Online Mathematics Learning during the Covid-19 Pandemic

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Abstract. This research is a descriptive quantitative research that focuses on evaluating learning using online media with the aim of (1) knowing the effectiveness of online mathematics learning that is expected by class XI students of SMA Negeri Kerjo as an effort to suppress the spread of covid-19 in the school environment; (2) knowing the obstacles in online learning; (3) knowing student suggestions to increase the effectiveness of online mathematics learning. The study population was all students of SMA Negeri Kerjo. The research sample was students of class XI A1 selected using simple random sampling by considering population homogeneity. Data were collected using an online questionnaire. The data were analyzed using descriptive statistical analysis. The results are (1) students rated online mathematics learning as ineffective (46%), very ineffective (27%), effective (17%), and very effective (10%); (2) the obstacles faced by students were the unstable internet network, limited internet quota, lack of time in discussion and assignment collection, and too many assignments; (3) to improve online mathematics learning during the Covid-19 pandemic, suggestions from students that need to be considered: learning through easy media, providing simple material, minimizing sending video to save quota, extending assignment time, and reducing assignments.

1. Introduction

The Covid-19 pandemic has infected tens of thousands of people and killed tens of thousands of our brothers. The situation in Indonesia could be even worse because the epidemic is growing along with social crises and economic pressures. As an effort to prevent the spread of Covid-19, WHO pays attention to activities involving large crowds. There are many ways that the government has done to prevent its spread. One of them is through Circular Number 15 of 2020 concerning Guidelines for Organizing Learning from Home in an Emergency for the Spread of Covid-19. Through this circular, the Ministry of Education and Culture advises students to study from home and instructs schools to conduct distance learning. Learning must be carried out in a scenario that is able to minimize physical contact between students and others, or between students and teachers.

Many instructors respond quickly to the pandemic by holding online lectures, so all classes are conducted online in a very short time. The challenge is that most of the instructors are accustomed to giving lectures in the classroom offline [1]. At present the education system was faced with a situation that required the teacher to be able to master distance learning media, especially during the Covid-19 pandemic outbreak [2].

The use of digital technology allows students and teachers to be in different places during the learning process [3]. However, the implementation of the online learning process has several obstacles. One of the toughest obstacles in online learning is teaching mathematics. The problem today is that there are still many students who think mathematics is a difficult subject. The fact that mathematics is considered
as a difficult subject to understand causes mathematics achievement to be low [4]. Mathematics is considered a difficult subject because of the characteristics of mathematics which are abstract, systematic, logical, and full of confusing symbols and formulas. The difficulties that exist in mathematics require the creativity of mathematics subject teachers to develop their learning, both in terms of methods and media [5].

Online learning using online media has been implemented at SMA Negeri Kerjo since the implementation of work from home on March 16, 2020 during the Covid-19 pandemic. Online media are used such as YouTube, WhatsApp group, Google classroom, and quizzes. The material is given in the form of power points, short videos, and reading materials. However, in the implementation of online learning, it is necessary to evaluate in order to obtain clear, data-based remedial steps. This is what underlies the authors to (1) determine the effectiveness of online mathematics learning that is expected by students of class XI SMA Negeri Kerjo as an effort to suppress the spread of covid-19 in the school environment; (2) knowing the obstacles that arise in online learning; (3) knowing student suggestions as an effort to increase the effectiveness of online mathematics learning.

2. Methods

This research is a descriptive quantitative study to describe the effectiveness of online learning using online media in mathematics subjects. The study population was 274 students of class XI SMA Negeri Kerjo who were taught online mathematics. The research sample was 30 students of class XIA1 who were selected using cluster random sampling technique by considering population homogeneity. The data collection instrument used a questionnaire containing closed, semi-closed, and open questions which were distributed using google form. Data analysis used descriptive statistics with computerized assistance.

3. Finding and Discussion

3.1. The effectiveness of online mathematics learning

Based on the online questionnaire distributed, there were still 3 students (10%) who could not fill it out because they did not have adequate equipment. This required them to fill out a questionnaire manually by coming to school while adhering to health protocols. Only 90% of students can fill out the online questionnaire. This means that 10% are not ready to take mathematics lessons online. The effects of technology on students' social and mental health as a whole as society becomes digitally-focused rather than relationship-focused is discussed. There are many lower income families that cannot afford to buy the educational and informational technology that have proliferated society[6]. These families also cannot provide the academic help and support that may be needed outside of the classroom setting. This can give a negative impact on youth who are expected to have these technology tools as well as Internet access at home by their teachers and peers. This can impact student self-esteem and personal perceived value and cause undue stress.

The dropout rate/student failure which occurs more in virtual classrooms than traditional classrooms is one of the problems in online education [7]. The time it takes to complete the module, lack of understanding of the context of the subject matter, problems with software accessibility, availability of reliable teachers, lack of support from the government and other reasons that can make motivation decrease and a learning atmosphere less conducive [8].

Online mathematics learning is directed to use learning instructions, methods, and media expected by students to minimize the obstacles faced by students [9]. Effective learning activities require a media that supports the absorption of various information as much as possible, along with the development, information technology plays an important role as a means to obtain information sources related to the subject matter being taught [10].

