

E-ISSN: 2614-3984



Universitas Negeri Jakarta



BIOSFER:
Jurnal Pendidikan Biologi

P-ISSN: 0853-2451
E-ISSN: 2614-3984

Biosfer: Jurnal Pendidikan Biologi
Volume 14, Nomor 1, April 2021

Biosfer: Jurnal Pendidikan Biologi (Journal of Biology Education) which has E-ISSN 2614-3984 published by Universitas Negeri Jakarta, Indonesia. Biosfer: Jurnal Pendidikan Biologi is published as one of the efforts to publish research results related to Biology education. Biosferjpb received research results from various parties oriented to the upgrades of science and technology education in biological scope, in order to become a source of scientific information that can contribute to overcoming educational problems, especially in increasingly complex biology.

Topics covered in the journal include modern biology education content, teaching strategies for the classroom and laboratory, field activities include ethnobiology, applications, professional development, social and ethical implications of biology and ways to incorporate such concerns into instructional programs, as well as reviews of books and classroom technology products. Papers about religion, culture and local wisdom related to biology education rigorous are welcomed.

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1. Department of Biology Education, Universitas Negeri Jakarta, Indonesia
2. Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Negeri Jakarta, Indonesia.

DAFTAR ISI

Effectiveness of argument-driven inquiry (ADI) learning model on students' creative thinking skill: Environmental pollution. Inas Nuha Afifa, Neni Hasnunidah, Dina Maulina	1-12
Dynamic assessment on high school biology students' reasoning skills Murni Ramli, Mayasari Mahfudhotul Khasanah, Sri Dwiastuti	13-24
How CCDA instrument analyzed science pre-service teachers' prior knowledge? Safira Permata Dewi, E Ermayanti, Lucia Maria Santoso	25-35
Effect of interactive media, make a match and lecture method on learning virus achievement Agus Ariyanto, Wahyu Hari Kristiyanto, Rully Adi Nugroho	36-53
The correlation between scientific argumentation with viruses learning outcomes of senior high school student Vera, Yenny Anwar, Ermayanti	54-64
The relationship between knowledge of socio scientific issue and nature of science in ecosystem material in high school students Ilmi Octaviani Geopany, Diana Hernawati, Vita Meylani	65-74
Students' interest and cognitive learning outcomes: Biology education in high schools during COVID-19 Linda Gustia, S Suhartini	75-85
The use of distance learning through whatsapp and google meeting to identify differences in biology learning outcomes Fendy Hardian Permana, Ellisa Sukma, Poncojari Wahyono	86-98
Analysis items of the four-tier immune system multiple choice test instrument using rasch model Feni Andriani, Meti Indrowati, Bowo Sugiharto	99-119
Effect of problem-based learning model on biodiversity problem-solving skills Ratna Komala, Erna Heryanti, Amelia Rinawati	120-131
A narrative inquiry of socio-scientific issues-based e-learning development in biology to promote student health literacy Agung Wijaya Subiantoro, Rio C. Handziko, Yuni Wibowo	132-143



The use of distance learning through whatsapp and google meeting to identify differences in biology learning outcomes

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ARTICLE INFO

Article history

Received: 24 February 2021

Revised: 19 April 2021

Accepted: 30 April 2021

Keywords:

Biology

Distance learning

Google meeting

Learning outcomes

Whatsapp group



ABSTRACT

The COVID-19 pandemic has turned face-to-face learning into distance learning using online media. Educational institutions strive to provide a system to meet students' needs in conducting distance learning using online media. Educational institutions also try to familiarize teachers and students with using online media in the learning process. Educators and students can utilize distance learning media in Whatsapp groups and google meetings to carry out the learning process. This study aims to determine whether there are differences in student biology learning outcomes between the experimental class I learning using WhatsApp group and the practical class II learning using google meetings. This type of research is a quasi-experimental design with a posttest-only control design. The study population was all class X MIPA (mathematics and science) Public Senior High School 02 Batu (There are five classes). The sampling technique used purposive sampling. The experimental class I was class X MIPA 4 with 28 students and the practical class II was class X MIPA 5 with 28 students. Descriptive and inferential statistical data analysis techniques using Ms. Excell and the Independent Sample T-Test (SPSS Statistics 17.0). This study indicates that there is a difference in the average learning outcomes of students between experimental class I (74.75) who carry out learning using WhatsApp group and experimental class II (64.75) who carry out learning using google meetings. In conclusion, learning using the WhatsApp group is better.

