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Comparative Study Between Digital and Conventional Based Learning on Student Learning Outcomes at STKIP Hermon Timika

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Abstract

The development of information and communication technology (ICT) has brought significant changes to the field of education, including higher education. The shift from conventional learning methods to digital-based learning has become an inevitable global trend. Conventional methods still offer advantages in terms of direct interaction between lecturers and students, but they are increasingly facing challenges related to flexibility and accessibility. On the other hand, digital learning methods provide easier access, greater flexibility, and improved efficiency, yet they also encounter obstacles such as limited face-to-face interaction and inadequate infrastructure particularly in remote areas. This study is a comparative analysis aimed at examining the differences in student learning outcomes between digital-based learning and conventional learning. A descriptive comparative method with a quantitative approach was employed to collect data from two groups of students, each consisting of 25 participants, who engaged in learning through both digital and conventional methods. The data collected included demographic information, learning outcomes, as well as students' perceptions and satisfaction levels with both approaches. The data were analyzed statistically. The findings indicate that digital-based learning is significantly more effective in improving learning outcomes compared to conventional methods. Students who participated in digital learning achieved higher average final exam scores. However, there were variations in student perceptions and satisfaction levels between the two methods, reflecting unique preferences and challenges associated with each approach.

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1. INTRODUCTION

The development of information and communication technology (ICT) today has changed various aspects of life, including the world of education. Technology is now an important part of the teaching and learning process, because it can improve the quality and efficiency of learning [1]. Therefore, higher education today no longer completely relies on conventional learning methods in its learning process [2]. Technological advances have changed the way teachers teach and students learn, as well as opening up new opportunities to increase the effectiveness and efficiency of the teaching and learning process .

Conventional learning methods are methods that have long been used in classroom learning. This method is carried out directly between lecturers and students in the classroom, usually using media such as whiteboards and textbooks. This method is considered effective in creating direct interaction. This method has the main advantage of creating an interactive learning atmosphere, allowing students to be actively involved, ask questions directly, and obtain quick feedback from the lecturer. Apart from that, direct supervision from lecturers also plays a role in maintaining student discipline and concentration during the learning process [3] . However, as technology develops and students' need for flexibility in learning, digital learning methods are starting to be introduced and implemented. This method allows students to access material online, discuss via forums, and complete assignments [4].

However, digital learning or e-learning has its own challenges. The lack of face-to-face interaction can reduce opportunities for in-depth discussions and collaboration, which are important aspects in understanding complex material [5] . In addition, e-learning requires students to have a high level of self-discipline and good time management skills. Not a few students face difficulties in adapting to a more independent learning model and minimal direct guidance. The success of e-learning also depends greatly on the availability of adequate technological infrastructure [6]. Access to devices such as computers or smartphones, as well as fast and stable internet connections, are crucial to supporting the smooth learning process. This is a challenge in itself in a number of areas, especially in areas that do not yet have adequate technological facilities. with limited internet access, implementing e-learning can be a challenge [7].

STKIP Hermon Timika is a higher education institution in the Central Papua region, eastern Indonesia, which also faces challenges in adopting and integrating digital technology in the learning process. Therefore, choosing the right learning method is crucial to ensure the effectiveness of the teaching and learning process and the achievement of optimal student competencies [8].

It is important to carry out a comparative study between conventional and digital learning methods in learning at STKIP Hermon in order to understand the advantages and disadvantages of each method, as well as identifying the most effective approach in the specific context of the educational institution. It is hoped that the results of this study can provide valuable insights for educators, policy makers and other stakeholders in developing optimal learning strategies in the digital era and also providing the best learning experience for their students.

Several previous studies have explored the effectiveness of conventional and digital learning methods. For example, research by [9] shows that that digital media significantly improves learning outcomes however, it does not provide an in-depth analysis of student satisfaction. Another study by [10] found that digital learning media had a positive effect of 1.115 on mathematics learning outcomes, but did not compare directly with conventional methods.

