

Analysis of the Effectiveness of Online Learning of Biology in Jayapura City State High Schools During the Covid-19 Pandemic for the Academic Year 2020/2021

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ARTICLE INFO

Keywords: Effectiveness, Biology Online Learning

Received : 5 April

Revised : 15 April

Accepted: 25 May

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ABSTRACT

This research aims to analyze the effectiveness of online biology learning at Public High Schools in Jayapura City during the COVID-19 pandemic for the 2020/2021 academic year. This type of research is quantitative descriptive, with a population of 1,217 students. Sampling was carried out using a purposive sampling technique so that it was obtained. the total sample was 211 students. The instruments in this research used questionnaires and interviews. The questionnaire is in the form of written questions given directly or online to respondents. Meanwhile, interviews were conducted to strengthen the statements that had been answered in the previous questionnaire. The data was analyzed manually using the average formula according to Sudijono 2007 which will be confirmed with the Widoyoko 2010 range of values. The research results of the three indicators were obtained as follows: (1) online learning support components obtained an average score of 3.17 in the effective category, (2) the characteristics of online learning obtained an average score of 3.22 in the effective category, (3) the benefits of online learning obtained an average score of 3.04 in the effective category. Overall, the effectiveness of online learning obtained an average score of 3.15

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a new type of virus that was discovered in Wuhan City, Hubei Province, China in 2019. This case spread rapidly throughout the world in early 2020, one of which is in Indonesia, which has had many negative impacts on all living things and the universe. especially in today's world of education the Covid-19 pandemic in Indonesia has made the learning system change drastically from face-to-face learning to online learning at home. The government issued a Circular from the Ministry of Education and Culture (Kemendikbud) Directorate of Higher Education No.1 of 2020 regarding preventing the spread of COVID-19 in the world of education. In this circular, the Ministry of Education and Culture instructed to organize distance learning and advised students to study from their respective homes (Handarini & Wulandari, 2020).

In addition to the above regulations for learning during the COVID-19 pandemic based on the Mayor of Jayapura's latest Instruction Number 1 of 2021 concerning the prevention and management of COVID-19 in the Jayapura City area on January 14, 2021, hereby instructs: the implementation of learning activities in Education Units (TK), PAUD, SD, SMP, and SMA) will continue to be carried out using the online method until March 2021 and will be evaluated further. The methods and media for Learning from Home (BDR) are implemented using Distance Learning PJJ (PJJ) which is divided into 2 first approaches to online distance learning. The second approach is distance learning outside the network (offline). In implementing PJJ, educational units can choose an online or offline approach or a combination of both according to the availability and readiness of facilities and infrastructure (Kurniasari, et al., 2020).

As an educator, you must continue to strive to increase innovation in the field of education, especially in teaching and learning, because a quality education system cannot be separated from the success of teachers in designing and implementing the learning process. Creating a learning environment is an important aspect of creating a conducive independent learning environment, where the learning environment in the education 4.0 era leads to the development of facilities that provide freedom for students to be able to process learning activities by providing flexible support and easy access, one of which is online learning (Choiroh, 2020).

Online learning cannot be separated from the internet network which is one of the obstacles faced by students so that the learning process will be hampered which can ultimately affect the effectiveness of the quality of student learning outcomes. Effectiveness is the reach of a program's efforts as a system with certain resources and means to fulfill its goals and objectives without paralyzing those methods and resources and without placing unreasonable pressure on its implementation. Learning requires careful planning, creating learning tools, selecting strategies, media, techniques, learning models, and evaluating learning, all of which are mutually sustainable (Anugrahana, 2020).

One indicator of learning effectiveness is the achievement of a learning goal. If learning objectives are achieved optimally, it can be said that learning has achieved its effectiveness. In addition, active student involvement shows

learning efficiency. The teaching and learning process is said to be effective if the learning can achieve the expected goals and students can absorb the lesson material and put it into practice (Choiroh, 2020).

Based on interviews, it is known that Jayapura City Public High Schools have implemented online learning since the beginning of the new school year until the pandemic period in March. When learning is carried out online, the teaching patterns that are usually carried out in schools cannot be completely carried out online. This indicates that there is a lack of variety in the learning models used by teachers during the online learning process due to limited online communication and face-to-face factors. Furthermore, when learning online biology subjects, teachers usually use group discussion or lecture methods which involve students having to present the results of group discussions. Apart from that, teachers also use learning media in the form of PowerPoint which can help students receive learning so that they can achieve the desired goals of the learning process.