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Permana, F. H., Sukma, E., & Wahyono, P. (2021). The use of distance learning through whatsapp and google meeting to identify differences in biology learning outcomes. *Biosfer: Jurnal Pendidikan Biologi*, 14(1), 86-98. <https://doi.org/10.21009/biosferjpb.20094>

INTRODUCTION

The world is currently facing Coronavirus Diseases 2019 (COVID-19), which can threaten human health. COVID-19 is an emergency problem faced by the whole world because it is contagious to humans. The COVID-19 pandemic has disrupted almost all aspects of life, one of which is education. The Indonesian government states that teaching and learning activities will be carried out at home using distance learning. Distance learning is expected to continue to provide meaningful learning experiences for students. This policy is also enforced to prevent the spread of COVID-19 and as a solution that is expected to overcome difficulties in face-to-face learning, which are also constrained by problems of time, location, distance and cost, and the existence of social distancing regulations.

The condition of the COVID-19 pandemic has caused a change in the learning system, which is usually done face-to-face and then switched to distance learning using online media. In Indonesia, most schools have tended to focus on face-to-face learning, and not many educational institutions have implemented distance learning in schools. School infrastructure in Indonesia, on average, does not have a Learning Management System (LMS), which in its implementation uses a lot of e-learning communication media. Educational institutions must strive to provide systems that can meet the needs of students in conducting distance learning using online media.

Research related to the use of online communication media that can be used to support the achievement of the learning process such as the use of the WhatsApp application (Fattah, 2015), zoom meetings and google classrooms (Gusty, 2020; Suhery et al., 2020), google meet, google form and quizzes (Fahmi, 2020), and YouTube (Pakpahan & Fitriani, 2020) are currently being done a lot. Some of these studies have proven that using these various applications has succeeded in improving student skills, interests, and student achievement. However, it is different from the research results Daheri et al (2020), which concluded that it is still not practical to use WhatsApp groups as an online learning medium. The research data evidence this, namely the majority of 41.2% of parents, believe learning using WhatsApp is not practical. In comparison, 33.3% of parents doubt its effectiveness because of the lack of interaction and material explanation from educators. This is also in line with the research results (Kusuma & Hamidah, 2020), which states that classes that do learning using zoom are more effective and better than classes that do learning using the WhatsApp group. However, when viewed from survey data, the Ministry of Education and Culture states that as many as 87.5% of students use the WhatsApp application in carrying out learning at the high school level. Based on the survey data, the use of WhatsApp remains the choice of educators and students in communicating during the learning process. Whatsapp also has 2 billion global users with active users in Indonesia, 84% of the 175.4 million internet users in Indonesia. WhatsApp is a social media that is relatively easy, cheaper, and does not require a large internet quota. WhatsApp as a learning medium can allow students to carry out learning activities such as asking questions, discussing, or asking and answering questions related to learning material that the teacher does not understand without meeting directly with the teacher.

Previous research on learning using WhatsApp has been carried out by several researchers, including (Sofyana & Rozaq, 2019). Their research shows that Whatsapp-based combination online learning in informatics techniques shows that its application is more effective than conventional learning. According to Pratama & Yusro (2016), the results of their research show that the implementation of Whatsapp mobile learning can improve student learning outcomes on introducing electronic components. According to Yensy (2020), the results of his research show that learning mathematics statistics through the WhatsApp group media in terms of student learning outcomes is very effective. According to Prajana (2017), the results of his research show that the use of the WhatsApp application for learning media is perfect.

Several researchers have conducted previous research on learning using Google meet, including Juniartini & Rasna (2020) the results of his research show that the use of the google meet application in listening and speaking skills for language learning is very good. According to Wihandar & Kurniawan (2020), the results of their research show an increase in lecturers' professionalism through distance learning system training using Google Meet. According to Wati (2020), the results of her research show that the effectiveness of learning using the google meet application in high school children.

These studies indicate that learning using WhatsApp is very good for distance learning, and education using Google meet shows that it is good to use in distance learning. This is supported by research using WhatsApp and Google meet by Rozi et al (2021) their research shows that the effectiveness of online learning using Google Meet and WhatsApp Group to improve mathematics learning outcomes during the Covid 19 pandemic. Comparing education using WhatsApp with Google has never been done. The novelty of this research activity is 1) comparing learning using WhatsApp with Google meet on learning outcomes, and 2) the material used in biology. The novelty of this research will provide benefits in distance learning information where we will understand more effectively using WhatsApp or Google Meet. So that educators can immediately focus on using one of these platforms in their learning activities.

