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Analysis of Students' Critical Thinking Skills in Learning Mathematics as Seen in The Face of Mathematics Anxiety

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Abstract- The problems found in SMP Negeri 4 Majene are low critical thinking skills, excessive mathematical anxiety of students, students often feel heart palpitations and cold sweats. The purpose of this study is to analyze students' critical thinking skills in mathematics learning in terms of mathematical anxiety. The type of research used is descriptive qualitative research. The subjects of this study were 26 students of class VII. A of SMP Negeri 4 Majene consisting of 17 female students and 9 male students. Then, 9 subjects were selected who had high, medium, and low mathematical anxiety categories using purposive sampling techniques. The instruments used were a mathematical anxiety questionnaire, a test of students' critical thinking abilities, and interview guidelines. This study shows that students with low mathematical anxiety categories are better than students with medium and high mathematical anxiety categories. So, it can be concluded that students with low mathematical anxiety have higher critical thinking abilities than students with moderate levels of mathematical anxiety, and students with moderate levels of mathematical anxiety have higher critical thinking abilities than students with high levels of mathematical anxiety.

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1. Introduction

Low critical thinking skills can be caused by many factors, one of which is students' negative views of mathematics. according this happens because negative assumptions often occur, especially since mathematics is used as one of the national exam subjects in indonesia (Fauzi & Abidin, 2019; Fitri et al., 2023; Nofriyandi et al., 2024). Negative views can trigger decreased brain function, interpersonal difficulties and decreased cognitive brain power such as the to think, learn, and remember information. In addition, having a negative view in a person can also increase brain activity to



process emotions. This can cause emotional instability which can affect a person's concentration, memory, and ability to make plans. Xie & Liu (2023) revealed that negative views of mathematics are also negative perceptions from students that can cause feelings of fear, nervousness, and anxiety which will then cause students to have anxiety in studying mathematics or what is known as mathematics anxiety.

There are several factors that affect critical thinking skills, one of which is students' mathematical anxiety, mathematical anxiety, is defined by Aschraf and Moore as negative emotions in the form of fear, tension, and discomfort felt by some individuals in situations involving mathematics and can interfere with the performance of mathematical tasks (Carey et al., 2016; Guo & Liao, 2022; Namkung et al., 2019; Wahyudy et al., 2019). This is in line with the opinion of (Arisoy & Aybek, 2021; Hadi et al., 2020; Namkung et al., 2019; Pnevmatikos et al., 2023) who said that one of the factors that causes students' mathematical critical thinking skills to be low is the anxiety of students who think that mathematics is something scary among students. The anxiety experienced by students is one of the factors in achieving student learning achievement. The high or low anxiety of students leads to students' dislike or lack of interest in mathematics. Therefore, anxiety can reduce students' understanding of mathematics. Megreya & Al-Emadi (2023) stated that anxiety experienced by students in mathematics is often referred to as mathematical anxiety. Math anxiety is a feeling of fear, worry, or discomfort experienced when facing or studying mathematics. This condition can interfere with performance and motivation in learning mathematics, even causing someone to avoid the subject.

Schools that have implemented the Independent Curriculum. Based on the results of the researcher's initial interview in November 2023 with one of the mathematics teachers, information was obtained that students' critical thinking skills were still low. Students still have difficulty understanding sentences in questions and do not use the knowledge they already have in solving problems. The teacher also stated that student activity in mathematics learning in class is still lacking. Students are reluctant to ask the teacher when there is something they do not understand. This is because students are embarrassed or afraid to ask. Students prefer to be silent or ask their friends. However, there are students who have dared to ask the teacher directly. In addition, based on the results of interviews with several grade VII students, information was obtained that negative views of mathematics cause other research on critical thinking skills in terms of mathematical anxiety shows a negative relationship between mathematical anxiety and critical thinking skills. been delivered by the researcher, the researcher is interested in analyzing the critical thinking skills of grade VII students of SMPN 4 Majene in mathematics learning in terms of mathematical anxiety.

2. Methods

- 1) The steps for selecting research subjects were as follows: Administering a mathematical anxiety questionnaire. Analyzing the results of the student questionnaire. Grouping students into three levels of mathematical anxiety (high, medium, and low anxiety) based on the analysis results. Administering a critical thinking skills test. Analyzing the results of the critical thinking skills test. Grouping students into three levels of critical thinking skills (high, medium, and low). After completing these steps, each category of high, medium, and low mathematical anxiety was represented by 9 subjects, with 3 for each category of mathematical anxiety. The selected students were deemed capable of providing information about this research according to the teacher's recommendations.
- 2) Research Instruments Mathematical Anxiety Questionnaire (Satriyani, 2016). The questionnaire used in this study was a student mathematical anxiety questionnaire. The questionnaire was intended to measure students' mathematical anxiety. The questionnaire only contained positive (favorable) and negative (unfavorable) statements. The questionnaire used a Likert scale with four response alternatives: always, often, sometimes, and never. Test Sheet, the test sheet was used to measure students' critical mathematical thinking skills regarding the material taught. This test was a progress/learning achievement test. The type of test administered was subjective (descriptive) with two questions. In-Depth Interview, according to Murjani (2022), an interview is a conversation with a specific purpose. The conversation is conducted by two parties: the interviewer who asks questions and the interviewee who provides answers to those questions. The interview method used was a semi-structured interview.