Learning will be more effective if students take an active role in it. Learning that is based on cooperation between students can make students who do not understand certain material feel less embarrassed about expressing their opinions. While implementing online learning, students feel happy because they are flexible in the time and place to study. Apart from that, it reduces transportation costs to school. However, there are still some students who do not have laptops, cellphones, and internet quota, but there are also quite a few students who already have laptops, cellphones, and sufficient internet quota. Based on the research background above, the researcher is interested in conducting research with the title "Analysis of the Effectiveness of Biology Online Learning at Public High Schools in Jayapura City During the Covid-19 Pandemic for the 2020/2021 Academic Year."

1. Formulation of the problem

Based on the background above, the formulation of the problem in this research is how effective online Biology learning is at Public High Schools in Jayapura City during the COVID-19 pandemic for the 2020/2021 Academic Year.?

2. Research purposes

Based on the problem formulation, this research aims to determine and analyze the effectiveness of online Biology learning at Public High Schools in Jayapura City during the COVID-19 pandemic for the 2020/2021 Academic Year.

LITERATURE REVIEW

1. Learning Effectiveness

Effectiveness is a measure that states how far the target (quantity, quality, and time) has been achieved. Where the greater the percentage of targets achieved, the higher the effectiveness. So effectiveness is the ability to choose the right goals or the right equipment to achieve the set goals (Choiroh, 2020). Effectiveness is the reach of a program's efforts as a system with certain resources and means to fulfill its goals and objectives without paralyzing those methods and resources and without placing unreasonable pressure on its implementation. Learning requires careful planning, creating learning tools, choosing strategies, media, techniques, learning models, and evaluating learning, all of which are mutually sustainable. It is necessary to use effective and innovative learning models so that the learning carried out can be more varied and run smoothly. The use of this learning model is also adapted to the material to be taught so that the suitability between the two and all components is correct. One indicator of learning effectiveness is the achievement of a learning goal (Choiroh, 2020). If learning objectives are achieved optimally, it can be said that learning has achieved its effectiveness. In addition, active student involvement shows learning efficiency. The teaching and learning process is said to be effective if the learning can achieve the expected goals and students can absorb the lesson material and put it into practice (Kurniasari, et al., 2020).

2. Online learning

Online learning is a learning method that uses virtual technology and communication in its implementation. Digital platforms are needed to support online learning activities so that interaction occurs between teachers and students (Manuela and Fernando, 2013).

a. Online Learning Support Components

Supporting components for online learning to facilitate the implementation of online learning during the COVID-19 pandemic needs to be supported in several components (Nabila, 2020) as follows: 1). Infrastructure is all the physical facilities needed to carry out online learning, including cell phones, computers, laptops, and other electronic devices. 2). Systems and applications, a system is a collection of elements that interact to achieve certain goals. An application is the application of a system designed to process data that uses the rules or provisions of a particular programming language. The systems and applications used in online learning include WhatsApp, Google Classroom, Zoom, Google Meet, Learning Management System (LMS), and other systems and applications. 3). Content is information available through media or electronic products. Content refers to learning material or information created by the teacher.

b. Government Online Learning Platform

Online learning is learning that aims to reach a wide group by utilizing the internet network. The online learning process utilizes technological advances such as multimedia technology, video, virtual classes, animated online texts, voice messages, e-mail, conference calls, and online video streaming. Online learning can be done with an unlimited number of participants and can be done for free or for a fee (Assidiqi & Sumarni, 2020). Online learning is carried out

without meeting face to face, but using a platform that can help the teaching and learning process be carried out even remotely. Online learning aims to provide quality learning services in an open network to reach more and wider people interested in learning. Several applications can also help with teaching and learning activities, for example, WhatsApp, Zoom, web blogs, Edmodo, and others. The government is also taking a role in dealing with inequality in learning activities during the Covid-19 pandemic. According to the official website of the Indonesian Ministry of Education and Culture, there are 12 platforms or applications that students can access to study at home, namely (1) Home Learning; (2) Our Desk (3) Icando (4) Indonesia (5) Google for education (6) Smart class (7) Microsoft Office 36 (8) Quipper school (9) Teacher's room; (10) Your school (11) Zenius (12) Cisco Webex (Handarini & Wulandari, 2020). Apart from these platforms, other digital platforms can be used during learning, including WhatsApp Group (WAG), Google Classroom (GC), Google Meet, and Zoom Meeting (Rachmawati, et al., 2020).

