

# The Effectiveness of Online Learning in terms of Biology Learning Achievement of Class XII Mathematics and Natural Sciences at SMA Negeri 1 Paciran

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## Abstract

The purpose of this research was to describe the effectiveness of online learning in the Covid-19 era in terms of the biology learning achievement of class XII MIPA students of SMA Negeri 1 Paciran. This research design uses a descriptive quantitative research approach. The subjects of this study were taken by purposive sampling technique with a total of 159 students from five class XII MIPA at SMA Negeri 1 Paciran. Research instrument with documentation and summative tests. The research data collection technique used school documentation and the year-end assessment test (PAT) which was carried out by schools online with the google form application. The research data were analyzed by means of the test, then compared with the standard measure of the effectiveness of the Ministry of Home Affairs Research and Development Agency. The results showed that the biology learning achievement average of class XII MIPA students reached 72.91. If the mean is compared with the standard measure of effectiveness, it is known that the level of achievement of the predicate is quite effective. So online learning carried out at SMA Negeri 1 Paciran is quite effective in terms of obtaining biology learning achievement for students of class XII MIPA.

**Keywords:** *Effectiveness, Online Learning, biology learning achievement.*

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## 1. Introduction

The world was shocked by the emergence of Covid-19 in Wuhan, China. Just two weeks from its appearance, Covid-19 has spread in 114 countries with 118,000 cases and 4,291 people who have died. The Director General of the World Health Organization (WHO) announced Covid-19 as a pandemic on March 11, 2020 (WHO 2020). The novel Covid-19 outbreak has hit most parts of the world, including Indonesia. In fact, until now, Covid-19 has been running for one year from the time it was declared a pandemic. Various efforts to prevent and inhibit the spread of covid-19 have been carried out. Even the WHO recommends that people with mild respiratory symptoms isolate themselves and keep their distance (CDRAP 2020). For the elderly, patients with comorbidities (Comorbid), lung disease (pulmonary) and

immunosuppression are very vulnerable and dangerous to contract covid-19 and cause many deaths (Zhou et al. 2020). Doctors and medical personnel are at the forefront of dealing with Covid-19 patients, and for their safety, sanitizing N95 respirators is urgent (Golladay et al. 2021). Efforts made by policymakers and the community to prevent and inhibit covid-19 transmission with 3M, washing hands, wearing masks, and maintaining social distancing (Kemenkes RI 2020),(Harahap 2020),(Mendikbud 2020a).

The Covid-19 pandemic has changed almost all areas of life, including education. Education is one of the basic needs of society, so it must continue to run, even during the pandemic. Education is a conscious effort to form and cadre human resources (HR) who have character, and character, as well as dignified civilization in order to educate the nation's life. Education aims to develop the potential of students to become human beings who believe in and fear God Almighty, have noble character, are knowledgeable, competent, creative, independent, become democratic and responsible citizens (Indonesia 2003). Education can lead to the creation of a just culture, a just culture is important to be achieved (Amalia 2019). The world of education is required to produce output in accordance with the needs of society, employment in accordance with technological developments. Therefore, the professional and pedagogical competence of a teacher is very influential in the effort to produce human resources who are ready to enter the community(Murkatik 2020). Education produces human resources who have culture (culture), the culture that is printed in the world of education will influence the world of work. Work culture has a very positive and real effect on the performance of education and training and educational institutions (Abdullah 2020).

