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The effect of using google classroom on students' mastery of physics concepts through the discovery learning model

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ABSTRACT

This study aims to describe the effect of using google classroom on students' mastery of physics concepts through the discovery learning model. The method used in this research is a Pre-Experimental Design with the type of One-Group Pretest-Posttest Design. The population in this study were students of class X MIPA at SMA Negeri 3 Tangerang. Sampling technique using simple random sampling. As an experimental class, the sample used was 72 students in classes X MIPA 1 and X MIPA 2. The instrument used was an essay question instrument with 10 questions. Then the data were analyzed and tested using the F-test. The hypothesis test results obtained $F_{count} = 45,709$ and $F_{tabel} = 3,98$, and it can be concluded that $F_{count} > F_{tabel}$. So it can be concluded that the null hypothesis is rejected, in other words accepting the alternative hypothesis which states that there is a significant effect of using Google Classroom on students' mastery of physics concepts through the discovery of learning model.

Keywords: Concept mastery, *discovery learning*, *google classroom*, physics

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INTRODUCTION

At the end of 2019, entering 2020 was a worrying year for all countries, including Indonesia. This was caused by the emergence of a new coronavirus outbreak, namely Coronavirus disease 2019 (COVID-19). The COVID-19 pandemic in Indonesia has forced the central government to issue policies to minimize the spread of COVID-19 in various regions and regions (Gitiyarko, 2020). One of them, the central government issued circular letter 36962/MPK.A/HK/2020 concerning online learning and working from home to prevent the spread of coronavirus disease (COVID-19) (Chryshna, 2020). The circular contains the implementation of online learning from home for students and students. The impact of the

COVID-19 pandemic crisis on the education sector, among other things, affected the learning process, teaching and learning activities, level of understanding, mastery of concepts, and student learning outcomes. Learning media is one of the factors that play an important role in the learning process. Of course, educators can use lots of learning media, but if you are required to continue doing distance learning (PJJ), the only way is to use e-learning-based learning media.

The measurement of mastery of concepts in this study is the cognitive ability of students, which refers to Bloom's taxonomy indicators refined by Anderson & Krathwohl, namely C1 (remembering), C2 (understanding), C3 (applying), C4 (analyzing), C5 (evaluating), and C6 (creating) (Sari et al., 2017). Physics concepts can be well mastered by students, so an educator in learning does not only provide subject matter but must be able to create an effective teaching and learning process. Mastery of physics concepts is one aspect of measuring student learning outcomes obtained to realize that learning from students' ability to master physics concepts can foster a creative attitude in solving physics problems.

In the research by Ewid Nur Anisa, Ratu Betta Rudibyani, and Emmawaty Sofya titled "*Pembelajaran Discovery Learning untuk Meningkatkan Motivasi Belajar dan Penguasaan Konsep Peserta didik*". His research proves that an increase in students' mastery of concepts is influenced by discovery learning (Maisaroh et al., 2017). Then it was also conveyed by Gesa Kharisma Putri and Yuli Ani Setyo Dewi with the research title "*Pengaruh Pembelajaran Jarak Jauh Berbasis Google Classroom*". This research proves that there is an increase in the average score after learning using Google Classroom, although it is not very significant (Putri & Dewi, 2019).

This research was conducted to determine and describe the effect of using e-learning-based learning media, namely Google Classroom, on students' mastery of physics concepts, especially on momentum and impulse material. In this research, there are quite a lot of variables that influence the use of Google Classroom that have examined this variable. However, more research still needs to be done on the variable mastery of physics concepts, especially with the material of momentum and impulse. If the two variables are linked into a title, only a few have researched this. Based on the problem description and several theories, the researcher took the title for this article: *The Effect of Using Google Classroom on Students' Mastery of Physics Concepts Through the Discovery Learning Model*.

RESEARCH METHODS

This research refers to a quantitative research approach. The method used in this research is a Pre-Experimental Design with the type of One-Group Pretest-Posttest Design. This research was conducted at SMA Negeri 3 Tangerang. The population in this study were students of class X MIPA at SMA Negeri 3 Tangerang. Sampling technique using simple random sampling. As an experimental class, the sample used was 72 students in classes X MIPA 1 and X MIPA 2.

