



## Mathematics online learning during COVID-19 pandemic: The effectiveness of online learning at SMK Negeri 2 Tanah Putih

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**ABSTRACT:** During the Covid-19 pandemic, the learning process must be carried out online. During the implementation of learning, it is undeniable that there are many complaints from various parties, especially students who judge online learning to be less effective. This study is a qualitative research with a descriptive method that aims to provide an overview of the effectiveness of online-based mathematics learning carried out at SMKN 2 Tanah Putih during the Covid-19 pandemic. The data collection technique was carried out using a google form questionnaire "Analysis of the implementation of online-based mathematics learning" with research subjects as many as 10 male students and 10 female students in class XI at SMKN 2 Tanah Putih. The data analysis used is descriptive statistics using the Miles & Huberman analysis model which consists of three stages, namely data reduction, data display, and conclusion drawing and verification. The results showed that the implementation of online learning in mathematics subjects at SMKN 2 Tanah Putih was categorized as less effective with an effectiveness level of 59.4%. Less effective learning is caused by factors that affect the online learning at SMKN 2 Tanah Putih which can be seen in technical indicators and implementation of learning.

**Keywords:** Online Learning; Covid-19; Pandemic; Mathematics; Students.

### Pembelajaran matematika secara daring pada masa pandemi Covid-19:

#### efektivitas pembelajaran daring di SMK Negeri 2 Tanah Putih

**ABSTRAK:** Pada masa pandemi Covid-19 mengharuskan proses pembelajaran dilaksanakan secara daring. Selama pembelajaran diterapkan, tidak dipungkiri banyaknya keluhan dari berbagai pihak terutama siswa yang menilai pembelajaran daring kurang efektif. Penelitian ini merupakan penelitian kualitatif dengan metode deskriptif yang bertujuan untuk memberikan gambaran efektivitas pembelajaran matematika berbasis daring yang dilaksanakan di SMKN 2 Tanah Putih pada masa pandemi Covid-19. Teknik pengumpulan data dilakukan dengan menggunakan angket *google form* "Analisis pelaksanaan pembelajaran matematika berbasis daring" dengan subyek penelitian sebanyak 10 siswa laki-laki dan 10 siswa perempuan kelas XI di SMKN 2 Tanah Putih. Analisis data yang digunakan yaitu statistik deskriptif dengan menggunakan model analisis Miles & Huberman yang terdiri dari tiga tahapan, yaitu reduksi data, *display* data, serta penarikan dan verifikasi kesimpulan. Hasil penelitian menunjukkan bahwa pelaksanaan pembelajaran daring pada mata pelajaran matematika di SMKN 2 Tanah Putih dikategorikan kurang efektif dengan taraf efektifitas 59,4%. Kurang efektifnya pembelajaran disebabkan oleh adanya faktor-faktor yang menghambat selama pembelajaran daring di SMKN 2 Tanah Putih yang terlihat pada indikator teknis dan pelaksanaan pembelajaran.

**Kata kunci:** Pembelajaran Daring; Covid-19; Pandemi; Matematika; Siswa.

## INTRODUCTION

The Covid-19 pandemic has had a major impact on education in Indonesia. One of the impacts is a change in the teaching and learning process. The learning process which is usually face-to-face has turned into learning at home which is done online or known as online learning. According to the Kemenristekdikti Team (2017) online learning is learning "on the network" translation of the term "online" which means being connected to a computer network. Online learning can also be interpreted as communication between teachers and students in the learning process without involving direct physical contact but connected via a network or internet connection (Loviana & Baskara, 2020). This is in line with Nur et al. (2020) which states that online learning is virtual learning by utilizing online information technology which is carried out directly and together with the aim of replacing face-to-face learning. Thus, online learning can be said as a learning that is carried out online using certain technological media to support a learning process.

Online learning has several advantages. Online learning is not limited by time and saves transportation costs (Setyorini, 2020). This is further clarified by Hidajat et al. (2018) which states that the advantages of online learning are that learning becomes more flexible, can be done anywhere, able to reach students in a broad scope, and is easier to deliver or the process of transferring knowledge. Furthermore, Safitri (2021) adds that the advantages of online learning are the students able to develop themselves in what they usually do on their own so that they can develop their talents. The advantages of online learning can be achieved if online learning runs successfully. Teachers must think about how to carry out online learning successfully so that subject matter can be delivered effectively even without meeting face to face. To make online learning successful, the key is the realization of learning effectiveness (Pangondian et al., 2019).