This outbreak implies a change in the work model for civil servants, from Work From Office (WFO) to Work From Home (WFH). The Minister of PANRB regulates the work of civil servants during the Covid-19 period in government circles by working from home (WFH) as an effort to prevent Covid-19 (MENPANRB 2020). The Minister of Education and Culture changed education policy in the Covid-19 era. This policy change includes several things; first, the implementation of the learning process from face to face learning (face to face learning) to distance learning (PJJ) and / or online learning (in the internet network) (online learning) (Mendikbud 2020b). Second, the learning assessment includes the cancellation of the 2020 National Examination (UN) and is not a prerequisite for graduation; the form of school exams as one of the prerequisites for graduation is done online or in a portfolio; Class promotion can be determined from final semester exams conducted with online tests, previous report card portfolios, meaningful assignments that do not need to measure the overall achievement of curriculum completeness. Third, education funding for the purposes of preventing the spread of covid-19 such as masks, hand sanitizers, cleaning tools, disinfectants, and distance learning can be allocated from the School Operational Assistance (BOS) funds(Mendikbud 2020c),(Rahmawaty 2020).

The Covid pandemic era has also changed the learning model from school (study from school) to learning from home (study from home). Learning from home online requires internet connectivity, computers or devices, and virtual classes as a forum for interaction between teachers and students (Firman & Rahayu 2020). Utilization of internet networks and multimedia technology can reconstruct teaching and delivery of learning materials in the era of technology 4.0 (Zhang et al. 2004). Various online applications and media have been used in the online learning process, for example the

google classroom application which can help understand biology material (Suhada et al. 2020).

Research on the effectiveness of online learning has been carried out by several previous researchers with the following results. Online learning using discussion groups on WhatsApp is very effective and active in the learning process, even students find it easier to get material explanations through sharing files, videos, and VN (Susilowati 2020). Online learning is a challenge for teachers to be more innovative in choosing a learning model that is not monotonous. Research shows that the use of Project Based Learning (PjBL) learning models can improve learning outcomes of biotechnology materials at the junior high school level (Siregar, L., Sari, N.F., Harahap, R.D., Chastanti 2019). Online learning by using blogs can have a positive effect on improving learning to read English, so that the scores obtained by students increase from before (Khusniyah & Hakim 2019). Online learning in the Advanced Business Statistics course by utilizing the WhatsApp and Zoom Meet group media is not effective in improving student learning outcomes (Handayani 2020). However, online learning (e-learning) has advantages over conventional learning. The advantages of e-learning include student and teacher interactions that run freely, without being limited by time and distance; students can review the teaching material over and over again (Hayati 2020). Therefore, the research problem can be formulated as follows, Is the use of online media effective in online biology learning? Are online forms of biology learning effective? Is online learning effective in terms of the biology learning achievement of class XII MIPA students at SMA Negeri 1 Paciran?

Based on the above background, it is necessary to conduct research with the aim of knowing the effectiveness of the use of online media in online learning, the effectiveness of online learning forms during the pandemic period, and the effectiveness of online learning in terms of the biology learning achievement of class XII MIPA students at SMA Negeri 1 Paciran. The advantage of this research for biology teachers is that it can be used as material for consideration in choosing the type of online media (virtual classroom), and forms of learning that can improve student achievement during online learning.

## **2. Research Methods**

This research design uses descriptive quantitative approach research. The descriptive quantitative research approach is real, rational, objective (Hermawan & Yusran 2017),(Rukajat 2018), displays a lot of numbers, both data collection, results, interpretation and data analysis with statistical formulas (Siyoto & Shodiq 2015), and visualizing a more detailed description of objects in words and answered about how his condition (Priyono 2008),(Gulo 2002). The population of this study was 461 students of the MIPA specialization program with details of 150 students of class X MIPA, 152 students of class XI MIPA, and 159 students of class XII MIPA. The sampling technique used was purposive sampling technique, the sample of this research was 159 students of class XII MIPA in SMA Negeri 1 Paciran 2020/2021 Academic Year. The research instrument used school documentation instruments and tests. The test questions have met the validity of the reliability and the validity of the instrument. Data collection techniques in this study used school documentation techniques in the form of online journal recapitations of online teaching and learning activities, and summative test

techniques, year-end assessment tests (PAT) conducted by SMA Negeri 1 Paciran online with the google form application. Summative test is a measuring tool to determine the success of student learning outcomes in achieving all learning competencies and is carried out after the learning program is completed at a certain time, for example every cawu (four months) or every semester (six months) (Ratnawulan & Rusdiana 2015), (Asrul et al. 2014). Class XII PAT at SMA Negeri 1 Paciran will be held on March 1 to 5, 2021.

