



**ANALYSIS OF STUDENT LEARNING DIFFICULTIES REVIEWED  
FROM THE ASPECT OF COGNITIVE PROCESSES**

**Nurul<sup>1</sup>, Wendi Kusriandi<sup>2\*</sup>, Neneng Aminah<sup>3</sup>**

<sup>1,2,3</sup> Universitas Swadaya Gunung Jati, Cirebon, Indonesia

\*Corresponding author: [wendikusriandi@ugj.ac.id](mailto:wendikusriandi@ugj.ac.id)

**Abstract**

Learning difficulties in mathematics can be a significant obstacle in a student's academic achievement and can affect their self-confidence in terms of their mathematical abilities. This phenomenon requires a deep understanding of the cognitive processes involved in mathematics learning. By understanding the cognitive aspects underlying mathematics learning difficulties, we can identify effective intervention strategies to help students overcome their difficulties. This research aims to explore the analysis of students' mathematics learning difficulties by considering aspects of the cognitive processes involved. The cognitive process here refers to the assessment preparation guide which consists of connecting with previous knowledge, making connections in the text, making inferences, vocabulary, summarizing the text, mathematical thinking, multimodal literacy, and metacognition. This type of research is descriptive qualitative research. Namely research that is described through writing and words. The data collection technique in this research was a diagnostic test on Opportunity material in class XII MIPA 2, totaling 34 students. Based on research results, most students still do not have sufficient ability to use previous knowledge in understanding a text. Strengthening material concepts and skills is highly prioritized in learning, especially in linking the relationship between existing knowledge and text content, and strategies are needed to apply this knowledge.

**Keywords:** *Learning Difficulties, Cognitive Processes*

**INTRODUCTION**

Learning aims to help students achieve predetermined learning outcomes, including cognitive abilities in mathematics subjects. Unfortunately, cognitive mathematics learning results show that students' level of understanding is still lacking (Anditiasari, 2020). This lack of understanding can be influenced by internal and external factors. Although both factors play a role, the cognitive aspect has greater dominance in student learning achievement. Mathematics is often a challenging subject for most students at various levels of education. Learning difficulties in mathematics can be a significant obstacle in a student's academic achievement and can affect their self-confidence in terms of their mathematical abilities. This phenomenon requires a deep understanding of the cognitive processes involved in mathematics learning. By understanding the cognitive aspects

underlying mathematics learning difficulties, we can identify effective intervention strategies to help students overcome their difficulties. Students' less than optimal success in achieving learning outcomes is possible because there are learning difficulties within students. Students who experience learning difficulties tend to experience difficulties in solving problems both in the classroom and in life. Regarding the learning process, it is possible that there are factors both in terms of cognitive, emotional and student social environments that trigger difficulties in the learning process. Inaccuracy in providing learning approaches or strategies to students is one of the things that triggers students to experience learning difficulties (Febriyani & Hasni Kurnia, 2019). In solving mathematical problems, each person has a different way and style of thinking because not everyone has the same thinking ability.

This research aims to explore the analysis of students' mathematics learning difficulties by considering aspects of the cognitive processes involved. The cognitive process here refers to the assessment preparation guide which consists of connecting with previous knowledge, making connections in the text, making inferences, vocabulary, summarizing the text, mathematical thinking, multimodal literacy, and metacognition. Through this approach, we can open new insights into the nature of mathematics learning difficulties and create more effective learning strategies. Based on the results of researchers' observations at one of the public high schools in Cirebon City and based on the descriptions above, the aim of this research is to describe the location and factors of mathematical difficulties experienced by students in solving mathematical problems in class. In this way, we can create a supportive learning environment for all students and provide teachers with a better view of the difficulties experienced by students.