3.1.1. Learning instruction. The results of the descriptive study like in Table 1 describe only some of the students who chose learning using online, namely 17%, and 40% who liked the blended learning model (a combination of face-to-face with online), and most of the students stated that they liked face-
to-face learning, namely 43%. There are still many students who choose face-to-face learning even in pandemic conditions because of the low learning progress achieved by students. This is in accordance with [11] that the low learning progress achieved by students is because online learning is not easy when compared to face-to-face learning systems. Integrating the best features of learning in face-to-face class and online class, Blended Learning was developed to enhance active independent learning by students. The combination of learning in Blended Learning is believed to have advantages that are more efficient, students become more active, are flexible, and at any time anywhere can review the material [12].

### Table 1. Percentage of learning instruction

| Learning Instruction | Percentage (%) |
|----------------------|----------------|
| Face-to-face          | 43             |
| Online               | 17             |
| Blended              | 40             |

#### 3.1.2. Learning methods

The learning methods chosen by students to be applied during a pandemic are as shown in Table 2, namely learning with videos (47%), group assignments (13%), independent / individual assignments (13%), online discussions (10%), lectures (10%), and quizzes (7%). In this case, lectures can only be done online either directly or postponed by video, so they can be included in the video method (57%).

### Table 2. Percentage of learning methods

| Learning Method          | Percentage (%) |
|--------------------------|----------------|
| Learning with videos     | 47             |
| Group assignments        | 13             |
| Individual assignments   | 13             |
| Online discussions       | 10             |
| Lectures                 | 10             |
| Quizzes                  | 7              |

#### 3.1.3. Learning media

Learning media need to be adjusted according to student choices because it will affect student motivation in learning. This is in line with [13] that there is a significant effect of the use of learning media on student motivation. According to Table 3, the online media chosen by the students were WhatsApp Group (60%), Google Classroom (23%), and Youtube (27%). None of the students choose online media in the form of synchronization such as Zoom, Google Meet, and the like. They like the media because it is considered easy and practical to use. In line with [14], the use of the google classroom application in online learning during the covid-19 outbreak was quite good and effective, it's just that it would be better if combined with other online platforms. In addition, because it does not take up too much quota credit. Even so, they still want face-to-face online meetings such as youtube and zoom as they suggest in this study. It's just that the quota constraints and network access are limited, so they hope that the government provides online facilities that are effective and not burdensome.

### Table 3. Percentage of learning media

| Learning Media        | Percentage (%) |
|-----------------------|----------------|
| WhatsApp Group        | 60             |
| Google Classroom      | 23             |
| Youtube               | 27             |

#### 3.1.4. The effectiveness of learning mathematics online

Online mathematics learning was considered ineffective by most students (46%), considered very ineffective (27%). Only a few students rated online mathematics learning as effective (17%), and very effective (10%).
3.2. Problems in online mathematics learning

3.2.1. Obstacles in online mathematics learning. The obstacles faced by students during online learning like in Table 4 are the unstable internet network (17%), limited internet quota (7%), difficulty focusing due to lack of time in discussion and assignment collection (46%), too many assignments (20%), and unavailability of adequate equipment (10%).

| Obstacles                      | Percentage (%) |
|--------------------------------|----------------|
| Unstable network               | 17             |
| Limited internet quota         | 7              |
| Unfocused                      | 46             |
| Over-assignment                | 20             |
| Inadequate equipment           | 10             |

3.2.2. Physical complaints. Using gadgets (cell phones, laptops, etc.) for a long time causes a decrease in visual acuity. This is in accordance with [15] show that using gadgets can cause headaches and eye irritation, like in Table 5.

| Physical complaints          | Percentage (%) |
|-----------------------------|----------------|
| Eye irritation               | 30             |
| Headache                     | 57             |
| No complain                  | 13             |

3.2.3. Psychological complaints. The effects of online learning using social networking fatigue which is defined as a “self-evaluated feeling of tiredness are caused by an obsession with social media and the need to respond immediately. It's noted this leads to both physical and psychological strain. Technology addiction is a growing health risk in the child and adolescent population [16]. There are some psychological complaints shown at Table 6.

| Psychological complaints          | Percentage (%) |
|----------------------------------|----------------|
| Worried                          | 10             |
| Fret                             | 10             |
| feeling like ending soon         | 23             |
| Bored                            | 34             |
| No complaints                    | 23             |

3.3. Problem solving

The obstacles faced need to be addressed in order to further improve the quality of online learning. As explained in [17] that in order to improve the quality of online mathematics learning during the Covid-19 pandemic, educators must fulfil the suggestions of students, namely: (1) learning is carried out via video calls; (2) providing brief learning materials; (3) minimize sending material in the form of heavy videos to save quota; (4) the selection of material in the video must be based on language criteria that are easy to understand; (5) continue to provide material before the assignment; (6) giving varied and different questions for each student; (7) assignment must include the way it works; (8) assign assignments according to the lesson schedule; (9) remind students if there is a task given; and (10) reducing tasks. As for the suggestions from students in this study, namely learning through WhatsApp,
providing concise material, minimizing sending video material to save quota, extending the time for collecting assignments and reducing assignments.

4. Conclusion
The results showed that (1) students rated online mathematics learning as ineffective (46%), very ineffective (27%), effective (17%), and very effective (10%); (2) the obstacles faced by students were the unstable internet network, limited internet quota, lack of time in discussion and assignment collection, and too many assignments; (3) to improve the quality of online mathematics learning during the Covid-19 pandemic, suggestions from students that need to be considered, namely learning through WhatsApp, providing concise material, minimizing sending video material to save quota, extending assignment collection time and reducing assignments.

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