Research related to this matter is essential and needs to be done to answer communication challenges in e-learning during a pandemic. To carry out the learning process with the distance learning method using online media during the COVID-19 pandemic. Education is an essential aspect so that in any situation, education must always be endeavored to run and be carried out correctly. Based on the background of the above problems, this study aimed to determine the differences in biology learning outcomes between using WhatsApp and Google Meet.

METHODS

Research Design

The type of research used is Quasi-Experimental Design which uses a Posttest-only control design (Sugiyono, 2012). This is used to see the results of a treatment by comparing differences in biology learning outcomes in two class groups: experimental group I (students using the Whatsapp Platform. Group) and experimental group II (students using the Google Meeting Platform). This research was conducted at public senior high school 2 Batu, Indonesia. The sample consisted of two classes, namely class X mathematics and science 4 (X MIPA 4) as the experimental class I and X mathematics and science 5 (X MIPA 5) as the experimental class II with 28 students each. The research design can be seen in Table 1.

Table 1.

Pre-experimental research design with posttest-only control design

Class	Treatment	Valuation
Experiment I, class X mathematics and science 4 (X MIPA 4). Public senior high school 2 Batu, Indonesia.	Learning using WhatsApp group	Posttest
Experiment II, class X mathematics and science 5 (X MIPA 5). Public senior high school 2 Batu, Indonesia.	Learning using google meeting	Posttest

Table 1 shows the research design that compares the class group post-test with the application of its learning. Learning using the WhatsApp group uses a PowerPoint inserted with an audio explanation—learning using google meetings with a presentation system using PowerPoint. The learning stages, learning steps using Whatsapp group and google

meeting, can be seen in [Table 2](#).

Table 2.

Learning steps

No	Method	Students Activity	Teachers Activity
1.	lecture	Students listen to the explanation from the teacher.	The teacher provides a stimulus to students. Then provide examples of questions related to biodiversity that can be found in the surrounding environment or daily life.
		Students cite examples of levels at similar levels of biodiversity and explain why they chose these examples.	The teacher chooses two other students to give examples and explain the reasons why they chose these examples.
		Two students who were shown randomly would read their insights related to the material on biodiversity.	The teacher chooses two students randomly to read out the insights related to the biodiversity material.
		The other three students will explain again with their understanding and language without looking at books or other learning resources.	The teacher randomly chooses three other students to explain again by concluding or summarizing the answers of the previous two students.
		Students listen to the explanation from the teacher.	The teacher clarifies the answers from the students.
2.	question and answer	Students ask questions related to material that is not clearly understood and answer questions from the teacher.	The teacher provides opportunities for other students to ask questions.
		Students listen to answers from other students or teachers.	The teacher provides the opportunity for other students to try to answer these questions.
		Students listen to the explanation from the teacher.	The teacher classifies the answers from students.
3.	discussion	Students carry out discussions such as exchanging opinions, thoughts, and ideas related to learning materials.	The teacher gives students problems or questions related to the material and then asks students to discuss answering these problems or questions with other students.
		Students present the results of the discussion in turn.	The teacher directs students to explain the results of the discussion.
		Students listen to the explanation from the teacher.	The teacher classifies the answers from students.
		Students conclude the results of the discussion and record the results of the discussion.	The teacher helps students to conclude the results of the discussion.

Population and Samples

The population in this study were all students of class X MIPA at state senior high school 02 Batu, which consisted of 5 classes. The sampling technique used in this research is the purposive sampling technique because it is based on specific considerations. Namely, experimental class, I is class X MIPA 4 with as many as 28 students, and experimental class II is class X MIPA 5 with 28 students. The selection of this class as the research sample was carried

out considering that the class used as the experimental class I had the same abilities as the experimental class II. Also, the classes are taken as experimental class I and experiment II have the same number of students.

Instrument

The instrument used in this study was a biology learning outcome test instrument used to measure the level of students' cognitive mastery of biodiversity material. At the last meeting, students will be given multiple-choice questions to gauge student biology learning outcomes between classes taught using the WhatsApp group and google meeting platforms.

The test of the validity and reliability of the research instruments was carried out before the implementation of the research. Both of these tests were carried out using the help of the SPSS Statistics 17.0 application. This test was carried out in a class that was not given experimental treatment, with the number of respondents being 63. The questions tested were in the form of cognitive assessment questions with 35 multiple-choice questions. The grid and sample questions used can be seen in [Table 3](#) and [Table 4](#).

Table 3.

