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The Effect of Whatsapp-Based Blended Problem-Based Learning on Students' Scientific Argument Ability in the Concept of Viruses

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ABSTRACT

This study aims to determine the effect of Whats App-based blended problem-based learning on students' scientific argumentation skills on the concept of a virus in class X MIPA Madrasah Aliyah Negeri Tasikmalaya Indonesia. The research method used is a quasi-experimental method using a posttest only control design. The population in this study was class X MIPA as many as 202 people. Samples were taken by non-probability sampling in the form of purposive sampling. The sample used is MIPA 5 and X MIPA 6 classes at Madrasah Aliyah Negeri Tasikmalaya Indonesia as many as 61 students. With MIPA 6 class as many as 30 students as the experimental class and X MIPA 5 as many as 31 students as the control class. Data collection was done by giving 7 questions of scientific argumentation. The data analysis technique used was t independent with a significance value (0.0001). The results showed that there was an effect of WhatsApp-based blended problem-based learning on the ability to argue scientifically. Other findings show that the average scientific argumentation ability of students is based on its components, namely claim (2,224), evidence (1,825) and reasoning (0,378).

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KEYWORDS: Blended learning, Blended Problem-Based Learning, Scientific Argument

I. INTRODUCTION

Education has changed from time to time along with the development of technology and science for various reasons and purposes. One of the goals of the change is to improve the quality of learning in Indonesia to be even better than before, especially from the curriculum. In addition, in the era of technology 4.0, the development and use of technology has become a human need, including in the field of education. In ongoing learning there is usually influence by several factors including the use of learning models.

There are several learning models used in the 2013 curriculum, including problem based learning, project based learning, discovery learning, group investigation, inquiry, blended project based learning and blended problem based learning. The learning model is a working framework or concept that provides a systematic description of learning to help students learn in a certain way to achieve. In education, learning is currently supported by technology and information. According to Triyanto, et al. (2016) said that technology and information are utilized in learning activities, including in biology learning, one of which is by using a blended problem-based learning model.

Blended problem-based learning is a problem-based learning model that is carried out face-to-face and distance learning (online). According to Sugiharto, et al. (2019) said that blended problem-based learning has integration between online learning and face-to-face learning based on problem-based learning and collaborative activities to be a prospective effort to be implemented in learning in Biology Education classes because of the high readiness of students. In addition, there is research from Donnelly, R. (2006) which states that blended problem-based learning is an integration of face-to-face problem-based learning in the classroom with e-learning, where problem-based learning is the more dominant pedagogical model. In line with Dewi's research (2013) said that blended problem-based learning can be implemented with support from online applications that can be accessed by all students who have smartphones connected to the internet. Among them are google meet, zoom meeting, google classroom, telegram and whatsapp.

The application used in this study is the WhatsApp application. The whatsapp application is a communication medium that can be installed on a smartphone. The whatsapp application is used as a means of chat communication by sending text messages, pictures, videos, and even telephone calls. According to Zakirman, et al. (2018) whatsapp has its own uniqueness when compared to other social media. Unlike Facebook, Twitter and forums on the internet, closing forums on WhatsApp will make it difficult for groups of people with homogeneous thoughts to be exposed to other information. In the learning process it is expected to be able to make students more critical in collecting sufficient data or scientific evidence to solve a given problem and be able to make scientific arguments. Scientific argumentation is a skill for communicating and a process of mental activity in which students exchange ideas to produce conclusions about a topic or problem. According to Suraya, et al. (2019), Mustofa and Hidayah (2019), said that the correct argument is if the data and conclusions are mutually supportive and appropriate. In scientific argumentation usually not only use verbal communication but also use visuals to convince someone what the argument is in his view that is good.

In this study using blended problem-based learning because in the learning process students are given unlimited time so that students can study the material without a set time. Because, in the learning process there is something that is done online which time can be done outside of school hours. According to research from Woltering, et al. (2009) said that problem-based learning blended learning can increase student motivation and satisfaction in the learning process. This is because blended problem-based learning can improve high-level cognitive skills such as reflective analysis, metacognition and problem solving. In addition, according to Yu-chu Yeh (2010) said that blended problem-based learning can also develop knowledge that influences student satisfaction in understanding the material being studied so that it can lead to positive and negative perceptions of students.

In this research, the material used is virus concept material. A virus is a microorganism that is very small and can only be seen with an electron microscope that infects the cells of biological organisms. Viruses can only reproduce (live) in living cells by invading and exploiting these cells because viruses do not have the cellular equipment to reproduce on their own. Viruses are often debated over their status as living things because they cannot carry out their biological functions freely. Because of the unique characteristics of this virus, one of the learning models that supports use is problem-based learning, namely problem-based learning because this learning model is able to analyze the main components of the virus and analyze the structure and anatomy of the virus so that students can solve the problems given and are able to explain reconsider the concept of the virus through scientific argumentation carried out indoors with groups/individuals or it can also be done through writing/media.