The tools and materials needed and used in this study include laptops or cellphones with access to a cellular data network or WiFi, then the Google Classroom application as a forum for giving material, assignments, and submitting assignments, then finally, the Google Meet application as a forum for face-to-face meetings, online. The implementation of the treatment (learning procedure) or the treatment given during the research takes place using the syntax of

the discovery learning model, adjusting to the research to be carried out. The syntax of the discovery learning model includes (1) stimulation, (2) statement/problem identification/problem statement, (3) data collection, (4) data processing, (5) Verification, (6) Concluding/generalizations (Darmawan & Wahyudin, 2018).

The processing of research data is divided into two. First, the analysis of the research instruments includes the study of questions, validity tests, reliability tests, difficulty level tests, and discriminating power tests. Second, test the requirements analysis test, which includes the normality test with the Kolmogorov-Smirnov through the SPSS 25 application, the homogeneity test with the Levene test through the SPSS 25 application, the improvement test (N-Gain), and the hypothesis test with the F-test.

RESULTS AND DISCUSSION

A concept mastery test or task is given to measure how students master physics concepts on momentum and impulse material with the help of google classroom learning media. The test is carried out online, and ten questions are tested after students carry out learning using Google Classroom learning media. In the instrument analysis in the question study section, the questions were reviewed by expert evaluation lecturers and physics teachers at SMA Negeri 3 Tangerang with the result that the instrument was feasible. In the validity test section, the results are obtained in the table below:

Table 1. Validity test

Classification	Question item number	Number of question items	Percentage
Valid	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	20	100%
Drop	0	0	0%
Total		20	100%

The results of calculating the validity test on the items, with an N of 72 and a significance level of $\alpha = 5\%$, the value of $r_{table} = 0,232$, is obtained. A question is said to be valid if $r_{count} > r_{table}$. The table above shows the results of the instrument validity test consisting of 10 questions which resulted in 20 valid questions and 0 dropped questions.

In the reliability test section, the results are obtained in the table below:

Table 2. Reliability test

r_{count}	r_{table}	Conclusion	Information
0,894	0,232	Reliable	High

If $r_{count} > r_{table}$, then the items tested are reliable. Based on the instrument reliability test results on 72 students, $r_{count} = 0,894$ and a significance level of $\alpha = 5\%$ obtained $r_{table} = 0,232$. Because $r_{count} > r_{table}$ is $0,894 > 0,232$. It can be concluded that the items tested are reliable with high information.

In the difficulty level test section, the results are obtained in the table below:

Table 3. Difficulty level test

Classification	Question item number	Number of question items	Percentage
Easy	5, 6, 7, 8, 9, 10	6	30%
Medium	1, 2, 3, 4, 11, 12,13, 14, 15, 16,17, 18, 19, 20	14	70%
Difficult	0	0	0%
Total		20	100%

Based on the calculation of the difficulty level classification of the questions, the number of questions that fall into the easy classification is 6 questions, 14 fall into the medium classification, and 0 into the difficult category.

In the differentiating power test section, the results are obtained in the table below:

Table 4. Discriminating power test

Classification	Question item number	Number of question items	Percentage
Poor	0	0	0%
Reasonably good	6, 7, 9, 10	4	20%
Good	1, 3, 4, 8, 17	5	25%
Very good	2, 5, 11, 12, 13, 14, 15, 16, 18, 19, 20	11	55%
Total		20	100%

Table 4 shows that 11 questions fall into a very good classification, five in a good classification, four in a reasonably good classification, and 0 in a poor classification.