## **LITERATURE REVIEW**

### **Difficulty learning**

According to the National Institute of Health, USA, learning difficulties are learning obstacles/disorders in children which are characterized by a significant gap between the level of intelligence and academic abilities that should be achieved. Learning difficulties or learning disabilities, also known as learning disorders, are disorders that make it difficult for individuals to carry out learning activities effectively (Fatah et al., 2021). Learning difficulties may be caused by disorders in the central nervous system of the brain which can cause developmental disorders such as disorders of speech, reading, writing, comprehension and numeracy (Febriyani & Hasni Kurnia, 2019). The difficulties to be monitored are difficulties that occur in the learning process, namely difficulties in the subject matter. According to Silverius (Tes Ani Rusilowati & Rusilowati, 2015), This process cannot be observed, but can be known or inferred through student answers or test questions. To be able to identify students' learning difficulties correctly, a test is needed. Formative or summative tests can be used as initial identification, namely determining what material students find difficult. Next, where students' difficulties lie identified in more depth using diagnostic tests.

Mathematical abilities that are still low are also faced by students in the learning evaluation process which the students still tend to have difficulty in translating questions using conventional evaluation tools, so the results obtained cannot meet learning objectives in general (Wahyuni et al., 2020). A teacher who has good knowledge and appropriate way of teaching will help students to easily build their understanding of the material, which is presented, this ability becomes a requirement for a teacher, especially for math teachers who are required to explain the understanding of an abstract material to be able to absorb easily by students (Aminah & Wahyuni, 2019).

### **Cognitive Processes**

In cognitive development, this period has four main stages. The stages of cognitive development show differences in levels of cognitive function and form, there are children who experience cognitive progress at the same stages, but there are also children who are not at a regular stage of development. These developmental differences are caused by factors that speed up and slow down cognitive development and environmental influences (Ujang Khiyarusoleh, 2016). The cognitive level shows the thought processes required or required to be able to solve problems or questions. Cognitive processes in reading literacy and mathematics-numeracy literacy are divided into three levels. In reading literacy, these levels are finding information, interpretation and integration, as well as evaluation and reflection. In mathematics-numeracy literacy, the three levels are knowing (knowledge and understanding), applying (application), and reasoning (reasoning). The cognitive process here is viewed from the guidelines for preparing literacy and numeracy assessments. As we know, literacy and numeracy skills are important abilities for students to have. Based on data obtained from the results of the Program for International Student Assessment (PISA) survey conducted by the Organization for Economic Cooperation and Development (OECD) in 2022. Even though Indonesia's 2022 PISA results rose 5-6 places compared to 2018 in terms of various aspects, However, Indonesian students still get average scores in numeracy and literacy skills below the OECD average (International Study Center, n.d.). To provide a clearer picture of how the cognitive process works and to help identify students' strengths and weaknesses in the learning process. At the classroom level, teachers can also carry out diagnostic assessments. This assessment is not to be graded, but is used to help teachers choose the right strategies to help students' learning process in certain subjects. Cognitive assessments for learning are carried out at the beginning of the school year and can be repeated in the middle of the semester to record student learning progress (Wa Ode Arini Maut, 2022).

Cognitive ability is one of the domains that becomes the most important assessment in the learning process. So from that cognitive domain must get more attention from each teacher (Maharani et al., 2019). As a good educator, teachers are expected to have a deep knowledge and understanding of the material being taught. However, adequate knowledge is not sufficient to build students' understanding well without good preparation before teaching. Through good knowledge and good teaching methods will help students more easily build their understanding of the material presented by the teacher, especially for the



mathematics teacher who must be able to provide students with an understanding of the abstract material to be absorbed easily (Aminah & Wahyuni, 2018).

## METHOD

This type of research is descriptive qualitative research. Namely research that is described through writing and words. The data collection technique in this research was a diagnostic test on Opportunity material in class XII MIPA 2, totaling 34 students.

## RESULTS AND DISCUSSIONS

### Result

The diagnostic test or initial ability test used is related to Opportunity material, where the questions are prepared based on guidelines for compiling literacy assessments for cognitive processes. The following is a score guide that can be used by teachers to assess the cognitive processes of the questions that have been given. The signs (-, v, and +) indicate the student's ability category in the cognitive process.

