Student Learning Outcomes in CNC Subject Using Tutorial Video Learning Media

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ABSTRACT

One of the productive subjects at the Vocational High School level unit in the curriculum of the Mechanical Engineering expertise program at SMKN 1 Padang is the CNC (Computer Numerical Control) subject. CNC subjects focus more on discussing how the manufacturing process uses computerized controls to operate machining tools. Learning is still carried out conventionally with blackboard media and students listen and take notes without being provided with a handbook. This condition has an impact on the ineffectiveness of learning so that it tends to be boring which can result in students forgetting the steps in making programming and being less motivated which in the end student learning outcomes are not optimal. In overcoming this problem, learning is carried out using video tutorial media. This study aims to show the effect of video tutorials on CNC material on student learning outcomes. The research method was carried out with a quantitative research type approach using the experimental method. The population and research sample used students of class XI Mechanical Engineering. Data collection techniques include taking tests in the experimental class and control class. The results obtained from the research stated as a percentage of learning outcomes given by students after using video tutorial learning media. Based on the results after the test there was an increase, the average student learning outcomes of the experimental class was 79.73. Meanwhile, the average student achievement in the control class was only 67.57. Using video tutorial learning media can have a good impact on the development and increase in student learning values.

Keywords: *Learning Outcomes, Learning Media, Video Tutorials, CNC.*

1. INTRODUCTION

Education is the process of studying the skills, knowledge and habits of a group of people in developing the potential for self-mastery, intelligence, character which is passed on from generation to generation through education, training or research [1]. In the goal of sustainable national development it is necessary to advance the education system. The secondary level education unit in Indonesia is SMK (Vocational High School). SMK have a role in directly supporting the direction of further national development, especially in preparing workers with skills and education about the needs of the world of work [2]. SMK is an education system that requires students to be able to master certain skills in this special training program [3]. Lessons at SMK itself consist of 3 main subjects, namely adaptability, description and effectiveness. The main subject of the mechanical engineering expertise program

is the CNC (Computer Numerical Control) course [4]. CNC subjects are lessons on machines with work processes controlled using a computer, so that the movements on the machine run automatically with input program commands [5]. SMK 1 Padang teaches this topic to Class XII students of the Mechanical Engineering Specialization Program, explaining how manufacturing operating systems utilize computer controls to process and manipulate tools and cutting machines to make parts such as metal, plastic, wood, foam and so on.

Based on observations at SMK 1 Padang, this SMK has the potential to utilize learning media as infrastructure in assisting the teaching-learning process in a class [6]. However, in reality teachers still use traditional learning aids, namely blackboards, then students listen and take notes [7]. The use of conventional methods without effective learning transformation during the opening of learning, so that in the long run it can lead to forgetting programming steps and lowering student

motivation which will eventually lead to poor student performance. Implementation of learning, especially in this CNC subject, students are less equipped with student handbooks. So that if students do not pay attention and record the teaching material provided, the efficiency of the learning process is reduced. The final impact will be seen in the assessment of student learning outcomes that are not optimal. The achievement of student passing grades based on the Minimum Completeness Criteria (MCC) only obtained 20% and 80% were declared not passed.

Factors that influence the decline in learning outcomes are triggered by two main factors, namely external factors and internal factors [8]. Factors from external students include social, anti-social factors such as methods in the learning process, teacher qualifications, supporting equipment and assessment of learning outcomes, learning media. While the internal factors of students include psychophysiological factors [9]. It is necessary to create new learning media that can hone students' cognitive abilities, but are easy to understand and understand [10]. The application of learning media in the form of video tutorials is an optimization of solutions to produce students who are able to understand learning material well [11].

The use of video tutorial media facilitates teachers in directed teaching and learning procedures. Teachers do not need to redefine the same material in different classes [12]. By using modern and interesting learning media, learning interest has an impact on increasing motivation in learning [13]. This is because, being able to play the learning videos that have been given, besides that this tutorial video learning media has never been implemented at SMK 1 Padang. Based on the explanation above, the researcher is interested in conducting research to show the impact of video tutorial media on students on CNC subjects.