The effectiveness of learning is the behavior of teachers when teaching which can bring new experiences to students through certain approaches and strategies in order to achieve a learning goal (Yulianto & Nugraheni, 2021). In contrast to the previous opinion which emphasized only teacher behavior, according to Rohmawati (2015) the effectiveness of learning is a measure of success in learning conditions from the interaction process between students and students or teachers in achieving learning goals. So it can be concluded that the effectiveness of learning is a condition that shows the achievement of learning objectives from the interaction process that occurs between teachers and students.

An effective and efficient learning process can be achieved if there is a reciprocal relationship between students and teachers to achieve a common goal (Badrudin, et al., 2020). This is in line with the statement of Lubis (2020) which states that whether or not learning is effective can be identified through the behaviors between teachers and students and how students respond to what is conveyed by the teacher in learning. In addition, Rohmawati (2015) states that besides the relationship between teachers and students, a learning process should also be adapted to the conditions of the school environment, facilities and infrastructure, as well as learning media needed as a support to achieve all aspects of student development. This is further supported by a research from Oktavian &

Aldya (2020) which states that online learning activities become very effective when the essential components in the learning itself are fulfilled such as interactive, adaptive, discursive, and reflective with good elements when integrated with the learning environment. Thus, the effectiveness of online learning can be measured through the student responses to online learning using indicators that include technical, learning process and stake holder or support (Puspaningtyas & Dewi, 2020).

Previous research has shown that online learning can be carried out effectively. To begin with, a research from Solihin et al. (2021) showed that the implementation of distance learning (online) at STAI Asy-Syukriyyah Tangerang was categorized as effective with the effectiveness level of 63.79%. In addition, Hasanah et al. (2020) stated that online learning in mathematics during the COVID-19 pandemic at SMP Negeri 6 Samalanga was already in the good category, with the effectiveness level of 82%. Furthermore, Mustakim (2020) states that online learning using online media is very effective, although there are several things that must be improved by the teacher to maximize learning, for example in providing material and giving assignments, teachers must consider things that may occur. Thus, online learning cannot be guaranteed to be successful in all circles, especially schools in villages that lack facilities to support the online learning process. The lack of adequate costs and facilities between teachers and students is one of the obstacles that makes the online learning process not as effective as expected (Dwi C et al., 2020).

The obstacles that interfere with successful online learning can be seen from several previous studies including research conducted by Alfiyatin et al. (2020) which states that online learning in the view of MI Al-Falah Dakiring Bangkalan students is less effective. This is because the signal is not good and not all the students have an android phone as the primary tools of online learning. In addition, a research conducted by Kurniasari et al. (2020) showed that the implementation of learning from home (online) for class VI students of SD Muhammadiyah 18 Surabaya was less effective. The reason is that both teachers and students do not master how to use the online learning media platform.

Based on the explanation above, it can be seen that knowing the effectiveness of a learning is important as an evaluation for further learning development so that learning can be carried out better. However, from several existing studies, there has been no research on the effectiveness of online learning conducted on vocational students, especially in mathematics. As we know, mathematics is one of the important subjects that requires a detailed explanation of the material. Usually if there are students who have difficulty or do not understand, the teacher can directly explain to students, but due to the Covid-19 pandemic, teachers have to teach online, so that the process of transferring knowledge is not optimal due to various obstacles encountered in the implementation of online learning (Husna et al., 2021). Therefore, the authors are interested to carry out a research to know the vocational students' perception of the effectiveness of online mathematics learning during the covid-19 pandemic, especially at SMKN 2 Tanah Putih. Through this research, it is expected that the result can provide an input for teachers in implementing more suitable strategies and considering many aspects of online learning.