Based on the research results, the pretest and posttest values are obtained as a reference for the level of mastery of concepts that have been treated using Google Classroom through the Discovery Learning model. In this study, the posttest was given two times. Giving a posttest is done at the end of each lesson after giving treatment. This posttest was conducted to determine whether there was an effect after treatment. The recapitulation of the calculation results obtained by 72 students can be seen in table 5 as follows:

Table 5. Data recapitulation of pretest and post-test results

Data	Pretest score	First post-test score	Second post-test score
Lowest	0	40	50
Highest	87	100	100
Mean	42,53	77,20	83,77
Median	49,5	84	92
Mode	0	50	60

Based on table 5 above, the average value of the results of the 2nd post-test is greater than

that of the 1st pretest and post-test results. The mean pretest value was 42.53, while the last post-test mean score was 83.77. The increase in the mean marks obtained by students in this study can be seen in Figure 1 below:

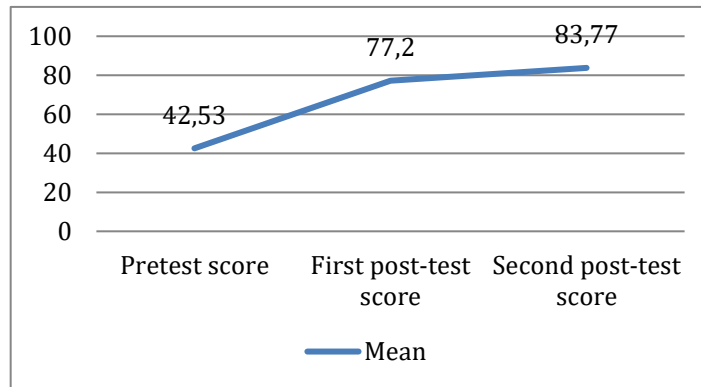


Figure 1. The mean marks obtained by students

Based on Figure 1, it can be concluded that there was an increase in the average yield before and after being given treatment. The percentage increase in the 1st pretest and post-test was 82%, then the 97% increase in the 2nd pretest and post-test, and finally, the percentage increase in the 1st and 2nd post-test was 9%.

In testing the requirements analysis of the normality test section, it is carried out using the Kolmogorov-Smirnov normality test through the SPSS 25 application. The purpose of this normality test is to find out whether the data is normally distributed or not. This test was carried out on three data pieces: pretest, 1st post-test, and 2nd post-test data. The results of the normality calculation can be seen in table 6 below:

Table 6. Normality test calculation results

Test type	Statistics	Compute significance	Information
Pretest	0,120	0,011	Abnormal
First post-test	0,176	0,000	Abnormal
Second post-test	0,232	0,000	Abnormal

Based on table 6 uses the Kolmogorov-Smirnov test on the concept mastery variable in terms of pretest, 1st post-test, and 2nd post-test scores. Accepted if the *calculated significance > level of significance*.

The significance level is $\alpha = 5\%$ where the number of samples is 72. The results of the calculations, both in the pretest, 1st post-test, and 2nd post-test, the data are not normally distributed. Based on the researcher's analysis, one of the reasons for abnormal data is the presence of outliers. Outliers are data with an extreme score, either too high or too low. Too many extreme values in a data set will result in a skewed distribution. If the process has many values close to zero, the data distribution will be skewness to the right or left.

The homogeneity test is carried out to determine whether a sample comes from a homogeneous or non-homogeneous population. A one-way ANOVA test can be done if the

data has the same variance. The Levene test through the SPSS 25 application uses the data variance or homogeneity test. The results of the calculations can be seen in table 7 below:

Table 7. Homogeneity test calculation results

Test type	Statistics	Compute significance	Information
Pretest	1,732	0,192	Homogeneous
First post-test	13,069	0,001	Inhomogeneous
Second post-test	7,063	0,007	Inhomogeneous

Based on table 7, it is accepted if the *calculated significance* > *level of significance*. Significance level $\alpha = 5\%$ where the number of samples is 72. Based on the calculation results in the pretest, the data is **homogeneous**, while in the post-test 1st and 2nd post-tests, the data is **not homogeneous**.

To find out the increase in student mastery of concepts in physics learning by applying Google Classroom learning media through the discovery learning model using a normalized gain score. N-gain data or normalized gain is data obtained by comparing the average scores between the 1st and 1st post-test with the difference in pretest scores. The results of the calculation of the N-Gain increase test can be seen in table 8 below:

Table 8. N-Gain increase test results

Pretest	First and second post-test	N-Gain test	Information
43	80,5	0,70	High

Based on table 8, the N-Gain test results were obtained at 0,70 with a description of the high criteria. The N-Gain test criteria can be considered high if the $N - Gain \geq 0,70$. This means that there is an increase in students' mastery of physics concepts, and the growth is classified as high according to the N-Gain test criteria.