c. Characteristics of Online Learning Students

One of the challenges of online learning is expertise in using technology on the part of educators and students (Hasana, 2020) states that the characteristics of students in online learning activities are as follows: 1). The enthusiasm for learning during the learning process is strong or high for independent learning. When learning online, the criteria for a complete understanding of the material in learning are determined by the students themselves. Knowledge will be discovered by themselves and students must be independent. So that the independence of each student's learning makes the difference in learning success different. 2). Interpersonal communication skills. In these characteristics, students must master communication skills and interpersonal skills as one of the conditions for success in online learning. Interpersonal skills are needed to establish relationships and interactions with other students. As social creatures, we still need interaction with other people even though online learning is carried out independently. Therefore, interpersonal skills and communication skills must continue to be trained in social life.

METHODOLOGY

1. Types of research

This type of research is quantitative descriptive research to determine the Effectiveness Analysis of Biology Online Learning at Public High Schools in Jayapura City during the COVID-19 pandemic.

2. Place and time of research

Place: This research was conducted in the city of Jayapura at all schools that carry out online learning. This can be seen in the following table:

Table 1. List of High Schools That Implement Online Learning in The City of Jayapura

No	School name	Address
1	Jayapura 1 Public High School	JL. Biak, Kota Baru, Abepura, Jayapura City
2	Jayapura 2 Public High School	JL. Serui, Imbi, North Jayapura, Jayapura City
3	Jayapura 3 Public High School	Jl. Merah Putih-Buper Waena, Jayapura City
4	Jayapura 4 Public High School	Jl. Banyan, Entrop, Jayapura City

3. Population and sample

The population in this study were all public high school students in Jayapura City with a total of 1,217 students consisting of students in classes X, XI, and XII. Meanwhile, the sampling technique in this research used a purposive sampling technique. The criteria are that only schools apply online learning during the Covid-19 pandemic in 2021. The next criterion is that online learning is carried out systematically during the pandemic and there is no mixture of offline learning. So we got a sample of 211 students.

4. Definition of research variables

a. conceptual definition

1. Learning Effectiveness

Learning effectiveness is a learning activity that teachers and students must carry out so that learning objectives can be achieved effectively and efficiently (Fathurrahman, et al., 2020).

2. Online learning

Online learning is learning that is carried out virtually or carried out without face-to-face but through available platforms (Pakpahan & Fitriani, 2020).

b. Operational definition

The effectiveness of online learning referred to in this research is the success of learning that is carried out effectively. It is said to be effective if it is in the always and often category.

5. Research Instrument

Measuring analysis of the effectiveness of online biology learning at Public High Schools in Jayapura City during the COVID-19 pandemic for the 2020/2021 academic year. This is done using a questionnaire that is filled in directly, that is, the respondent will give the correct answer using a checklist (√) in the column provided with a total of 37 statements with a score for each alternative answer given by the respondent using a Likert scale for positive statements (+) answers

(S) 4 Always, (SR) 3 Often, (KK) 2 sometimes and (TP) 1 Never and negative statements (-) answer (S) 1 Always, (SR) 2 Often, (KK) 3 sometimes and (TP) 1 Never.

6. Data Type

There are two types of data used in this research, namely:

a. Primary data

The data obtained by researchers comes from the individuals themselves by distributing completed questionnaires, the source of which is the respondent who will complete the questionnaire.

b. Secondary Data

Data was obtained through interviews and from books, research journals, and scientific reports related to research.

7. Data Collection Technique

Data is an important factor in research, the data collection techniques used in this research are:

a. Questionnaire

The questionnaire is carried out by providing written questions for the respondent to answer directly.

b. Interview

Interviews are used if you want to know things from respondents in more depth.

