Learning Mathematics in Madrasah Aliyah Muhammadiyah 2 Banjarmasin during the covid-19 pandemic era

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Abstract. In 2020, the world is being plagued by the Covid-19 epidemic, Indonesians are required to follow health protocols established by the central government and WHO. One of the protocols for the world of education is not held face-to-face teaching to avoid more transmission. Instead, learning is done through online media and students learn from their homes. The purpose of this article was to describe the learning of mathematics that took place at Madrasah Aliyah Muhammadiyah 2 Banjarmasin during the Covid-19 pandemic era, difficulties experienced by teachers and how to overcome them and their impact on student learning outcomes. The research method used was quantitative and qualitative where data is taken from students' scores before and during the covid-19 pandemic as well as questionnaires and interviews with mathematics teachers. To see differences in student learning outcomes before and when a pandemic, the statistical test (t-test) was used. The results obtained were the teacher used several learning methods with several different software, including using Quizizz for interactive quizzes to reduce student boredom in online learning. Student learning outcomes had improved, this was because when students took exams from home students did not experience anxiety because they were not supervised directly by the exam supervisor, also before the exam was carried out students had been guided by parents and students also learnt independently through online media to get information added. In addition, it was also described the difficulties experienced by teachers during carrying out online learning as well as the ways to overcome them along with the results obtained.

1. Introduction
In 2020, there is a phenomenon that has hit almost all over the world, namely the emergence of a disease outbreak caused by a virus called corona or better known as Covid-19 (Corona Virus Diseases-19). This virus started and began to develop in Wuhan, China. The transmission of this virus is very fast to various countries around the world, one of which is also in Indonesia. The Covid-19 virus is a virus that attacks the respiratory system accompanied by coughing, sore throat and high fever above 38°C [1]. Regarding the spread of this virus, the WHO (World Health Organization) and the central government issued a circular stating that Indonesian residents are required to follow established health protocols, such as maintaining distance, wearing masks when in a crowd, and always washing their hands with soap.
The spread of the Covid-19 virus has an impact in various sectors, such as health, economy, tourism and others. The world of education is one of the areas affected by the Covid-19 pandemic. New policies about learning through online media have occurred throughout the world during the Covid-19 pandemic [2]. In Indonesia, the Ministry of Education issued a policy to adjust learning in the situation of the spread of Covid-19, namely by replacing face-to-face learning in schools to learning through online or online media and students learning from their homes. This is based on the circular letter of the Ministry of Education and Culture of the Republic of Indonesia No. 4 of 2020 on the Implementation of Policy and Education in an Emergency Period of the spread of the Coronavirus Diseases (Covid-19).

According to Sun et al [3], education through online media or distance education has never been carried out simultaneously for all elements of education, namely students, teachers to parents. During the Covid-19 pandemic, time, site and distance became a big problem [4], therefore learning through online media and developing learning methods through online media is a solution to overcoming difficulties in implementing face-to-face learning [5]. In the learning process through online media, teachers play an important role in preparing effective learning methods so that learning occurs effectively and learning targets can be achieved. This is also in line with technological developments that are not limited to the 4.0 industrial revolution.

The preparations that teachers need to do in learning during the Covid-19 pandemic, namely using media or platforms as infrastructure that supports learning. Learning can be done freely through various discussion rooms such as WhatsApp Group, Google Classroom, Smart Class, Zenius, and Quipper [6]. This is also in line with the opinion of Gunawan [7] which stated that learning through online media can take advantage of platforms in the form of applications, websites, social networks and learning management systems. Various online media can be used to support the learning process with various discussion techniques and others.

In addition to preparing learning media, learning rooms, this very drastic change in learning, teachers are required to improve themselves to switch to learning through online media, especially to deal with obstacles that will occur through online learning [8]. One of these obstacles is that research is still rare about the use of digital media to ease mathematics learning [9]. There are still many students who consider mathematics to be a difficult subject because mathematics subjects are abstract, logical, systematic, and full of confusing symbols and formulas. Students often feel anxious when they have to learn mathematics [10]. Therefore, online learning media and learning methods are needed that can resemble face-to-face learning that makes it easier for students to learn mathematics.

Based on these facts, the researcher wants to conduct a further review of the implementation and impact of learning carried out online. Mathematics learning conducted online has been implemented at Madrasah Aliyah Muhammadiyah 2 Banjarmasin. Online learning has been in effect since March 30, 2020. Researchers are interested in examining more about the difficulties experienced by teachers and students and how to overcome them and their impact on student learning outcomes at Madrasah Aliyah Muhammadiyah 2 Banjarmasin in the era of the Covid-19 pandemic.

