

The Influence of Project-Based Learning Models to Increase Student Motivation and Learning Outcomes In Digital Simulation And Communication Subjects In the 3T Region at Vocational School Negeri 4 Talaud

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ABSTRACT

The background of this research is that learning is still focused on the teacher. During the ongoing learning process in the classroom, it can be seen that students are not participating enough in learning because students only accept and are passive. There were only a few students who seemed to pay attention to the explanation and respond to questions from the teacher, while some other students were less enthusiastic, less attentive, and interested in following the learning process. This research aims to determine the effect of project-based learning, as well as determine the increase in student motivation and learning outcomes through the application of the project-based learning model. The method used in this research is a quantitative method of the Quasy Experiment type with the Static Group Comparison research design. The population in this study were all class X students at SMK Negeri 4 Talaud. Sampling used the Purposive Sampling technique. Class X Accounting is the experimental class and Class X TITL is the control class. Research data on students' Digital Simulation and Communication learning outcomes was obtained from the final test. Based on the analysis of the research data, it is known that the final test of Digital Simulation learning outcomes was calculated using the t-test with the result $t_{count} > t_{table}$ ($2,731 > 22$, which means that H_0 was rejected at the $\alpha = 0.05$ level. So from these results, it can be concluded that rejects H_0 and accepts H_1 . So it can be concluded that the effect

of using project-based learning on students' Digital Simulation and Communication learning outcomes is better than students who take conventional learning.

Keywords: digital simulation, influence, learning outcomes, problem-based learning

INTRODUCTION

Education is a conscious human effort with a dual aim, namely developing personality and human abilities. It is this conscious effort that indicates the intentional nature of education. In the national education goals, it can be seen that the expected goal is to develop the potential of students. Efforts to achieve these goals must go through a process or activity called learning. The purpose of learning is that what is learned is useful in the future, namely helping to continue learning more easily. State Vocational School 4 Talaud is a school whose address is Gemeh village, Gemeh sub-district, based on observations in classes X accounting and learning is less effective and does not involve students in teaching and learning activities so that students tend to become passive.

In the learning process, student motivation to learn is very important. One of them is activeness in exploring learning. However, a boring learning process can make students pay less attention to learning and tend to be passive. There are even some students who are busy playing with their cellphones because they don't understand the material being presented. And some students think the material is too difficult to understand, this causes a lack of student understanding of the material presented in simulation and digital communication subjects. In education, a teacher is required to have the ability to teach well and correctly, for this reason the teacher must be able to choose and use learning that is appropriate and appropriate to the subject matter that will be presented and taking into account the level of development of his students. Therefore, the learning methods used by teachers should pay attention to student factors who act as learning subjects, because students' abilities and students' learning methods are different. These differences cause different needs for each individual, but this does not mean that learning must be changed to individual learning, but rather that learning is needed so that students' individual needs are met. As a researcher, I take the Project Based Learning (PjBl) learning model, which is a model that uses projects or activities as the core of learning. Students carry out exploration, assessment, interpretation, synthesis to produce various forms of learning outcomes. The steps for implementing project-based learning are determining basic questions, preparing project plans, preparing schedules, monitoring, testing results, and evaluating experiences (Permendikbud). Project Based Learning uses problems as an initial step in collecting and integrating new knowledge based on experience in real activities.

Based on the background of the existing problem, research was carried out with the title: The Influence of the Project-Based Learning Model to Increase Student Motivation and Learning Outcomes in Simulation and Digital Communication Subjects in the 3T Regional Vocational School N 4 Talaud.

LITERATURE REVIEW

Learning Motivation

Motivation and learning are two things that influence each other. Motivation to learn can arise due to intrinsic factors, in the form of desire and desire to succeed encouragement of the need to learn, and hope for ideals (Hamzah B. Uno, 2008). Meanwhile, the extrinsic factors are awards, a conducive learning environment, and interesting learning activities.

Sri Adi Widodo expressed his opinion, namely: Learning Motivation is the overall driving force within students which gives rise to learning activities which ensures the continuity of learning activities and provides direction to learning activities so that the learning objectives desired by the learning subject can be achieved. Learning Motivation is a process that provides enthusiasm for learning, direction, and persistence of behavior (Agus Suprijono, 2012). This means that motivated behavior is behavior that is full of energy, directed, and long-lasting. Motivation plays an important role in providing passion, enthusiasm, and enjoyment in learning so that students who have high motivation have a lot of energy to carry out learning activities.