8. Data Analysis Technique

The data obtained in this research is an analysis of the effectiveness of using online learning media in the biology learning process at Public High Schools in Jayapura City. analyzed using descriptive statistical tests with the help of the SPSS application, and then a discussion was carried out on quantitative data analysis. Meanwhile, to determine the value range that will be confirmed with the value range using theory(Widoyoko, 2010) as follows:

Table 2. Average effectiveness

Value Range	Information
1 – 1.80	Ineffective
1.81 – 2.60	Less effective
2.61 – 3.40	Effective
3.41-4.00	Very effective

RESULT AND DISCUSSION

1. Instrument Quality Test Results

Instrument quality testing was carried out by testing the validity and reliability of the questionnaire. Test the validity of the instrument using the Pearson Product Moment formula using the SPSS Version 25 for Windows application. Results Testing the validity of the biology online learning effectiveness instrument consisted of 50 statement items, 37 statements had an r table value above 0.30, which had valid criteria, while 13 statement items had an r table value below 0.30, which had invalid criteria. Furthermore, based on the calculation results, Cronbach's Alpha value for the biology online learning effectiveness variable is 0.802. Thus, it can be concluded that the questions in this questionnaire are reliable because they have a Cronbach's Alpha value greater than 0.70. This shows that each statement item used can obtain consistent data, which means that if the statement is submitted again, an answer that is relatively the same as the previous answer will be obtained.

2. Data Analysis Results

Results data analysis will be displayed based on online learning implementation indicators.

Indicator I: supporting components for online learning can be seen in the following table:

Table 3. Supporting online learning

Indicator	Frequency	N	%	Average Effectiveness	Information
Supporting components for online learning	Never	624	13.4	3.17	Effective
	Sometimes	557	12		
	Often	840	18.1		
	Always	2621	56.4		
	Total	4642	100		

Based on table 3 above, shows the data results on indicators of online learning supporting components. 56.4% of students answered Always, 18.1% answered Often, 12% answered Sometimes and 13.4% answered Never with an average effectiveness of 3.17 in the effective category. Based on Table 3, the highest score was obtained, namely 2621 (56.4%) in the effective category. This indicator explains that online learning requires technological assistance such as cell phones, computers, laptops, and other electronic devices. Students are required to have a cell phone to participate in online learning. Seeing the world conditions, especially Jayapura City, which is currently being hit by the COVID-19 pandemic, all activities are carried out from home, so as high school students it is mandatory to have a cellphone as a tool to support online learning. To create effective learning, several supporting components are needed, some of which are

infrastructure, systems, and applications as well as creative educators to create fun learning models. Where teachers are required to be able to plan and design online learning through videos, and presentation slides by utilizing appropriate online devices or media that are appropriate to the material being taught. Teachers must be able to choose which applications such as WhatsApp, Google Classroom, Zoom Meeting, Google Meet, and LMS (Learning Management System) are suitable for online learning.

Students' understanding of the material online is very good if this is supported by the learning facilities and infrastructure provided by the school and teachers. Referring to the results of research conducted by Kurniasari, Pribowo, and Putra (2020) which states that online learning has a positive influence on student motivation and learning achievement at SDN Tahunan Yogyakarta. Teachers provide online learning media in the form of material that is complete and easily accessible to students via the LMS (Learning Management System) page. Teachers also provide videos as a medium to support the explanation of material to students. The effectiveness of videos in learning is as a supplement to attract students' attention and interest in learning.

To find out how learning management during the COVID-19 pandemic was carried out by Negeri High Schools in Jayapura City, I conducted interviews with each biology teacher. It can be concluded that learning is carried out using an online system. The online system involves the internet network as a connection between teachers and students. Most students already have sufficient internet quota to take part in online learning, while students who don't have a quota get a free quota from the Ministry of Education and Culture so that online learning can run well. Students study from home and teachers must be present at school to provide online learning from school with the facilities provided. The school has prepared 8-12 study rooms for teachers who carry out online learning as a protocol for preventing Covid-19. The school has also created a home study schedule, which teachers use as a schedule for providing online teaching to students, especially in biology subjects.

