STUDENTS' MISCONCEPTIONS IN SOLVING PROBLEMS BASED ON THE NEWMAN PROCEDURE SEEN FROM MATHEMATICAL DISPOSITION

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Abstract
The aim of this research is to determine the factors and the influence of conceptual errors in solving problems in the form of story problems based on newman procedures in terms of mathematical disposition. This research uses a mixed method. The population of this study were seventh-grade students of MTs LAB Al Washliyah Medan with a total of 133 students. The sample was selected by purposive sampling, 30 students for quantitative data and 3 students for qualitative data. Qualitative data analysis methods involve the process of reducing, conveying and verifying data. Meanwhile, quantitative data uses hypothesis testing stages using factor analysis tests, simple linear regression and F tests. The results of qualitative data research show that conceptual errors in solving problems in the form of story problems based on Newman procedures are in line with the criteria for students' mathematical disposition. Quantitative data shows that there is only one factor formed and there is a significant influence between mathematical disposition and concept errors in solving story problems based on newman.

Keywords: Concept, Disposition, Newman, Solution to Problem.

INTRODUCTION

One of the most common mistakes students make when working on questions is not understanding the concept. Many mathematical problems are formed in story problems. When solving word problems, students must master the mathematical concepts taught at the previous level. Mistakes when solving mathematics problems can affect student learning outcomes.

Understanding concepts is very important in solving problems because if students only understand the solving procedure, they will only know how to solve the problem without understanding the concept (Komariyah et al., 2022). The concept itself is an idea that is built by looking at the characteristics of several similar examples (Andriani et al., 2019). According to another definition, a concept is an idea or result of someone's thinking based on their experience of something abstract (Tiara, 2022).

Students are said to have the ability to understand mathematical concepts if they can make planned solutions, using simple calculations, symbols and representation of ideas, including changing numbers into fractions in mathematics. Mistakes in understanding ideas and facts in the subject matter used are
called conceptual errors (Hidayat, 2019). Students can experience conceptual errors if they interpret
the question incorrectly and use the concept incorrectly.

Solving math problems requires understanding concepts. The process a person encounters concepts,
abilities, and methods to solve mathematical problems is known as problem solving (Amaliah et al.,
2021). Problem solving requires mastery of mature concepts, the ability to calculate and interpret good
language with the aim of ensuring that students do not make mistakes in solving mathematical
problems.

One method used to analyze the location of student errors is the Newman error analysis method.
Newman analysis are steps to find out and analyze how students solve problems in the form of story
questions (Visitasari et al., 2019). When students solve story problems, they have to go through
several steps in solving the problem (Ayuwirdayana, 2019) such as: (1) understanding the
representation; (2) understand the problem; (3) modifying the problem; (4) able to operate and (5)
write answers.

In reality, when solving problems, students have not gone through several steps in solving problems as
previously explained. This was obtained based on observation data carried out on students at MTs
LAB Al Washliyah in the form of a presentation test. The results of the observation of the description
test showed that where students made mistakes when solving story problems based on the Newman
procedure, there were 0.84% of students who did not comply with the Newman procedure and 0.16%
of students who could solve problems based on the Newman procedure. This is proven in the picture
of the observation test results submitted by several students, one of which can be seen in the results of
the S-1 students' answers.

![Figure 1](image)

**Figure 1. Undergraduate Student Test Results**

The results of undergraduate students' answers do not meet the indicators at all stages of Newman
errors. Students still face difficulties in transforming problems into mathematical models and still do
not understand the problems involved.

Apart from having to have problem solving abilities as a cognitive ability, students must also have
affective abilities which have a role in solving mathematical problems. The affective ability that
students must have is mathematical disposition. Mathematical disposition can be interpreted as a love
of mathematics. This is demonstrated by self-confidence, perseverance, enthusiasm for learning,
flexibility, sharing with others, facing problems persistently and a positive way of thinking and
attitude (Hendriana et al., 2021).
Mathematical disposition refers to the way students solve problems by increasing their self-confidence, determination, interest, and flexible thinking ability so that they can learn various problem-solving strategies (Nasution et al., 2020). The results of student observations showed that 83.33% of students felt confused and not confident in completing the test and 16.67% of students felt confident in completing the test questions and were confident when working on the questions.

Based on the description of the problem above, it is known that there are still many students who make conceptual errors in solving problems based on the Newman procedure in terms of students' mathematical disposition.

METHOD

This research used mixed methods with a concurrent mixed methods strategy whose population was class VII students at MTs LAB Al Washliyah Medan with a total of 133 students. The sample in this study used a purposive sampling technique. Data was obtained through tests, questionnaires, interviews and documentation. Qualitative data analysis uses 3 stages: (1) data reduction, (2) data submission, and (3) data verification. Quantitative data uses 2 stages: (1) classic assumption test, using normality and linearity tests and (2) hypothesis test, using factor analysis test, simple linear regression and F test. Quantitative data collection uses SPSS Windows version 20 software application tools.

