

## Research Article

# Analysis of Difficulty Understanding Student Mathematica by Using Online Learning Model

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## Abstract.

This research is based on the low understanding of students' mathematics. One of the causes for the low understanding of students' mathematics is a factor in the students themselves in the form of student difficulties in solving problems related to the material in the Differential Calculus course. The purpose of this study was to describe the difficulties of students' mathematical understanding in solving problems in the Differential Calculus Course using the online learning model. This type of research uses a qualitative approach and is descriptive in nature. The subjects of this study were first semester students taking Differential Calculus courses in the Mathematics Education study program, Muhammadiyah University of Tapanuli Selatan, Academic Year 2020/2021. The instrument used in this study was an interview. The results showed that the difficulties of students' mathematical understanding in solving problems in the Differential Calculus course using the online learning model were related to technical difficulties, adaptation difficulties and internal difficulties for each individual student. To overcome these difficulties, it is necessary to have a more varied strategy for using online learning media.

**Keywords:** Online learning; mathematic; media

## 1. Introduction

Mathematical understanding is one of the many abilities that every student must have. According to Hewson and Thorley understanding is a conception that can be digested or understood by students so that students understand what is meant, are able to find ways to express these conceptions, and can explore related possibilities [1] [2]. The ability to understand mathematics is one of the important goals in learning, giving the understanding that the materials taught to students are not only memorizing, but more than that with understanding students can better understand the concept of the lecture material itself [3] [4].

According to Hendriana, the term understanding is different from the level of understanding in Bloom's taxonomy, where the understanding of mathematics in question is

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that a person is said to understand a mathematical theorem if he knows deeply about the theorem concerned, in addition to mastering the deductive aspects and proof of the theorem, he also understands application examples. and or the consequences of that theorem and understand its relationship with other theorems [5]. This is in line with Sumarmo mention outline basic math skills are classified in 5 standard, namely (1) to know, understand, and apply the concepts, procedures, principles and ideas of mathematics (Mathematical Understanding) (2) mathematical problem solving (3) mathematical reasoning (4) doing mathematical connection and (5) mathematical communication [6] [7]. So one of the basic mathematical abilities that students must have, especially in the differential calculus course, is understanding mathematics.

To become a candidate for mathematics teacher, students are highly required to have various competencies. There are 6 teaching standards for mathematics teachers / educators according to the NTCM. namely, (1) must bring up valuable mathematical assignments, (2) in discourse, must play a responsive role in questions, listen and observe, (3) support active and interactive students in listening, responding, asking, exploring and discussing, (4) ) encourage students to use devices such as models, technological devices, writing instruments, visual and oral, in order to improve mathematics learning, (5) must form a learning atmosphere that fosters mathematical power, (6) involvement in the analysis of the teaching and learning process [8]. Looking at the standards of a teacher / educator, it is necessary to have a direct approach in guiding students' mathematical understanding so that the expected learning objectives are achieved.

However, the problem now is that it is impossible for direct face-to-face interaction in the room because of the situation that is being faced by Indonesia and the world, namely the problem of the Covid-19 pandemic outbreak. According to Kusuma, JW; Hamidah, the distance education system is one of the solutions to overcome difficulties in face-to-face learning with the existence of rules social distancing given the problems of time, location, distance and cost which are major obstacles at this time and Rahmawati stated that the interaction of educators and students is carried out directly or indirectly, for example by chatting via an internet connection (direct) or by sending an email (indirectly) to simply collect assignments [9]. Second, the interaction that occurs between educators and students is better known as the online learning model. Online learning can be defined as a teaching and learning activity that utilizes a network or internet connection so that there is communication between the teacher and students without involving physical contact [10]. The learning model that changes from face-to-face learning to online learning takes a long time to adapt, so it is expected that there will be learning

and teaching difficulties for lecturers and students. Learning difficulties are the presence of verbal and nonverbal disturbances or where students are unable to learn properly both conceptually and in principle, especially in solving problems [11] [12] [13]. The online method used is with the help of Google Classroom, google meet and zoom meet. The three applications are designed so that students and educators can learn online while still requiring internet quota. Where Google Classroom is designed in writing only, while google meet and zoom meet are designed in written and spoken form or face to face online. Even though using an online learning model that has been well designed, there are still possibilities for difficulties experienced by students during learning, especially difficulties in understanding student mathematics. So that the purpose of this research is to describe the difficulties in understanding mathematics of students in solving problems in the Differential Calculus Course using the online learning model.