Furthermore, the school has prepared a room equipped with WiFi access which can be used by teachers to carry out online learning. The school also carries out training with teachers as participants, and the school provides headset facilities to assist teachers in holding online meetings. Based on the explanation above, it can be seen that determining the model and providing infrastructure for online learning has been implemented well in Jayapura City Public High Schools. The results of this research are also supported by research conducted by Albab (2020). Apart from the shortcomings of online, it turns out that there are also many advantages experienced by both educators and students in the access process. Several advantages were found that were often experienced by students, including: first, internet packages or quotas. Most students have sufficient quota packages to take part in online learning, this is not an obstacle for students in the online learning process. Second, adequate equipment. Because adequate devices can make online learning easier, one of which is a laptop with a good WiFi device. Relatively sophisticated smartphones may be based on Android. Third,

understanding the material. If online learning is paper/text-based, students are presented with the material that has been provided and answer the questions.

The online learning model that is the first choice is the WA facility often known as WhatsApp, where according to the opinion of Biology teachers at Public High Schools in Jayapura City, teachers create WhatsApp groups so that all students can be involved in the group. Assignments are given via WhatsApp. Even if the students still don't understand, the teacher will also add it by sending a video or making a WhatsApp video call with the students. Collecting assignments is also easier for students via WhatsApp messages. Assignments can also be sent via WhatsApp and students usually take photos of the assignment and send it to the teacher. Even many video tutorials made by teachers are uploaded via WhatsApp. The way students do assignments is by doing the assignments manually by writing in a book and then sending photos of the assignment results via WhatsApp chat. To strengthen the assessment, the teacher also added assignments in the form of a Google Form. Teachers use WhatsApp as a means to collect assignments. The reason teachers choose to use WA is that it is more practical, easier for children to understand, and more effective because it does not require a lot of capital in the learning process. Another reason is that it is easier and all parents and guardians of students can use it and it is not something strange. Currently, WA is easier and can be reached by many groups. The advantage of using WA is that it is easier to operate and easier to send questions and material. Even if you want to hold a virtual meeting, the teacher can directly use the WA Video Call feature. WA is simple, effective, and efficient in use.

The results of this research are supported by research conducted by Muliadi, Mirawati & Jannah (2021). Very limited preparation 'forces lecturers to use online learning media that are familiar and owned by all students, such as WhatsApp. The use of WhatsApp makes online learning effective because it facilitates two-way interaction between lecturers and students or between students in two directions. Lecturers can only facilitate learning in the form of writing, voice recordings, videos, and independent assignments. detailed explanations from educators via group messages and videos. Explanatory videos or tutorials can provide a better understanding than just being given independent assignments.

Indicator II: Characteristics of Online Learning

Table 4. Results of Indicator Analysis of Online Learning Characteristics

Indicator	Frequency	N	%	Average Effectiveness	Information
Characteristics of Online Learning	Never	150	11.8	3.22	Effective
	Sometimes	160	12.6		
	Often	216	17.1		
	Always	740	58.5		
	Total	1266	100		

Based on table 4 above, shows the data results on indicators of online learning characteristics. 58.5% of students answered Always, 17.1% answered Often, 12.6% answered Sometimes and 11.8% answered Never with an average effectiveness of 3.22 in the effective category. Based on Table 4, a score of 740 (58.5%) was obtained with the effective category showing that students were very enthusiastic, passionate, and motivated in carrying out online learning so that during the learning process students played an active role in answering questions given by the teacher. Paying attention to the teacher when explaining the material will also make it easier for students to complete assignments and homework. In the opinion of each biology teacher, it can be concluded that in Jayapura City Public High Schools the implementation of online biology learning has been carried out well, regarding the provision of motivation by teachers. Teachers motivate students online at the end of learning by providing entertainment while learning by making games or asking students random questions so that students are motivated to understand the teacher's explanations carefully. Teachers also urge students to activate videos so that they can see the activities students are doing even though they are far away, motivate students to study well, remind them to do assignments and attend every meeting held by the teacher. The teacher gives assignments to foster an interest in reading in students. Then the assignments given were discussed during online meetings and reminded students to always pay attention to the 3M Health protocol, namely washing hands, using masks, and maintaining a minimum distance of 1 meter. The assessments given by biology teachers do not only prioritize numerical values but are based on students' activeness and psychomotor skills. Teachers assess students based on attendance and discipline in submitting assignments. Teachers also give more value to students who are active in asking and answering the teacher's questions during learning.

