

# Identification of Prospective Teachers' Perceptions of Didactic Obstacles in Online Mathematics Learning

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# Identification of Prospective Teachers' Perceptions of Didactic Obstacles in Online Mathematics Learning

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## Abstract

The spread of the corona virus has caused learning that was previously carried out offline to be online. This causes didactic obstacles in learning when implementing online learning. Research related to didactic obstacles has been widely studied from the perceptions of teachers and students. The purpose of this study is to investigate the didactic obstacles that arise in terms of the perceptions of prospective teachers in online mathematics learning. The method used in this research is descriptive qualitative. The research subjects were 18 prospective teachers who were divided into 6 groups with each group consisting of three prospective teachers. The research locations were taken in two locations, namely East Java and East Nusa Tenggara (NTT). The instruments used include: assignment sheets, field notes, field observations, and sheets for interviews with mathematics teachers in junior high schools. Triangulation technique is done by comparing the data from observations, interview recordings, and descriptions of answers. The research findings show that the biggest didactic obstacle occurs in the giving of too many assignments by the teacher to students. Giving too many assignments makes the quality of student work low. Further research is recommended to provide follow-up in the form of learning designs that provide options for students to complete assignments and according to learning objectives.

**Keywords:** didactic obstacles; online; prospective teachers; mathematics learning

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## Introduction

The spread of COVID-19 led to face-to-face online. Learning that was previously done offline becomes online from home (Purwadi et al., 2021). This causes learning systems to be disrupted in all countries (Ferretti et al., 2021). The online learning system must be faced by all components of education, namely: schools, teachers, students, and parents.

The implementation of online learning causes didactic obstacles in learning (Van & Thi, 2021). Didactic obstacles are part of cognitive obstacles (Brousseau, 1997; Murniasih et al., 2020). Didactic obstacles are caused by teaching in schools (Nurjanah & Juliana, 2020; Mustika et al., 2018). Didactic obstacles are not only experienced by low-ability students but also by high-ability students due to the difficulty of teachers transmitting knowledge online (Alves et al., 2021).

The results showed that in online learning, teachers experienced fewer didactic obstacles compared to students (Alolaywi, 2021). However, for poor countries teachers experience the same didactic obstacles as students (Poroçani & Zaçellari, 2022). This shows that the availability of digital devices is indispensable in overcoming didactic obstacles in online learning.

Several researchers have studied didactic obstacles in terms of teacher and student perceptions. The results of research by Novainda & Turmudi, (2021) show that the teacher's mistakes in teaching concepts, lack of prerequisite material, the material is not associated with several different contexts, and the teaching material is not arranged properly causing didactic obstacles. Furthermore, according to Nurjanah & Juliana, (2020) didactic obstacles are caused, among others, by the lack of emphasis on concepts, inappropriate material sequences, and lack of use of learning media. Didactic obstacles are caused by teachers who are not able to manage time, do not provide student worksheets, lack of variety of problems, and do not implement all the steps in the lesson plan (Fuadiah et al., 2019; Mustika et al., 2018; Sukirno & Ramadhani, 2016).

Research in several countries also examines didactic obstacles to online learning based on student and teacher perceptions. The results of research in Indonesia show obstacles to online learning, including: network limitations, internet quotas, technology and the use of online applications (El Khuluqo et al., 2021; Tauhidah et al., 2021; Susanto et al., 2021). The results of research in America show that the lack of parental support in online learning causes didactic obstacles (Borup et al., 2019). Research in Arabic shows that the lack of face-to-face contact causes didactic obstacles (Alshumaimeri & Alhumud, 2021). The low ability to use technology and internet facilities is a didactic obstacle for developing countries in South Africa (Queiros & de Villiers, 2016).

Online learning is not something that is easy without adequate preparation. Even though the use of technology has been designed as well as possible, it turns out that there are still didactic obstacles that arise in online learning. The results of previous studies based on the perceptions of teachers and students have revealed this. How the didactic obstacles seen from the perception of prospective teachers in online learning? This study aims to describe the didactic obstacles in terms of the perceptions of prospective teachers regarding online learning.

This research is important so that similar obstacles can be minimized and know strategies to overcome them.

