



Analysis of Students' Physics Learning Outcomes Using E-learning During Covid-19 Pandemic

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Abstract –This study aims to analyze the physics learning outcomes of students with e-learning during the Covid-19 pandemic at SMA Negeri 12 Bone. This type of research is a survey with a quantitative approach. Data analysis used descriptive statistics in the form of percentages. The study involved 105 students of class XI at SMA Negeri 12 Bone as respondents who had studied physics with e-learning during the Covid-19 pandemic. The results showed that there were 1.91% of students in the very high category, 7.61% in the high category, and 18.10% in the medium category. While the distribution of the highest score is in the range of scores of 41-55 with a percentage of 38.10%. This range of scores is in a low category and then followed by the distribution of the second-highest score in the very low category with a percentage of 34.28%. From the results of the study, it can be concluded that the average cognitive physics learning outcomes of students with e-learning during the covid-19 pandemic at SMA Negeri 12 Bone were in the low and very low categories.

Keywords: covid-19 pandemic; e-learning; physics learning outcomes

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I. INTRODUCTION

Covid-19 has become a disease outbreak that has disrupted all sectors in almost the entire world. Indonesia is one of the countries exposed to the Covid-19 virus, and it affects all fields, including education (Adeoyo, 2020; Alea et al., 2020; Nugroho, 2021). In minimizing the spread of the virus, the Indonesian government implements work and school from home, or what is usually called

distance learning (Nugroho, 2021; Nurazmi & Bancong, 2021). This is done to ensure that learning continues in the midst of a pandemic that makes the government implement social distancing.

One of the government's strategies to keep the learning process going is by utilizing the current information technology. But the Covid-19 pandemic has also provided an overview of the sustainability of the world of

education in the future through the help of technology. The form of the development of information technology applied in the world of education is online-based learning (e-learning). E-learning is electronic learning or a distance learning process carried out online (Elyas, 2018; Deviyanti et al., 2020). Khotimah et al. (2020) further explained that e-learning is one of the most significant educational innovations driven by expanding array of technology enable platforms that offer potential learners an alternative and innovative learning environment compared with traditional learning.

According to Elyas (2018), some of the benefits of e-learning that students can enjoy are flexibility, independent learning, and cost-effectiveness. The results of research conducted by Nasrah and Muafiah (2020) found that as many as 52% of students obtained good grades and were in a good category while using online learning. Aziz & Fatimah (2020) also found that e-learning is more effective than traditional learning in some ways. They claimed that students can retain 25-60% more material from the online course than from the offline course due to its flexibility, self-paced system, and lowered cost. This can make higher education more open, reasonable, intelligent, and student-centered. E-learning brings up many challenges or disadvantages. Since students' social activity is limited, they may feel isolated, demotivated, and anxious about delayed feedback (Deviyanti et al., 2020).

The positive thing about e-learning is that the teacher does not need to spend extra energy in providing lessons, and learning is very flexible in terms of place and time, while the negative side is in terms of internet connection (Prastiyo et al., 2022). This negativity is worsened by low-quality internet access and unconducive study space for some students. Ideally, students study in a quiet and hassle-free like at school (Ariyanto, 2016). Based on the statement above, the use of e-learning has a positive and negative impact on its use.

According to a study before the covid-19 pandemic conducted by Dharma, et al (2017), the use of e-learning in learning can improve student learning outcomes. Research in the Covid-19 pandemic situation conducted by Ratnawati (2020) regarding learning strategies by utilizing technology in the form of the google classroom application can improve student learning outcomes. In addition, the research results during the covid-19 pandemic conducted by Deviyanti et al. (2020) and Hikmatiar et al. (2022) also show a significant difference between student learning outcomes before and after using google classroom learning media. This learning media can also be used for virtual teaching and learning activities (outside of effective school hours). Google classroom-based e-learning media can also be used for class discussion activities and student learning assessments in a more efficient time. Different results were obtained by

Abdullah et al. (2021), who found that student learning outcomes through e-learning-based learning were in a low category, as indicated by the percentage score achieved by students was 69%.

In addition, e-learning can stimulate students in developing their way of thinking, demanding them how to solve problems without any help from the teacher. This is in line with the results of research conducted by Setiyoaji et al. (2021), which explains that using e-learning media makes students more creative in solving existing problems so that it has a good impact on their learning outcomes. Another opinion regarding e-learning, expressed by Adeoye et al. (2020) that e-learning education is concerned with the holistic corporation of modern telecommunication equipment and ICT resources into the education system. Rusman (2011) explains that the characteristics that e-learning must possess include: interactivity, independence (independence), accessibility (accessibility), and enrichment.