Next, the teacher asks about what was not understood in learning. The teacher also allows students to answer questions, when students are unable to

answer the question then it becomes a contested question. The teacher allows students to ask questions when the material has been completed. At that time the teacher asked what the students did not understand, so the teacher straightened out and told the students what they did not understand. Apart from that, the teacher also provides questions in the form of exercises that students can answer orally during online learning. The results of this research are supported by research conducted by Assidiqi & Sumarni (2020) that online learning also has the advantage of being able to foster independent learning (self-regulated learning). The use of applications can increase learning independence, online learning is more student-centered which causes them to be able to take responsibility for learning (learning autonomy). Learning online requires students to prepare their learning, evaluate, organize, maintain motivation in learning, and increase student interest.

Indicator III: the benefits of online learning can be seen in the following table:

Table 5. Results of Analysis of Online Learning Benefit Indicators

Indicator	Frequency			Average	
		N	%	Effectiveness	Information
Supporting Factors for Online Learning	Never	296	15.6	3.04	Effective
	Sometimes	271	14.3		
	Often	382	20.1		
	Always	950	50		
	Total	1899	100		

Based on table 5 above, shows the data results on indicators of the benefits of online learning. 50% of students answered Always, 20.1% answered Often, 14.3% answered Sometimes and 15.6% answered Never with an average of 3.04 effective statements. Based on Table 5, a score of 950 (50%) was obtained in the effective category, this shows that one of the learning areas that emphasizes technology is online learning. With the help of Internet access, learning does not have to be done face-to-face, so it could be said that learning using this method can be done anywhere and at any time as long as the tools used in the learning process are connected to the Internet, at a cost that may often be encountered during the Covid pandemic -19 teachers and students save more on transportation costs to school. The presence of online learning can facilitate communication between teachers and students. Where there are no more obstacles in terms of time and place. This statement is related to research conducted by Febrianto, Mas'udah & Megasari (2020) where learning via online methods can overcome distance and time limitations. This learning makes it easier for students to share learning

material sources and is comfortable for discussions. However, it all comes back to each student's understanding, distance learning methods are not as natural as face-to-face because they use other media to interact.

Based on interviews conducted with each biology teacher, it can be concluded that in Jayapura City Public High Schools, teachers said that students play an active role in learning. Students take advantage of their opportunities to ask questions to the teacher. Students also do their assignments well. Ensuring that the material is conveyed well to students in delivering the material, the teacher initially prepares class meetings by advising students via LMS/Google Classroom about what will be taught and when the meeting will be held. When the time comes, the teacher joins the LMS/Google Meet to confirm and accept students to join the online learning group. Next, the teacher takes student attendance manually and asks the students to turn on the video so the teacher can see and ensure the students are paying attention to the lesson. Next, the teacher displays a PowerPoint about the material that will be taught, then the teacher explains the material well.

Average results of online learning effectiveness indicators

Table 6. Results of Data Analysis on the Effectiveness of Biology Online Learning

School name	Total score	Total Questionnaire	Average Effectiveness	Information
Jayapura City Public High School	24,604	7,807	3.15	Effective

Based on the results of each indicator above, it proves that online biology learning at public high schools in Jayapura City during COVID-19 as a whole with a total score of 24.604 obtained an average effectiveness of 3.15 in the effective category. This is supported by the opinion of research results according to Assidiqi & Sumarni (2020) that the digital platform is a program that can support the success of online learning. The online learning process is carried out in two models, namely one-way and two-way. One-way online learning here is carried out when the teacher gives assignments and then students actively and independently study the material and carry out the assignments given. Meanwhile, two-way online learning is carried out when teachers and students are in one virtual space which is deliberately provided for the teacher-student interaction process. This interaction process can take the form of delivering material and explaining assignments which can be directly followed by students and teachers. The success of the one-way and two-way online learning process is determined by the use of technology to provide interaction services between teachers and students. The facilities that support this interaction in online learning are provided by many digital platforms with various equipment according to the interaction goals to be achieved.

CONCLUSION AND RECOMMENDATION

Based on the results of the discussion on the supporting component indicators with an average score of 3.17 in the effective category, the characteristics of online learning indicators with an average score of 3.22 in the effective category, and the results on the benefits of online learning indicators with an average score of 3.04 in the effective category and overall it produces an average score of 3.15. It can be concluded that online biology learning for public high schools in Jayapura City during the COVID-19 pandemic is said to be effective in replacing face-to-face learning, online learning increases enthusiasm and responsibility. Responsible for doing assignments online.

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