## 1 Methods

The method used in this research is descriptive qualitative. Through descriptive qualitative research, researchers want to get a comprehensive description of didactic obstacles (Apsari, et al., 2020). The research subjects were 18 prospective teachers. Furthermore, 18 prospective teachers were divided into 6 groups with each group consisting of 3 people. Each group is given a task to identify didactic obstacles that occur during online mathematics learning in junior high school. The locations for prospective teachers to get data are junior high schools in East Java and NTT. The reason for choosing this area is because the prospective teachers who attend lectures are in East Java and NTT. The number of prospective teachers who attended lectures is 18 people, with details of 9 people coming from East Java and 9 people from NTT. The research flow can be seen in Figure 1.

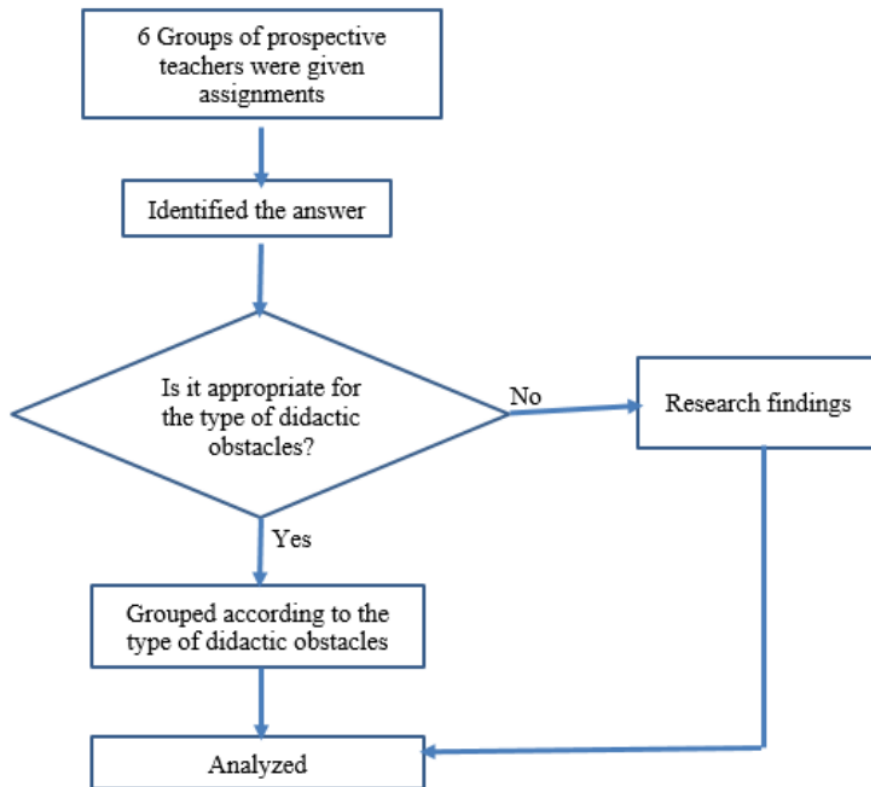


Figure 1. Research Flow

The instruments used in the study were: assignment sheets, observation sheets, field notes, and interview sheets with junior high school mathematics teachers. Researchers assign tasks to prospective teachers to identify didactic obstacles experienced in online mathematics learning in junior high schools. Prospective teachers then make plans and activities in doing assignments. Prospective teachers according to groups conducted observations of students and interviews with mathematics teachers in junior high schools. Observation sheets are used to record interesting things when found in the field. Observations were made according to the teaching hours of the mathematics teacher at the school. Interviews were recorded and conducted online via telephone, whatsapp or zoom. Field notes are used to record interesting things during the research (Murniasih et al., 2020). Furthermore, to obtain data accurately, triangulation techniques were carried out by comparing data on observation sheets, descriptions of answers, and interview recordings (Alfansyur & Muryani, 2020).

Indicators of didactic obstacles are determined based on the results of previous studies as shown in Table 1.

