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Analysis of the Challenges Faced by Mathematics Education Students in Distance Learning During the Covid-19 Pandemic

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ABSTRACT

Mathematics learning is one of the areas directly affected by the Covid-19 pandemic. The Covid-19 pandemic has resulted in all teaching and learning activities being carried out online, students and lecturers are forced to adapt to the new situation. The aim of this research is to describe the difficulties faced by students majoring in Mathematics Education in online learning, especially in Algebraic Structure courses during the Covid-19 pandemic. This type of research is qualitative research, the subjects of this research are 3rd semester students of Mathematics Education at Alauddin State Islamic University (UIN) Makassar who are taking the Algebraic Structure course. The instruments used in this research were questionnaires, interviews and documentation. The data collection technique was carried out by giving questionnaires in the form of questionnaires and interviews to subjects to examine in more depth the difficulties of mathematics students during online learning during the Covid-19 pandemic. The results of the analysis show that students face several difficulties which are classified into technical difficulties, adaptation difficulties and teacher unpreparedness. To overcome these difficulties, it is necessary to develop learning strategies that are able to support the acceleration of student adaptation in online learning. Apart from that, teachers (lecturers) must also improve their ability to master technology in developing interactive learning media that can be used online and lecturers are also expected to be able to develop varied learning models so that students do not feel bored while studying.

Keywords: *Mathematics, Online Learning, Student Difficulties*

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INTRODUCTION

Based on the Circular Letter from the Ministry of Education and Culture, Directorate General of Higher Education Number 1 of 2020 concerning the Prevention of the Spread of Covid-19 in Higher Education Institutions (Majumdar dkk., 2020), teaching activities are conducted through distance learning methods, and students are required to study from home or participate in online lectures (Elen & Avuçlu, 2021). Online learning refers to education carried out using technology through virtual applications and utilizing the internet (Joosten & Cusatis, 2020).

Online lectures, often referred to as e-learning, involve the delivery of learning materials that are not limited by time or location, using various technologies in an open, flexible, and distributed learning environment (Chatterjee & Correia, 2020). In online learning, it is essential to focus on the competencies being taught, rather than merely assigning materials and tasks through social media applications (Fekri dkk., 2021). Educators must understand that learning is a complex process, involving various aspects, including pedagogical, psychological, and didactic elements (Dargan dkk., 2020). Therefore, online learning must be planned, implemented, and evaluated in the same way as face-to-face learning (Zhang dkk., 2021).

The learning process for mathematics education students has also been conducted through distance learning methods (Du dkk., 2019). Several challenges have been raised by mathematics education students during the distance learning process, which have led to a decline in their interest, understanding, and academic performance (Samaniego dkk., 2020).

One of the courses that mathematics education students have reported difficulties with during distance learning is the Algebra Structure course (Sun dkk., 2020). Algebra Structure I is a core course in pure mathematics in the curriculum of the Mathematics Education Study Program at UIN Alauddin Makassar (Muthuprasad dkk., 2021). The characteristic of algebra structure is that it follows a strict and sequential deductive-axiomatic structure, rich in abstract concepts in both definitions and theorems (García-Lucas dkk., 2023).

Based on the description above, the author is interested in conducting a study on the difficulties experienced by mathematics education students during online learning in the Covid-19 era.

RESEARCH METHODOLOGY

This research is qualitative in nature, with the subjects being third-semester students of Mathematics Education at the State Islamic University (UIN) Alauddin Makassar who are enrolled in the Algebra Structure course (Caraballo & Lyiscott, 2020). The instruments used in this study include questionnaires, interviews, and documentation (Wang dkk., 2020). The data collection technique involved administering questionnaires and conducting interviews with the subjects to gain deeper insights into the difficulties faced by mathematics students during online learning amid the Covid-19 pandemic (Kidd & Murray, 2020).

RESULT AND DISCUSSION

Mathematics learning, such as in the Algebra Structure course, which requires a high level of focus and precision, has caused many Mathematics Education students taking the Algebra Structure course to struggle in understanding the material delivered by the course instructor (Russell dkk., 2020).

