The effect of online mathematics learning on junior high school mathematical resilience during covid-19 pandemic

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Abstract. Covid-19 Pandemic has changed all sectors, one of which is the system in education. Teachers and students are required to learn from home through online learning, it affects the mathematical resilience of students. This research is motivated by the number of findings of decreased student resilience in learning mathematics. The purpose of this study is to examine: (1) Steps of online learning by teachers (2) Mathematical resilience of students during online learning (3) students responses for online learning. The method in this research is descriptive qualitative, the sample selected as many as 4 teachers and 6 students with high, medium and low abilities in one junior high school in Cimahi. Data collection techniques used questionnaires for students to study students' mathematical resilience during online learning, interviews to examine students' responses to online learning, and interviews and observations with teachers to analyze the steps of online learning that were carried out. The results of the study show: 1) The online learning process begins with handouts through Google Classroom, followed by an explanation of the material using a zoom meeting and assignments through the Google Classroom (2) Student resilience of mathematics is high during online learning. (3) students give positive responses for online learning.

1. Introduction
In 2020 the whole world was shocked by an outbreak of Corona Virus Disease (COVID-19), an outbreak suspected to originate from China which was detected at the end of 2019. Data in China showed 66% of patients were positive a society that relates directly to the seafood or live market in Wuhan, Hubei Province of China [1]. This outbreak spreads almost to all over the world including Indonesia. After the outbreak invaded Indonesia in early March 2020, The Government of Indonesia issued a regulation Stay at Home for all Indonesian citizens (except in specific sectors) in accordance with the appeal of the World Health Organization (WHO). Then also take steps to reduce the chance of spreading the virus by practicing physical distancing. This limitation of social interaction is done by issuing a policy of learning, working, and worshiping at home.

In Indonesia this outbreak came in early March 2020 with a very rapid spread, at that time WHO established Covid-19 as a global pandemic. The education sector is one that is affected by this pandemic, the process of teaching and learning in schools by way of face - to - face must be stopped, and all replaced by online systems and learning at home using existing online media. This action was done as an effort to reduce or even break the spread of Covid-19. Based on that, for the very first time the Ministry of Education Indonesia directs teachers and lecturers do Work From Home [2].

Although the teaching and learning activities carried out in homes, as a teacher it is obliged to continue implementing and monitoring the teaching and learning process. Even the online monitoring is much more severe than offline monitoring. Because many obstacles are passed, such as connection issues and
even the ability to operate the online media. Based on preliminary analysis, the are several ways that conducted by the teachers during the online learning: 1) video conferencing using Zoom Meeting; 2) Provide material and assignments through Google Classroom; 3) Communicate through the WhatsApp or Telegram group; 4) If students experience difficulties in understanding the material or assignments, students can contact the teacher through the private chats on the WhatsApp.

At a time when the current situation and conditions not only rely on the efforts of the teacher, but also parents play a big role to supervise and guide the teaching and learning activities of their children at home based on the direction of the teacher. In line with research of [3] parents have an important role in assisting children in using technology. Because of these activities, not a few parents are able to understand the online learning system and not a few parents who do not understand it because of limited knowledge, so online tasks become a burden for parents [4].

The need for adaptation of students and teachers as well as the role of parents in dealing with the above conditions greatly affects the mathematical resilience of students. Failure of teachers to deliver material is caused when the teaching and learning process of teachers does not arouse the attention and activities of students in participating in lessons especially mathematics which can lead to low student mathematical resilience and can cause students to become lazy and not interested in mathematics [5]. In line with Reivich and Shatte [6] resilience is the ability to overcome and adapt to severe events or problems that occur in life. It is feared that student resilience will decrease during online learning, as seen from the activities of teachers and students who were lacking during the pandemic and the anxiety of students in participating the distance learning (online). The decrees of student resilience during online learning should become our concern as educators.

Various obstacles experienced by mathematics teachers in carrying out online learning especially mathematics is an abstract science that is difficult to explain only with limited words and translation, intense interaction is required between the teacher and students in teaching and learning activities, on the observations, it shows that some teachers only provide material files and ends with the assignment which causes students to get confused in understanding the material. Meanwhile, according to [7] there is a resilience caused by several obstacles. These obstacles are in the form of failed classes, boredom of students, low teacher instruction, and zero interaction between teacher and students as well as students and students. Therefore, teacher need to have an ability to compile good teaching materials so that they can be understood by students [8]. Teachers need to have knowledge and competence as well as ongoing efforts to overcome difficulties, and good preparation in teaching as well as preparing teaching materials.