The research data were analyzed by statistical mean or mean count (mean test). The calculated average (mean test) is calculated by dividing the number of data values by the number of data with the formula (Bluman 2012), (Weiss 2012), (Triola 2018):

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$\bar{x}$  = average arithmetic

$x_i$  = the value of the i sample

n = total of samples

After each class is calculated the average, then the combined average is searched using the formula (Sudjana 1982) :

$$\bar{\bar{x}} = \frac{\sum_{i=1}^k n_i \bar{x}_i}{\sum_{i=1}^k n_i}$$

$\bar{\bar{x}}$  = average arithmetic

$x_i$  = the value of the i sample

n = total of the i samples

Meanwhile, to determine the effectiveness of distance learning, comparisons (compared) between the arithmetic mean and / or the combined average with the standard measure of effectiveness of the Ministry of Home Affairs Research and Development reference are shown in Table 1.

Table 1. Standard Measures for the Effectiveness of the Ministry of Home Affairs Research and Development Reference

Effectiveness Ratio	Achievement Level
0-40	Very ineffective
40-59,99	Ineffective
60-79,99	Effective enough
80-100	Very effective

Source (Luh Ayu Kartika Yuniastari S & Wiyati 2015)

### 3. Research Result and Discusssuion

The policy of implementing online learning at SMA Negeri 1 Paciran during the pandemic era, schools gave teachers the freedom to use virtual classes. Based on the

processing of school documentation data related to the evaluation of online teaching and learning activities journals at SMA Negeri 1 Paciran during the pandemic era, it shows that the virtual classroom whatsapp group is the most widely used by teachers, 48.4%, then the combination of whatsapp group with google classroom, 32.7%, and a combination of google classroom with quizziz, 10.7%. This data can be seen in Figure 1.

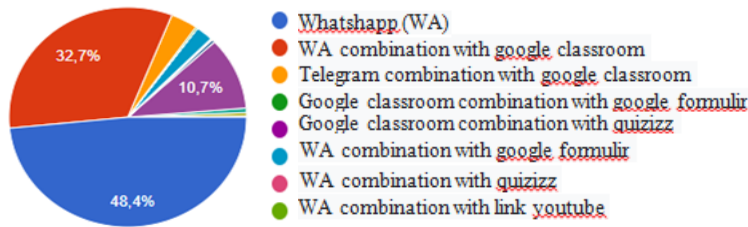


Fig 1. Percentage of Maya Classrooms used by Paciran 1 Public High School teachers in online learning in the pandemic era.

The implementation of online learning carried out by teachers of SMA Negeri 1 Paciran in various forms. Based on the processing of school documentation data from the online learning teaching and learning journal for SMA Negeri 1 Paciran teachers in the pandemic era, it was shown that the teacher delivered 44.8% of the material by explaining the material through sharing PDF, Word files, and question and answer, 15.8% of the assignments were in the form of questions or LKS sent through the application, 13.5% of material explanations through video link sharing and questions and answers, 8.8% of assignments in the form of resumes and answers sent via the application. All of that, can be seen in Figure 2.

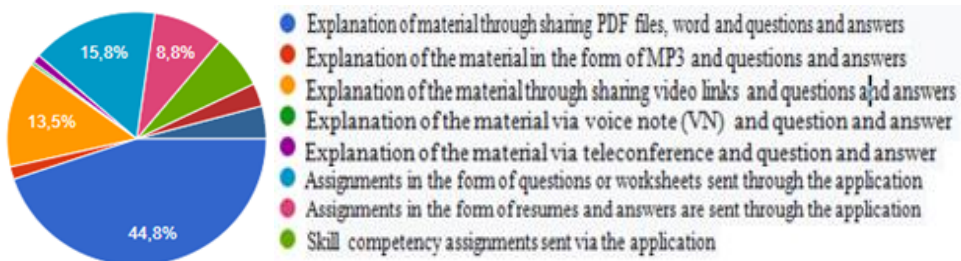


Fig 2. Percentage of online learning forms conducted by teachers of SMA Negeri 1 Paciran in the pandemic era.

