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The Perceptions of Mathematics Teacher about Students' Difficulties in Online Learning

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ABSTRACT

The Covid-19 explosion has changed all activities, including the learning process. The existence this pandemic makes all sectors try to find the best solution. This needs to be done so that all systems are well maintained. One solution during the pandemic is learning activities with online activities. Online learning without face to face certainly raises some problems. New activities make teachers and students must adapt to new learning conditions. In addition, various obstacles provide a paradigm that applying online learning is difficult. The difficulty of carrying out online learning is certainly not only felt by student but also teacher feel the same way. However, it is the teacher's responsibility to address their difficulties and students' difficulties. To determine an effective solution in overcoming students' difficulties, further research is needed to determine the aspect that promote students' difficulties in online learning. Through this survey research, researchers wanted to see how mathematics teacher's perception about students' difficulties when participating in online learning. Most teachers' perceptions indicate that aspects of facilities and infrastructure, learning activities and environment are the main factors which promote students' difficulties in online learning.

Keywords: *perception of athematics teacher, students' difficulties, online learning*

1. INTRODUCTION

Since the emergence of the Covid-19 pandemic, all activities have been carried out online or using existing technology. This is intended to reduce face-to-face activities and meetings. One of them is the change in the learning process with a distance system or what is known as online learning. Nowadays, we are preparing student for the postpandemic period, where several educational institutions are implementing hybrid learning models, which include both face-to-face and online components. This strategy offers adaptability and can cater to various learning inclinations. There are ongoing utilisation of online learning platforms and technologies for delivering lectures, assigning tasks, and evaluating performance.

Online learning is learning where all activities carried out by teachers and students are carried out virtually. This is the newest and most popular form of distance education today. Online learning is catalyzing a pedagogical shift in how we teach and learn. There is a shift away from top-down lecturing and passive students to a more interactive, collaborative approach in which students and instructor co-create the learning process (Sterm).

Based on the findings of the studies within this literature review, we can deduce the prevailing characteristics of online learning. According to (Meylani, *et.al.* (2015), Allen & Seaman (2017)), this computer tutorials and online learning activities have the capacity to make students learn at their own convenience in terms of pace and level and have a positive impact on the retention of old knowledge and acquisition of knowledge use of multimedia elements, simulation, and manipulatives. There are four dimensions of online learning, namely affect, attitudes, intrinsic and extrinsic motivation, can be used to better understand students' attitudes toward online learning. Different types of learning experiences are supported by online learning, such as purely online vs. mixes or instructor-directed conditions vs. direct control of learners. Online learning also provides online quizzes at the end of each unit and gives feedback on the results. The other characteristic is, this should be customized instruction and adaptive to suit the diverse needs of learners. For an online environment traits like self-explanation, self-control and prompts for reflection approaches have been shown to enhance learning result. Next characteristics is about scaffolding, the support given during the learning process which is tailored to the needs of the student, helps learners achieve their learning goals and may result in enhanced test performance. Online learning can be delivered through a mobile environment, the world wide web or via email, research has shown no considerable differences in learning resulting from the medium of delivery. Distance learning situations enhance the learning experience significantly when digital resources such as computer-mediated interactions are available. Integration of cooperative learning permits people to enjoy the group's collective knowledge and gain knowledge from others to enhance the overall learning experience. Technology can be integrated to the classrooms to address different learning styles that correspond with multiple intelligences. In addition, online learning conforms to the state-wide and national educational standards and must be implemented with fidelity for producing the result it has been designed to produce. For an online learning to be successful, it must be implemented with fidelity, and for this to happen, the facilitators must know how to use the online learning intimately. An online learning must possess the flexibility to adopt new and useful instructional paradigms as they emerge.

Mathematics is an abstract science that is not easily accessible. Students are able to understand mathematical concepts and principles well through direct interaction in learning (Klobas & McGill, 2010). Depth involvement in mathematics learning process can be applied in learning activities that involve more direct activities than get the teacher's explanation.