## 2. Methods

Type of research uses a qualitative approach and is descriptive in nature. Qualitative research methods are research methods used to examine the conditions of natural objects where the researcher is the key instrument [14]. The subjects of this study were first semester students taking Differential Calculus courses in the Mathematics Education study program, Muhammadiyah University of Tapanuli Selatan, Academic Year 2020/2021. The sampling technique used is snowball sampling, which is a sampling technique that is initially small in number, then taken again so that the sample increases. The selection itself ends when there has been repetition of information, in other words the information obtained is saturated, so sampling must be stopped [15]. The instrument used in this study was an interview with the help of the applications zoom meet and google meet. The data analysis used is descriptive which aims to describe the phenomena that occur in the research subject in depth. In this study, the observed phenomena and will be described are the difficulties faced by students when participating in online learning. The difficulties that arise are grouped into 3, namely technical difficulties, adaptation difficulties and internal difficulties for each individual student.

## 3. Results and Discussion

Interviews were conducted by observing the snowball sampling technique. Students as research subjects were interviewed one by one. The form of data collection will

be stopped after repetition of information or the same information appears between students. The results of the interviews used only reached subject 4 because the next subject repeated answers so that the researcher took up to 4 subjects only.

### 3.1. Technical Difficulties

It can be noted in the results of the technical difficulties interview above, subject 1 reveals that the difficulties faced are: (1) the difficulty of the internet network at home / village, this is because as long as there is arule stay at home, students choose to go home to the village where most of the students live in areas that are difficult to reach the internet network; (2) the internet packages used are very slow, this is because the internet packages used by students have not yet installed special towers and also because students are constrained by the cost of buying standard packages. Subjec 2 argued that: (1) the internet quota ran out quickly, this was due to the large number of tasks that had to be sent every day; (2) the cellphone used does not support online applications, this is because not all students have the latest Android cellphone. Subjec 3 revealed: (1) unable to share the maximum time online because of homework that must be done, this is because students have to help their parents at home and also many students choose to work while studying online to help the family economy; (2) cellphones do not support doing assignments or material attachments, this is because not all parents can afford to buy cellphones to support children’s learning, so sometimes students have to borrow cellphones from relatives and neighbors. Subjec 4 revealed: it is difficult to send assignments, this is because the areas where students live are classified as difficult to reach the internet, where if the PLN dies, the network will also die.

TABLE 1: Interview Results Regarding Technical Difficulties of Students.

| Subject    | Interview Results  |
|------------|--|
| Subjects 1 | During my online lecture, I experienced difficulties with the internet network at home / village; The internet package that I use is so slow that it does not support learning in the form of zoom meet and google meet          |
| Subject 2  | During online learning my internet quota runs out quickly, especially when the lecturer asks to send assignments in video form; The cellphone that I use does not support online applications such as zoom meet and google meet. |
| Subject 3  | During the pandemic I was unable to share the maximum time online because of homework to do; The cellphone I use is an old cellphone, so it doesn't support doing assignments or attaching material from the lecturer.           |
| Subject 4  | I find it difficult to send assignments if in my village the PLN lights go out then the internet network is also dead.   |

### 3.2. Student Adaptation Difficulties

It can be seen from the results of interviews that have been conducted related to student adaptation difficulties, it was obtained that subject 1 revealed that: (1) not being familiar with online learning which resulted in difficulties in understanding lecture material where students preferred face-to-face learning in the room; (2) not accustomed to studying alone for a long time, where students really need guidance from lecturers or friends regarding learning. Subjec 2 revealed: (1) They prefer and get used to direct learning in the room because students are very happy to be able to gather with their friends; (2) difficulty understanding the symbols in the course because there are still students whose school background is not from high school but from MA. Subjec 3 revealed: (1) not accustomed to studying material from files or the internet because students at home / boarding rarely read material from internet sources; (2) it is difficult to divide the time between studying and working at home because of the large number of jobs that must be helped while at home and some also take advantage of the pandemic to find work to help the family economy. Subjec 4 revealed that: (1) really missed face-to-face learning in the room because with Darig learning students felt bored and tired of the assignments given by the lecturers; (2) not accustomed to self-study, they prefer to study in groups so that in general students expect the Covid-19 pandemic to pass quickly.