Based on the observations of researchers in Bone Regency, the use of e-learning has been widely applied in various schools, for example, at SMA Negeri 12 Bone. The use of e-learning at this school utilizes Google Classroom. A test is given to identify students' learning outcomes in the cognitive domain using e-learning. Therefore, this study aimed to analyze student learning outcomes using e-learning during the Covid-19 pandemic at SMA Negeri 12 Bone. The

learning outcomes become indicators to determine the success and failure of students with learning physics through e-learning.

II. METHODS

This study was conducted to determine the cognitive learning outcomes of students during the Covid-19 pandemic through teaching using e-learning at SMA Negeri 12 Bone. This research can be classified into quantitative descriptive research with survey methods. The data obtained in the form of physics learning outcomes are processed using calculations and descriptive analysis.

This research was conducted in the even semester of the 2020/2021 academic year. The research location was at SMA Negeri 12 Bone. The population in this study were students of SMA Negeri 12 Bone who had participated in learning during the Covid-19 pandemic with e-learning in physics subjects. The sampling technique in this study was using a saturated sample. Figure 1 shows the research procedure in this study.

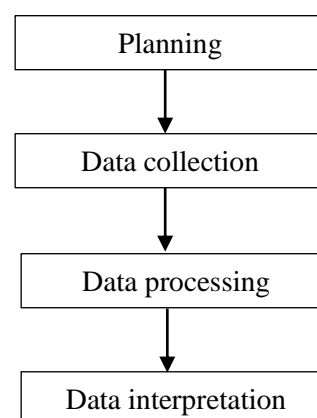


Figure 1. Research procedure

The data needed in this study is the physics learning outcomes of students. The data collection technique used is through the provision of tests. The test is a data collection technique taken from the learning outcomes obtained by students. In this study, the instrument used is a test instrument made in the form of multiple-choice that can measure student learning outcomes in physics subjects. An instrument is said to be valid if it is able to measure or record what it is intended to measure or record (Hernawati, 2018). The instruments used were validated by experts and tested, and then used to get the value of learning outcomes.

Data on students' physics learning outcomes in the form of final test scores were analyzed using descriptive statistical tests. Descriptive statistics is a method of how to collect numbers in the form of notes and then how to present these numbers in graphic form to be analyzed and interpreted by drawing conclusions (Astra, et al, 2015). Descriptive statistics are used to present data that has been obtained from student learning outcomes in the form of tables (minimum value, maximum value, average, standard deviation, and variance).

To find out the average value of student learning outcomes can be calculated by the following formula (Sudjana, 2015):

$$Me = \frac{\sum_{x=i}^n x}{N} \quad (1)$$

Description :

Me = Mean

$\sum_{x=i}^n x$ = sum of values x to i to n

N = number of individuals

According to Sugiyono (2008), to calculate the standard deviation of the sample, using the formula:

$$s = \sqrt{\frac{\sum f_i(x_i - \bar{x})^2}{n-1}} \quad (2)$$

Description :

s = Sample standard deviation

\bar{x} = Mean

$\sum f_i$ = the number of 1st data frequency where $i= 1, 2, 3, \dots$

n = amount of data

x_i = the i-th data where $i = 1, 2, 3, \dots$

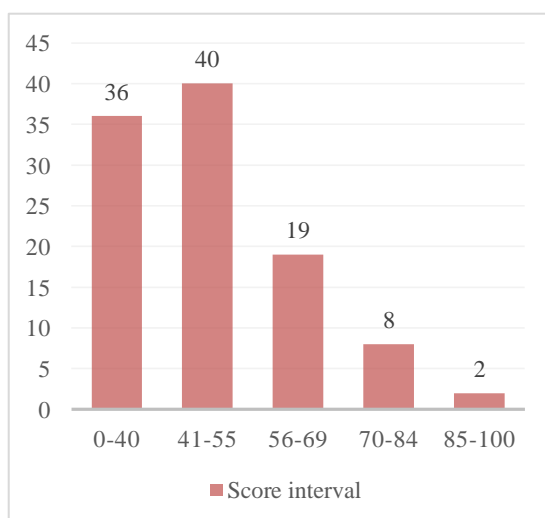
III. RESULTS AND DISCUSSION

Data from research results analysis of students' physics learning outcomes with e-learning during the covid-19 pandemic at SMA Negeri 12 Bone using a survey method consisting of sound wave and light wave test instruments. The instrument was used in the form of multiple-choice questions with a total of 35 items consisting of cognitive ability tests based on C1 (remembering), C2 (understanding), and C3 (applying). The scoring method used in the test is the number 1 for the correct answer and the number 0 for the wrong answer. Cognitive physics learning outcomes of students at SMA Negeri 12 Bone are presented in Table 1 as follows.