Question grid

Indikator	Number	Cognitive level
Describe and analyze levels of biodiversity	1, 9, 11, 24, 25, 27, 30, 39	C2, C4, C4, C2, C2, C2, C2, C2
Induce and consider outcomes related to levels of biodiversity	10, 15, 26	C4, C5, C5
Focusing questions related to the level and distribution of biodiversity in Indonesia	3, 4, 8, 14, 17, 12, 22, 31, 38, 42, 43,	C4, C5, C4, C4, C4, C4, C2, C4, C4, C2, C2
Analyze arguments regarding the level of biodiversity and classification of living things	5, 6, 16, 33, 34, 35, 36, 47, 48, 50	C5, C4, C5, C4, C5, C5, C4, C5, C2, C2,
Determine actions related to biodiversity conservation	20, 21, 44	C5, C2, C2

Table 4.

Example questions

Question example
<p>9. The gray and white Angora cat mated with a black local cat produces several different colored offspring. The right statement for the situation is...</p> <ol style="list-style-type: none"> The two cats are different varieties but still one breed The two cats are of the same variety and belong to the same breed The two cats belong to different breeds The two cats belong to different genera When mated, it will produce offspring that are not sterile
<p>10. In observing the diversity of species levels in the garden, Joy found differences in the places under big trees and those that were not shaded by big trees. The difference is that in a place covered by a large tree, the plants appear many and varied, while in a place that is not shaded, the plants are few and uniform. This is due to abiotic factors, namely....</p> <ol style="list-style-type: none"> water light air humidity the number of levels I consumers
<p>4. Based on the results of observations made in the market, one group of students found the following conditions:</p> <ol style="list-style-type: none"> Pet sellers sell Angora cats, lions, and cheetahs

Question example

2. The rice seller sells types of rojolele, ciherang, and ciliwung rice.
3. Bird traders sell parakeets of various colors.
4. Many fish sellers include catfish, tilapia, koi fish.
5. Grocery traders sell various chilies, including green bird's eye chilies and red bird's eye chilies.

Which of the above observations includes gene diversity?

- a. 1, 2 dan 3
 - b. 1, 2 dan 5
 - c. 2, 3 dan 4
 - d. 2, 3 dan 5
 - e. 3, 4 dan 5
-

6. A researcher wants to cross the Grapefruit (*Citrus maxima*) with the Medan Orange (*Citrus reticulata*) in the hope of obtaining a fruit that is large and tastes sweet with a yellowish color. The crossed plants never produced fruit after being planted for several years. The results of this study indicate that the Grapefruit and Medan Oranges show a diversity of levels....

- a. genes
 - b. Type / Species
 - c. ecosystem
 - d. genes dan species
 - e. genes dan ecosystem
-

20. The following are efforts to conserve biodiversity in Indonesia.

- 1) Maintenance of Bunaken marine park
- 2) Carcass flower protection in Bengkulu
- 3) Preservation of germplasm gardens in Cibinong
- 4) One-horned rhino conservation in Ujung Kulon
- 5) Development of a mekarsari fruit garden in Cileungsi

Which is an ex-situ conservation effort is....

- a. 1 and 2
 - b. 1 and 4
 - c. 2 and 3
 - d. 3 and 5
 - e. 4 and 5
-

The validity test of the instrument is valid if the correlation efficiency (r_{xy}) is more significant than (r_{tabel}). Based on the results of the calculation of the learning outcome assessment instrument, it has a value of r_{tabel} : 0.248, and r_{xy} of a total of 35 questions shows a number greater than r table. The conclusion is that the research instrument is valid.

The instrument reliability test can be reliable if it has a Cronbach Alpha coefficient of more than 0.60 (Ghozali, 2006). The results of the calculation of the learning outcome assessment instrument have a Cronbach Alpha value of 0.84. The conclusion is that the learning outcome assessment instrument used in this study is reliable.

Procedure

The research procedure in this study consisted of two stages, namely the preparation stage, including 1) observation related to students and the learning process, 2) determining the population and research sample, 3) developing research instruments, and 4) testing the validity and reliability testing. The implementation stage includes learning using WhatsApp group in the experimental class I (X MIPA 4) with learning material in the form of power points inserted with audio explanations. Learning using google meeting in experimental class II (X MIPA 5) with a presentation system using PowerPoint

The learning process is carried out based on the Learning Implementation Plan, which refers to the syllabus. At the end of the meeting, students were given learning outcome test

questions to determine the level of students' understanding (cognitive) of the learning material. The research procedure can be seen in [Figure 1](#).