**Table 1. Diagnostic Test Results**

Cognitive Processes	-	v	+
Linking with previous knowledge.	10	23	1
Create connections in the text.	7	24	3
Make inferences	1	18	15
Vocabulary	0	9	25
Summarizing text	0	0	34
Think mathematically	0	4	30
Multimodal literacy	2	15	17
Metacognition	7	20	7

The first row shows that 10 students have not been able to state previous knowledge that can be used to understand the text. Meanwhile, 23 students were able to mention previous knowledge but could not explain how they used that knowledge to understand the text. As many as 1 student already has the ability to use previous knowledge and is able to explain how he uses it to understand the text. These data show that most students make connections to previous knowledge but do not explain how that knowledge is used to understand the text.

The second row shows that 7 students have not been able to show the connection between ideas. Meanwhile, 24 students showed some of the ideas they linked less accurately or less relevantly. A total of 3 students already have the ability to show that some of the ideas

linked are accurate and relevant. This data shows that most students are able to make connections between texts, but students are less accurate or less relevant in doing so.

The third row shows that 1 student did not make an inference or the inference made was unrealistic. Meanwhile, 18 students made realistic inferences but did not mention supporting evidence. A total of 15 students were able to make realistic inferences and mentioned supporting evidence. This data shows that most students are able to make realistic inferences but cannot provide supporting evidence.

The fourth line shows that students are able to define vocabulary correctly. Meanwhile, 9 students were only able to define some of the vocabulary or only quoted from the text. A total of 25 students were able to define all the vocabulary and make paraphrases based on the definitions in the text. This data shows that the majority of students are able to compose all vocabulary using their own words and thoughts.

The fifth line shows that students are able to summarize the existing text. Students can differentiate between important and less important information. This data shows that all students can summarize text from the information provided.

The sixth line shows that students are able to think mathematically. Based on this data, 4 students can think mathematically but are incomplete in completing the answer. Meanwhile, 30 students were able to think mathematically by solving the questions given completely. This data shows that the majority of students are able to think mathematically and are able to solve the problems given.

The seventh row shows that 2 students only used 1 source, or the information was not converted to another mode. Meanwhile, 15 students have been able to create written and graphic forms but the information is incomplete. A total of 17 students were able to create modes in written and graphic form and the information provided was also complete. This data shows that the majority of students already have multimodal literacy skills.

The eighth row shows that 7 students could not explain their methods in understanding information. Meanwhile, 20 students were quite able to show how to understand the text even though it was incomplete. A total of 17 students were able to show how to understand the text completely. This data shows that the majority of students are quite capable of showing how to understand a text even though it is incomplete.

## **Discussion**

The most difficult cognitive process for students in this class is connecting with previous knowledge. Teachers can use this data to set learning goals, namely by practicing various strategies to activate previous knowledge. The difficulties experienced by students are related to each cognitive process, including:

- 1) In the cognitive process of vocabulary, students' difficulties are that students still quote from the text.
- 2) In the cognitive process of making connections in text, students' difficulties are that some of the ideas linked are less accurate or less relevant.

- 3) In the cognitive process of making inferences, students' difficulties are that students make realistic inferences but do not mention supporting evidence.
- 4) In the cognitive process of summarizing text, students have no difficulties. Students summarize some main ideas and provide detailed information.
- 5) In the cognitive process of using previous knowledge, students' difficulties are that students make connections with previous knowledge but do not explain how that knowledge is used to understand the text.
- 6) In the cognitive process of metacognition, the student's difficulty is that the student is quite able to show how to understand the text even though it is incomplete.
- 7) In the multimodal cognitive literacy process, students' difficulties are that students' responses are given in written and graphic form but the information is incomplete.
- 8) In the cognitive process of mathematical thinking, students' difficulties are that students are able to solve problems but are not complete.

## CONCLUSION

Most students still do not have sufficient ability to use previous knowledge in understanding a text. Teachers can set learning goals, namely by practicing various strategies to activate previous knowledge. Strengthening material concepts and skills is highly prioritized in learning, especially in linking the relationship between existing knowledge and text content, and strategies are needed to apply this knowledge.

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