States that every individual has experienced failure and periods filled with difficulties in the learning process [9]. Online learning during the Covid 19th pandemic is a difficult experience that could not be avoided for students and teachers. Negatives sides found during the online learning process can be minimized so that individual resilience can be developed, and the development of this resilience is very useful as a provision in dealing with difficult situations that cannot be avoided.

Mathematical resilience is the ability to face and overcome all difficulties and obstacles during mathematics learning. If students have high resilience, they will not give up easily when facing difficulties in learning mathematics [6]. Therefore, there is a need to have high mathematical resilience in students in online learning during the Covid-19 pandemic.

Based on the explanation above, we can know that online learning has an influence on student resilience. Even so, online learning challenge teachers to improve their competence in both professional competence and pedagogical competence. Teachers also challenge to improve the resilience of students in learning mathematics. Teaching and learning activities must continue to be carried out so that students can still receive lessons, keep up with the material, and use the time efficiently, so that the online learning can increase student motivation [10] and increase mathematical resilience of the student. Based on the description, the purpose of this study is to analyze: (1) Steps of online learning by the teacher (2) Examine students' mathematical resilience (3) Student responses to online learning.

2. Method
The method in this research is descriptive qualitative method. This study aimed to describe the phenomena of online learning during the Covid-19 pandemics, and examine the effect of online learning
to the students’ mathematical resilience, as well as the responses of students and teachers and also the feedback from teachers and students so that online learning can be more effective.

This research is conducted at one of the junior high schools in Cimahi. The subject of the research is 4 teachers of mathematics and 6 the students of 7th grade, those students are selected based on the level of ability. With a composition of 2 students with high ability, 2 students with medium ability and 2 students with low ability.

Data collection techniques in this study is by using questionnaire to measure the resilience of students via Google Form and online interview to see what the students’ responses as well as the activities during the online learning. Indicators of resilience examined in this study are: (1) Resilience of will and persistence in learning mathematics despite experiencing difficulties, obstacles, and challenges. With the resilience of students, students are expected to show a willingness and persistence in learning mathematics even in difficult conditions; (2) Resilience endures and does not give up, always gives a positive response in learning mathematics. Positive response in question is that students can control emotions, and are able to control the stimulus provided by the teacher; (3) Showing perseverance, confidence and working hard in every condition; (4) Having curiosity, self-reflection and utilizing various sources of learning; (5) Bring up new ideas or thoughts and look for creative solutions to face challenges.

Analysis of student responses is conducted from online interviews using WhatsApp calls in order to find out whether students’ have positive or negative responses to online learning. Resilience indicator consisting of 5 indicators divided into 20 statements consisting of positive and negative statements, with the distribution of statements as follows (Table 1).

| No | Indicator                                                                 | Statement Positive | Statement Negative |
|----|---------------------------------------------------------------------------|--------------------|--------------------|
| 1  | Willingness and determination in learning mathematics despite difficulties, obstacles and challenges | 1, 2               | 3, 4               |
| 2  | Endure, never give up, always give a positive response                     | 5, 6               | 7, 8               |
| 3  | Demonstrate diligent, confident and well attitude and work hard           | 9, 10              | 11, 12             |
| 4  | Have a curiosity, reflect on yourself and utilize various sources in learning | 13, 14             | 15, 16             |
| 5  | Come up with ideas, new thoughts, find creative solutions to face challenges | 17, 18             | 19, 20             |

3. Result and Discussion
The data contained in this study were obtained from filling the questionnaire on the google form and online interview online to 8th grade students of one of the junior high school in Cimahi consisting of 4 math teacher and six students. The students consisted of 2 high-ability students, 2 medium-ability students and 2 low-ability students. The following will be discussed about the main points of this research.

