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Effectiveness of powerpoint learning media on students' learning outcomes on basic mechanical engineering

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Abstract
The problem in this analysis is how effective the use of Power Point as a learning media is on student learning outcomes in Basic Knowledge of Mechanical Engineering (PDTM) subjects. The purpose is to test the effectiveness of Power Point media in improving student learning outcomes in PDTM subjects at SMK Negeri 2 Bengkulu City. The results showed that Power Point learning media had a high level of effectiveness, with a normalised gain index of 0.71, while traditional learning media had low effectiveness with a normalised gain index of 0.13. The mean learning outcomes tested by T-test supported this finding > or 18.857 > 2.011. The conclusion is rejected and accepted. It is proved as the iPowerPoint learning media is effective in improving students' learning outcomes in the PDTM subject of SMK Negeri 2 Kotai Bengkulu.Top of Form

Keywords : Effects, PowerPoint, Learning Outcomes

Introduction

In the context of vocational education, a curriculum that is tailored to the needs of the industrial world is very important. A study shows that the success of vocational education is measured by how much graduates can be absorbed by the world of work. Vocational schools should emphasise relevant 'hard skills' and 'soft skills', given that 80% of the competencies required in the world of work are soft skills (Sutrisno. (2013). According to Bukit (2014, p. 13), vocational education refers to teaching that is less academically orientated and more practice-based. It is also training and education for individuals seeking employment. Training and education for vocational fields Vocational education and training is an educational approach that prioritises knowledge, skills, behaviours, attitudes, work habits, and an appreciation of each student's individual contribution to the work demanded by business and industry. This is achieved through collaboration with organisations, professional associations, and productive-based learning environments (Sudira, 2012, p. 14).
SMK Negeri 2 Kota Bengkulu is one of the many vocational schools in the city, improving teaching standards so as to produce graduates in the industrial technology group who are competent, independent and passionate in the face of regional globalisation. This is done by improving the quality of teaching by: increasing the capacity of teaching staff, creating a competency-based education pattern in conjunction with an area-based curriculum, applying what has been learned in relation to life skills, developing an entrepreneurial attitude, encouraging an industry-oriented work ethic, and strengthening discipline. According to Arsyad (2016, p. 4) states that one of the elements of learning resources is learning media. As a physical vehicle or component of learning resources, educational information that can be used to encourage students to be motivated to learn in class is known as learning media.
According to Hamalik, learning media is as defined based on quotations in the book written by Arsyad (2016, p.19), learning media is defined as media in the learning process with the intention of

stimulating learning activities and even providing new changes for students besides that it can also increase curiosity, desire, and motivation to learn. The word 'media' has a broad meaning and can refer to any industry. Daryanto (2016, p.4) states that media functions as tools and materials used in learning activities. According to Maulana et al. (2020), PowerPoint facilitates delivery of information in an engaging and interactive way. They emphasize that the effective use of visualization can help audiences understand the presentation material better. understand the presentation material better. A study by Kahn et al. (2021) states that presentations that involving multimedia elements such as images, videos, and animations can increase audience engagement. According to Setyawan (2019), the ability to use PowerPoint well can improve one's communication skills, especially in academic and professional contexts. communication skills, especially in academic and professional contexts.
Based on preliminary findings from SMK Negeri 2 in Bengkulu City, it is known that teachers have implemented the 2013 curriculum during the learning process of Basic Mechanical Engineering, but it has not gone according to plan. Students are considered to be less engaged in learning as can be seen from their responses. Furthermore, teachers still use the same teaching strategy to date, namely the colonial or lecture method in addition to the utilization of printed books, whiteboard media, and LKS as learning resources. In addition, students' curiosity in following the educational process is also very low, so the motivation and creativity of students' participation in learning is also low, as well as their lack of activeness in participating in PDTM lessons. This has an impact on student learning outcomes. Purwanto (2016) states that learning outcomes are evidence that shows the extent to which students are able to follow learning in accordance with predetermined educational objectives. Low learning achievement, therefore, indicates that learning objectives are not achieved as much as possible, therefore, the use of media is needed to support the learning process of teachers and students.

The problem to be solved is whether the use of Power Point media can significantly improve students' understanding of the basic concepts of mechanical engineering design compared to conventional teaching methods. This research will look at the level of student engagement in learning to practice Power Point media, the comparison of learning outcomes of conventional methods with Power Point media, as well as factors that influence the effectiveness of using Power Point media, such as the quality of materials and teacher-student interaction. By deepening the understanding of these issues, this research will examine how engaged students are with Power Point learning, how learning outcomes differ between Power Point and conventional learning, and what factors - such as material quality and teacher-student interaction - influence how effective Power Point learning is. It is hoped that this research will improve our understanding of these issues and offer in-depth information that will help mechanical engineering educators design more successful teaching methods. According to Slameto (2003), "the cause of poor learning methods is actually quite a lot of students who are still smart but only a few students do not achieve learning achievement because they have poor learning methods too, and vice versa".