The calculation of hypothesis test carried out in this study was to use the F-test using SPSS 25. In this test, the decision was taken based on the testing criteria, if $F_{count} < F_{table}$, then H_0 was accepted and H_1 was rejected. Whereas $F_{count} > F_{table}$, H_0 is rejected, and H_1 is accepted. This calculation aims to determine whether the hypothesis researchers have formulated before conducting research at school can be accepted, or even the hypothesis is rejected. The results of the calculation of the hypothesis test can be seen in table 9 below:

Table 9. Results of calculation of hypothesis test F-test

F_{count}	F_{table}	α	Information
45,709	3,98	0,05	H_0 is rejected

Based on table 9, it was obtained $t_{count} = 45,709$ with a sample size of 72 students. The significant level used in this study was 0.05, so what obtained the value of $t_{table} = 3,98$. Because $t_{count} > t_{table}$, it can be concluded that using Google Classroom affects students'

mastery of physics concepts through the discovery learning model.

Based on the results of the pretest that has been done, there is a dominance of low scores, causing the average score to be also low at 42.53, and 50% of students' scores are still below the KKM. The average score is low, and the score is still below the KKM because the distribution of the ability of learning outcomes of these students is almost the same, and they have not received treatment.

After the treatment was carried out in the class using Google Classroom learning media through the Discovery Learning model, the first and second post-test was given. The results of the first and second post-test have increased. So there are significant differences in scores and averages between the pretest, the 1st post-test, and the 2nd post-test. This follows what was conveyed by Ewid Nur Anisa, Ratu Betta Rudibyani, and Emmawaty Sofya titled “*Pembelajaran Discovery Learning untuk Meningkatkan Motivasi Belajar dan Penguasaan Konsep Peserta didik.*” His research proves that an increase in students' mastery of concepts is influenced by discovery learning (Maisaroh et al., 2017). Then it was also conveyed by Gesa Kharisma Putri and Yuli Ani Setyo Dewi with the research title “*Pengaruh Pembelajaran Jarak Jauh Berbasis Google Classroom.*” This research proves that there is an increase in the average score after learning using Google Classroom, although it is not very significant (Putri & Dewi, 2019).

Based on the results of hypothesis testing using the F-test, the analysis prerequisite test is not fulfilled because the data is not normally distributed, but there are homogeneous and non-homogeneous. The results of the N-Gain increase test were carried out on the pretest and post-test values with a value of 0.70. The result of the N-Gain increase test was high because the $N - Gain \geq 0,70$. This means that there is an increase in students' mastery of physics concepts, and the increase is classified as high according to the N-Gain test criteria. Then on the results of the hypothesis testing carried out on the $t_{count} > t_{table}$ post-test value of $45,709 > 3,98$ so it can be concluded that H_0 is rejected and H_1 is accepted, which means there is an effect of using google classroom through the Discovery Learning model on the participants' mastery of physics concepts educate.

CONCLUSION

Based on the results of research data analysis, it was obtained that the average results of students' mastery of physics concepts using Google Classroom learning media through the Discovery Learning model were high, with an average of 80.5. This shows a significant difference in the results of students' mastery of physics concepts before and after being given treatment (treatment). Before treatment, the average student score was 42.99, with 50% of student scores below the KKM. However, after being given treatment, the average student increased drastically, with an average of 80.5, with more than 50% of student scores above the KKM. The results of the N-Gain increase test were carried out on the pretest and post-test values with a value of 0.70. The result of the N-Gain increase test was high because the $N - Gain \geq 0,70$. This means that there is an increase in students' mastery of physics concepts, and the increase is classified as high according to the N-Gain test criteria. Then on the results of the hypothesis testing carried out on the value of the post-test $t_{count} > t_{table}$, which is $45,709 > 3,98$ so it can be concluded that H_0 is rejected and H_1 is accepted, which means that there is an

effect of using Google Classroom on students' mastery of physics concepts through the model discovery learning.

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