Based on the definition above, it can be concluded that learning motivation is an impulse that exists within and outside students in learning activities, thereby causing changes in behavior to achieve a goal with supporting elements.

Factors that Influence Learning Motivation

Some elements influence learning motivation, including (1) Students' dreams or aspirations (2) Students' abilities (3) Students' conditions (4) Students' environmental conditions (5) Dynamic elements in learning and learning (7) Teacher efforts in teaching students (Dimiyati and Mudjiono, 2009).

Project Based Learning (PjBL) Learning Model

The Project Based Learning method is a refinement of the Problem-Based Learning method. Project-based learning is a training strategy that is oriented toward CTL or contextual teaching and learning processes (Jones, Rasmussen, and Moffit, 1997). CTL is a learning concept that helps educators link learning material with real-world situations and encourages students to use the knowledge they have to apply it to their lives as members of society.

Project Learning is learning that places more emphasis on solving authentic problems that occur every day through direct practical learning experiences in the community (John, 2008). Project-based learning can also be interpreted as project-based learning, experience-based education, or learning that is rooted in real-life problems (Gijbels, 2005). So, project-based Learning is a way of learning that leads to a training process based on real problems carried out by oneself through certain activities (projects).

This Project Based Learning method is different from direct learning which emphasizes the achievement of educators' ideas and skills. The role of educators in the Project Based Learning method is to present problems, ask questions, and facilitate investigation and dialogue. Project Based Learning will not occur without the skills of educators in developing a training environment that allows for an open exchange of ideas and dialogue between trainers and participants. Learning using the Project Based Learning method must use real problems so that training participants learn, think, critically, and

are skilled at solving problems and support the development of technical skills and the acquisition of in-depth knowledge.

Framework of Thinking

The success of learning is not only seen from the final value of the learning outcomes but also from the learning process, quality input not followed by an appropriate process means the resulting output will not necessarily be of good quality. The success of teaching and learning is influenced by several factors, one of which is the teaching model or method used by the teacher in delivering the material. The use of learning methods that are less varied and less involving students can cause students to become passive, which of course will affect their activeness and motivation to learn.

The learning model or method used by teachers in teaching has a very important role in achieving learning success. Several factors that influence learning achievement are students' activeness and learning motivation. Choosing the right method that is appropriate to the material to be delivered will bring student participation and can arouse student activity and motivation to learn. Learning that is still centered on the teacher by telling stories or lecturing, which has so far been carried out in the learning process involves students very little in learning, resulting in a lack of student activity and motivation to learn, especially class X students at SMK Negeri 4 Talaud. The solution to overcome this problem is to apply the project-based learning model. It is hoped that the application of project-based learning will be able to be applied effectively in Simulation and Digital Communication subjects because students are required to be more active and enjoy learning.

Action Hypothesis

Based on theoretical studies, relevant research, and a framework of thinking, the following action hypothesis can be formulated: (1) The Project Based Learning Model can increase students' learning motivation in the Digital Simulation and Communication subject class X at SMKN 4 Talaud (2) The Project Based Learning Model Learning can improve student learning in the Simulation and Digital Communication subjects for class X SMKN 4 Talaud

METHODS

Type of Research

The method used in this research is a quasi-experimental or quasi-experimental method, namely an experimental method in which control is carried out on only one variable, namely the variable that is considered the most dominant. The experimental class was treated with the Project Based Learning (PjBL) learning model and the control class was given learning treatment using the 5 M learning based on the 2013 curriculum, namely: observing, asking, collecting data, evaluating and communicating.

Population and Sample

Population

The population is the entire research object (Arikunto, 2010). Population is the entire population intended to be investigated (Hadi, 2000). The population in this study were class X students of SMK N 4 Talaud. And the samples taken in this research were class X Electrical Power Installation Engineering (TITL) students and class X Accounting students.

Sample

Sampling was carried out due to the limitations of researchers in research who were unable to provide treatment to the entire population, so they only took a portion of the population as a sample that could represent the entire population (Sugiyono, 2011). The sample from this research is class X Accounting as an experimental class using a project-based learning model with a total of 12 students and class.

Research Design

In this research, the statistical group comparison method is used, where two groups will be compared, namely, first; learning using conventional methods as a control group and second; learning using the PJB learning model as an experimental group in simulation and Digital Communication subjects. Both classes will be given the same learning materials. See Table 1.

Table 1. Research Design Patterns.