2. RESEARCH METHOD

This type of research uses the experimental method. The experimental method is defined as a research method in looking at the effect of other actions on resolved conditions [14]. This study utilized an experimental and control design without pre-test testing. This form is known as a randomized control group only post-test design for randomized controlled trials. This design proves the effect of treatment by comparing the average post-test scores between the control and experimental groups.

Populations are various abstract domains consisting of: objects or subjects with the properties and qualities that are implemented by researchers who are being investigated and conclusions drawn [14]. The research population was students of class XI in the Mechanical Engineering Department, SMK 1 Padang in the 2022/2023 academic year, totaling 64 students, with a total of 30 students in class XI TP-A and 34 students in class XI TP-B. The sample is a number of characteristics held in a population structure [14]. Two classes were taken as a sample: class XI TP-A and XI TP-B at SMK 1 Padang. Data collection is a technique used by the author in the process of collecting data, so that in order to find the data it is hoped that the researcher will need tests and documentation for students to become research sample objects [15]. The research instrument for quantitative research is the quality of the equipment regarding the effectiveness and reliability of the equipment and the data collection process so as to capture the accuracy of the methods used to collect data [14]. The research instrument used is a test. Tests are used to reveal the level of student learning outcomes in learning [16]. In this study, student tests were given 20 questions with a question grid consisting of 6 sections according to basic competencies and the subject matter of learning.

3. RESULTS AND DISCUSSION

The posttest results obtained in class XI TPA using the video tutorial method found that the highest score = 97 and the lowest score = 64, the number of students is 30 people. Table 1 shows the frequency distribution of the experimental class. With statistical calculations, the average value = 81.30 and standard deviation (s) = 94.24.

Table 1. Posttest Frequency Distribution of Experimental Classes

No	Interval Class	F
1	50 – 57	3
2	58 – 65	2
3	66 – 73	3
4	74 – 81	8
5	82 – 89	11
6	90 – 98	3
	Amount	30

The frequency of the highest scores achieved by students is with intervals of 82-87. Students who have achieved completeness. There are 22 students who complete (meet the MCC) and 8 students who have not completed (do not fulfill the MCC). Figure 1 shows the frequency distribution on the normal curve graph.
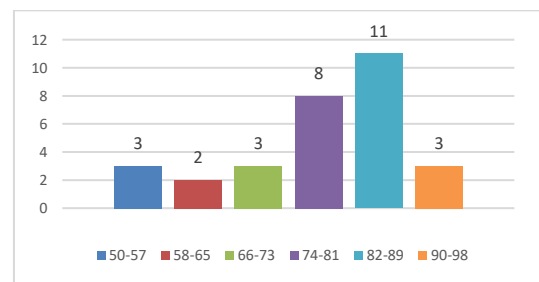

Figure 1 Graph of Normal Curve of Experimental Class post-test scores

Based on the posttest scores or student learning outcomes after applying video tutorial learning media, the scores of students who achieved the MCC were 22 people with a score of 73.3% while the MCC had not been achieved, namely 8 people with a percentage of 26.7% with control class students totaling 30 people. Table 2 shows the minimum classical completeness criteria for the experimental class learning outcomes of 73.3%.

Table 2. Percentage of Classical Completeness of Experimental Class Posttest Scores

No	Learning outcomes	Achievement	Percentage
1.	Average value	79.73	-
2.	The highest score	97	-
3.	Lowest value	64	-
4.	Number of students who completed	22	73.3%
5.	The number of students which is not completed	8	26.7%
6.	Number of experimental students	30	100%

Posttest results were obtained in class XI TPB using the conventional method as the control class, namely the highest score = 85 and the lowest score = 43, the number of students, namely 30 people. Table 3 shows the frequency distribution of the control class. With statistical calculations, the average value = 67.57 and standard deviation (s) = 7.29.