This condition is certainly contrary to the conditions of learning during the Covid-19 pandemic. Learning cannot be done face-to-face, making teachers more often provide explanations through videos or online discussions such as WhatsApp Group, Zoom, G-meet (4,5,&6). Therefore, students' activities to engage in analyzing activities, practicum, project-based learning and deeper learning activities become more difficult to achieve (7,8).

Teachers have a tougher challenge in improving students' mathematical abilities through online learning. Several methods have been used by teachers to design effective learning processes and support the achievement of student learning outcomes. However, the limitations of online learning result in more variables appearing compared to direct learning (9). This condition is indicated by the increasing problems faced by students when participating in online learning. The survey results from Saiful Mujani Research and Consulting (SMRC) show that out of 2,201 elementary and junior high school students, 92% of students experience many obstacles in participating in online learning (10).

Problems in online learning need to be addressed properly. Therefore, it is necessary to follow up from the teacher to get the best solution. Gaining insight into teachers' perspectives can facilitate the identification of precise domains in which educators may benefit from further training or professional development. Understanding teachers' perspectives helps guide the creation of impactful instructional approaches for online mathematics education. Researchers can aid in the development of educational methods that are in line with instructors' requirements by comprehending the difficulties and worries that teachers encounter.

Although in the future learning will be conducted face-to-face, this solution can be adopted in blended learning in the future.

Before getting the best solution, it is necessary to conduct a preliminary analysis or study. This is done to examine what aspects are the causes of problems in online learning. In addition, solutions provided can be addressed to the most urgent matters.

In the learning process there are two main elements that are most important, teachers and students. Therefore, the problems that occur in online learning certainly come from teachers and students. However, both problems that come from the teacher and students are the responsibility of the teacher (11). Teachers need to know what problems students face when participating in online learning. Teachers can provide alternatives, design, and provide direction so that online learning continues to run well.

One of the problems that arise in online learning is the difficulties faced by students. This difficulty certainly arises from several other influencing variables. In order to be able to overcome the problems that exist in online learning well, it is necessary to know what problems are the most important to be overcome first. The teacher's point of view is needed for further research whose domain is the solution to be offered. This survey research was conducted to examine "how are teachers' perceptions of students' difficulties in online learning?".

2. METHOD

2.1. Research Design

This research employed survey method in collecting qualitative data. The data of teachers' perception about students' difficulties in online learning were gathered using web questionnaire. Data from questionnaire was analysed using descriptive statistics.

2.2. Participants

Participants in this research included sixty-five (65) mathematics teacher. Mathematics teachers who participated in this study consisted of 45 high school mathematics teachers and 20 junior high school mathematics teachers. The method of choosing participants is random sampling. Participants were selected from schools that are diverse in both culture and accreditation. This study will also focus on the results of mathematics teachers' perceptions which are classified based on teaching experience, the classification are presented in Table 1.

Table 1. Classification Of Participants Based on Teaching Experience

Categories	Number
Profecient (16-25 years)	7
Competent (6-15 years)	21
Advance (0-5 years)	37

2.3. Instruments

This research is descriptive-qualitative research. The purpose of this study was to determine the perception of mathematics teachers regarding students' difficulties in online learning. In addition to examining mathematics teachers' perceptions, the researcher also wants to see how the learning scenarios have been carried out so far. Researcher used an instrument in the form of a questionnaire containing open-ended questions.

2.4. Analysis

Data gathered from questionnaire are sorted and organized using MS.Excel. The data then analyzed descriptively including mean, modus, median of data.

3. RESULT AND DISUSSION

The purpose of this study was to determine mathematics teachers' perception about students' difficulties in online learning. There are several things that need to be known to make interpretation clearly, (a) online learning scenarios carried out by mathematics teachers based on the category of teaching experience; (b) the learning media used by the teacher; (c) what factors make students' difficult in online learning.

3.1. Online Learning Scenarios

Online learning scenarios were discussed in 3 groups, (a) learning scenarios guided by experienced teachers (SP); (b) teacher-led learning scenarios with "competent" teaching experience (SC); and (c) teacher-led learning scenarios with "advanced" (SA) teaching

experience. Each online learning scenario is described in outline from the number of teachers involved.