This research aims to fill this gap by comprehensively comparing the effectiveness of conventional and digital learning methods at STKIP Hermon Timika, as well as identifying the advantages and disadvantages of each method from the perspective of learning outcomes, perceptions and student satisfaction. Therefore, through this research it is hoped that it can provide new, useful contributions to the world of education, especially in the context of higher education in Indonesia and the results can add insight and become a useful reference for various parties.

Overall, this research is important because it can provide a clearer picture of how the two learning methods are implemented at STKIP Hermon Timika and how they can continue to be improved. With better understanding, campuses can continue to improve the quality of teaching and create a better learning experience for students, while simultaneously responding to the challenges of the world of education in this digital era.

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2. MATERIALS AND METHOD

Material

Digital learning is a modern approach to the learning process that relies on the use of information technology as the main media. According to Moore, Dickson-Deane, and Galyen (2011), this concept includes the use of digital devices such as the internet, computers, and e-learning applications to support online learning activities. Digital learning offers freedom in terms of study time and location, and allows access to a wider variety of learning resources.

[1] stated that digital learning provides a more interesting and interactive learning experience, and can be tailored to individual needs. However, obstacles to its implementation cannot be ignored, such as the lack of direct interaction between teachers and students, limited digital skills of students, and technical obstacles that are often found in areas with limited access to technology [5].

Conventional learning refers to the learning process that takes place directly in the classroom, where interaction between lecturers and students is carried out face to face. This

method places lecturers as the main transmitters of information and students as recipients [11] . Even though it is considered traditional, this approach is still relevant because it is able to create more personal communication, allows direct questions and answers, and provides stronger control over the course of learning.

According to [2] , conventional learning also supports student discipline and concentration during the learning process. However, this approach has limitations in terms of flexibility and access to information, because it only takes place within a certain time period and place.

Learning outcomes are a measure of students' achievement of abilities after following the learning process.[12] classifies learning outcomes into three aspects, namely cognitive, affective and psychomotor. Factors such as teaching methods, learning environment conditions, and student motivation play a major role in determining the quality of learning outcomes.

[13] explained that choosing the right learning method can speed up the understanding process and have a positive effect on the final results achieved by students. Recent research by Azkiahi et al. (2023) shows that the use of digital learning methods can significantly increase student academic achievement, as long as they are supported by adequate technological devices and students' adaptability to digital systems.

3. METHODS STUDY

This research uses a comparative descriptive design with a quantitative approach, as explained by [14]. This approach was chosen because it allows objective comparisons to be made of the effectiveness of two learning models, namely conventional and digital (e-learning), by measuring aspects of learning outcomes, perceptions and levels of student satisfaction [15]. The main focus of the quantitative approach is on collecting data that is measurable and can be analyzed statistically to provide an objective picture of the effectiveness of each method [16] .

The techniques used in data collection include distributing questionnaires, carrying out learning outcomes tests, as well as statistical analysis to detect significant differences between the two groups . The population in this study were STKIP Hermon students in the even semester of the 2024/2025 academic year. Samples are determined using techniques *purposive sampling*, namely choosing subjects based on certain criteria, namely students who take the course "Learning and Learning". The sample was divided into two groups, namely the group with conventional methods and the group with digital methods. Each group consists of 25 students. To measure student perceptions and satisfaction, a questionnaire instrument with a Likert scale was used, while understanding of the material was assessed through a written test that had been validated by material experts.

The data obtained was analyzed using descriptive statistics to describe the results of questionnaires and learning tests, as well as the independent t-test as part of inferential statistics to determine whether there were significant differences between the two groups [17] .