**Table 1.** Types of didactic obstacles (adaptation of (El Khuluqo et al., 2021; Novainda & Turmudi, 2021; Nurjanah & Juliana, 2020; Fuadiah et al., 2019; Borup et al., 2019; Alshumaimeri & Alhumud, 2021; Queiros & de Villiers, 2016))

| Types of Didactic Obstacles | Description  |
|-----------------------------|--|
| DO1                         | Not using the lesson plan as a reference (unable to manage time, not providing worksheets, not carrying out all the steps in the lesson plan)                            |
| DO2                         | The lack of prerequisite material, the material is not related to several different contexts, the lack of variety of problems and the order of the material is not right |
| DO3                         | Teacher mistakes teaching concepts   |
| DO4                         | Lack of use of learning media  |
| DO5                         | Network limitations, and internet quota  |
| DO6                         | Lack of mastery of the use of technology   |
| DO7                         | Lack of parental support   |
| DO8                         | Lack of face to face   |

Note: DO = Didactical Obstacles

Didactic obstacles were analyzed and identified based on the results of completing the tasks of prospective teachers. Furthermore, the results of the completion of the task of prospective teachers are grouped based on indicators of didactic obstacles and research findings.

## Results

Researchers analyzed the results of the completion of the task of 6 groups of prospective teachers. Prospective teachers collect assignments in the form of answer descriptions equipped with observation sheets and recorded interviews with junior high school mathematics teachers. Furthermore, the researchers grouped the obstacles that occurred based on the indicators of

previous studies and analyzed. Meanwhile, didactic obstacles that are not included in the indicators specified are included in the category of findings and analyzed. The researcher also performed technical triangulation by matching answers based on answer descriptions, observation sheets, and interview recordings. Table 2. below shows the didactic obstacles faced by prospective teachers during online mathematics learning in junior high schools.

**Table 2.** Didactic obstacles based on the results of prospective teacher assignments on online mathematics learning

| Group | Research Location | Types of Didactic Obstacles | Research Findings   |
|-------|-------------------|-----------------------------|---|
| G1    | East Java         | DO4                         | The teacher gives a lot of assignments to students  |
| G2    | NTT               | DO3, DO5, DO6, DO8          | Not all students have cellphones and computers<br>The teacher gives too many assignments                |
| G3    | NTT               | DO1, DO3, DO5.              | Not all students listen to the lesson diligently  |
| G4    | NTT               | DO7                         | Not all students have cellphone facilities.<br>Teachers have difficulty developing student competencies |
| G5    | East Java         | DO2, DO7                    | Difficult to condition students for discipline  |
| G6    | East Java         | DO2, DO7, DO8               | Difficulty correcting group assignments.<br>Too many assignments.                                       |

*Note: G = Group*

<sup>13</sup> Based on Table 2. it can be seen the division of groups, research locations, types of didactic obstacles and research findings. Research in East Java was conducted by G1, G5, and G6. Meanwhile, research in NTT was carried out by G2, G3, and G4.

## Discussion

Group1 (G1) describes the didactic obstacles that were obtained during the observation, including the lack of use of learning media (DO4). This result is in accordance with the research of Nurjanah & Juliana, (2020) which said that teachers should use various learning media so that students can imagine the material being taught. In addition, G1 also found another didactic obstacle, namely giving teachers a lot of assignments during online learning. Assignment is widely considered effective for online learning (Hosseini & Mehraein, 2022). But in reality, most junior high school students do not understand the assignments given online so they are not able to complete the tasks given by the teacher properly (Sousa, 2021). Students are less responsive when asked to do assignments. The tasks given by the teacher are only partially done by students independently, the rest is the result of the work of parents (Retanal et al., 2021).

The didactic obstacles found by Group2 (G2) are DO3, DO5, DO6 and DO8 types. Teachers have difficulty teaching concepts only through whatsapp, googlemeet, and learning videos, especially for math lessons. This result is in line with the research of Novainda & Turmudi, (2021) who said that teachers have difficulty teaching concepts using online teaching media. In addition, network limitations and internet quotas are obstacles for students in remote areas. This result is supported by previous research in Indonesia which said network and quota limitations caused didactic obstacles (El Khuluqo et al., 2021; Tauhidah et al., 2021; Susanto et al., 2021). Some junior high school students also do not master technology so it takes a long time to be able to join in learning. These results are in accordance with research in South Africa (Queiros & de Villiers, 2016). During the pandemic, face-to-face meetings are only held twice a week for 3 hours. This limited time causes students to have difficulty understanding mathematical material in a short time. These results are reinforced by research in Arabic (Alshumaimeri & Alhumud, 2021). The research findings show that some students do not have mobile phones and computers. The government has provided internet quota assistance, but the absence of computers and mobile phones has caused its own obstacles for students. The teacher must think of a solution to this problem, among others, by studying in groups with students who live close by and have computers and mobile phones. In addition, the teacher also prefers to give a lot of assignments, this causes students to be overwhelmed in completing besides not really understanding the material given briefly.