Overall, in one semester of learning mathematics carried out as many as 16 meetings. Each meeting is held in 2 JP or equivalent to 90 minutes. Overall mathematics learning was carried out for 1440 minutes. Time descriptions can be used to help interpret the percentage of online and face-to-face learning undertaken. Both SP and SC on average 85% conduct online learning from all meetings and the remaining 15% are face-to-face. Face-to-face meetings in SP and SC are used for enrichment, remedial and exam activities. Meanwhile for SA, an average of 95% of meetings are conducted online and only a small part is for face-to-face learning. Most SAs arrange face-to-face learning as time for taking final exams.

Online learning was carried out by teaching students through certain tools and procedures. Teachers do not let students to study alone at home with math modules or books. However, all teachers participate in guiding students to achieve mathematical understanding. Online learning from the third category is carried out with various accesses such as Zoom, Google Meet, Microsoft Office 365, Quipper School, Google Classroom, WhatsApp, Youtube. This access is used by the teacher to explain the material and discussions.

3.2. Learning Media

The learning media used by the teacher will also be explained first. The goal is to clearly see the mathematics learning that has been done online. The media described in this chapter are learning media other than access used to support online learning such as Zoom, Google Meet, Microsoft Office 365, Quipper School, Google Classroom, WhatsApp, Youtube.

The SP category consists of 7 mathematics teachers where all teachers use additional learning media. The media used by teachers in the SP category can be seen in Figure 1. From the data obtained, it can be seen that most teachers use presentation slides and explanation videos as additional media in the online mathematics learning process.

In the SC category there are 21 mathematics teachers where all teachers make additional media. Additional media are used to assist students in participating in online mathematics learning. The media used by teachers in the SC category can be seen in Figure 1. From the data obtained, teachers in this category mostly use explanatory videos and modules as supporting media.

In the SA category there are 35 teachers who use additional media, while the other 2 teachers do not use additional media. Teachers of this category who do not develop media only explain the material through Google Meet and WhatsApp Groups. Teachers do not use additional media for two reasons. First, teachers cannot develop other learning media because of time constraints. Because when working from home, teachers cannot divide their time between completing homework, raising children and preparing teaching materials. Second, the additional media that have been made have never been accessed or used optimally by students. Overall variance data for additional learning media used by teachers in three categories can be seen in Figure 1.

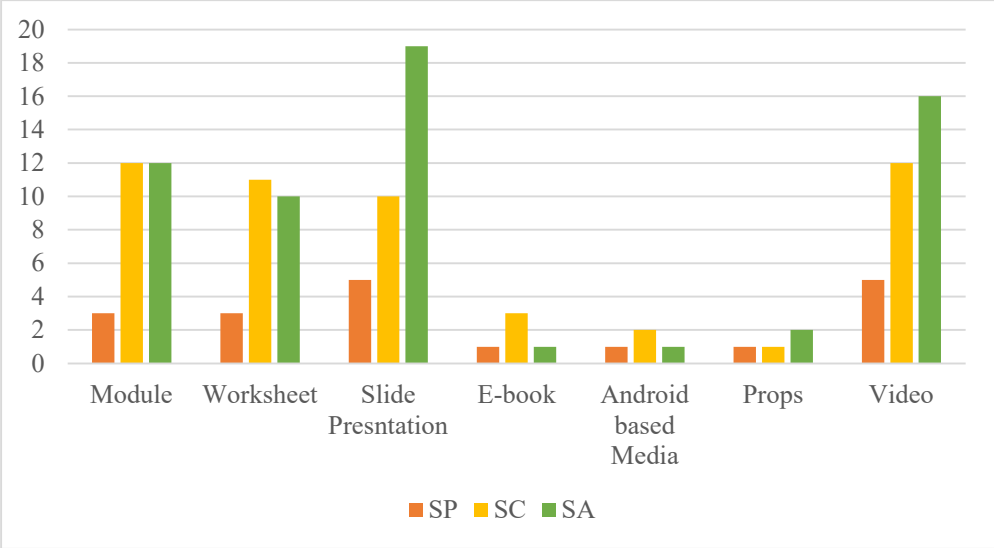

Figure 1. Distribution Of Additional Media Usage In Each Category

Descriptions related to the use of additional media in each category can be used in interpreting the conclusions which will be explained later. The additional media used by the teacher is a type of media outside of virtual access. Media is a learning media made by the teacher himself. From all participation, there were 2 teachers in the SA category who did not develop media at all, except using existing books. The two teachers explained the material directly to students through Google Meet and WhatsApp groups.