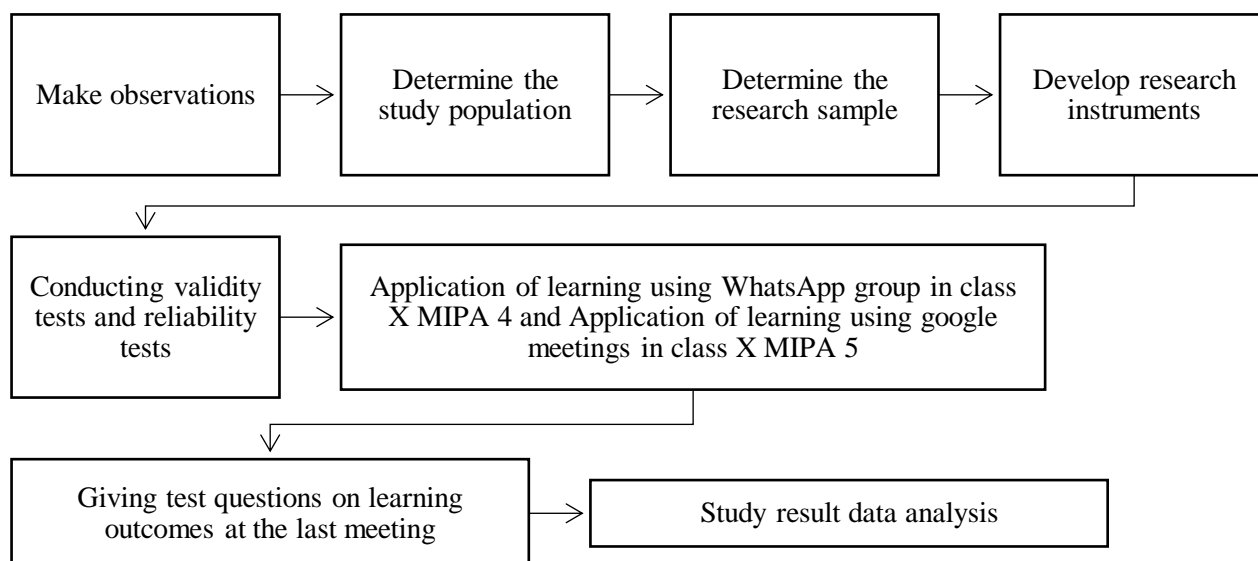


Figure 1. Research procedure

Data Analysis Techniques

Data analysis in this study was carried out using descriptive statistics and inferential statistics. The first stage of research data is processed with simple calculations using MS. Excel 2016. The second stage is a prerequisite test, namely the normality test, to determine the distribution of the study population. The following prerequisite test is the homogeneity test to determine the variants of research data. Furthermore, the data will be processed using the independent test data analysis technique sample t-test using SPSS version 17.0.

Based on the results of the data normality test, it is known that the significance value of biology learning outcomes in experimental class I is 0.200 and in experimental class II is 0.070. This shows that the data is usually distributed, this is because the significance value is more significant than 0.05. The homogeneity test results show that the significance value of the biology learning outcomes in experimental class I and experimental class II is 0.222. This indicates that the data is homogeneous because the significance value is more significant than 0.05.

RESULTS AND DISCUSSION

This study examines the differences in biology learning outcomes in class X MIPA 4 and X MIPA 5 using the WhatsApp group platform and google meeting at state senior high school 2 Batu. The dependent variable measured in this study is the result of studying biology. The results of processing the overall value of the data are detailed in [Table 5](#).

Table 5.

The summary of the results of the descriptive statistical analysis of the biology learning outcomes data

	Class	N	Minimum Value	Maximum Value	Average	SD
Student learning outcomes	Ekspersiment I_Whatsapp_Group	28	48	100	74,75	13,465
	Ekspersiment II_Google Meet	28	6	88	64,75	18,428

The descriptive statistical analysis results shown in Table 3 show that the average value of the biology learning outcomes in the experimental class I learning using the WhatsApp group has an average value of 74.75. The experimental class II using google meeting had an average value of 64.75. Based on these data, it can be seen that the intermediate biology learning outcomes are higher in experimental class I, which carry out learning using the WhatsApp group. Then, the independent sample t-test was used to determine whether there was a difference in students' average biology learning outcomes, as presented in Table 6.