3. Results

A. Demographic Data

Table l. Student Demographics

	Category										
	Age			**Gender**		**Study program**			**Semester**		
	18-19	20-21	22-23	L	P	English pend	Pend. Mathematics	Pend. Physical	3	5	6
Digital Learning Group	8	9	8	16	9	5	4	16	23	1	1

Conventional Learning Group	8	7	10	15	10	6	2	17	22	2	1

From the student demographic table above, it describes the characteristics of STKIP Hermon Timika students, which consist of two groups learning, namely the Digital Learning Group and the Conventional Learning Group. Each group consists of 25 people. In the digital learning group, the majority of students came from the physical education study program (16 students), the English education study program (5 students) and the mathematics education study program (4 students), while in the conventional learning group, the majority of students came from the physical education study program (17 students), the English language education study program (6 students) and the mathematics education study program (2 people). The students' ages ranged from 18 to 23 years, with a relatively even distribution between the two groups. The gender of students in each group is also distributed proportionally. This analysis provides a detailed picture of the demographic composition that is relevant for the context of learning method effectiveness research.

B. Data Analysis and Interpretation of Results

Table 2. Questionnaire and Learning Results

	Category				
	Ease of Access	**Interaction with Lecturers**	**Motivation and Interest**	**Learning Effectiveness**	**UAS Learning Results**
Digital Learning Group	3.40	3.92	3.28	2.64	89.24 (S.D 9.17)
Conventional Learning Group	2.84	3.76	2.40	2.72	75.08 (S.D 8.43)

Measurement Standards Used:

- Questionnaire Scale: Scale 1-5, where 1 = strongly disagree and 5 = strongly agree
- Final Exam Score: Percentage, with standard deviation (SD) indicating the variability of scores among students within the group.

Based on the table of data analysis results from questionnaires and tests, learning outcomes can be described in the following data interpretation:

1. **Ease of Access**: Questionnaire scores related to ease of accessing learning materials are in the range 1 to 5, with a score of 1 indicating less easy access, and a score of 5 indicating very easy access. The results showed that the average score in the digital learning group was 3.40, while the conventional group obtained an average of 2.84. These findings indicate that students who participate in digital learning tend to experience greater ease of access to material compared to students using conventional learning methods.
2. **Interaction with Lecturers**: Questionnaire scores related to interaction with lecturers are in the range 1 to 5, where a value of 1 indicates low quality of interaction and a value of 5 indicates high quality of interaction. The group that took part in digital learning recorded an average score of 3.92, while the group that used learning conventional obtained an average score of 3.76. These findings indicate that students in the digital learning group tend to assess direct interactions with lecturers more positively compared to students in the conventional group.

3. **Motivation and Interest**: Questionnaire scores related to Motivation and Interest are in the range 1 to 5, where a value of 1 indicates very low motivation and interest and a value of 5 indicates high motivation and interest. The group that took part in digital learning recorded an average score of 3.28, while the group that used learning conventional obtained an average score of 2.40. These findings indicate that students in the digital learning group tend to rate motivation and interest more positively compared to students in the conventional group
4. **Learning Effectiveness**: Questionnaire scores related to learning effectiveness are in the range 1 to 5, where a score of 1 indicates poor learning effectiveness, while a score of 5 indicates good learning effectiveness. The digital learning group obtained a score of 2.64 and group learning conventional obtained a score of 2.72. These findings indicate that students in the conventional learning group tend to assess learning effectiveness more positively compared to students in the digital group
5. **UAS Learning Results**: Final exam results are presented in percentage form. The group that took part in digital learning obtained an average score of 89.24 with a standard deviation of 9.17. On the other hand, the conventional learning group recorded an average score of 75.08 with a standard deviation of 8.43. This difference shows that students who participated in digital learning obtained slightly higher final exam results compared to the conventional group, although there was a greater degree of variation in scores among students in the digital group.

