The Effectiveness of Implementation Blended Learning Flipped Classroom Type Reviewed from Student Learning Outcomes in Digital Simulation Subjects at Vocational High School

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Article Info	ABSTRACT

This study aims to find out the differences in student learning outcomes in the application of blended learning model flipped classroom type with enriched virtual learning model and to find out the more effective learning model between blended learning model flipped classroom type and enriched virtual learning model. The research method used is a quantitative quasi-experimental design by using pretest-posttest control. The population in this study is all students of grade X majoring in Accounting and Finance at Vocational High School. The sample used in this study was 72 students. Sampling techniques in this research are by total sampling method. Data obtained from pre-test and post-test results based on indicators of student learning outcomes. The results obtained from this study are as follows: First, there are differences in learning outcomes in Digital Simulation subjects in experimental classes by applying flipped classroom type blended learning models and control classes by applying enriched virtual learning models. Evidence from the average study results of experimental classes of 82.94 and control classes of 75.39. Second, flipped classroom blended learning models are more effective than enriched virtual learning models. The effectiveness of applying flipped classroom type blended learning models in experimental classes is in a moderate category, while the effectiveness of implementing enriched virtual learning models in control classes is in a low category.

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1.   INTRODUCTION

The development of information and communication technology today is growing rapidly where it can be seen the use of electronic or internet-based media is often used in various fields and aspects of life to support daily activities. The field of education has also begun to be used in learning systems that utilize online-based electronic media where teachers can interact with students without the need to face-to-face so that learning will run more flexibly because it can be done anytime and anywhere. The use of media in teaching and learning activities will change the role of teachers in a more positive direction [1]. The use of media makes teachers no longer have to verbally write and explain the content or subject matter in front of the class as has happened in the past.

Vocational High School is an educational institution that has been prepared to produce graduates who are competent and have skills in their fields to directly enter the world of work [2]. The purpose of Vocational High School implementation is further explained in Government Regulation No. 19 of 2005 on National Education Standards, namely vocational secondary education prioritizes the preparation of students in entering jobs to develop professional attitudes [3]. Vocational education has different characteristics than other educational units. From the substance of the lesson, the purpose of education, and the demands of education have their design. Generally, the difference lies in the direction of students to be ready in the face of a more emphasized world of work. Every vocational school graduate ideally has skills in a particular field so that they are ready to work in the business and industry.

The problem that is the basis of this research is the low participation of students in learning and the lack of cooperative attitudes of students so that it has an impact on low student learning outcomes. Based on the results of interviews that have been conducted by researchers with teachers of Digital Simulation subjects,

there are some problems when teaching and learning activities run. One of them is that there are students who do not pay attention to the material and explanation given by the teacher. Some students are still procrastinating until it is too late to collect assignments. In addition, students' ability to understand a theory is still not good. When in the learning material many theories must be understood it seems that students are still distressed. The teacher needs to explain over and over again so that the student is completely familiar with the material presented. Of course, this slows down the process of material delivery and leads to a lack of effectiveness of time in learning. Another problem is that students who are not present or permission not to participate in learning activities will be left behind by other students and have difficulty doing homework or assignments. Such matters will have an impact on students' learning outcomes becoming less satisfactory.

Djamarah and Zain [4] stated that the learning model has a considerable influence on teaching and learning activities. The relevance of choosing a learning model to be applied to a particular subject is very important and closely related to the achievement of learning objectives. Thus, the learning model used by the teacher and the method of application can have an impact on the level of understanding of the student's material so that it will also affect the student's learning outcomes. During this pandemic, the learning model used by teachers certainly changes according to the conditions under which the implementation is carried out online.

In an effort to improve student learning outcomes, educators need to determine suitable media and models for learning. One of them is with a blended learning model. This learning model combines indirect learning using online-based media and learning that involves direct or face-to-face interaction. During the work from home (WFH) period due to the current pandemic, blended learning is fully applied online by combining synchronous and indirect (asynchronous) learning. This model is used to make it easier for students to access learning materials or tasks given by teachers. With a combination of synchronous learning and asynchronous learning, students will get wider access to understanding the material because students can ask the teacher directly through online media. From this model, of course, it is necessary to support the learning process such as internet access and electronic devices to access it. Thus, the school has provided internet quota subsidy facilities as well as for students who each have a device such as a laptop or a smartphone to access it.