## METHODOLOGY

### Types of Research

The type of research used is a qualitative research using descriptive methods. Qualitative research is a research that emphasizes the analysis, process and point of view from research subjects, while the theoretical basis is used as a guideline so that this research is more focused on facts in the field (Putri & Suparmi, 2020). Furthermore, qualitative research with descriptive methods is a research procedure that produces discrete data from a symptom, event, or event in the form of speech or writing and observable behavior from the people (subjects) themselves. (Muthy & Pujiastuti, 2020). Therefore, this study aims to provide an overview of the effectiveness of online-based mathematics learning during the COVID-19 pandemic based on student responses at SMKN 2 Tanah Putih.

### Time and Subject of the Research

The study was conducted in the even semester of the 2020/2021 academic year with the research subjects being randomly selected as many as 20 students of class XI consisting of 10 male students and 10 female students at SMKN 2 Tanah Putih.

### Research Instrument

The instrument used in this research is a modified online-based mathematics learning google form questionnaire from Isnaini (2020) using a valid questionnaire item and a Cronbach alpha reliability coefficient ( $r$ ) of 0.78 or in the "strong" category. The questionnaire used in this study consisted of 20 closed statements using a Likert scale ranging from 1-4 with two forms of statements, namely positive statements with alternative choices of answers: strongly agree (4), agree (3), disagree (2) and strongly disagree (1) and negative statements with alternative answers: Strongly agree (1), agree (2), disagree (3) and strongly disagree (4). Indicators of online-based mathematics learning questionnaires are identified through behaviors between teachers and students taken through student responses to what is conveyed by the teacher in learning (Lubis, 2020) which includes student responses to: 1) learning implementation, namely: student motivation and interest, teacher explanation, student participation, and assignment. 2) technical, namely: signal and quota problems, as well as the inability of students in learning. 3) support, namely: economy, environment, parents and teachers (Isnaini, 2020).

### Data Collection Technique

The data collection technique of this research was Google form questionnaire "Analysis of the implementation of online-based mathematics learning" which is distributed using the link: [https://docs.google.com/forms/d/e/1FAIpQLSfEO3dW8dw\\_XXVb1GPI0OUq6FDlqhlygshHHKqCOW-BbXoNTQ/viewform](https://docs.google.com/forms/d/e/1FAIpQLSfEO3dW8dw_XXVb1GPI0OUq6FDlqhlygshHHKqCOW-BbXoNTQ/viewform). The Google form application was chosen because it is easier and more practical to distribute questionnaires quickly and widely through the links which was distributed to the research subjects. In addition, researchers can immediately find out the results of the scores obtained.

### Data Analysis Technique

To analyze the data, the authors used the Miles & Huberman analysis model which consists of three stages, namely data reduction, data display, and conclusion drawing and verification (Sadikin & Hamidah, 2020). In the data reduction phase, the researcher collects information and processes the data obtained from the questionnaire by giving a value based on the form of the item statement (positive and negative). Furthermore, at the data display

stage, the researcher groups the data based on the indicators. Then, the data was presented in the form of a table that displays the percentage of each indicator which was calculated using the following formula (Sari & Amrozi, 2020):

$$P = \frac{\sum(\text{Score Obtained})}{\sum(I \times R \times \text{Ideal Score})} \times 100\%$$

Description:

P = Percentage

I = Number of Items

R = Number of Respondents

The withdrawal and verification stage of the conclusion of the researcher interprets the data as a whole to draw a conclusion whether the learning has been effective or not by using the following criteria (Solihin et al., 2021):