Group	Treatment	Test
Experiment	PJBL	X ₁
Control		X ₂

In this study, the treatment of the experimental group used a project-based learning model and the results of student activity and motivation to learn were the scores obtained from taking the test after the treatment was completed.

Research Instruments

An instrument is a tool or technique for collecting data. The quality of the instrument will determine the quality of the data collected. The type of instrument used in this research is learning outcomes test questions, namely written test questions in the form of objectives with the material provided during the treatment. The instruments that will be given have been validated so that they are reliable as measuring and research tools.

1. Test Validity

Validity is the level that shows that a test can measure what it is supposed to measure. The learning outcomes instrument was tested at a school equivalent to the research location. In this case, the trial was carried out in class X of SMK N 4 Talaud. After the trial is carried out, the test results are analyzed using the formula

2. Reliability

Reliability is the determination of an instrument to show consistent scores in carrying out its measuring function. A test is said to have high reliability if the test can provide consistent results. The reliability of the questions is determined using a formula which is as follows:

3. Differentiating Power

Determining differentiating power is the ability of a question to differentiate between clever students and students who are less clever. The way to determine the differentiating power (D) for a small group is that the entire test group is divided into two, 50% of the upper group and 50% of the lower group, while for the large group, 27% of the top score is usually taken as the upper group and the 27% of the lowest score as the lower group.

To calculate the differentiating power of questions, the formula is used:

4. Difficulty Index

The difficulty index is a number that shows the level of difficulty of each question item. Good test items are items that have balanced proportions. The higher the difficulty index, the easier the questions are. The way to find the difficulty index is to use the following formula

Data Collection Techniques

Data was collected by texting the research sample. The test is carried out after all the material is given or at the end of the research

Data Analysis Techniques

1. Normality Test

The normality test is carried out to determine whether the data comes from a normal distribution or not.

2. Homogeneity Test

This test aims to see whether the two groups have homogeneous variance or not. This test is carried out using a test

3. Hypothesis Testing

This hypothesis test aims to prove whether the specified hypothesis is accepted or rejected. To determine whether there are differences in learning outcomes between the two sample classes, for data that is normally and homogeneously distributed, a test of equality of two means (t-test) is carried out. Based on the hypothesis put forward, a two-part test is carried out with the following hypothesis formulation:

$H_0: \mu_1 = \mu_2$ and $H_a: \mu_1 > \mu_2$ with μ_1 being the average motivation and learning outcomes of digital simulations in the experimental class and μ_2 being the average learning outcomes in digital simulations in the control class. To test the hypothesis, the t-test is used, namely if the data is normally distributed and homogeneous, then the following formula

4. Determination Test

The steps for determination testing are as follows:

a. Testing the correlation coefficient

The correlation coefficient test is used to test the direction of the relationship between the independent variable and the dependent variable.

RESULTS AND DISCUSSION

Data Description

This research is experimental research which is divided into two classes, namely the experimental class and the control class. This research activity was carried out from August 14 to September 22 2023 in class X Accounting as an experimental class and class X TITL as a control class at SMK N 4 Talaud.

Before research activities are carried out, researchers carry out a learning process and prepare research instruments. The material chosen explains presentation software, analyzes the features of making presentation slides, shows examples of presentation slides, and practices making presentation slides because this material follows the project-based learning model that will be applied. The learning process takes place from August 2023 to September 2023 and a final test is given, both students in the experimental class and the control class are present.

Based on the results of the data that has been processed, the experimental class and the control class, the experimental class is the class whose learning uses the Project Based Learning learning model and the control class is the class whose learning does not use the Project Based Learning learning model, the following are the results of the data that has been processed and displayed right in the form of table 2 below:

Table 2. Data from calculations of student motivation and learning outcomes in simulation and digital communication subjects.

Class	N	X	s^2	S	X _{max}	X _{min}	Classical Completeness Presentation
Experiment	12	82.91	90,45	9.51	95	70	91,66 %
Control	12	78,33	8,59	9.04	85	65	66,67%

Based on Table 2, it can be seen that there is a difference in the average value of the experimental class and the control class. The average of the experimental class was 82.91 while the control class had an average of 78.33. So, the average in the experimental class is higher than in the control class.

Besides, the number of students in the experimental class was more than in the control class. It can be seen that the average completeness of the experimental class is higher compared to the control class. In the experimental class, the number of students who completed was 11 students out of 12 students. Meanwhile, in the control class, the number of students who completed was 8 students out of 12 students. See Table 3.