Students' Level of Understanding of the Material in Online Learning

The results of the survey from the questionnaire given to third-semester Mathematics Education students from the 2020 cohort can be seen in the following diagram (Maqableh & Alia, 2021):

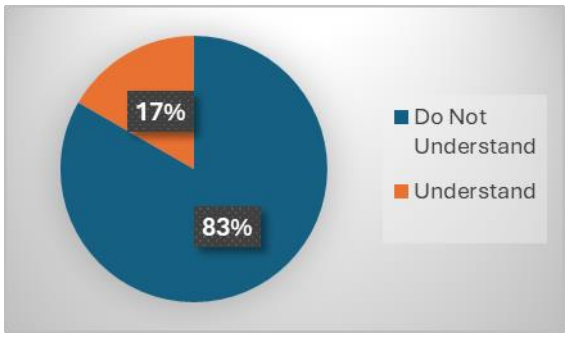

Figure 1. Mathematics Education Students' Understanding Level in Algebra Structure

From the data above, it can be seen that 83% of Mathematics Education students did not understand the material during distance learning for the Algebra Structure course, while only 17% of students felt they understood the material taught through online learning during the pandemic (Bodine dkk., 2020).

Based on interviews conducted with the research subjects, they reported difficulty in understanding the rather complex material given the limitations they faced during online learning (Kumagai dkk., 2022). One of the topics they found particularly challenging, which required precision and focus, was Isomorphism (Bao dkk., 2023).

In this topic, they learn a formal method to determine whether two groups, defined in different forms, are essentially the "same" (Canfora dkk., 2023). In such cases, it is said that there exists an isomorphism between the two groups (Gardella & Thiel, 2022). This notation was first introduced by Galois about 1.5 centuries ago (Dostál & Spurný, 2020). The term isomorphism comes from the Greek words *isos*, meaning "same," and *morphe*, meaning "form." R. Allenby gives a vivid description of someone studying algebra as "a person who cannot distinguish between isomorphic systems (Zach dkk., 2021)."

Challenges Identified

This study found that Mathematics Education students experienced several challenges during the teaching and learning process for the Algebra Structure course during the Covid-19 pandemic (Carolus & Staic, 2022).

The results of the survey from the questionnaire distributed to the research subjects can be seen in the following diagram:

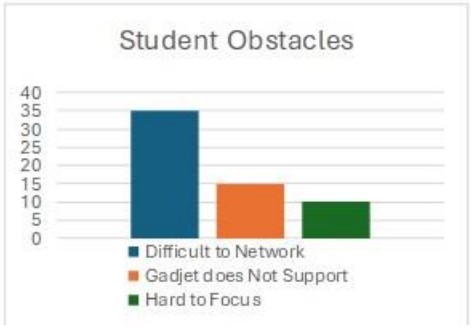

Figure 2. Results of the survey from the questionnaire

From the data above, it can be seen that the biggest challenge faced by the 2020 cohort of Mathematics Education students was poor network connectivity, experienced by 35 students (Shim & Lee, 2020). Additionally, 15 students faced issues with unsupported devices, and 10 students reported difficulties with maintaining focus (Shao dkk., 2020).

Interviews conducted with students who experienced network issues revealed that these problems arose during the Covid-19 pandemic when online learning was conducted while they were in their respective hometowns. As a result, they faced limited network access, particularly in remote rural areas where network coverage is still uneven (Sibley dkk., 2020).

Another interview was conducted with students who faced challenges with unsupported devices (Liegghio & Caragata, 2021). The main issue was that their devices, such as those with limited RAM, were unable to download or run the applications required for distance learning (Schneider & Council, 2021). The fact that different lecturers used various platforms for teaching, such as Zoom, Google Meet, Google Classroom, and Lentera (the platform used at UIN Alauddin Makassar), meant that students had to download several applications, further straining their device capabilities (Qin dkk., 2022).

Interviews were also conducted with students who reported difficulties focusing during lessons (Das dkk., 2020). These students explained that they were often disturbed by other family members, such as siblings or parents, during the learning sessions, which prevented them from focusing on the material (Ye dkk., 2020). As a result, they were unable to understand the lessons, leading to a decline in their academic performance (Taghrir dkk., 2020).

Several solutions have been attempted by the course lecturers to address the challenges faced by students (Choi dkk., 2020). These include adopting platforms that are used by other lecturers, developing interactive teaching materials and resources tailored to distance learning, and modifying teaching methods to be more engaging so that students do not become bored during the learning process (Hayat dkk., 2020).

CONCLUSION

Based on the research conducted, it can be concluded that there are several challenges that hinder students in the online learning process, such as network issues, lack of focus, and unsupported devices.

The recommendation that the author can provide is to conduct further studies on the effectiveness of using teaching materials or interactive learning media to improve the quality of online learning, especially for Mathematics Education students.

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