2. Method

2.1. Approach

The research approach used in this research was quantitative and qualitative. Quantitative research was intended to see differences in student learning outcomes before and during a pandemic, using a statistical test, which is the two-mean test. While qualitative research used to understand the phenomena experienced by research subjects holistically and with descriptions in the form of words and language, in a special natural context and by utilizing various scientific methods. This study aimed to describe the mathematics learning that took place at Madrasah Aliyah Muhammadiyah 2 Banjarmasin during the Covid-19 pandemic era, the difficulties experienced by teachers and how to overcome them and their impact on student learning outcomes.
2.2. **Hypothesis**

- **H₀**: There is no average difference between student learning outcomes before the Covid-19 pandemic and student learning outcomes during the Covid-19 pandemic, which means that there is no effect on the use of learning media through online media in improving student learning outcomes in mathematics for class X IPA students Compulsory Mathematics at Madrasah Aliyah Muhammadiyah 2 Banjarmasin.

- **H₁**: There is an average difference between student learning outcomes before the Covid-19 pandemic and student learning outcomes during the Covid-19 pandemic, which means that there is an effect of the use of learning media through online media in improving student learning outcomes in mathematics for class X IPA students Compulsory Mathematics at Madrasah Aliyah Muhammadiyah 2 Banjarmasin.

2.3. **The subject**

The subjects in this study were taken from the population and samples. The population in this study were all students of Madrasah Aliyah Muhammadiyah 2 Banjarmasin who were taught mathematics using online media. While the sample who became the respondents of this study were 18 students of class X Science Compulsory Mathematics at Madrasah Aliyah Muhammadiyah 2 Banjarmasin who were selected using simple random sampling technique by considering population homogeneity.

2.4. **Data collection**

Data were collected through instruments in the form of documents and interviews. The instruments used were documents in the form of student grade data before and during the Covid-19 pandemic, as well as questionnaires and interviews with mathematics teachers at Madrasah Aliyah Muhammadiyah 2 Banjarmasin.

2.5. **Data analysis**

The data analysis technique in this study used descriptive statistics and Miles and Huberman's model, namely data reduction, turning off data, and drawing conclusions. Descriptive statistics aim to analysis data by describing or describing the data that has been collected. Data reduction is carried out with the aim of selecting data that can later be analysis and supporting research with unnecessary data, so that unnecessary data can be discarded and data that has been reduced is combined with transcript analysis of interviews conducted with teachers and students as respondents. After the data has been collected, then the data is presented in descriptive form and will be presented as a conclusion from the research results that have been obtained.

3. **Results and discussion**

The purpose of this study was to describe the mathematics learning that took place at Madrasah Aliyah Muhammadiyah 2 Banjarmasin during the Covid-19 pandemic era, the difficulties experienced by teachers and how to overcome them and their impact on student learning outcomes. The results obtained based on the responses from students and the results of interviews by the teacher will be presented as follows.

3.1. **Learning mathematics in the Covid-19 pandemic era**

Mathematics learning through online media was announced at Madrasah Aliyah Muhammadiyah 2 Banjarmasin during the Covid-19 pandemic era starting on March 30, 2020, as an effort to break the chain of the spread of covid-19. This was in line with the circular letter of the Ministry of Education and Culture of the Republic of Indonesia No. 4 of 2020 on the implementation of educational policies in the emergency period of the spread of Coronavirus Disease (Covid-19). Through this letter, the Ministry of Education and Culture instructed all schools to carry out the learning process from home with the following conditions, (1) Learning from home through online / distance learning; (2) Learning from home can be focused on life skills education, including of the Covid-19 pandemic; (3) Learning from Home learning activities and assignments may vary between students, according to their respective interests and conditions, including considering gaps in access / learning facilities at home; and (4)
Evidence or products of Home Learning activities are given qualitative and useful feedback from the
teacher, without being required to give a quantitative score.
The online learning was carried out since the end of March, and after learning was carried out for about
a month, students were given a questionnaire about their online learning. Next, the teacher provided
several additional variations of the method based on the feedback from students.

The online learning was carried out, as follows:
- The teacher made a module that will be used in learning.
- The teacher created a Google classroom account
- The teacher socialized to students about its use and how to join classes that have been made
  by the teacher through the WhatsApp Group application.
- When all students had joined Google Classroom, the teacher shared the learning materials.
- According to the learning schedule, students downloaded the material and studied it and asked
  questions that were not understood in the chat column.
- The teacher gave the assignment and the students did the assignment and the results were
  uploaded in the google classroom
- After receiving feedback from students about the implementation of online learning, the teacher
  did online learning except with Google classroom, the teacher also used Quipper
  and learning materials in the form of videos. Several times the teacher used the Quizizz app
  to create interactive quiz games as material for student evaluation in mathematics learning, in addition to
  making students more active and motivated to learn.
- Meanwhile, Google Classroom and WhatsApp Group services were used for discussion media
  both during class hours and outside these hours.