Table 6. Independent sample t-test of student learning outcomes

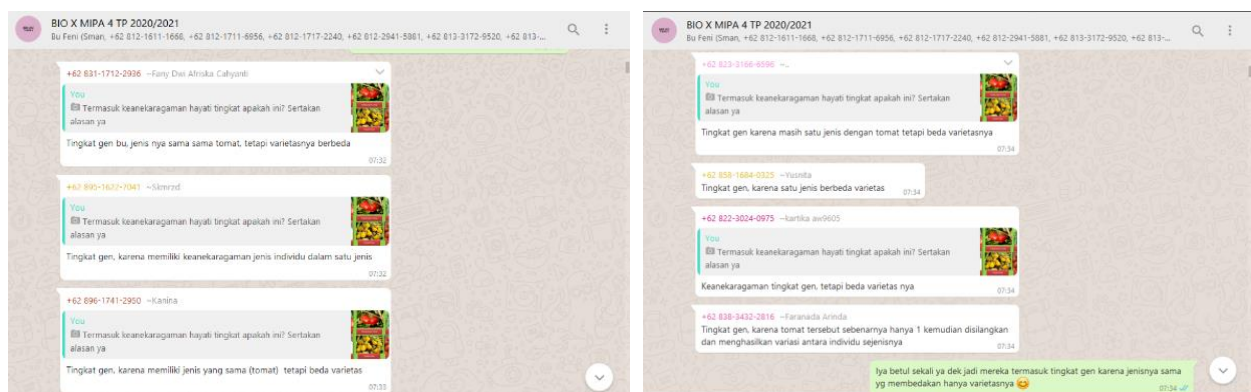
		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
Student learning outcomes	Equal variances assumed	2,318	54	,024	,59636672
	Equal variances not assumed	2,318	49,435	,025	,59636672

The independent sample t-test on student learning outcomes is shown in Table 4, indicating that the biology learning outcomes of students have a significance value of $0.024 < 0.05$. So, it can be concluded that there is a difference in the average between students in the experimental class I carry out learning using WhatsApp group and students in experimental class II who carry out learning using google meetings.

The higher average learning outcomes obtained by the experimental class I, namely 74.75, who carried out learning using the WhatsApp group, were several factors. The first factor is that using the WhatsApp group is relatively easy to use and is rarely constrained by the network. This is supported by an opinion Arora & Srinivasan, (2020) which states that using the WhatsApp group media makes it easier for students; for example, in terms of discussion, students can send photos of the results of solving practice questions to educators.

The second factor is a stable network condition in the use of Whatsapp groups so that the learning process takes place without any network constraints. The advantages of Whatsapp groups are cheap, save the quota, provide convenience in terms of use, practicality, efficiency, and convenience in creating a learning community (class in the form of a group) (Zakirman & Rahayu, 2018). In terms of the comfort of Whatsapp groups, it can be accessed anytime and anywhere if students want to look back at activities during discussions or questions and answers. This is because the WhatsApp group also has advantages, namely that the material and discussion materials can be stored directly by students to make it easier to solve practice questions and repeat and read material that is poorly understood (Yensy, 2020).

The third factor is the occurrence of interaction marked by the involvement or participation of students at the time of question and answer and discussion with educators. This involvement or participation will affect students' understanding of the learning material when learning occurs. The involvement of students determines the success of education. To achieve optimal learning outcomes, it is necessary to involve or participate in learning (Ginancar et al., 2019). The question and answer and discussion activities in the experimental class I can be seen in Figure 2.