3.3. Factors

In this sub-chapter, teacher' perceptions will be explained in detail about the factors that influence students' difficulties in participating online learning. Teachers' perceptions will be described in three categories, SP, SC, and SA. The teacher' perception of the difficulties experienced by students can be the basis for determining further solutions. The teacher' perception was seen from several points of view which will be explained later in this sub-chapter.The instruments used to assess teacher's perceptions in this sub-chapter can be seen in Table 2.

Table 2. Questions To Assess Teacher's Perceptions About Students' Difficulties

Aspect	***Question***
Student	1. Can you distinguish between students who have difficulty and students who do not have difficulty in carrying out the online learning process? (**S1**)
	2. What are the things that indicate the student has difficulty in online learning? **(S2)**
	3. Are there students who have difficulty following the online learning process? **(S3)**
Actors	1. What are the obstacles that affect students having difficulty learning online in terms of facilities and infrastructure?**(F1)**
	2. What are the obstacles that affect students having difficulty learning online in terms of learning media?**(F2)**
	3. What problems affect students having difficulty learning online in terms of the teacher's role?**(F3)**
	4. What problems affect students having difficulty learning online in terms of learning activities?**(F4)**
	5. What problems affect students' difficulties in online learning from an environmental point of view?**(F5)**

3.3.1. Student Aspect

In S1 questions, of the 65 mathematics teachers, all of them can distinguish between students who have difficulty and students who do not difficulties in carrying out the online learning process. According to the teacher's perceptions, there are several things that make students look difficult in online learning. The next discussion is the answer to S2 which will be described in each category, SP, SC dan SA. For the distribution of various answers, the answers in each category are summarized in a graph which can be seen in Figure 2.

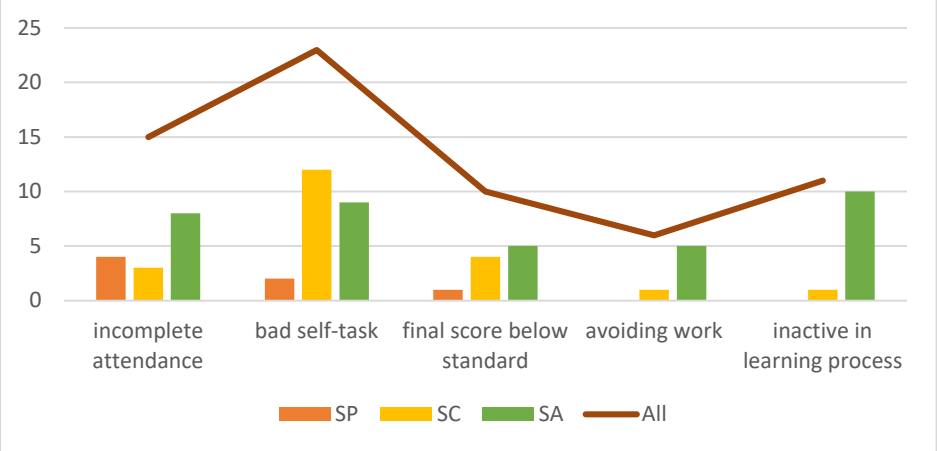

Figure 2. Distribution Of Answers To Questions S2

Some of the teacher's answers related to S2 questions are grouped into five categories which are explained as follows.