There are several applications that can be used to support the implementation of blended learning models, one of which is Google Classroom. According to Iftakhar [5], Google Classroom is one of the best platforms for improving teacher performance flow. Inside there are many useful features that are ideal for classroom learning with students. Features available in Google Classroom include teachers creating virtual classes, attaching subject matter, creating assignments, quiz assignments, and announcements for students. In addition, there is also a grading feature or assessment of the tasks that each student does. The advantages of using Google Classroom in learning according to Abid Azhar and Iqbal [6] are free, easy to use for teachers and students because of their appearance such as social media (Facebook, Twitter), and integrated with other Google applications such as Google Form, Google Drive, Google Doc, Google Slides, YouTube, and so on. Google Classroom media is preferred over other media because most students already have a google account so there is no need to register again on this platform. Moreover, the display of Google Classroom itself is very simple and minimalist so it is easy to understand its use and can also be accessed through computer/laptop devices and smartphones.

According to Staker and Horn [7], in blended learning models, there are several types of learning implementation models that can be used. The first model is rotation model, which is a combination of online learning and face-to-face rotation, this model is divided into 4 types, station-rotation model; lab-rotation model; flipped-classroom model; individual-rotation model. The second is flex model, a model where the delivery of materials and learning through the internet, but student supervision is carried out directly. And the third is self-blend model, where students choose independently learning, but still done in the same learning environment. And the fourth is enriched-virtual model, done by sending content and learning online and then conducted in-person meeting when needed, this model is often also called remote blended learning. At this vocational high school, the learning model that was previously often used by teachers in teaching digital simulation lessons is enriched virtual. So with the variety of other models is expected to improve student learning outcomes.

One type of blended learning rotation model is a flipped classroom. The flipped classroom model is based on reverse traditional learning where student activities typically performed in the classroom are reversed or exchanged for student activities that are usually done outside the classroom [8]. This means that classroom learning such as material delivery and Q&A are conducted outside the classroom through virtual classrooms in Google Classroom. Similarly, learning outside the classroom such as assignments, discussions, evaluations, and reviewing materials is done in the classroom. Flipped Classroom was chosen because it involves e-learning so it is very related to Digital Simulation subjects in which there are e-learning materials. So that by using e-learning students can also know and learn it. The learning materials provided vary such as e-books, digital references, or pictures, and videos. That way students who can't attend the classroom can still learn the material flexibly. When there are some parts that you don't understand, students can ask questions and discuss them in the Google Classroom app. In the application, students are not only given materials but assignments and quiz assignments where students have to upload their work into virtual classes. After going through the learning

stage outside the classroom, then the learning in the classroom is carried out which is filled with discussions about the previous material and evaluation of learning so that student development can be monitored by the teacher. From research conducted by Nouri [8], it was found that students are more interested in learning flipped classroom models because students can learn through video materials, learn at their own pace, flexibility and mobility in accessing materials so that learning will be easier and more effective in flipped classroom models.

2. RESEARCH METHOD

This research is quasi-experimental design research, which is included in the experimental method. This type of research uses a quantitative approach. Arikunto [9] explains that experimental methods are a way of finding causal relationships between two factors that researchers intentionally appear by reducing or setting aside factors that can be disruptive.

Quasi-experiment research method according to Sugiyono [10] there are two forms, namely time series design and nonequivalent control group design. The design used in this research is quasi-experimental and using a non-equivalent control group design model. Before being given treatment, both the experimental group and the control group were given a pre-test, to know the condition of the group before treatment. Then after being given treatment, the experimental group and control group were given a post-test, to find out the condition of the group after treatment.

Table 1. Research Design

Class	Pre-Test	Treatment	Post-Test
Experiment	O1	X1	O2
Control	O3	X2	O4

In determining samples in this study, the authors used total sampling techniques. The population used in this study was students of grade X Acounting and Finance which amounted to 72 students from 2 classes. The sample consists of 2 classes, namely from students of grade X majoring in Acounting and Finance in the 2019/2020 school year, with a total of 72 students. One class becomes a control group, namely X Acounting and Finance 2 class and one class becomes an experimental group that is X Acounting and Finance 1 class.