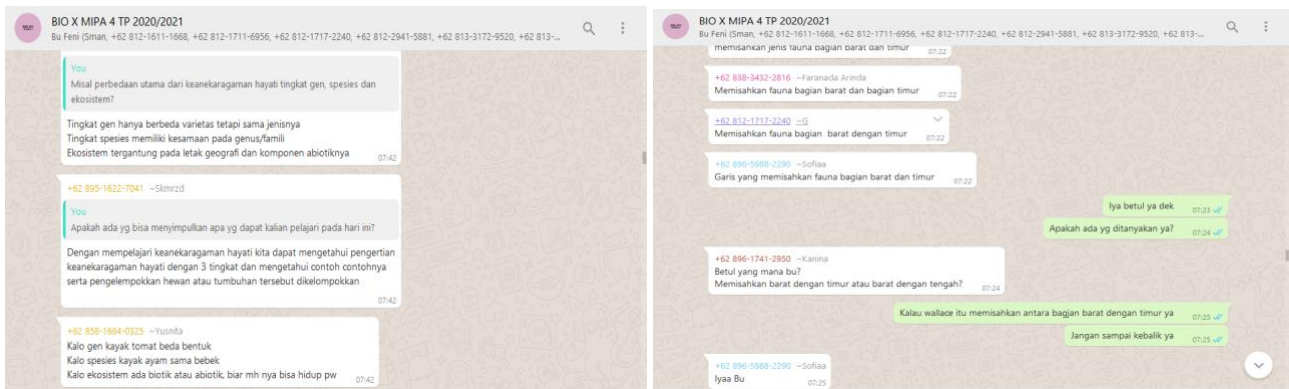
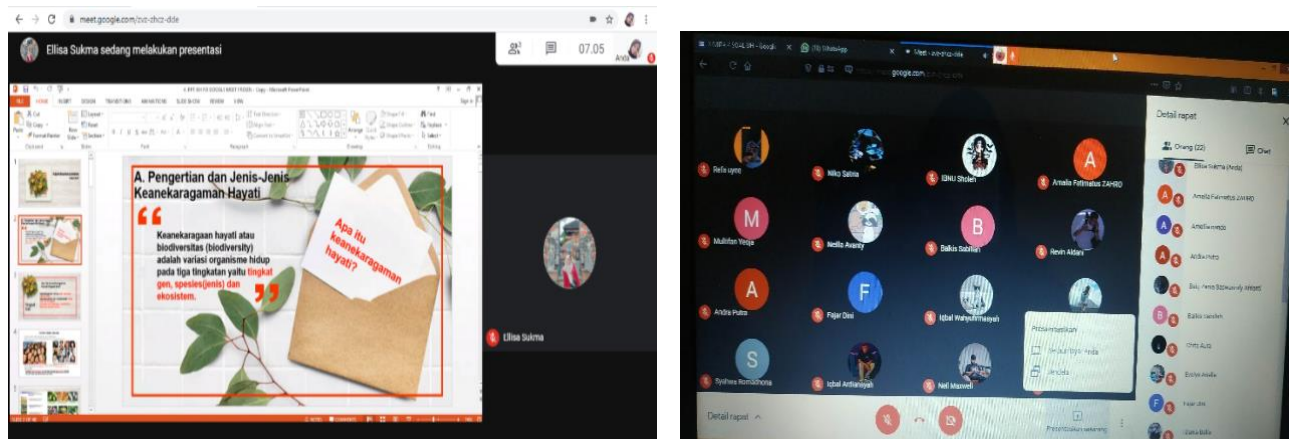


Figure 2. Question and answer and discussion activities in the experimental class I

The lower average of biology learning outcomes obtained by the experimental class II, namely 64.75, which carried out learning using google meetings, could be caused by students not listening to explanations from educators or students doing other activities outside the learning process. Even though educators have provided directions to activate the video feature, there is still a possibility that students deliberately do not start the video feature. So, those educators cannot supervise or monitor the activities of students.

It can also be caused by factors of unstable network conditions due to more wasteful quota data. During the learning process, several students go in and out of Google Meetings or have difficulty accessing entry. Google meeting has a weakness, namely the absence of a data-saving feature resulting in more data quota being wasted, which will also cause disconnection of the network connection or video connection when using Google Meeting (Sawitri, 2020). Disconnected network connections or video connections can also lead to a lack of interaction between students and educators during the learning process and a lack of involvement and participation of students during question and answer and discussion with educators. This is in line with the opinion Hadisi & Muna, (2015), which states that online learning can result in a lack of interaction between educators and students, even between students themselves, which will impact slowing values in the teaching and learning process. Lack of exchange, such as the involvement or participation of students, can occur because students cannot or are even late in following the learning process. Google meetings do not have a feature that can look back at activities during the learning process, affecting students' level of understanding of learning material. This is also supported by the opinion of Atsani, (2020), which states that the obstacles faced in learning using an online system are that students cannot fully understand the material presented. Students are confused in receiving the material presented. Even though education is carried out using video conferencing, it is still not as effective as imagined. The conditions of learning activities in experimental class II can be seen in Figure 3.