a) incomplete attendance
   Teacher assumes that students' difficulties can be seen from imperfect attendance. In the initial session, the number of students who took part in the lesson was almost 100%, except for those who had permission to not come to class from the beginning because of illness or there was an urgent need. In the middle, the number of students began to decrease. Many students leave online learning suddenly without the teacher's prior permission.
b) bad self-task
   The teacher assesses that the student's assignments have not been maximized, indicating that students have difficulty participating in online learning. Students do not get maximum knowledge and instructions so that it affects the independent tasks they do. The assessment of the assignment is not good because the task does not follow the instructions, the answer is wrong, the task is independent because of plagiarizing the work of other friends.
c) final score below standard
   Final score that are not in accordance with the minimum limit (KKM) are students who do not take online learning well. This is indicated by bad understanding and has an impact on bad test scores.
d) avoiding work
   Students ignore assignments by not submitting the assigned assignments. When asked a question, suddenly students leave online learning for no reason. In fact, students do not come to class when assignments must be presented.

e) inactive in learning process
Students do not participate in any class activities or in other words passive students. Students do not ask and do not respond to anything in the discussion session.

Based on the data, there were different points of view from the three categories. Most teachers in the SP category look at the "incomplete attention" aspect. The SC category teacher sees students' difficulties in participating in online learning from the "bad self task" aspect. While the SA category is more concerned with the aspect of "not being active in the learning process".

The next question, S3, the teacher's point of view describes that they feel they have students who have difficulty following online learning. As has been shown in the master's answer, based on this aspect the teacher assesses his students when they have difficulty. Why and how teachers have this point of view will be explained in the discussion section.

3.3.2. Factor Aspect

In the previous discussion, teacher's perception of what indicates students have difficulty participating in online learning has been shown. Furthermore, the researchers wanted to look specifically at what factors caused students to have difficulty in online learning. However, this is not seen from the student's perception but from the teacher's perception. This perception can lead to where the real problems of online learning arise.

In this case, the researcher refers to five main factors, namely (1) facilities and infrastructure; (2) learning media; (3) teacher's role; (4) learning activities; and (5) environment. Before the teacher explains in detail the causes of the difficulties faced by students, the teacher has given an assessment of the factors that influence the most. The results of the assessment can be seen in Figure 3.

When viewed from the SP category, most teachers think that environmental factors are the most influential. The teacher's perception illustrated that there are three things in environmental factors that do not support the online learning process. First, home conditions that are not conducive greatly interfere with the concentration of student learning. Second, various activities at home that do not provide opportunities for students to fully participate in the online learning process, such as having to do an errant. Third, there is no support between one student and another so that many students are not present in online class.

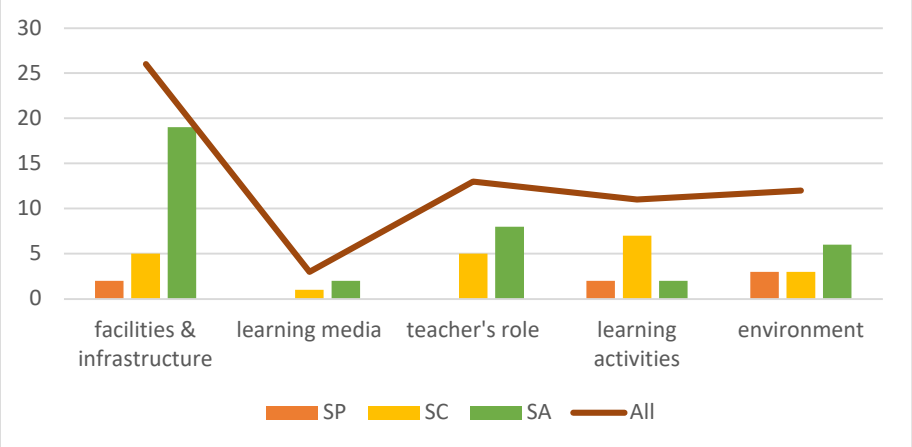

Figure 3. The Most Influential Factor on Student Difficulties

In the SC category, teacher's perception refers to the learning activity factor. Learning activities carried out online have limited space and time. So that some obstacles arise because of these factors. These obstacles ultimately cause students to find it difficult to participate in online learning. Learning activities cannot be carried out optimally due to several obstacles such as, (1) the opportunity to be directly involved in learning activities is very limited; (2) learning activities are dominated by looking at smartphone or PC screens and this is very tiring for students; (3) limitations in monitoring and guiding students; (4) learning activities are dominated by teacher explanations through videos or presentation slides.