Methods

Type of Research

quasi-experimental research is a type of research that is a development of the real experimental method. According to Winarni (2018), this research allows researchers to manipulate the dependent variable and see its effect on the dependent variable - possibly even without significant data collection. In addition, Dewa Gede Baskara et al. (2020) stated that in the context of health research, experimental designs using pretest and posttest can effectively reduce changes in knowledge and work habits.

Research Subjects

The subjects of this study were Class X Machining Engineering (TP) students, with a total of 25 students in one class, being the research subject.

Research Design

This research uses a quasi-experimental research design, which is a form of experimental research. experimental Research design by giving tests to students. The following table displays the design of the model.

Tabel 1. Research design in general

group	Pretest	treatment	posttest
Experiment	01	x	02
Control	03	-	04

Data Collection Technique
The data collection methods used were observation, test (pretest-posttest) and documentation.

Data Analysis Techniques
Descriptive data analysis
It is quantitative data applied to characterize or define evidence that has been collected during the research process. "Descriptive statistics provide an initial foundation for researchers in understanding the patterns of data collected and assist in formulating advanced statistical analysis steps."(Fitriana, R., & Suryadi, A. (2022).

Inferential statistical data analysis
Normality test to determine whether a particular set of data is normally distributed or comes from a population with a normal distribution, the normality test is applied. In p. 79 Nuryadi et al. (2017), the distribution is symmetrical and has a centered mode, mean, and median. The Liliefors normality test, which was developed from the Kolmogorov-Smirnov test, was used by the researchers.
Homogeneity test to determine whether the variances of the two groups are equal, conduct a homogeneity test. Levene's test remains a reliable method for testing homogeneity of variance, especially in non-normalized data, making it suitable for various experimental designs" (Xu et al., 2021).
The t-test is often used in small-scale sample research, mainly due to its ability to provide accurate results when the data has a normal distribution, even when the sample size varies (Kim & Choi, 2021). "The paired t-test is particularly effective in analyzing pre- and post-intervention data in longitudinal studies or controlled experiments" (Samuels and Witmer, 2020).
The N-Gain test is intended to assess how much a variable or learning outcome has improved after a treatment or intervention "N-Gain is a very useful tool for assessing learning effectiveness, especially for measuring learning outcomes before and after an intervention" (Hake, 2019). "In the context of physics education, N-gain tests are very effective in measuring conceptual change and student understanding from pre-test to post-test" (Meltzer & Thornton, 2020).

Finding and Discussion

Finding
Pretest results
The pretest data from the descriptive test results taken using Microsoft Excel are shown in table 2 below:

Tabel 2. Pretest result

score criteria	experiment class	control class
number of respondents	25	25
sum of scores	1425	1317.5
minimum scores	42.5	45
Maxsimum scores	70	65
Average	57	52.7
standard deviation	7.5	4.8

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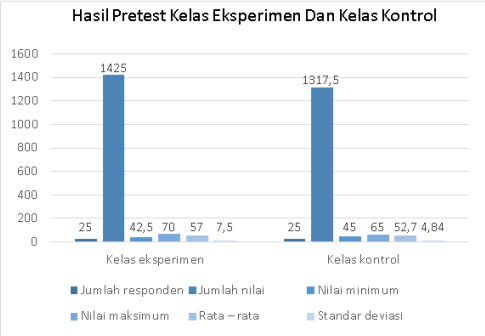
Picture 1. Pretest result



In line with Table 2, the pretest results on the treated and untreated pairs were obtained from the results of a description test using Excel application. The experimental class had a total score of 1425, with a mean of 57 and a standard deviation of 7.50. The control group had a total score of 1425, with a standard deviation of 7.50, a lowest score of 42.5, a highest score of 70, and an average of 57. A maximum score of 65, with an average of 52.7, and a minimum score of 45 were recorded in the control class, with the results resulting in a total score of 1317.5. The standard deviation was 4.84.

Posttest results

Table 3. Posttest result

score criteria	**experiment class**	**control class**
number of respondents	25	25
sum of scores	2193	1480
minimum scores	77.5	47.5
Maxsimum scores	95	70
Average	88	59.2
standard deviation	4.56	6.03

Picture 2. Posttest result

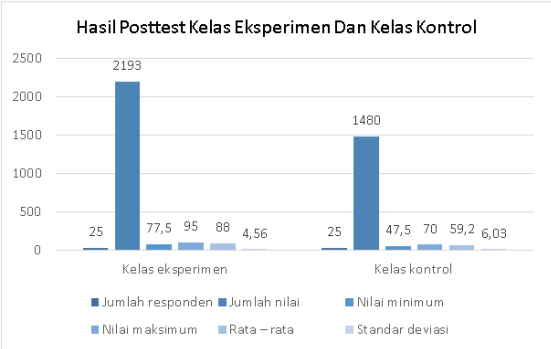


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Table 3 shows that the experimental class had a total score of 2193, with a minimum score of 77.5 and a maximum score of 95, with a mean of 88 and a standard deviation of 4.56. These results were obtained from test results using the Excel application. The results of the total score in the control class were 1480, with an average of 59.2 and a standard deviation of 4.56. The lowest value of the score is 47.5, and the highest value is 70. The result of the total score in the experimental class is 1480, with an average of 59.2, and a standard deviation variation of 6.03.