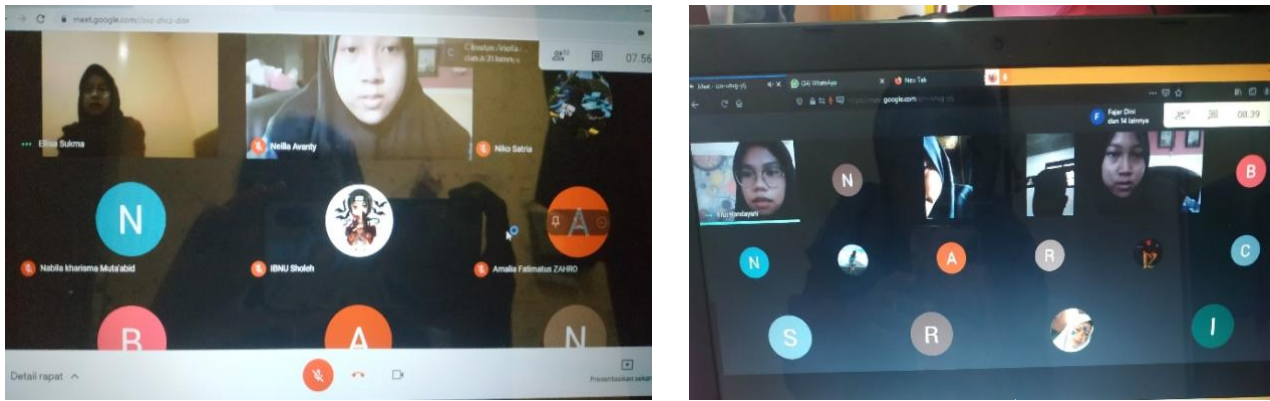


Figure 3. Learning activities, question and answer, and discussion in the experimental class II

Other factors that can also affect student learning outcomes include success in online learning, which requires students to be responsible, motivate themselves, and communicate with educators and other students through information and communication technology. The need to build shared understanding and personal qualities in terms of motivation, attitudes, learning styles, previous learning experiences, and individual perceptions. These factors need to be integrated to minimize differences among students to support the creation of success in online learning (Irawati & Santaria, 2020).

This is also in line with Nakayama et al., (2007), which states that all e-learning literature indicates that not all students will be successful in online learning. This is due to the learning environment and student characteristics. According to Fahmi, (2020), the parts in question are students who have the type of character that is enthusiastic and enthusiastic in the learning process, such as during the question and answer process and discussion as well as high learning independence so that the learning outcomes that students get will be maximized and vice versa. According to Hadisi & Muna, (2015), Online learning also can foster student learning independence (self-regulated learning). According to Syarifudin, (2020), students learn best to understand what is being known actively. Based on the study results, it can be said that students in the experimental class I and II tend to have learning characteristics and independence that are appropriate and support the achievement of online learning success. The features and learning independence in experimental class 2 were not as optimal as those in practical class I. The average value of student learning outcomes in the experimental class I who carried out learning using WhatsApp group was 74.7 while the average weight of student learning outcomes in the experimental class 2, which was do learning using google meeting, is equal to 64.75.

Educators in the COVID-19 pandemic are required to have adequate skills in mastering technology and changing communication styles. The style of communication that usually occurs during direct learning is that educators communicate directly and in one direction so that it is easy to discuss with students. Students will be less active and less enthusiastic in participating in the learning process in the current pandemic condition, such as discussion or question and answer. Teachers must have the ability to be alert and creative in building students' enthusiasm through good communication. This is in line with the opinion of Mastura & Santaria, (2020), which states that not all teachers are experts and understand technology. Teachers' ability to use technology is also a factor that can affect the success and quality of learning. Teachers must have adequate abilities in mastering technology; this is because teachers must design appropriate and appropriate methods, models, styles, and learning strategies in the online learning process. The technique used in the learning process must be maximally utilized so that the learning objectives are adequately achieved. To achieve these learning objectives, an important aspect that needs to be considered by teachers when learning online is

communication. The communication that teachers usually do is direct; however, with the implementation of an online learning system, the teacher must communicate online to be still channeled.

CONCLUSION

Based on the research results that have been carried out, it can be concluded that there is a difference in student biology learning outcomes between the experimental class I learning using the WhatsApp group platform and the experimental class II learning using the google meeting platform. This can be seen from the independent sample t-test, which shows that the biology learning outcomes of students have a significance value of $0.024 < 0.05$. The average learning outcomes of students in the experimental class I carried out learning using the WhatsApp group amounted to 74.75. Meanwhile, the average of biology learning outcomes in experimental class II, which carried out learning using google meetings, was 64.75. The average student learning outcomes of biology were higher in the experimental class I, who carried out learning using the WhatsApp group.

ACKNOWLEDGMENT

The researchers would like to thank the principal, biology subject teachers, and students of class X MIPA 4 and MIPA 5 at Public Senior High School 02 Batu, Indonesia for supporting and assisting the implementation of this research.

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