3.1. The Scenario of Online Learning made by Teacher
The following are the results of interviews with teachers about the learning process carried out during online learning (Table 2).
Table 2. Online learning scenarios conducted by the teacher.

| No | Learning Stage                                      | Teacher and Student Activities                                                                                                                                                                                                 |
|----|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Provision of handouts or material about lines and angles | The teacher gives handouts or material about lines and angles through *online* media. The media used is *Google Classroom*. Then the material is downloaded by students and read by students. |
| 2  | Explanation of material about lines and angles       | The teacher explains the material about lines and angles through *Zoom Meeting* to make it easier for the teacher to convey the material and makes it easier for students to ask or think in understanding the material.                           |
| 3  | Giving assignments                                   | The teacher gives assignments through *Google Classroom* by setting deadlines. Then students work on the assignments. If there are things that are still unclear about the material or about the assignment, students can add comments on the *Google Classroom* page or send messages via *WhatsApp*. |
| 4  | Reminding the task                                   | If it is a long-term assignment, the teacher needs to remind students regarding the deadlines of assignment. This step is used to anticipate if the students forgot about the assignment.                                      |
| 5  | Giving short quizzes once a week                     | This quiz is provided by the teacher in *Google Classroom* using *Google Form*. In this short quiz, students can get the score directly. If a student's grade is below the MCC (the lowest score criteria), the student can repeat it once more, so the students have opportunity to do it twice. |
| 6  | Daily Test Award                                     | The test is carried out when the line and angle material has been delivered. Can be through *Google Form, Google Classroom*, or *WhatsApp*.                                                                                                                                 |

Based on Table 2. The online learning process carried out by teachers and students using WhatsApp, Google Classroom and Zoom Meeting, before learning the teacher sends messages to the WhatsApp class group to remind students, using WhatsApp is felt effective because each student can easily access when there is an incoming message.

3.2. Student Resilience in Online Learning

There are 5 indicators which are divided into 20 statements consisting of positive and negative statements, students fill the online form in the form using Google form with the results of the students as follows (Table 3).

Table 3. Percentage of student resilience data

| Indicator | Percentage of Student Answers |
|-----------|-------------------------------|
|           | Positive | Negative |
| 1         | 53.37    | 46.63    |
| 2         | 64.25    | 35.75    |
| 3         | 67.16    | 32.84    |
| 4         | 51.46    | 48.54    |
| 5         | 62.41    | 37.59    |
| Average   | 59.73    | 47.47    |
From the data in Table 3, students’ resilience can be seen from the indicators (1) Willingness and persistence in learning mathematics despite difficulties, obstacles and challenges; (2) Enduring, never giving up, always giving positive responses; (3) Showing attitude of perseverance, confidence and confidence and work hard; (4) Having curiosity, reflecting on ourselves and utilizing various sources in learning; (5) Generating ideas, new thoughts, looking for creative solutions in facing challenges. The average percentage of students’ answers of the five indicators was 59.73 percent with positive response. This means that student resilience is more than 50 percent with positive resilience results, so that student resilience is high.

### 3.3. Student response to online learning

Student responses were collected using the online interview method, following a summary of the results of the interview analysis (Table 4).

| No | Respondents | Fill in Response | Response type (Checklist) |
|----|-------------|------------------|--------------------------|
| 1  | Student 1   | It is quite a troublesome to frequently update information on social media as well as more tasks than explaining the material | √ |
| 2  | Student 2   | Fun because the presentation of material is varies by using social media | √ |
| 3  | Student 3   | Sharpen the independence of students learning and take responsibility for what is directed by the teacher | √ |
| 4  | Student 4   | Makes it easy to study anywhere. It doesn't have to be at school | √ |
| 5  | Student 5   | Happy to be longer at home, I learned independently | √ |
| 6  | Student 6   | Difficult to understand the material and less free to interact with friends | √ |

In the interview (Table 4), there were 2 students who gave negative responses to online learning. However, there were 4 students who gave positive responses, as we can see in Table 5. With online learning, they claimed to be more independent in learning, responsible for assignments and more flexible because they studied at home.

### 3.4. Results of Analysis of Student Assignment Grades

In this section will analyze the value of the tasks the students while learning online is applied, as shown in Table 5.
Table 5. Recapitulation of student assignments

| No Student Number | Assignment Value | Student Ability Criteria based on Grades (Checklist) |
|-------------------|------------------|-------------------------------------------------------|
|                   | Q1   | Q2   | Q3   | Average | Very good | Good | Medium | Low |
| 04                | 95   | 90   | 80   | 88.34   | √          |      |        |     |
| 27                | 95   | 75   | 70   | 80      | √          |      |        |     |
| 17                | 95   | 85   | 85   | 88.34   | √          |      |        |     |
| 18                | 90   | 85   | 70   | 81.67   | √          |      |        |     |
| 09                | 75   | 80   | 70   | 76.7    | √          |      |        |     |
| 11                | 60   | 75   | 65   | 66.67   | √          |      |        |     |

MCC (Minimum Completeness Criteria) = 75

In Table 5, we can analyze from 6 students the grades of students, 4 included in either category 1 student in the medium category and 1 student in the less category. This means that 5 out of 6 students scored above MCC (Minimum Completeness Criteria), this shows that online learning is not an obstacle for learning mathematics, as for students who are under MCC (Minimum Completeness Criteria), after interviews can be concluded he prefers learning to discuss with peers, with online learning interaction with friends is also limited.