Based on the results of observations through interviews with biology subject teachers, information was obtained that students were still low in making scientific arguments, this was because students were unable to provide opinions or ideas accompanied by data the strong one. So it is necessary to do research to find out whether there is an effect of whatsapp-based blended problem-based learning on students' scientific argumentation abilities on the concept of viruses.

II. RESEARCH METHOD

This research was carried out on 14 October 2021 – 22 October 2021 at one of the Tasikmalaya Indonesia State Madrasah Aliyah. The research method used is experimental research in the form of a quasi experiment. The population in this study were all class X MIPA in one of the State Madrasah Aliyah in Tasikmalaya Indonesia for the 2021/2022 academic year as many as seven classes with a total of 202 students. The research design used was the posttest only control design. The population in this study were all class X MIPA in one of the Tasikmalaya Indonesia State Madrasah Aliyah. The sampling technique used non-probability sampling in the form of purposive sampling, resulting in class X MIPA 6 as the experimental class and X MIPA 5 as the control class. The data analysis method in this study used the independent t test.

The research procedure begins with the preparatory stage by conducting literature studies, observing the intended schools, compiling and making research instruments, then conducting research instrument judgments on lecturers. After that, instrument trials and analysis of the instruments to be used were carried out. After that, it was continued with the implementation stage which was carried out in class X MIPA 6 as an experimental class with learning starting at the first meeting online, namely via WhatsApp. By first dividing the groups to solve problems in each group's works sheet. At the second meeting in the experimental class, face-to-face learning was carried out, namely presenting the results of problem solving in the student worksheet. The third meeting of learning was carried out face-to-face, namely reflection by evaluating each student worksheet of his group of friends and evaluating scientific arguments on the concept of viruses. In the control class, using the discovery learning learning model with 3 meetings with face-to-face learning.

III. RESULTS AND DISCUSSION

In this study, the normality test was carried out using the Kolmogorov-Smirnov test. The data tested includes the results of scientific argumentation questions, with the hypothesis being tested, namely:

H_O : sample comes from a normally distributed population
H_a : the sample does not come from a normally distributed population

Basic decision making with a significance level of 5%. Samples are normally distributed if they have a significance value greater than 0.05 (Sig > 0.05). The results of the normality test for scientific arguments are in Table 1.

Table 1. Scientific Argumentation Normality Test

Class	Statistic	df	Sig.
Experiment Class	0,133	30	0,185
Control Class	0,154	31	0,058

The conclusion of the normality test for the experimental class and the control class both have a significance value that is greater than the value of 0.05. In the experimental class it has a significance value of 0.185 and the control class has a significance value of 0.058. So it can be stated that the data on the results of scientific argumentation questions in the experimental class and control class are normally distributed with Sig > α, namely 0.185 > 0.05 and 0.058 > 0.05.

The homogeneity test on scientific argumentation data uses the Levene's Test with the help of the SPSS version 26 for windows program. Data can be said to be homogeneous if the significance value is more than 0.05 (Sig > 0.05). The results of the homogeneity test for scientific arguments are homogeneous because the significance value is more than 0.05. The results of the scientific argument homogeneity test are in table 2.

Table 2. Uji Homogenitas Argumentasi Ilmiah

Levene Statistic	df1	df2	Sig.
0,961	1	59	0,331

Test the hypothesis using the independent t test with the hypothesis being tested as follows:

Ho : There is no effect of whatsapp-based blended problem-based learning on students' scientific argumentation abilities on the concept of viruses in class X MIPA at one of the Tasikmalaya Indonesia State Madrasah Aliyah in the 2021/2022 academic year.

Ha : There is an influence of whatsapp-based blended problem-based learning on students' scientific argumentation abilities on the concept of viruses in class X MIPA at one of the Tasikmalaya Indonesia State Madrasah Aliyah in the 2021/2022 academic year.

With the hypothesis testing rules, accept Ho if the significance is <0.05. Following are the results of hypothesis testing in Table 3.

Table 3. Summary of Hypothesis Test Results

significance	α	**Analysis results**	Conclusion
0,000	0,05	**significance** < 0,05	**Reject** H_0

The results of the independent t test show that the significance is <0.05, so the conclusion of the test is reject Ho, which means that there is an influence of the whatsapp-based blended problem-based learning model on students' scientific argumentation abilities on the concept of viruses in class X MIPA in one of the Tasikmalaya Indonesia Madrasah Aliyah.

The use of blended problem-based learning in this study provides that in the learning process students are given unlimited time so that students can study the material in the absence of a specified time. Because, in the learning process there is something that is done online which time can be done outside of school hours. In addition, students get a new learning atmosphere which is certainly different from usual, especially in terms of the learning media used at school. According to research from Yusran, K., Subandi, & Suhadi, I. (2013) that blended problem-based learning can increase student motivation and satisfaction in the learning process. Then blended problem-based learning can also develop knowledge that influences student satisfaction in understanding the material being studied so that it can lead to positive and negative perceptions of students.