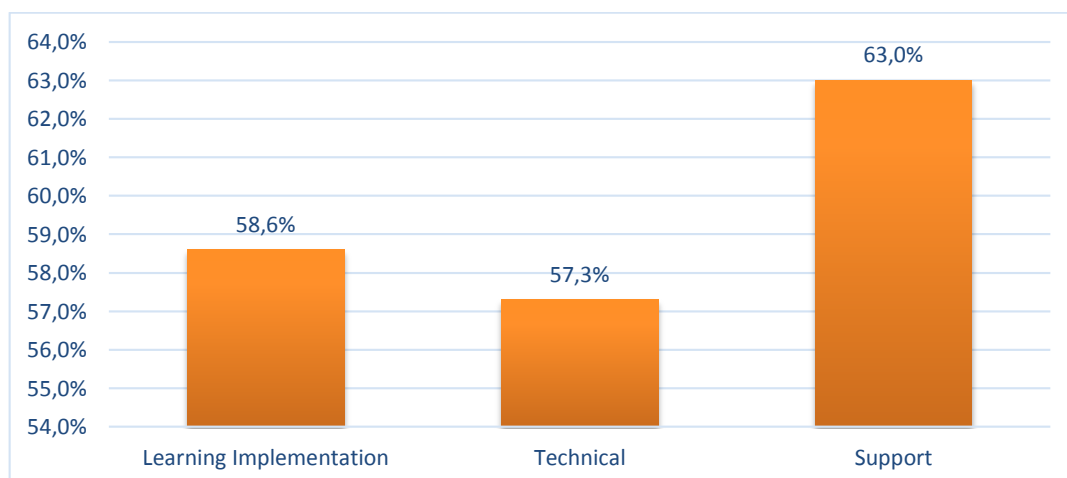
**Table 1. Effectiveness Criteria**

Percentage	Criteria
80 – 100	Very Effective
60 – 79	Effective
40 – 59	Less Effective
0 – 39	Ineffective

## RESULT AND DISCUSSION

The data obtained from 20 class XI students of SMKN 2 Tanah Putih based on the analysis of online learning questionnaire from each indicators on mathematics subjects at SMKN 2 Tanah Putih has shown that the average score is 59.4% which means the effectiveness level is in the less effective category. The low percentage of learning effectiveness level is caused by the low percentage obtained from each indicator, which includes: indicators of learning implementation, technical and support which can be seen in Graph 1 below:

**Graph 1. Percentage of Learning Effectiveness based on Indicators**

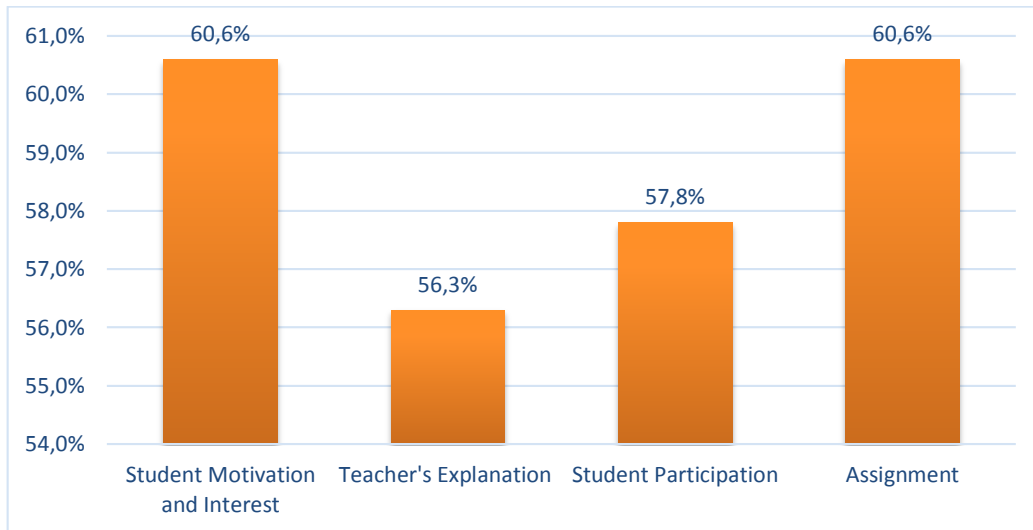


### 1. Learning Implementation

The percentage of the effectiveness level of learning on the indicators of the implementation of online learning is the second lowest indicator with the acquisition of the

percentage level of effectiveness of 58.6%. This showed that the implementation of online mathematics learning at SMKN 2 Tanah Putih is still in the level of less effective. The Graph 2 below has shown that the percentage of student responses to indicators of learning implementation including student motivation and interest, teacher explanations, student participation, and assignment.