In online learning has some differences with offline learning in the classroom, one of which is there is no standard of the Lesson Plan. However, the learning process should be carried on so that all students can be still on track so that students can get optimal learning process.

The first activity undertaken is the provision of material to students in the form of handouts that in the upload to Google Classroom. The use of Google Classroom in online learning aims to make it easier for teachers to share assignments and to facilitate teachers and students interaction at any time. The use of Google classroom can make learning more effective, moreover teachers and students can manage their interaction at any time through Google Classroom[11]. Students can later read, discuss, listen, and send assignments remotely. In addition to using handouts, the teacher also provides an explanatory video of the material uploaded in the YouTube page.

In this current time, the education is not only oriented to academicals aspect, but also to the character building. Such as providing clear instruction to make students able to engage in all time learning process even though there are no direct monitoring from the teachers, teacher also give an advice to students to stay at home, do homework or do other positive activities at home and do not leave the house, do worship at home and etc. The importance of character education was stated [12] that this effort aims to shape and develop Indonesian people who are devoted to God Almighty, obey the rule, maintain harmony with same religious group and inerfaith community, carry out intercultural interactions, develop social capital, implement social values, noble values of national culture, and have pride as an Indonesian in order to strengthen the spiritual, moral, and ethical foundations of national development.

Based on the results of data processing, that student resilience is classified as high during this online learning period. This can be seen from the willingness and sincerity of students to take part in learning through Google classroom and zoom meetings. Students always share positive responses even in difficult situations, and can utilize various sources during the learning process. Students learn to use several applications and learning media for their learning material. Maximum support and motivation from teachers and parents has also been one factor in the high level of student resilience during this pandemic. According [13] In the developmental process during the difficult time will somehow hamper the students feeling, the youth need understanding and support from the loved ones and close to them, especially the elder or families. The next important factor is the interaction with the teacher, although it is limited. Good interaction between teachers and students can increase learning activities and achievement [14]. Therefore in online learning the teacher must always answer questions from students as soon as possible so that good communication can be reached.
Other indicators that influence mathematical resilience are students' confidence and confidence during online learning. The students' self-awareness that is needed to facilitate such activities. Goleman in [15] states that, self-awareness is knowing what is felt at a time then uses it to guide his own decision making. In addition, self-awareness also means setting realistic benchmarks of self-ability and strong self-confidence. Someone who is confident will succeed in learning [16].

From the results of student interviews, students' responses to online learning are positive, one of them argues that they are more independent in learning, learning independence is very important to have, because it is positively correlated with learning success [17], researchers find interesting facts namely the majority of students who have positive opinions come from students with a stable economic background and in the medium to high ability category. This happens because students who have an unstable economic background can cause a lack of adequate facilities and infrastructure for them to do online learning. For medium to low ability, they have many difficulties in the process of understanding the material provided by the teacher even though it is available in handouts, video presentations, and even video conferences conducted through zoom meetings. Students in this category need motivation from teachers and parents to increase their mathematical resilience. Learning motivation is one of the success factors in learning mathematics which is in line with Uno [18] explaining motivation and learning are two things that influence each other. Learning is an activity of students by constructing their own knowledge and potentially occurs as a result of practice or reinforcement based on goals to achieve certain objectives.

From the results of the analysis of students' mathematical assignments in online learning, 5 out of 6 students score assignments above the MCC (Minimum Completeness Criteria). High student resilience also affects student learning outcomes, although with online learning if the level of student resilience is high then the learning outcomes will be good. Because resilience affects cognitive aspects, high resilience students are likely to have high cognitive abilities as well.

4. Conclusion
The conclusions of this study are: (1) The online learning process begins with handouts through Google Classroom, continued explanation of the material using zoom meetings and assignments through google classrooms; (2) Student resilience in mathematics is high during the online learning; (3) students give positive responses for online learning.

The suggestion is that teachers in online learning should pay attention to the needs of students in the form of adequate online learning facilities, while maintaining interaction with students, preparing teaching materials that are easily understood, and providing motivation so that students' mathematical resilience is reliable.

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