Based on the results of interviews conducted with the teacher, it was found that the obstacles felt
by the teacher while carrying out online learning were as follows:
- The teacher could not fully supervise the learning evaluation, so that the teacher had difficulty
  providing an assessment. This was because during face-to-face learning the teacher could see
  the honesty and understanding of students directly, while in learning through online media
  supervision was only carried out by parents and students themselves.
- It took more time to prepare learning materials in various forms.

There were several ways the teacher could overcome the obstacles faced during learning through
online media, namely always trying to convey material with various methods such as the teacher
providing material in the form of interactive videos, explaining briefly and clearly through Voice
Notes available on WhatsApp. Group applications and so on. Teachers also work together and
communicate with parents to always supervise students when working on evaluation questions. So that
students really do on the basis of their own knowledge and understanding.

Based on the results of the questionnaire given to students, the following results were obtained:
- 70% of students liked to learn mathematics through online media. The majority gave reasons
  because they could learn with new methods and new situations
- 75% of students disagree with the statement that students are more comfortable learning with
  online learning methods. The majority gave reasons, although at first, they liked it but if it
  took too long with online learning, they felt bored and burdened with such a process because
  they could not be interactive with teachers and friends as usual
- 68% of students thought they were less active in online learning than face-to-face learning as
  usual. The majority gave reasons they felt they could not be as active as face-to-face learning,
  because they felt separated and could not freely discuss with friends
- 77% of students find it difficult to understand learning through online media. The majority gave
  reasons because they could not directly ask questions that were not understood face-to-face as
  usual.
Learning must be carried out with a scenario that is able to decrease physical contact between fellow students, or between students and teachers. The use of digital technology allows students and teachers to be in different places during the learning process [11]. This is in line with the results of research Mulenga and Marbán [12] which states that learning through online media can use digital technology, but what must be done is giving assignments through monitoring mentoring by teachers through WhatsApp Groups so that students actually take part in the learning process online. Technology must be used in learning in such a way that it can help students construct knowledge and motivate students to learn [13].

Using the Google Classroom application is very helpful for teachers in delivering material and giving assignments and tests to students. This is because by using the Google Classroom application, the material and assignments given are stored in a structured way and the teacher easily checks student answer sheets and monitors student participation in mathematics learning. The following is a snippet of the results of an interview with a math teacher.

“I find it helpful to use the Google Classroom application because the provision of material and assignments can be coordinated well. The material provided is in the form of modules while the learning evaluation is multiple choice questions which are then uploaded using the Google Form application available in Google Classroom.”

In line with the results of research from Garrison & Cleveland-Innes [14] stated that the Covid-19 Pandemic brought about enormous changes to the learning process, in which learning is usually carried out directly now being transferred to online learning. It is assumed that students only read the material provided by the teacher and tend to when students feel difficulties students do not dare to ask the mathematics teacher directly. Teacher involvement in learning through online media does not show deep and meaningful learning [15]. Therefore, the interaction between teachers and students is very important in learning through online media because it is able to cut psychological distance which in turn will lead to better learning [16].

Students find it difficult to understand learning through online media with a percentage of 77%. This is in line with the results of interviews with students, namely students feel embarrassed when they want to ask questions directly by the teacher, and tend to have difficulty understanding the material that has been given so that learning is not effective. This is in line with the results of research Basilaia and Kvavadze [17] students cannot study effectively from home, which makes online learning systems very ineffective. Another obstacle is the internet network. This is due to limited quota and slow internet network. Teachers and teaching units can create innovative online learning media that can be accessed offline so that they do not need a lot of internet quota and do not obstruct the internet network [18].

3.2. Differences in student learning outcomes before and during the Covid-19 pandemic

The effect of the online learning process on student learning outcomes was carried out using the average difference test (statistical t test) between students’ math test scores before the Covid pandemic (face-to-face learning) and math test scores with online learning.

Based on student learning outcomes before the Covid-19 pandemic and then of the Covid-19 pandemic, the difference in the average value of student learning outcomes is shown in Table 1.

| Table 1. Average student learning outcomes before the Covid-19 pandemic and during the Covid-19 pandemic |
|---|---|---|---|---|
| | Mean | N | Std. Deviation | Std. Error |
| Pair 1 | Before | 74.9444 | 18 | 6.36601 | 1.50048 |
| | Currently | 87.7222 | 18 | 7.20952 | 1.69930 |

It can be seen from Table 1. that the average student learning outcomes before the Covid-19 pandemic were 74.94 and the average student learning outcomes during the Covid-19 pandemic were 87.72. There was a difference in the average student learning outcomes between before and during the Covid-19 pandemic. When students work on exams from home, students do not experience anxiety...
because they are not directly supervised by the exam supervisor. This is because before the exam, students have been guided by parents and students also learn independently through online media to get more information. In line with the results of student interviews, students do not only depend on one source, but by learning through online media students can find information about learning through tutorials on YouTube or other learning applications. Student learning time becomes flexible because the material being studied can be repeated. Learning methods through online media make teachers need time to adapt to face new changes that will indirectly affect the quality of learning outcomes [18]. Furthermore, to prove whether the difference was significant or not, it was necessary to interpret the results of the paired sample t test using SPSS. Before the t test, the correlation test to see the relationship between the students’ pre and post scores was carried out and the results can be seen in table 2 below.