**Graph 2. Percentage of Learning Implementation Indicators**



Based on the Graph 2 above, it can be seen that 60.6% of students have motivation and interest in learning mathematics online and as many as 56.3% of students feel that the teacher's explanation in learning mathematics online is interesting, although most students still find it difficult to understand. Meanwhile, in the sub-indicator the percentage of student participation is 57.8%, this shows that not all students actively participate in online mathematics learning. Furthermore, in the sub-indicator of giving assignments, 60.6% of students felt that they were not burdened by the assignment.

Based on the data presented above, the low percentage of the effectiveness level of learning on the indicators of the implementation of learning is caused by the existence of factors that affect the implementation of effective learning, including: 1) the low ability of students' understanding. It can be seen from the majority of students who still have difficulty in understanding the material given by the teacher so that students find it difficult to complete the tasks given. 2) the low interest of students in online learning, this causes the students participation in online learning is also low. One of the factors for the low interest of students is the lack of understanding of students towards the steps of learning activities and they feel that online-based mathematics learning is difficult and boring. As stated by Kurniasari et al. (2020) One of the causes for the ineffectiveness of online learning is the lack of two-way communication between teachers and students. Students are less active in responding to the instructions given by the teacher. Furthermore, Dwi C et al. (2020) stated that the level of enthusiasm for student learning also triggers the effectiveness of online learning. Infrequently during online learning activities many students feel bored or bored.

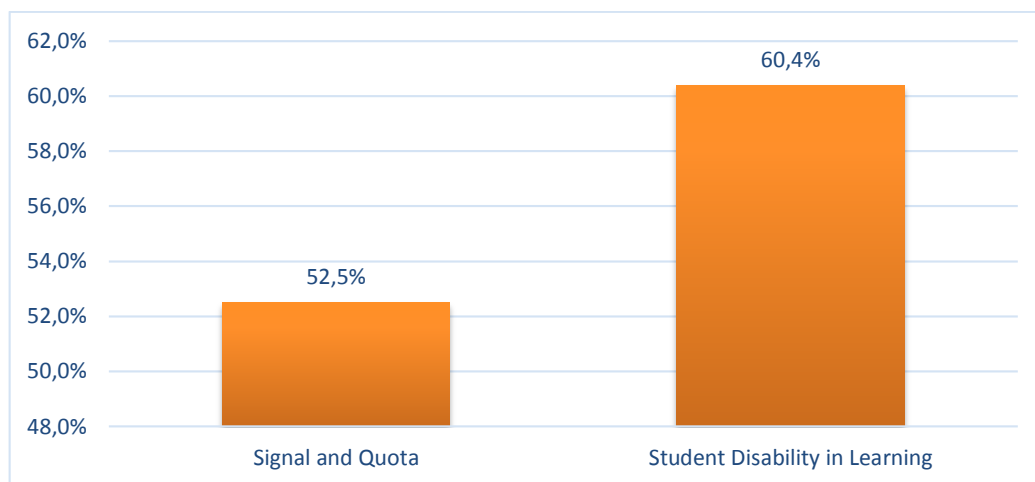
The teachers' effort to overcome the factors that affect the implementation of effective learning is the teachers are expected to guide the learning first and provide clear directions regarding the stages of learning activities (Pratama & Mulyati, 2020). In addition, teachers are expected to be able to use learning methods that suitable for students' conditions at home during online learning, not only giving assignments, but also being supported by providing

more detailed explanations of learning materials such as using learning videos, modules, tutorials, student worksheets and so on. It may increase the students' interest and seriousness in learning.

## 2. Technical

The percentage level of learning effectiveness on technical indicators is 57.3% or in the less effective criteria. The percentage of technical indicators is the lowest percentage compared to the percentage of other indicators. The technical indicators cover signals, quotas, and students' inability to learn. The percentage results of student responses obtained on technical indicators can be seen in the Graph 3 below:

**Graph 3. Percentage of Technical Indicators**



Based on the Graph 3 above, it can be seen that 52.5% of students have problems with signal and quota. Most of the students have experienced problems with signaling and often run out of quota during online mathematics learning and the percentage of students' learning disabilities is 60.4%. This shows that most of the students have not been maximal in implementing online mathematics learning.