In this study, data collection techniques were used in the form of a learning results test. The test serves as a measuring tool for the success of learners in the learning process. In this study, the study results used were pre-test and post-test. A pre-test is a test that is done at the beginning before treatment in the research sample and as an indicator of equality of conditions between the control group and the experimental group. While post-test is a test conducted after providing treatment to research samples in the form of the use of blended learning model flipped classroom type in the experimental group and enriched virtual learning in the control group. Post-test is used to get grades from the experimental group and control group as a measure of differences in learning outcomes after treatment. The research procedure is described in Figure 1 as follows:
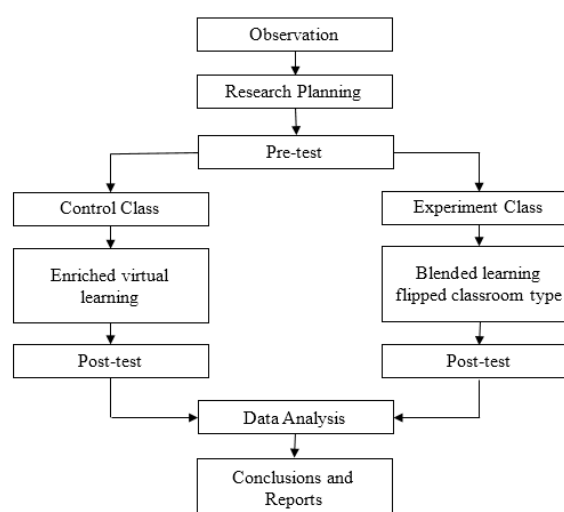

Figure 1. Research Procedure

3. RESULT AND ANALYSIS

Before the implementation of research in the experiment class and control class, instrument testing of pre-test and post-test questions to determine the feasibility of using the instrument for further use in the collection of research data. Instrument testing on pre-test and post-test was conducted on 15 students of class XII Multimedia 2. The instruments tested were 30 items of multiple-choice questions for each pre-test and post-test instrument. Based on the number of learners in the instrument test is known as r table value = 0.514.

From the test results that have been done, it can be concluded that the question used for this research is a question that has a validity category of 25 pre-test questions and 23 post-test questions. And in reliability testing obtained a reliability value (Cronbach Alpha) of 0.896 on pre-test and 0.871 in the post-test question where both fall into the category of excellent.

3.1. RESULT

The data of the students' initial achievement contains the values obtained by the learners through the pre-test. The value obtained from the pre-test becomes an indicator of the initial ability of the learner. An overview of the data from the learner's initial ability value can be seen in table 2.

Table 2. Pre-Test Result Data

Description	Experiment Class	Control Class
Average	70,67	72,44
Lowest Score	56	60
Highest Score	84	84
Standard Deviation	7,41	6,33
Varians	54,86	40,02
Number of Students	36	36

The final result of the student's achievement contains the grades obtained by the learner through the post-test. The value obtained from the post-test becomes an indicator of the final ability of the learner. An overview of the data from the final ability values of learners can be seen in table 3.

Table 3. Post-Test Result Data

Description	Experiment Class	Control Class
Average	82,94	75,39
Lowest Score	70	65
Highest Score	100	91
Standard Deviation	8,59	7,06
Varians	73,71	49,84
Number of Students	36	36

Furthermore, prerequisite tests consisting of a normality test, homogeneity test, and balance test. Normality tests are performed to test whether pre-test and post-test results are normal. Details of normality test results can be seen in table 4.

Table 4. Normality Test Results

Instrument	Class	Sig. Kolmogrov	Conclusion
Pre-Test	Experiment Class	0,152	Normal
	Control Class	0,099	Normal
Post-Test	Experiment Class	0,076	Normal
	Control Class	0,104	Normal

Normality test results in pre-test and post-test learning results in the experimental class and control class in table 4 showed significance value in the pre-test results of the experimental class of $0.152 > 0.05$ and pre-test control class of $0.099 > 0.05$ so that both distributed normally. Then the significant value in the post-test results of the experimental class was $0.076 > 0.05$ and the post-test control class was $0.104 > 0.05$ so that both were also distributed normally.

A homogeneity test is done to test whether the results of pre-test and final capability (post-test) are homogeneous. Homogeneity test results of pre-test and post-test data can be seen in table 5.

Table 5. Homogeneity Test Results

Instrument	Sig. *Levene's*	α = 5%	Conclusion
Pre-Test	0,332	0,05	Homogeneous
Post-Test	0,204	0,05	Homogeneous

Table 5 shows that the sig value in the pre-test experiment class and control class is 0.332 and the sig value in the post-test experiment class and the control class is 0.204. Both values have a significance value greater than 0.05 so that the data can be said to be homogeneous.

The balance test was conducted to test whether both groups had the same pre-test to be researched. The results of the balance test can be seen in table 6.