Table 1. The results of descriptive statistics analysis

Descriptive Statistics	Value			
	C1	C2	C3	Total
Sample size	105	105	105	105
Mean	47.83	59.05	43.70	48.78
Standard deviation	18.81	19.69	17.51	14.63
Variance	354.04	387.73	306.66	214.19
Range score	89	89	94	71
Highest score	100	100	100	100
Lowest score	11	11	6	29

As seen in Table 1, the average score of students' cognitive learning outcomes after e-learning was implemented during the Covid-19 pandemic was 48.78 out of 100 possible scores. Of the 3 cognitive abilities measured, the students' scores were the highest in the ability to understand (C2) and the lowest in the ability to apply (C3). Scores of students are then grouped based on the categorization of student learning outcomes. The distribution of the frequency and percentage of student learning outcomes can be seen in Figure 2.

**Figure 2.** Distribution of students' learning outcomes

Based on Figure 2, it can be seen that the highest frequency is in the 41-55 interval,

which is 40 students and followed by the 0-40 interval with 36 students. The 41-55 and 0-40 intervals are categorized as low and very low, respectively. On the other hand, the smallest frequency is in the interval of 85-100, which is 2 students. This interval is in the very high category.

The results of this study show an increase in students' physics scores with varying results. Based on the data, the cognitive learning outcomes of class XI students at SMA Negeri 12 Bone showed that 2 students with a proportion of 1.91% were in the very high category, 8 students with a proportion of 7.61% were in the high category, and 19 students with a proportion of 18.10% were in the medium category. Furthermore, 40 students with a percentage of 38.10% are in a low category, and 36 students with a percentage of 34.28% are in the very low category.

The data was obtained by giving tests to 105 students who were sampled showing the highest score of 100 and the lowest score of 29. The results of learning physics with e-learning during the covid-19 pandemic can be seen from the proclamation of the cognitive

domain (C1-C3) on the test instrument. The results of the analysis of students' low scores indicate that learning carried out using e-learning during the Covid-19 pandemic is less effective. The indicator of remembering (C1) is the ability to recognize or recall an object, idea, procedure, principle, or theory that has been found in the experience without manipulating it in other forms or symbols. Based on the findings, the learning outcomes of students on this indicator are in the low category with a percentage of 34.28%. This can be seen from the ability of students to solve the problems given, where most of them cannot do the questions properly and correctly.

On the other hand, the indicator of understanding (C2) is the ability to understand certain material being studied. Such as the ability to understand a fact, concept, and principle. Based on the data, the learning outcomes of students on this indicator are in enough category with a percentage of 37.14%. Meanwhile, the indicator of applying (C3) is defined as the ability of students to apply information in concrete situations. Based on the data, the learning outcomes of students on this indicator are in the very poor category with a percentage of 41.90%. This can be seen from the ability of students to work on the questions given, where most of them cannot do the questions properly and correctly.

The results of this study are in accordance with the results of previous

research by [Abdullah et al. \(2021\)](#) that students' mathematics learning outcomes through e-learning is in the poor category as indicated by the percentage score. However, the results obtained are different from those of [Deviyanti et al. \(2020\)](#) which show a significant increase in cognitive learning outcomes with the use of e-learning media based on Google Classroom. Likewise the research of [Khotimah et al. \(2020\)](#) which states that e-learning can be a good medium for distance learning during the covid-19 pandemic. Therefore, the learning model with e-learning is a new breakthrough in teaching and learning, because it is able to provide different ways of teaching and materials so that learning quality standards are more consistent ([Elyas, 2018](#)).

IV. CONCLUSION AND SUGGESTION

Based on the results of the study, it can be concluded that the cognitive physics learning outcomes of students with e-learning during the Covid-19 pandemic at SMA Negeri 12 Bone is in the low and very low categories with a percentage of 38.10% and 34.28%, respectively. The researcher suggests numerous ideas based on the findings of the research that might be taken into consideration in order to improve student physics learning outcomes. Even if it is centered on e-learning during the covid-19 pandemic, students must get used to it and maintain motivated themselves to study effectively. Teachers must provide a pleasant

learning environment, engage students, assess learning results on a regular basis, and adapt learning to technology advancements.

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