The use of virtual classes with social media (WhatsApp) and Google Classroom, and the teaching materials used by teachers and students in the learning process contribute to determining the effectiveness of learning, including student learning achievement. The results of the summative test at the end of semester assessment (PAT) at SMA Negeri 1 Paciran after the implementation of distance learning can be seen in Table 2.

Table 2. Average Calculation of PAT Value in Each Class

No	Class	Total Students	Total Value	Average
1	XII MIPA 1	33	2261	70,66
2	XII MIPA 2	31	2019	65,13
3	XII MIPA 3	32	2388	74,63
4	XII MIPA 4	31	2127	68,61
5	XII MIPA 5	32	2433	<b>76,03</b>

While the combined mean of the combined PAT values for the five class XII MIPA can be seen in Table 3.

Table 3. Computed Average of PAT Values

No	Class	Average ( $x_i$ )	Total Students ( $n_i$ )	$n_i x_i$	Combined Average
1	XII MIPA 1	70,66	33	2.331,78	<b>72,91</b>
2	XII MIPA 2	65,13	31	2.313,53	
3	XII MIPA 3	74,63	32	2.388,16	
4	XII MIPA 4	68,61	31	2.126,91	
5	XII MIPA 5	76,03	32	2.432,96	
	Total	355,06	159	11.593,34	

Based on Figure 1 shows that the application or online learning media at SMA Negeri 1 Paciran which has a large percentage is whatsapp (WA) and a combination of whatsapp and google classroom. The whatsapp application is an application that can be installed on Android easily, lightly, does not require a strong internet network signal, low cost. Whatsapp can be used to chat, send files, and as a medium of communication that is practical, battery efficient, and simple (Rahartri 2019). The familiar whatsapp application is used by all ages, including students, about 70% of students can use the whatsapp application (Pranajaya 2018). The WhatsApp application is also used as a media and virtual classroom for learning between teachers and students, including biology subjects, so that the implementation of learning is not limited by space, time, and can even be done when and however the teacher-student situation (Pustikayasa 2019). The use of the WhatsApp application in learning biology subjects is categorized as high and has a strong relationship with online learning biology courses (Thahir et al. 2021). The whatsapp application can be used in online learning at Yapita Elementary School Surabaya to run well, although there are several shortcomings, including face-to-face learning online, and cannot limit the processing time in learning (Bhagaskara et al. 2021). Whatsapp technology is effective for teachers, students, and parents in teaching religious education in the new normal era (Masitah 2021). The use of online media, google meet, zoom meet, e-learning, whatsapp group by lecturers and students in online learning is seen as effective by students (Basri et al. 2020).

The google classroom application is an application that allows it to be used as a virtual class. Google Classroom is used as an alternative Learning Management System (LMS) by teachers in active and collaborative learning. Google classrooms have advantages over other social media virtual classes, including a very fast and easy setting process, saving time, learning storage archives centered on cloud, and providing collaborative opportunities between teacher-students or between students so that effective communication is established in learning (Putri S & Rummyeni 2017).