Table 6. Balance Test Results

Instrument	Sig. (2-*tailed*)	Conclusion
Pre-Test	0,277	Balanced Class

Table 6 shows that the pre-test data has a significance value of 0.277 where the value is greater than 0.05. With these results, it can be concluded that both classes have the same ability or balance.

Table 7. First Hypothesis Test Results

Instrument	Sig. (2-*tailed*)	Conclusion
Post-Test	0,000	H_a accepted

Table 7 shows that the value of sig (2-tailed) is 0.000 which means that the value is less than the significance level of 0.05. With these results, it can be concluded that hypothesis zero (H0) is rejected and Ha is accepted which means there is a difference in student learning outcomes between the use of blended learning model flipped classroom type and enriched virtual learning in Digital Simulation subjects.

Table 8. Second Hypothesis Test Results

Class	*Pre-Test Average*	*Post-Test Average*	*Standart Gain*	Description
Experiment	70,67	82,94	0,43	Medium
Control	72,44	75,39	0,09	Low

Table 8 shows that the standard gain value in the experiment class is 0.43 which means that the effectiveness of using the flipped classroom model belongs to the medium category. While the standard gain value in the control class is 0.09 which means that the effectiveness of using the enriched virtual model belongs to a low category. Thus the standard gain value in the experiment class is greater than the control class (0.43 > 0.09) which means H0 is rejected and Ha is accepted. Therefore, it can be concluded that the use of a blended learning model flipped classroom type is more effective compared to enriched virtual learning in Digital Simulation subjects.

3.2. ANALYSIS

Based on the results of pre-test scores conducted before both classes were treated, it was found that the average score in the experiment class was 70.67 and the control class was 72.44. It shows that the average pre-test value in both classes still does not meet the Minimum CompletedNess Criteria of 75. After the experiment class was treated using blended learning model flipped classroom type and in the control class using enriched virtual learning, it was found that the average post-test value in the experiment class was 82.94 and in the control class was 75.39.

From the results of the average pre-test and post-test scores that have been described, there can be found an increase in average grades in the experimental class by 17.4% while in the control class there was an average increase in the value of 4.1%. Thus, there were differences in learning outcomes from both classes where the experiment class experienced a higher average score increase than the control class. The results of this study are in accordance with the research that has been done by Ario and Asra [11] on the influence of flipped classroom learning on learning outcomes has found that flipped classroom learning affects the learning outcomes of learners. These influences result from flipped classroom learning that gives learners more time to learn learning materials and the availability of learning videos can make it easier for learners to play over and over again if they forget the past material.

The use of blended learning model flipped classroom type in this study can facilitate learners in learning because learning materials can be learned by learners through google classroom in the few days before the teaching and learning activities begin. Learners can use the time to understand the material in the form of a video provided by the teacher. Then if the learner has difficulty can be directly asked the teacher at the upcoming meeting so that the learner in a condition already understands the material when given the assignment. While in the use of enriched virtual learning model materials are given at the time the teaching and learning activities begins then-new learners are assigned. This makes students tend to be lazy because they feel they can do it next time. The teaching and learning activities time is spent studying the material so that the opportunity to ask the teacher becomes very limited. Therefore, the understanding of learners becomes slow and affects the learning outcomes of learners.

The use of blended learning model flipped classroom type has a higher level of effectiveness compared to enriched virtual learning because in flipped classroom learning learners are given time to learn the material first so that they are ready when working on tasks during learning. This is in line with the results of research from Nouri [8] which indicates that the use of flipped classroom learning models makes learners' learning more effective, supportive, and motivating especially for students who have low learning outcomes.

4. CONCLUSION

There are differences in student learning outcomes in the blended learning model of flipped classroom type with enriched virtual learning. The difference is known from the results of t-test calculations on post-test values whose results are $0.000 < 0.05$ which means H0 is rejected and Ha is accepted. Thus, it appears that there is a significant difference in learning outcomes between the use of flipped classroom type blended learning models and enriched virtual learning in Digital Simulation subjects. Blended learning model flipped classroom type has higher effectiveness compared to enriched virtual learning reviewed from student learning outcomes in Digital Simulation subjects. This is evidenced by the results of the N-Gain calculation were in the experimental class using blended learning model flipped classroom type obtained a standard gain value of 0.43 which belongs to the medium category. Meanwhile, the control class that uses enriched virtual learning models obtained a standard gain value of 0.09 which belongs to the low category. Therefore, it can be concluded that the use of a blended learning model flipped classroom type is more effective compared to the use of a enriched virtual learning model.

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