Table 2. Output Paired Samples Correlations using SPSS

| N   | Correlation | Sig. |
|-----|-------------|------|
| 18  | .766        | .000 |

Based on Table 2., the correlation value between 2 variables, namely before the pandemic and during the Covid-19 pandemic, the results obtained were 0.766, which means a strong and positive relationship. The significance level of the relationship is 0.000, which means it is significant at the 0.01 level. This showed that students' math scores with face-to-face learning were positively related to their math scores with online learning.

Table 3. Output Paired Samples Test using SPSS

| Paired Differences | t  | df  | Sig. (2-tailed) |
|--------------------|----|-----|----------------|
| Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | Lower | Upper |
| Pair 1 Before - Currently | -12.7778 | 4.70988 | 1.11013 | -15.119 | -10.436 | -11.510 | 17 | .000 |

Based on table 3, it can be seen that the difference between the average learning outcomes before and during the Covid-19 pandemic which is shown in the Mean Paired Differences column, which is -12.78 is obtained from 74.94 - 87.72 and the difference is between -15.12 to -10.44 (95% Confidence Interval of the Difference). Furthermore, based on the t column, which means that the t value obtained is negative, which is equal to -11.510. This negative value of t count is because the average value of learning outcomes before the pandemic is lower than the average learning outcome during the Covid-19 pandemic.

In this case the negative t value can be positive, so the t value becomes 11.510. Because the value of t table with df 17 and a significance value of 0.025, the value of t table is 2.10982. Because t count 11.510 > t table 2.109, then Ho is rejected and H1 is accepted. It can be concluded that there is an average difference between student learning outcomes before the Covid-19 pandemic and student learning outcomes during the Covid-19 pandemic, which means that there is an effect of learning through online media in improving student learning outcomes in mathematics for class X IPA students. Compulsory Mathematics at Madrasah Aliyah Muhammadiyah 2 Banjarmasin.

Furthermore, by looking at the Sig. (2-tailed) is 0.001 < 0.05, so Ho is rejected and H1 is accepted. So, it can be concluded that there is an average difference between student learning outcomes before the Covid-19 pandemic and student learning outcomes during the Covid-19 pandemic, which means there is an effect of learning through online media in improving student learning outcomes in mathematics subject to compulsory mathematics for grade X students at Madrasah Aliyah Muhammadiyah 2 Banjarmasin.
4. Conclusion

In general, it was found that learning mathematics through online media that took place at Madrasah Aliyah Muhammadiyah 2 Banjarmasin in the Covid-19 pandemic era was learning using the Google Classroom application. The teacher provides modules and explanations through Google Classroom and provides practice questions to see the level of student understanding of the material that has been given. The teacher also used the Quipper and learning materials in the form of videos to avoid boredom. Several times the teacher used the Quizizz application to create interactive quiz games as material for student evaluation in mathematics learning, in addition to making students more active and motivated to learn. Student learning outcomes have increased, which means that there is a difference in the average student learning outcomes before the Covid-19 pandemic and student learning outcomes during the Covid-19 pandemic. This means that student learning outcomes with online learning are higher than face-to-face learning outcomes, even though students are not too comfortable learning online because they cannot face-to-face with the teacher and friends. Students really feel that they miss the time they can interact directly with their friends.

These results are understandable, because when students work on exams from home students do not experience anxiety because they are not directly monitored by the exam supervisor, this is because before the exam is carried out students have been guided by parents and students also study independently through online media to get more information. In addition, it also describes the difficulties experienced by the teacher while implementing online learning, namely that the teacher cannot fully supervise when evaluating learning is held, so that the teacher finds it difficult to give an assessment. This is because during face-to-face learning the teacher can see the honesty and understanding of students directly, while when learning through online media, supervision is only carried out by parents and students themselves.

As for how to overcome the obstacles faced, namely always trying to convey material in various methods such as the teacher providing material in the form of interactive videos, explaining briefly and clearly through Voice Notes available on the WhatsApp Group application and so on. The teacher also works closely with parents to always supervise students when working on evaluation questions. So that students really do on the basis of their own knowledge and understanding.

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