Normality test

Table 4. Normality test

N0	treatment	data	L count	L table	Conclusion
1	pretest	experiment	0.125	0.173	Normal
		control	0.156	0.173	Normal
2	posttest	experimen	0.109	0.173	Normal
		control	0.167	0.173	Normal

Based on the results of the previous normality test, it leads to the conclusion that all data is normally distributed.
Conclusion: The data obtained is normally distributed if l_{hitung} < dari l_{tabel} dan Apabila l_{hitung} > dari l_{tabel} then the data obtained is not normally distributed.

Homogeneity test

Table 5. Homogeneity test

N0	treatment	f count	f table	Conclusion
1	pretest	2.92	4.28	Homogen
2	posttest	0.644	4.28	Homogen

The previous results lead us to the conclusion that all data have homogeneous variants.
Conclusion: data has the same / uniform variance if apabila $f_{hitung} \leq f_{tabel}$ and If the data has unequal / non-uniform variance then $f_{hitung} > f_{tabel}$.

T test

Table 6. T test

n students	T count	T table (0,05)	Conclusion
25	2,409	2,011	H_0 rejected

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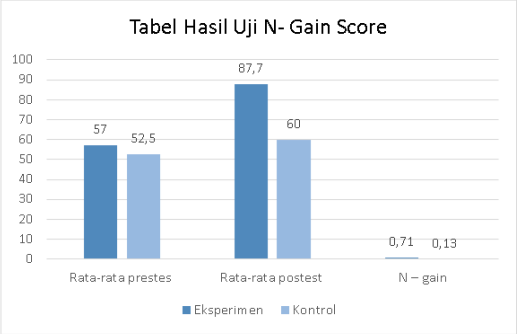
Pretest From the summary table, it can be seen that t_{count} = 2,409 The value of t_{table} is 2.011, so it is obtained that $t_{count} > t_{table}$ or 2.409 > 2.011. Then H_0 is rejected and H_1 is accepted.

N - gain test

Table 7. N-gain test

group	Average pretest	Average posttest	N-gain	N-gain category
experiment	57	87.7	0.71	Hight
control	52.5	60	0.13	low

Picture 3. Bar chart of N- Gain test results



The experimental class group data showed a high category n-gain value of 0.71. It can be concluded that the method used is effective for improving student learning outcomes.

Discussion

This finding is that students' learning outcomes are influenced by learning materials in the form of PowerPoint in the delivery of learning. The difference in student learning outcomes between the two classes shows this. We can conclude that educational media significantly influences students' learning outcomes. The typical student learning outcomes prove this. In the experimental class, the sum of student learning outcomes was 88. In contrast, the average student learning outcome of the control class was 59.2. These results imply that the learning outcomes between the treated and untreated groups are the same or different when students use the same learning resources and follow the learning activities in class. Conversely, different results occur when students participate in learning activities by utilizing varied media.

By using the pre-test data as a basis, the result t_{count} is 2,011. These results show that t_{table} 2,409 > 2,011. It is concluded that $H0$ is rejected and $H1$ is accepted. Meanwhile, the posttest analysis data resulted in a value t_{count} is 18.857 and a value t_{table} is 2.011 then $t_{count} > t_{table}$ or 18.857 > 2.011. After that, it is determined that $H0$ is rejected and $H1$ is accepted. Therefore, the hypothesis is accepted.

According to this hypothesis, “students' learning achievement in the subject of DPTM at SMKiNegerii2 Bengkulu City will differ significantly between the group of students who use PowerPoint learning media and students who use traditional traditional learning media.” This is based on the effectiveness of the PowerPoint learning media. As a result, when compared to students using other learning media, students using PowerPoint learning media get better learning achievement. This shows how learning media has an impact on student learning achievement as well as learning objectives for students.

Conclusion

Students who use learning media at SMK Negeri 2 Bengkulu City in pdtm learning can get better learning results than students who do not use learning media related to learning media in pdtm learning.

Acknowledgement

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Declaration

Author contribution

Zafira Nurramadhani as a researcher and data collector for the facility relationship. Prof. Remon Lapisa, S.T., M.T., M,Sc. Tech. is a provider of direction and methods in research; Primawati, S.Si., M.Si. Evaluating research methods, Sri Rizki Putri Primandari, Ph.D. data analysis and evaluating Background of the Problem.

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Conflict interest

The author states that there was no conflict when conducting the research.

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