In the SA category, the perception of mathematics teachers mostly refers to the facilities and infrastructure factors. According to teachers in this category, they assess the learning process they are doing is very constrained by not optimal student involvement. This is because there are several problems related to facilities and infrastructure such as; (1) internet access is difficult due to weak signal; (2) some students do not have supporting devices such as smartphones and PCs; and (3) specifications of the devices used have not been updated so that their use is not optimal. Some of these things mostly happen to students so that students find it very difficult to engage in online learning.

Overall, the highest factor that causes students to have difficulty participating in online learning is the facilities and infrastructure. However, the three categories, SP, SC, and SA have different ratings. The majority of teachers in the SA category gave the largest assessment contribution to the facilities and infrastructure factor, while the SP was on environmental factors and SC on the learning activity factor. How and why each category has a different rating will be discussed in the following discussion.

4. CONCLUSSION

Based on the data analysis, the results of learning scenarios and the teacher's perception will be interpreted in each category. The aim is to get a clear picture of the things that underlie teachers' perceptions of students' difficulties in online learning. This discussion will be explained in detail in each category.

In the SP category there are 7 mathematics teachers who have very good teaching experience. Mathematics teachers in this category have an average of 19 years of teaching. In the online learning process carried out, most teachers more often use learning media in the form of presentation slides and video explanations. Mathematics material is delivered in its entirety through online learning and for exams it is carried out offline.

SP category teachers identify students who have difficulty participating in online learning as students who do not fully follow the online learning process. Simanjuntak also stated that imperfect attendance indicates that students have difficulty in participating in online learning (12). Through identification by the teacher, the teacher's perception refers to environmental factors. An environment that is not conducive makes students not have full motivation and responsibility in participating in online learning (13). Teachers in this category believe that the facilities and infrastructure really support students to be able to take part in online learning. However, environmental factors such as unfavorable home conditions (too crowded, many children playing around the house), homework that cannot be handled by parents so that children

are required to help when learning hours begin and when meeting with relatives or peers tend to want to play rather than follow online learning.

In the SC category, there are 21 mathematics teachers who have an average teaching experience of 8 years. In the online learning process, most teachers in this category use module media and explanation videos. The teacher provides a module that can be read independently by students. In addition, the teacher also provides an explanation video related to the topic of the material that must be understood by students.

Through learning scenarios that have been designed by SC teachers, they identify the difficulties of students participating in online learning based on the bad self task aspect. The SA category teacher analyzed that there were students who were not good at individual assignments and group assignments. Tasks that are not done well or the results are not optimal indicate that there are obstacles faced by students (14).

Bad self task show students have difficulty in following the learning process. According to the SA teacher's perception, this difficulty is influenced by learning activity factors. Learning activities that are not optimally affect student learning outcomes (15). Learning activities cannot be carried out optimally due to several obstacles such as, (1) the opportunity to be directly involved in learning activities is very limited; (2) learning activities are dominated by looking at smartphone or PC screens and this is very tiring for students; (3) limitations in monitoring and guiding students; (4) learning activities are dominated by teacher explanations through videos or presentation slides.

The SA category consists of 37 mathematics teachers. Teachers in this category have less than 6 years of teaching experience. In the online learning process, the teacher used presentation slides and video explanations. Presentation slides were used when the teacher wants to deliver an explanation directly via Google Meet, Zoom or others. To make it more varied and make it easier for students to remember the material, the SA teacher also added an explanation video that students can play repeatedly.

According to analyst data, the majority of SA teachers have a perception that students have difficulty learning online, which can be seen from the participation of students who are not active in the learning process. Inactive students show difficulty or displeasure in participating in learning activities (16). Furthermore, SA teachers think that students are not active in online learning because of unsupported facilities and infrastructure. Facilities and infrastructure that do not support this, for example (1) internet access is difficult due to weak signal; (2) some students do not have supporting devices such as smartphones and PCs; and (3) the specifications of the devices used have not been updated so that their use is not optimal

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