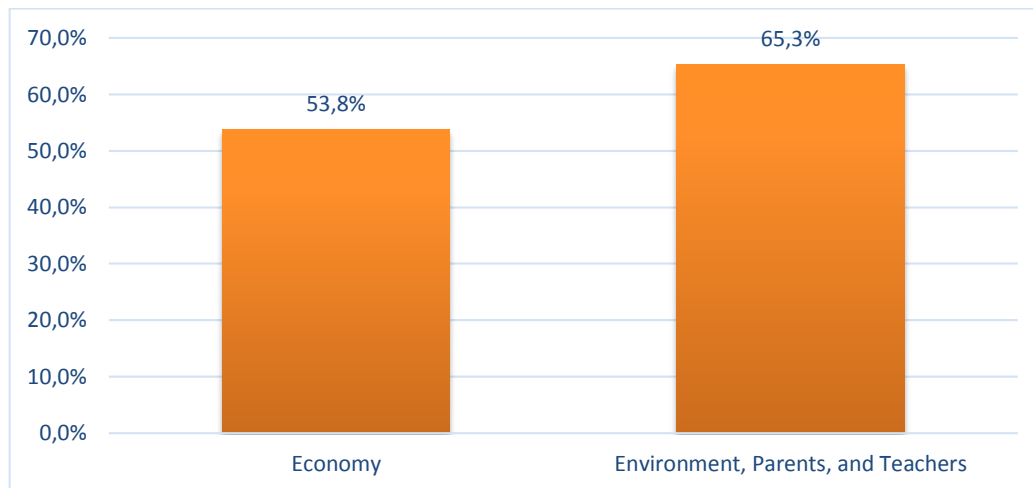
The low percentage of learning effectiveness on technical indicators is caused by the following factors: 1) there are problems with signals and quotas. It can be seen in student responses to the signal and quota sub-indicators which show that most students have experienced signal interference and also run out of quota when learning. 2) the inability of students to use the online learning media. Although most students already have their own smartphones, but they are still not proficient in using the online learning applications. Similar obstacles were also found in research conducted by Sari & Amrozi (2020) which states that the main obstacle is the unstable condition of the internet network in some areas and the limited and expensive internet quota where for some students it may disrupts the smooth of learning process especially if the internet quota suddenly runs out.

There are some efforts that can be used to minimize the obstacles in online learning. To begin with, the teacher should consider the condition of the students so that the teacher can choose the effective learning method wisely. In addition, the teacher must also consider the time (Students' signal and quota) for collecting the assignments given so that students have enough time to complete the tasks. The schools and teachers are expected to seek free quota assistance from the government that can be used by every student without exception and always remind students to make good use of the free quota provided by the government.

### 3. Support

The percentage of student responses to the indicators of support was obtained at 63.0%. This shows that the effectiveness of online mathematics learning in terms of support is already in the effective category. The support indicator has covered the economy, environment, parents and teachers. The percentage result of student responses to support indicator can be seen in the Graph 4 below:

**Graph 4. Percentage of Support Indicators**



Based on the Graph 4 above, it can be seen that the students have not received enough support from an economic perspective as illustrated by the data above which reached 53.8% of students who often cannot afford to buy quotas continuously. This is because most of the students are still in the middle to lower economic family category. Therefore, free quota assistance from the government is expected can be used by all students continuously as long as online learning is still being carried out. Furthermore, the sub-indicator of support from the environment, parents and teachers obtained a percentage of 65.3%. This shows that students have received sufficient support from their environment such as support from parents, teachers and schools. Therefore, the percentage level of the learning effectiveness in the support indicator can be categorized effective with the percentage score 63%.

### CONCLUSION

The effectiveness of learning mathematics online based on the perceptions of students at SMKN 2 Tanah Putih on the indicators of learning implementation is in the less effective category with a percentage of 58.6%, while on the technical indicators, the percentage obtained is 57.3% which is in the less effective criteria and the support indicator is in the effective criteria with a percentage of 63.0%. Overall, the effectiveness of online mathematics learning based on the perceptions of SMKN 2 Tanah Putih students' has obtained an average score 59.4%. So, it can be concluded that online mathematics learning during the COVID-19 pandemic based on the perceptions of SMKN 2 Tanah Putih students is categorized as less effective.



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