The didactic obstacles that occur based on the results of Group3 (G3) assignments include DO1, DO3, and DO5 types. The learning steps taken by the teacher are not in accordance with the lesson plan so that students have difficulty understanding the material in a short time. Teachers who are not able to manage time according to lesson plans cause didactic obstacles (Fuadiah et al., 2019; Mustika et al., 2018; Sukirno & Ramadhani, 2016). Online learning on mathematics material causes students to be less able to understand concepts. This is reinforced according to the results of research by Novainda & Turmudi, (2021) and Nurjanah & Juliana, (2020). In addition, internet limitations and quotas also cause online learning obstacles (Tauhidah et al., 2021). The research findings obtained by G3 are that students do not listen diligently because students feel bored with online learning. Teachers must be creative in making learning media to overcome student boredom (Murniasih, 2018). Even though learning has been done through google classroom, zoom meeting or google meeting, students do not fully understand math material.

The results of Group4 (G4)'s work show that the lack of parental support in caring for their children when school causes didactic obstacles in learning (DO7). Parents have been busy working to earn a living so they pay less attention to their children when learning online from home. These results are in accordance with research in America which says the lack of parental support causes obstacles during online learning (Borup et al., 2019). In addition, some parents in Indonesia bring cellphones to work so children have to wait for their parents to come home so they can do the assignments given by the teacher (Khairat & Junaidi, 2022). The research findings show that teachers have difficulty developing student competencies because teachers are less able to measure students' abilities during online learning. Some students cannot understand the material if they are not face to face. In addition, teachers also cannot recognize

the character of students directly during online learning. Teachers need a lot of time to get to know students' characters, while online learning only takes a little time.

The results of Group5 (G5) work show didactic obstacles of DO2 and DO7 types. Lesson plans are only partially realized through online learning. The material delivered depends on the ability of students so that not all material is taught. The new curriculum during the pandemic allowed some materials to be omitted. This result is supported by the opinion of Novainda & Turmudi, (2021) and Nurjanah & Juliana, (2020). In addition, the lack of parental support due to busy work is also a separate obstacle (Wafiroh & Harun, 2022; Borup et al., 2019). Group5 found another result in the study, namely that teachers had difficulty in conditioning students to be disciplined and serious during online learning. It is important for teachers to make interesting and fun media so that students are disciplined and serious about learning (Murniasih et al., 2021). Attractive animated videos can visualize mathematical concepts so that students better understand the material being taught.

The results of the analysis of the work of Group 6 (G6) found that the didactic obstacles encountered during online learning were DO2, DO7, and DO8 types. The lack of variety of problems is due to shorter online learning times or lack of face-to-face contact (Mustika et al., 2018; Alshumaimeri & Alhumud, 2021). In addition, parental support is also lacking because many parents work (Wafiroh & Harun, 2022; Borup et al., 2019). The results found by G6 include when the teacher applies group assignments, it is difficult to measure students' understanding. This is because only diligent students work on group assignments and the others only answer questions. Meanwhile, students do not want to work in groups because students feel bored and do not understand the material online. Too many assignments also become a didactic obstacle in itself when students have to complete without a teacher beside them. Especially if the task is difficult and at home there are no parents who can assist in the process. Many tasks make children stressed and lazy to do. Student assignments should not be measured only by quantity but also by the quality of their work (Hobbs et al., 2013).

## **8** **Conclusion**

Based on the results of the study, it was found that the three biggest didactic obstacles were: a) the teacher gave too many assignments to students, b) the lack of parental support during online learning, and c) not all students had cellphones and computers. Further research is suggested to provide follow-up in the form of appropriate learning designs for students. Students can be given group assignments where each group member does a task according to their expertise, including: those who are good at designing pictures are given the task of making pictures, and those who are good at making videos are given the task of making videos. With a learning design like this, it is expected that all group members are active, and learn from each other together.



## Conflicts of Interest

I declare there is no conflict of interest in the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely by the authors.

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