Based on Figure 2 shows that the percentage of online learning forms carried out by teachers at SMA Negeri 1 Paciran with the largest percentage is material explanation through sharing pdf or word files on online applications followed by questions and answers, and question assignments or lks sent via online applications. Online biology learning is in dire need of gadgets as learning media that are practical, flexible, diverse reference sources, and can help visualize abstract material content, as well as digital literacy learning tools (S et al. 2017). Online learning can encourage students to be independent and active. Therefore, online learning requires a wide variety of teaching materials that can be shared through virtual classes. Teaching materials can be in the form of a PDF (e-module) module that is used by teachers and students in learning. The use of science modules in distance learning can effectively encourage students to study independently at the MTs level, so as to increase the percentage of classical completeness (Krismayanti & Sudibyo 2021). Teaching materials in the form of e-books are also effective as a learning resource for biology subjects, so that they can increase student activity and learning outcomes (Azrai & Dj 2013). Learning media in the form of videos can function as learning resources and visual teaching materials. The use of video learning media can make it easier for elementary level students to understand the subject matter and can eliminate students (Ridha et al. 2021). Explanation of the subject matter through videos uploaded on the YouTube channel then shared in the virtual WhatsApp class can make it easier for students to memorize and understand the subject matter for elementary level students (Dishinta 2020).

Based on Table 2, it shows that class XII MIPA 5 has the highest mean count than the other classes, namely 76.03. When compared with the standard measure of the effectiveness of the Ministry of Home Affairs R&D reference, the mean count of 76.03 from class XII MIPA 5 lies in the effectiveness ratio interval between 60-79.99 with the predicate quite effective. The use of virtual classes with social media (WhatsApp) and Google Classroom, and the teaching materials used by teachers and students in the learning process contribute to determining the effectiveness of learning, including student learning achievement.

Based on Table 3, it shows that the five classes XII MIPA have a combined mean of 72.91. When compared with the standard measure of the effectiveness of the Ministry of Home Affairs R&D reference, the combined mean of 72.91 of the five classes of MIPA lies in the effectiveness ratio interval between 60-79.99 with a fairly effective predicate.

Therefore, online learning carried out at SMA Negeri 1 Paciran, class XII MIPA with virtual whatsapp class and / or Google Classroom, and media or teaching materials in the form of modules, e-books, and video sharing are quite effective, when viewed from the learning achievement. students. Online learning of mathematics subjects by using WhatsApp group can increase the achievement of learning outcomes 86% of students achieve completeness, so that online learning with whatsapp virtual classes are considered very effective (Husna et al. 2021). In fact, online learning using WhatsApp

group is more effective in increasing learning outcomes compared to Google Meet (Fatkhurrozi et al. 2021). However, when compared to google classroom, the use of the google classroom platform is more effective in improving online learning outcomes compared to using the whatsapp group platform (Endah Yuliani & Romadhiyana Kisno Saputri 2021). Google Classroom is more effectively used as an online learning platform, because it has a high level of intensity, communication, and satisfaction in learning (Yolanda et al. 2020). The use of sharing learning videos in whatsapp virtual classrooms is better and more effective in improving student learning outcomes at the junior high school level (Suningsih et al. 2020). In principle, online learning using mobile learning (Android) can very effectively improve student learning outcomes, including students (Husna 2020).

So, online media, whatsapp and a combination of whatsapp with google classroom are quite effective in using online learning in biology subjects. Meanwhile, the form of biology learning with material explanations in the form of pdf, word, and assignment of questions in lks, as well as sharing videos through online applications is considered quite effective. Online learning with online media applications is quite effective in learning biology in terms of learning achievement.

#### 4. Conclusion

From the explanation and analysis of research data, as well as the discussion above, it can be concluded that online learning biology subjects in class XII MIPA SMA Negeri 1 Paciran is quite effective using WhatsApp and a combination of google classroom, and the form of learning by sharing material via pdf, word, lks. , and videos in online media, and quite effective in terms of student achievement. This is indicated by the combined mean achievement of student learning outcomes of 72.91 which lies in the effectiveness ratio interval between 60-79.99 with a fairly effective predicate. To increase the effectiveness of online learning, it is necessary to carry out further research on the effectiveness of the types of forms of teaching materials used in online learning.

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