- 3) Data Validity Testing Techniques by Murjani (2022). This study used two triangulation techniques: technical triangulation and source triangulation. a. Technical triangulation: To test data credibility, data was checked against the same source using different techniques. Different data collection methods included tests and in-depth interviews with the same source, namely grade VII students of SMPN 4 Majene. b. Source Triangulation: To test credibility, data was checked against data obtained from multiple sources. Source triangulation involves collecting the same data from different sources. The same data collection method included in-depth interviews with several students selected from three groups: high, medium, and low.
- 4) Data Analysis Techniques According to Sugiono (2014), the stages of data analysis are as follows: Data Condensation, which refers to the research process, selecting, simplifying, and transforming data that approximates the entirety of the field data obtained. The conclusion is that this data condensation process is obtained after the researcher conducts field research, which is then sorted to obtain the results needed by the researcher. Data Presentation, After the data is condensed, the next stage is the data presentation stage. This data presentation stage is carried out by compiling information regarding the analysis of the critical thinking skills of seventh-grade students at SMP Negeri 4 Majene in mathematics learning from the perspective of mathematical anxiety. Conclusion Drawing/Verification, this conclusion drawing stage, based on the data provided, is then compared and analyzed based on critical thinking ability test indicators and adjusted to the level of mathematical anxiety of the students, as indicated by the research subjects.

3. Results and Discussion

(a) Data Exposure of Subjects ST1 ST2 and ST3 Who Have High Levels of Mathematical Anxiety in Solving Critical Thinking Ability Questions for Students

In the focus indicator, subject ST1, in solving question number 1 has not been able to completely solve the question correctly. He only identified what information is known and could not identify what is being asked. In the reason indicator, subject ST1 is less able to complete the right concept or strategy, it is difficult to understand, he is confused, and does not understand how. In the overview indicator, he is less able to operate the right steps and does not recheck his answers. In the inference indicator, subject ST1 has not been able to conclude the final answer to the question given. In the focus indicator, subject ST1, in solving question number 2, was unable to write down the information that is known and asked in the question. In the reason indicator, subject ST1 is less able to complete the right concept or strategy, In the overview indicator, he has not been able to identify the steps to solve the problem correctly after the rechecking process. In the inference indicator, the subject did not write down the final conclusion of his answer. From the above explanation, the researcher concluded several things about the critical thinking ability in solving spatial problems possessed by subjects with high levels of anxiety. Subjects who have high mathematical anxiety can only achieve 2 indicators of critical thinking ability, namely the reason and overview indicators. And have not been able to achieve the other 2 indicators, namely focus and inference.

(b) Data Exposure of Subjects SS1 SS2 and SS3 Who Have a Moderate Level of Mathematical Anxiety in Solving Critical Thinking Ability Questions for Students.

In the focus indicator, Subject SS1 in solving question number 1 did not identify what information was known and asked in the question. The reason indicator, subject SS1 was able to identify concepts with arguments. Can provide reasons that support the solution strategy for the right solution to the problem. The overview indicator was able to identify the right steps to solve the problem after the re-examination process. The inference indicator was able to write down the conclusion from the given question. In the focus indicator, subject SS1, in solving question number 2 did not write down what information was known and asked in the question. The reason indicator, subject was able to identify the relationship between concepts and arguments. Can provide reasons that support the strategy to determine the right solution. The overview indicator, subject SS1 was able to identify the right steps to solve the problem

after going through the re-examination process. The inference indicator, SS1 was able to write down the final answer as a conclusion to the question. From the above explanation, the researcher concluded several things about students' critical thinking skills in solving spatial problems owned by subjects with moderate mathematical anxiety levels. Subjects with moderate mathematical anxiety can only achieve 3 indicators of students' critical thinking skills, namely the reason and overview and inference indicators. And have not been able to achieve 1 other indicator, namely focus.

(c) Data Exposure of Subjects SR1, SR2, and SR3 Who Have Low Levels of Mathematical Anxiety in Solving Critical Thinking Ability Questions for Students

In the focus indicator, subject SR1, in solving question number 1 did not write down the known information and subject SR1 only wrote down the information asked in the question correctly. Judging from the reason indicator, subject SR1 was able to create a solution strategy to determine the solution to the problem correctly. He was able to identify what concept was used in the question. The overview indicator of subject SR1 answered the question correctly. The inference indicator of subject SR1 was also able to write a conclusion that was in accordance with the question given. This shows that subject SR1 was able to fulfill all stages of the indicator of critical thinking skills correctly. In the focus indicator, subject SR1, in solving question number 2 was able to identify the information known and asked in the question correctly. He was able to understand the intent of the question given. The reason indicator of subject SR1 was able to identify the question well and was able to provide the right supporting information. The overview indicator of subject SR1 had answered the question well and correctly. He was also able to identify the stages of completion that he did. The inference indicator at the end of the answer also subject SR1 has written a conclusion that is in accordance with the question given. This shows that subject SR1 is able to solve the problem with the inference indicator correctly. From the above explanation, the researcher concluded several things about the critical thinking ability in solving spatial problems possessed by subjects with low levels of mathematical anxiety. Subjects who have low mathematical anxiety can achieve 4 indicators of students' critical thinking abilities, namely focus, reason, overview, and inference indicator.

4. Conclusion

Based on the results of the study on critical thinking skills in mathematics learning, viewed from the perspective of mathematical anxiety, it can be concluded that: The critical thinking skills of the three students who were the study subjects with high mathematical anxiety in solving geometric problems were only achieved in the reason and overview indicators out of four critical thinking skill indicators. The critical thinking skills of the three students who were the study subjects with moderate mathematical anxiety in solving geometric problems were only achieved in the reason, overview, and inference indicators out of four critical thinking skill indicators. The critical thinking skills of the three students who were the study subjects with low mathematical anxiety in solving geometric problems were achieved in all four critical thinking skill indicators: focus, reason, overview, and inference.

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