   For a comparison of questionnaires and learning outcomes, see the image below:

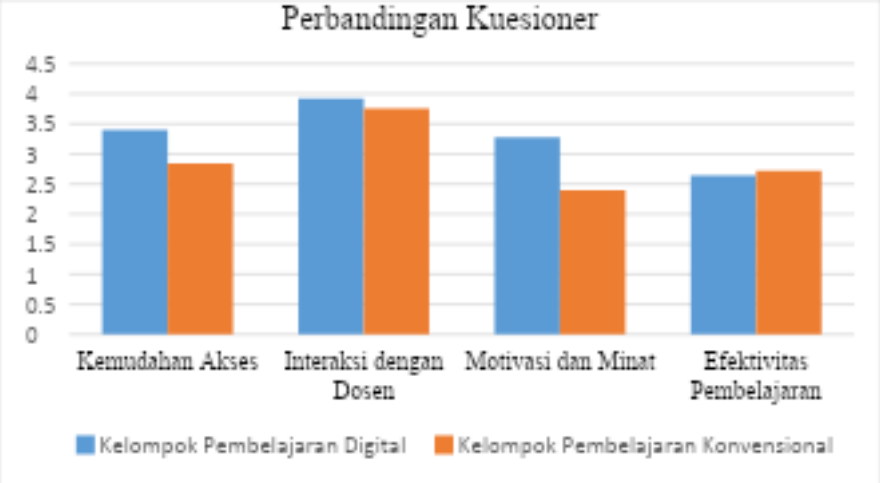

Figure 1. Comparison of Student Response Questionnaires

The bar graph above presents a comparison of the average scores from the questionnaire results regarding ease of access, quality of interaction between students and lecturers, motivation and interest, as well as learning effectiveness in digital learning groups and conventional learning groups. Ratings are given on a scale of 1 to 5, where 1 reflects very poor interaction and 5 indicates very good interaction. Students who participated in digital learning received an average score of 3.8 for ease of access, 3.92 for interaction with lecturers, 3.28 for motivation and interest, while for learning effectiveness they received a score of 2.68. Students who participated in digital learning received an average score, while students in the conventional group recorded an average score of 3.9, a score of 3.76 for ease of access, a score of 2.40 for interaction with lecturers, a score of 3.28 for motivation and interest, while for learning effectiveness they got a score of 2.72.

These results indicate that there are differences in students' views on several aspects of learning between conventional and digital methods. Students who took conventional learning gave a higher assessment of the quality of interaction with lecturers, and slightly higher in terms of ease of access. In contrast, students in the digital group gave slightly better

scores on learning effectiveness, although they rated interactions with lecturers significantly lower. The level of motivation and interest in learning showed similar figures in both groups. These findings show that even though digital learning offers easy access and competitive effectiveness, face-to-face learning is still considered superior in building quality communication and interaction between lecturers and students, which is an important factor in the success of the learning process. Face-to-face interactions in conventional methods are considered more positive by students compared to interactions that occur in digital-based learning systems. This visualization supports the conclusion that direct interaction is still considered more effective in building communication between lecturers and students.

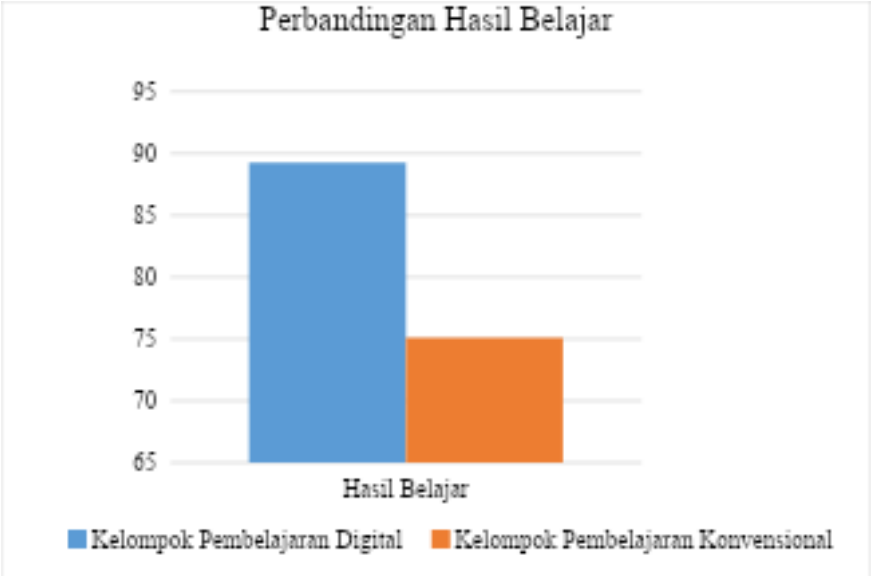

Figure 2. Comparison of learning outcomes of the Digital learning group and the Conventional learning group