Table 3. Frequency Distribution of Final Experiment Test Scores

No	Value	Absolute Frequency (fa)	Cumulative Frequency (fk)	Relative Frequency (fr%)
1	70	1	1	8
2	75	2	3	17
3	80	3	6	25
4	85	3	9	25
5	90	1	10	8
6	95	2	12	17
	Total	12		100

From the table 3, it can be concluded that 1 student got a score of 60 to 70, 2 student got a score of 71 to 75, 3 students got a score of 86 to 80, 3 students got a score of 81 to 85. people, students who got a score of 86 to 90 were 1 person, and students who got a score of 91 to 95 were 2 people. The most students get is 75 to 95.

Table 4. Frequency Distribution of Control Class Final Test Scores

No	Value	Absolute Frequency (fa)	Cumulative Frequency (fk)	Relative Frequency (fr%)
1	68	1	1	21
2	70	3	4	18
3	75	4	8	33
4	80	3	11	15
5	85	1	12	6
	Total	12		100

Based on the results of the final test scores of the control class which has been given learning using the conventional learning model, it can be described in the form of a frequency distribution table as in table 4. Based on tests carried out after using the conventional learning model as seen in Table 4, the highest score obtained by students was 85 while the lowest score was 68. From the scores obtained by students, it is known that the number of students who succeeded in achieving completion was 8 students.

Data Analysis

Before data analysis is carried out, there are requirements needed, namely data normality and data homogeneity. So that the conclusions drawn are correct and accurate, a Normality Test and Homogeneity Test are carried out.

Table 5. Normality Test Results for Student Activity and Learning Motivation

No	Kelas	L ₀	L _{table}	Conclusion	Information
1	Experiment	0.95	0.242	L ₀ < L _{table}	Normal Data
2	Control	0.91	0,242	L ₀ < L _{table}	Normal Data

Based on the Lilliefors test in the control class above, it can be obtained that $L_0 = 0.003$ and $L_{table} = 0.242$. The data is said to be normally distributed at the real level $\alpha = 0.916$ if $L_0 < L_{table}$ and if $L_0 > L_{table}$ then the data is not normal. Because $L_0 < L_{table}$ ($0.242 < 0.91$), it can be concluded that the control class has a normal distribution. So, based on table 5, above, it can be seen that the two sample classes have L_0 values smaller than L_{table} . So it can be concluded that the two sample classes are normally distributed.

The homogeneity test was carried out after carrying out the normality test, the homogeneity test was carried out on the experimental class and control class using the F test with the following formula, see table 6.

Table 6. Homogeneity Test Calculation Results

Data	F _{count}	F _{table}	Conclusion	Information
Final Test	0.942	1.69	F _{count} < F _{table}	Homogeneous

Based on calculated $F = 0.094$ while $F_{table} = 3.11$. So $F_{count} < F_{table}$, then the variance is homogeneous.

Hypothesis Testing The results of the hypothesis test can be seen in the following calculations. From the Normality and Homogeneity of Variance Test Table 5 and 6, it turns out that the sample is Normally distributed and has Homogeneous Variance, hence the test.

The hypothesis uses the t formula, previously looking for the combined S, see table 7.

Table 7. Hypothesis Test calculation results

Data	T _{count}	T _{table}	Conclusion	Information
Final Test	2.731	22	T _{count} > T _{table}	There is a difference

Based on this analysis it can be concluded that $T_{count} > T_{table}$ ($2.731 > 1.622$ which means H_0 is rejected and the conclusion is "Motivation and Digital Simulation learning outcomes of students who take part in learning using the Project Based Learning learning model are better than students who take part in conventional learning in class X Talaud State Vocational School 4."

In carrying out the research, the amount of learning time given to the experimental class and control class was the same. So the treatment is different only in the learning model used. The

experimental class uses the Project-based learning learning model, while the control class uses learning without using the Project Based Learning learning model. The following is the influence of the project-based learning model starting from the teacher entering the class explaining the lesson and dividing the students into several groups to solve problems using the project-based learning model.