TABLE 2: Interview Results About Student Adaptation Concerns.

| Subject    | Interview Results   |
|------------|---|
| Subjects 1 | I am very unfamiliar with online learning, so I feel confused about the course material myself; I am not used to studying on my own for a long time online. I prefer to study with the help of a lecturer or friend.  |
| Subject 2  | I prefer and get used to face-to-face learning in a room; I had a very hard time understanding the symbols in the course because my basik was not from high school but from MA.   |
| Subject 3  | I am not used to studying or learning material from files or the internet, so I have difficulty following the next lesson; I find it difficult to divide my time between studying and working at home because at home I have a lot of work to help and I also look after my little adx when my parents go to work |
| Subject 4  | Honestly, my mother really misses face-to-face learning in the room; I am not used to studying on my own so naturally I am lazy to study because I feel bored with the online learning model so I hope that the Covid-19 pandemic will pass quickly.  |

TABLE 3: Interview Results About Student Internal Difficulties.

| Subject    | Interview Results  |
|------------|--|
| Subjects 1 | I do not have a deep understanding of the prerequisites of the course so I miss the following materials; I still need direct lecturer guidance regarding the material because it is very difficult for me to understand the material without the help of other people, especially the assistance of the lecturers.   |
| Subject 2  | I still need a direct explanation in understanding the material because I did not have sufficient basic math beforehand; I don't know all the uses of symbols in the material so I expect face-to-face learning so that it can be directly asked by the lecturer.  |
| Subject 3  | My knowledge regarding mathematics is still low so I still need guidance and direction from the lecturer, so I always have difficulty solving problems in the material; I still need a lot of problem examples so that the material can be understood where the examples must be the same as the questions given so that I can easily solve the problems.  |
| Subject 4  | I find it difficult to understand the discussion of material through files sent toonline <i>Google Classroom</i> because previously I rarely studied at home; My lack of experience and readiness in learning online is because this is my first time taking part in learning via internet applications; Every time I understand math material I still need help from others because I have missed a lot of material because of my difficulty in digesting the material that has been distributed. |

### 3.3. Internal Student Difficulties

It can be noted that from the results of the interviews regarding internal student difficulties related to the use of online learning models, namely Subject 1 revealed that: (1) did not have a deep understanding of the prerequisites of the course, this was because not all students graduated from high school background; (2) still need direct lecturer guidance regarding the material, this is because students are used to having lecturers or group friends where to ask questions when the learning takes place. Subject 2 revealed: (1) still need direct explanation in understanding the material, this is because there are still many students whose basic mathematics is very little so they still need in-depth guidance from lecturers; (2) do not yet know all the uses of symbols in the material, this is because previous students in participating in learning did not participate actively. Subjec 3 revealed: (1) knowledge related to mathematics is still low so it still needs guidance and direction from lecturers; (2) still need a lot of problem examples so that the material can be understood. Subjec 4 revealed: (1) it was difficult to understand the discussion of material via files sent online on its own because this was because previously it was rare to read the material via files; (2) lack of experience and readiness to learn online; (3) every understanding of mathematics material still needs help from others.

## 4. Conclusions

Based on the results of the above discussion, it can be explained that the difficulties faced by first semester students taking Differential Calculus courses in the Mathematics Education study program of the Muhammadiyah University of Tapanuli Selatan, Academic Year 2020/2021, are: (1) Technical difficulties, including internet signal difficulties, limitations internet quota and inadequate supporting devices, (2) difficulties in student adaptation, which include unfavorable home conditions, not being used to studying online, more online assignments, job demands and difficulty managing time, (3) Student Internal Difficulties, which include abilities basic mathematics, previous mastery of material, lack of experience and readiness in online learning. The suggestions based on the difficulties found are (1) technical difficulties related to internet networks and internet quota by registering student cellphone numbers in order to get free quota assistance from the Ministry of Education and Culture, (2) student adaptation difficulties are resolved with an approach from the lecturer in delivering learning by creating an atmosphere which makes students feel comfortable while participating in online learning, not just providing materials and assignments. (3) related to students' internal difficulties, lecturers must guide students more by digging deeper into the prerequisites of each material. The delivery of material must be more diverse with a variety of online existing not only relying on PPT or PDF.

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