The graph depicts the distribution of final exam scores from the two learning groups, namely the digital group and the conventional group. The Digital group shows a more diverse distribution of scores, with a higher average score, namely around 89.24, although there are several extreme scores that are lower or higher compared to the conventional group. Meanwhile, the conventional group shows a distribution of values that tends to be stable, with the highest value being in the range of 75.08.

Independent "t" Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Say.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AND	Equal variances assumed	.066	.798	5.682	48	.000	14.160	2.492	9.149	19.171
	Equal variances not assumed			5.682	47.660	.000	14.160	2.492	9.148	19.172

From the table above, it is known that the analysis was carried out using tests *Independent Samples T-Test* with a sample size of 25 students per group. *Uji Levene* produces a Significance (Sig.) value of 0.798, which is greater than 0.05. This shows that the

assumption of equality of variance between the two groups is met *(equal variances assumed*), so that the T-test results in the first row are used in interpretation. For Test results *T-Test,* t value = 5.68, with degrees of freedom (df) = 48, and Sig value. (2-tailed) = 0.000. Because the significance value is smaller than 0.05, there is a statistically significant difference between the final exam scores of students in the digital learning group and the conventional group. The average difference is **14,16** shows that the students' scores in the digital group are significantly **higher** compared to the conventional group.

4. DISCUSSION

Learning Outcomes in Digital Groups

Students who study using digital methods show varied learning outcomes. Some students experience significant improvement because they can study flexibly, access material at any time, and have the freedom to repeat material as needed. This is in line with the opinion of [18] who states that online learning allows students to adapt the learning process to their own rhythm.

The average learning achievement of the digital group is also in the "good" category, although there is a wider variation in scores, ranging from 65 to 90. This variation reflects differences in the level of learning independence between individuals (Moore, Dickson-Deane, & Galyen, 2011). The main challenges faced in digital learning include the lack of face-to-face interaction, obstacles in direct consultation, and the need for higher time management from students.

Learning Outcomes in the Conventional Group

Meanwhile, students who follow conventional methods show improved learning outcomes, especially in understanding material, involvement in discussions, and motivation to learn. Direct interaction with lecturers provides benefits in building more effective two-way communication and facilitating in-depth understanding of concepts [19].

The average score obtained by students in this group is in the "good" category, with most scores being between 75 and 85. A structured learning environment and direct supervision of teaching are the main supporting factors for student learning motivation (Dimyati & Mudjiono, 2009). However, limited study time and dependence on face-to-face meetings are obstacles, especially for students who have different learning speeds.

Comparisons and Implications

Both methods have their own advantages and disadvantages. Conventional learning tends to be more effective in building social interaction, discipline, and direct guidance from lecturers. In contrast, digital learning provides easy access to information, time flexibility, and the ability to learn independently.

These results are in line with previous research which shows that the blended learning approach can integrate the advantages of both methods, so that it has the potential to have a more positive impact on overall student learning outcomes[20] .

5. CONCLUSION

The results of this research indicate that digital learning provides benefits in terms of accessibility and academic achievement, but still requires strengthening in terms of interaction and learning effectiveness. In contrast, conventional learning is more effective in building interaction and understanding of material, but less flexible in terms of access.

By considering the advantages and disadvantages of each method, the most ideal approach is to integrate the two through a blended learning model. A hybrid learning model that combines digital flexibility with the close interaction of conventional methods has the potential to create a more balanced and effective learning experience.

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