The results of Digital Simulation learning at SMK N 4 Talaud using the project-based learning learning model, which overall achieved quite a significant increase in scores. This can be seen in the average value of the experimental class of 82.91 and the average value of the control class of 78.33. From the analysis of data obtained through hypothesis testing, it can be seen that the project-based learning model provides a significant increase in learning outcomes. This is caused by:

- a. Judging from the aspect of understanding, the influence of the project-based learning model is more effective than student learning outcomes. students who use the project-based learning model understand the material being studied better, this is because when the teacher presents the material the students are more concentrated in solving problems in their group. Thus, it can be concluded that the influence of the project-based learning model has a significant effect on improving student learning outcomes in the Digital Simulation subject at SMK N 4 Talaud.
- b. Judging from the implementation aspect, the influence of the project-based learning model is more effective than conventional learning models in improving student learning outcomes. Students who use the project-based learning learning model find it easier to apply learning in the teaching and learning process, this is because students find it easier to solve problems that have been given by the teacher previously. Thus, it can be concluded that the influence of the problem-based learning model has a significant effect on increasing student motivation and learning outcomes in the Digital Simulation subject at SMK N 4 Talaud.
- c. Judging from the analytical aspect, the influence of the project-based learning model is more effective than conventional learning models in improving student learning outcomes. Students who use the influence of the project-based learning model have more ability to analyze the questions given because students can absorb the learning material well. Thus, it can be concluded that the influence of the project-based learning model has a significant effect on motivation and increased motivation and student learning outcomes in the Digital Simulation subject at SMK N 4 Talaud.

Even though the influence value is not very large, the influence of the project-based learning model has been proven to increase student activity and learning outcomes, as can be seen from the average learning result in the final test for the experimental class, which was 75.71%, while in the control class, it was 52.05%. The higher average learning outcomes of the experimental class compared to the control class can be caused by the influence of the project-based learning model which has been proven to improve student learning outcomes, which can be seen from the average learning outcomes in the final test of the experimental class which was 75.71% while in the control class it was 52.08%. The higher average compared to the control class can be caused by the influence of the project-based

learning model because students become more interested and can focus their attention on learning. In this learning, students are more active in observing, thinking, developing, and studying the material.

The influence of the project-based learning model also has enormous potential to create a more interesting and meaningful learning experience. The influence of the project-based learning model will guide students to be active during learning so that students' activeness in learning will have an impact on the learning outcomes obtained.

Meanwhile, in the control class which does not use project-based learning, it provides students with the opportunity to optimize their potential. Educators place more emphasis on how students can master the material being studied. Learning without using project-based learning, watching makes students less interested, and bored, their attention is not focused and they are not motivated to learn, students do not discover new things that can be discussed with educators or friends.

The low score of the control class when compared to the experimental class can also be caused by the control class students not exploring enough information through tools or other sources. Students feel that the information they get from educators is sufficient. Students become bored as a result, students' concentration can be broken so that few students concentrate on lessons and doing assignments/practices. Based on these results, it can be seen that control class students are less motivated to learn so the effect on student learning outcomes is lower than in the experimental class.

Based on the theoretical studies put forward and from the results of data analysis, it can be concluded that the learning outcomes of students using the project-based learning model are better than the control class. It can be seen that the Simulation and Digital Communication learning outcomes of students who do not use the project-based learning model use the project-based learning can increase, and the improvement achieved is greater than learning without using the project-based learning model. This means that the hypothesis is accepted, namely that there is a significant influence of using project-based learning on student learning outcomes in the Digital Simulation and Communication subject class X TKJ at SMK N 4 Talaud.

CONCLUSION

This research concludes that there is an influence of the problem-based learning model on student learning outcomes in the Digital Simulation subject which is better than the learning outcomes of students who use conventional learning models in class X of SMK Negeri 4 Talaut for the 2022/2023 academic year. The average student learning outcomes in the experimental class (Because $t_{count} > t_{table}$, namely $2.731 > 1.24$, means that H_0 is rejected. So it can be concluded that "The influence of the project-based learning model on the activity and motivation of students' Digital Simulation learning outcomes is better than students who take conventional learning". So, the learning outcomes of the experimental class and the control class have quite significant differences in the results of the final test.

Suggestion

Based on the conclusions, the researcher suggests several things, namely:

1. Teachers, seeing that the use of problem-based learning has a positive impact on student learning outcomes in Digital Simulation subjects, Digital Simulation teachers should be able to use problem-based learning to improve student learning outcomes.
2. Students, in every learning process, students are expected to always be active and always improve their learning achievements to the maximum.
3. Other researchers. For other researchers, it is hoped that there will be further research as a development of this research and to use problem-based learning on other appropriate topics.

This research is still limited to student learning outcomes, it is hoped that other aspects of learning abilities will be examined for researchers who are interested in continuing this research.

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