When learning is carried out online based on whatsapp it can also minimize time for learning in the classroom. Where students during online learning can find solutions, solve problems and others so that when learning is carried out in class, they only present the results of the discussion. Whastapp is a social media that provides various features to support communication with social networks, such as sharing photos, videos, information, and the latest news for each user. This is in line with Irwandi, & Lusilawat. (2021) where the success of using learning via whatsapp is higher because it can train these students to be more active in participating in the learning process and their thinking skills to understand the material and assignments presented.

Based on the results of research that has been carried out in the experimental class and in the control class, the results of students' scientific arguments are obtained by using 3 indicators. The following diagram shows the difference in the average score of scientific arguments in the experimental class and the control class, which can be seen in Figure 1.

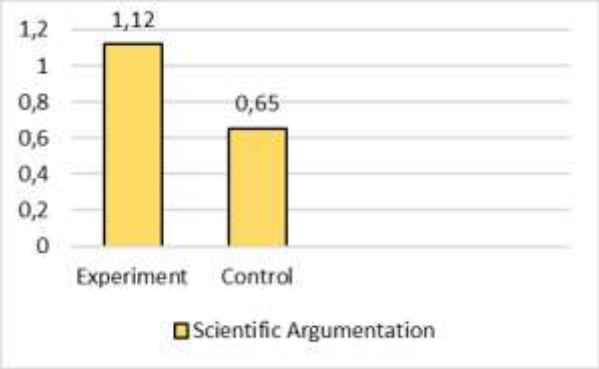

Figure. 1 Diagram of the Average Difference in Scientific Arguments

Based on the data obtained from the results of filling in scientific argumentation questions, the average score was obtained in the experimental class with an average score of 1.12 while in the control class it obtained an average score of 0.65. There were 30 students in the experimental class who filled out scientific argument questions. Meanwhile, for the control class, there were 31 students who filled out scientific argument questions.

The difference in the average score of scientific argumentation in the experimental class using whatsapp-based blended problem-based learning was higher than the average score in the control class using discovery learning. This is evidenced by the difference in the average score of scientific argumentation in the experimental class using WhatsApp-based blended problem-based learning. In accordance with the research of Koyimah, I. S., Suryani, Y., & Nuryanti, A. (2021) which proves that the results of students learning using whatsapp-based blended problem-based learning are higher than learning using the lecture model.

Based on the results of research that has been conducted in the experimental class using blended problem-based learning, the average score per indicator is obtained, namely claims (2.224), evidence (1.825) and reasoning (0.378). The implementation of learning in the experimental class was carried out in 3 meetings, namely 1 online learning meeting and 2 offline learning meetings in class X MIPA 6.

At the first meeting, learning was carried out online via the WhatsApp application with a learning time of 60 minutes. In the first phase, namely preparation (orienting students) with the researcher first presenting images related to images of viruses and explaining that the material to be discussed is viruses and their relation to viral replication lytically and lysogenically. After that the researcher divided the students into 5 groups to complete the group assignments in the student worksheet. The second phase is observation with the researcher sending student worksheet groups 1, 2, 3, 4 and 5 to the WhatsApp group to discuss solving problems in the student worksheet with their respective groups, given 40 minutes. The third phase is analyzing the problem with the researcher instructing students to be able to plan solutions. The fourth phase is formulating a solution plan, namely students can perfect solutions in overcoming problems that have been found from the results of discussions with their groups.

In the second meeting, learning was carried out offline with 60 minutes. In the fifth phase, namely presenting the results of the discussion. The researcher instructed each group to present the results of the discussion in the previous lesson.

At the third meeting, learning was carried out offline with a time of 60 minutes. The sixth phase is reflection and evaluation. Here the researcher instructs students to be able to discuss with the group regarding the summary of the results of the presentations made at the previous meeting and provide evaluations to each group of friends by providing student worksheet evaluations for other groups. Finish the presentation, followed by giving scientific argumentation questions and instructing students to work on the problem.

Based on the results of research that has been conducted in the control class using direct learning (discovery learning) the average score per claim indicator is obtained (1.618), evidence (0.281) and reasoning (0.037). According to Sinambela (2017) the steps for implementing discovery learning in the control class were carried out in three meetings, namely: Stimulation, problem statements, data collection, data processing, verification. (proving) generalization (drawing conclusions/generalizations).

There are 3 meetings at each meeting, all phases are carried out from the simulation (stimulus) phase, problem statement (problem identification), data collection (data collection), data processing (data processing), verification (proof) and generalization (generalization). add with students filling out scientific argumentation questions at the end of learning.

IV. CONCLUSION

Based on the results of the research, data processing and hypothesis testing, it can be concluded that there is an influence of whatsapp-based blended problem-based learning on students' scientific argumentation abilities on the concept of viruses (experimental studies in class X MIPA in one of the Tasikmalaya District State MAs for the 2021/2022 academic year).

The findings in this study indicate that learning using blended problem-based learning can influence students' scientific arguments with an average score of 1.12, especially on the claims indicator with an average of 2.224.

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