Table 3. Frequency Distribution of Control Class Posttest Results

No	Interval Class	F
1	40–47	2
2	48–55	4
3	56–63	5
4	64–74	7
5	75–79	8
6	80–87	4
	Amount	30

The frequency of the highest scores achieved by students is at intervals of 75-79. Students who have not reached completeness (have not met the MCC). Tested based on the average score below the MCC, which is 75. There are 12 students who have completed and 18 students who have not achieved completeness. Figure 2 shows the frequency distribution on the normal curve graph.
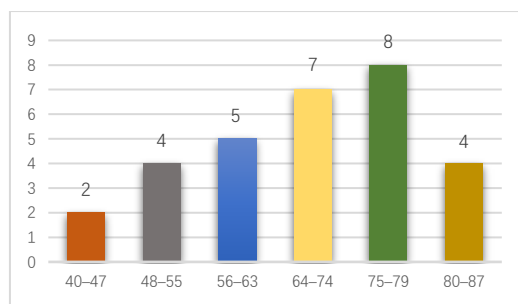

Figure 2 Graph of Normal Curve of Control Class Post test Values

From the posttest score graph after applying the video tutorial learning method, it can be illustrated that the MCC achievement level of students in the experimental class is higher than the MCC achievement of students in the control class. Achievement of completeness of graduation is at a percentage of 73.3% compared to 40%. Based on these data it can be stated that the method of using video tutorial learning media is very effective in CNC subjects. The level of MCC achievement of students in the experimental class is more abundant than that of students in the control class [17].

Based on the posttest scores or student learning outcomes, conventional or lecture learning models, the scores of students who achieved the MCC were 12 people with a score of 40% while those who had not reached the MCC were 18 people and a score of 60% with control class students totaling 30 people. Table 4 shows the minimum classical completeness criteria for the control class learning outcomes of 40%.

Table 4. Percentage of Classical Completeness of Control Class Posttest Scores

No	Learning outcomes	Achievement	Percentage
1.	Average value	67.57	-
2.	The highest score	85	-
3.	Lowest value	43	-
4.	Number of students who completed	12	40%
5.	The number of students which is not completed	18	60%
6.	Number of experimental students	30	100%

The results of the hypothesis test with the average difference test (t test) were carried out on the posttest results of students from the two classes to find out the different average values. Following, the standard deviation, the average value data and the variances of the two classes are shown in Table 5.

Table 5. Hypothesis test value data

Student	X	S	S²
Experiment Class (TPA)	79.73	8.74	76.39
Control Class (TPB)	67.57	7.29	53.14

For t_{table} with α = 0.05 and degrees of freedom (df) = n1 + n2 − 2 = 30 + 30 − 2 = 58. Look for the table of values in the t distribution and get t_{table} = 1.671. From the calculation results, it is found that t_{count} > t $_{table}$ is 3.21 > 1.672, meaning that H0 is limited so that it can be concluded that there is a difference in the posttest average in the experimental class and the control class. Based on these calculations, it was found that the average value of the experimental class was greater than the control class. Therefore, it was stated that the video tutorial learning media method was very effective in learning CNC subjects.

Based on the results of tests carried out using the classical mastery test of student learning which was carried out posttest to prove the learning outcomes of students after using video tutorial learning media. According to the results of the post-test scores, it was found that the learning outcomes carried out by students in the control class with an average of 67.57 with the highest score being 85 and the lowest being 43. Meanwhile, the average learning outcomes carried out by students in the experimental class was 79.73. From the results of calculating the data after the treatment, the average posttest result was 79.73. This research is in line with Rudibyani's research [18], which concluded that learning using video tutorial-based learning media can increase classical mastery above 85%. With increasing learning outcomes, obtained efficiency in learning has been achieved. Based on the results of the classical minimum completeness criteria, the percentage is 73.3% so using video tutorial media has reached the requirements for effective learning.

4. CONCLUSION

Based on the results of the research that has been carried out, a conclusion is drawn that the use of learning media in the form of video tutorials has a significant and good impact on growing students' learning motivation, affecting the value obtained. Evidenced by the results of research that showed an increase in student scores, namely the class used as an experiment obtained an average of 79.73, while the class used as a control obtained an average of 67.57. Therefore, the use of video tutorial-based teaching media plays a role in having an impact on the learning outcomes achieved by students, especially in the subject of CNC Mechanical Engineering SMK 1 Padang.

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