning through the application of technology.

Blended learning utilizes technology to facilitate efficient teaching using digital resources. Digital learning resources can combine teaching and motivate students to orient themselves in understanding content in a contemporary way. This study investigates the effectiveness of blended learning in the school. When blended learning is implemented, parents find evaluating students' learning materials and methods more accessible (Blieck et al., 2020). Parents can help monitor their child's cognitive and psychomotor development. Researchers working on this project are expected to develop various research models and methodologies. Future research should use a more comprehensive scale due to the study's limitations. This study only included respondents from one region. Based on the data processed, the blended learning program implemented by junior high schools in the Rembang region has produced positive results. Implementing blended learning has shown the efficacy and efficiency of this approach in the school. Therefore, schools are encouraged to use blended learning options to advance the digitalization of the education system in Indonesia.

CONCLUSION

The study shows that blended learning can be an alternative to student learning in the school as a form of support for the digitization of learning. Blended learning positively impacts school learning so that it can be used as an alternative to student learning. The creativity generated

from blended learning encourages students to have learning options. Therefore, learning can support students' creativity and cognitive development. In addition, this learning also enables teachers to continue to innovate in creating and delivering materials. Based on the research indicators that are then analyzed, it is found that blended learning supports the digitalization of student learning in the school well. This study still has a limitation of research locations with a small scope. In future research, it is hoped that researchers can use a more comprehensive location. In addition, the blended learning method can also be further researched as one of the revolutionary new learning processes.

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