RESULT AND DISCUSSION

Result

The research results were analyzed qualitatively and quantitatively. The qualitative data sample was 3 students and the quantitative data was 30 students. The qualitative data results are as follows: Master's students have a low mathematical disposition with a self-confident disposition indicator of 31.25%, flexible in researching mathematical concepts and looking for alternative paths at 25%, diligently completing mathematics assignments at 50%, showing interest, passion and the ability to excel. 35% and monitoring, reflecting on one's own performance and reasoning at 40%. The results of the analysis of conceptual errors by master's students can be seen in Figure 2.

Figure 2. Master's Student Test Results

Mistakes made by master's students are at the newman stage of process skills and final answers. This can be seen from the answer sheets of students who do not write answers. The results of discussions with students revealed that they did not understand how to operate adding fractions and were not confident in writing answers on the answer sheet that had been given so they did not fill in the answer
Errors at the newman stage of writing the final answer

**Figure 3. S-3 Student Test Results**

The mistake made by S-3 students from the results of the test answer sheet was an error at the last Newman stage, namely writing the final answer, the student did not write down the final answer he had obtained when solving the questions. The results of the interviews revealed that students were not used to writing conclusions or final answers even though they had completed the questions.

S-4 students have a high mathematical disposition with a disposition indicator of self-confidence of 81.25%, flexible in researching mathematical concepts and looking for alternative ways of 91.66%, diligently completing mathematics assignments of 75%, showing interest, interest and ability to achieve 80% and monitor, reflect on performance and own reasoning at 75%. The results of the analysis of S-4 students' conceptual errors can be seen in Figure 4.

**Figure 4. S-4 Student Test Results**

There are no mistakes made by S-4 students on their answer sheets. The results of the interviews showed that students had high self-confidence in writing answers on the answer sheet. This is because...
he feels confident in the answers he has completed and understands the concept of arithmetic operations. Apart from that, students also have to know how the mathematical model will be formed to solve the problem.

As for the results of quantitative data research based on factor analysis calculations, it was found that only one factor could be formed in the factor analysis test. The calculation results are as follows:

**Table 1. Component Matrix**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not understand the basic concepts of the material</td>
<td>0.924</td>
</tr>
<tr>
<td>Not used to solving fraction form problems</td>
<td>0.928</td>
</tr>
<tr>
<td>Not sure if you can solve the problem in the question</td>
<td>0.907</td>
</tr>
<tr>
<td>Confused when writing an explanation of what is known and asked in the question</td>
<td>0.900</td>
</tr>
<tr>
<td>Don't understand how to write a conclusion</td>
<td>0.884</td>
</tr>
<tr>
<td>Do not recheck questions that have been worked on</td>
<td>0.874</td>
</tr>
</tbody>
</table>

Table 1 Component Matrix shows the correlation value of the factors formed on each variable, including the following: (1) The correlation of variables not understanding the basic concepts in the material on the factors formed is 92.4%, (2) The correlation of variables is not used to solving problems. the fractional form of the factors formed is 92.8%, (3) The correlation of variables is not sure that it can solve the problem contained in the problem with the factors formed is 90.7%, (4) The correlation of variables is confused when writing examples regarding what is known and asked in questions about the factors formed was 90%, (5) Correlation of variables did not understand how to write conclusions about the factors formed was 88.4%, (6) Correlation of variables did not recheck the questions that had been worked on against the factors formed was 87, 4%.

After the factor analysis test was carried out, a simple linear regression test was carried out with the aim of seeing the correlation between the mathematical and Newman disposition variables. The results obtained are shown in the following table

**Table 2. Correlation**

<table>
<thead>
<tr>
<th></th>
<th>Newman</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newman</td>
<td>.</td>
<td>0.000</td>
</tr>
<tr>
<td>Disposition</td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

In table 2 there is a correlation between the mathematical disposition variable and Newman. This is because the significance value is < 0.05.

**Table 3. Model Summary**

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Std. error of estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.986</td>
<td>0.972</td>
<td>3.902</td>
</tr>
</tbody>
</table>

As shown in table 3 above, there is an R value of 0.986 which shows a positive correlation between disposition and the Newman variable. Apart from that, the results above also show an R square of 0.972, which means that the disposition variable can explain 97.2% of the variation in the Newman variable, while 3.8% is due to other variables not being studied. The next stage carried out was the F test which was carried out to find out whether mathematical disposition influenced students' conceptual errors when solving word problems based on the Newman procedure. The results obtained are as follows:
Table 4. F Test Results

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>336.339</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The table above shows that there is a significant influence between students' conceptual errors in solving story problems with the Newman procedure. This is because the data above meets the requirements, namely a significance value < 0.05.

Discussion

Problem solving skills are very important for students to master. This is because in solving mathematical problems students need to have problem solving abilities. Problem solving is a process where a person is faced with mathematical concepts, skills and processes to solve mathematical problems (Amaliah et al., 2021).

One of the basic aspects that students need to solve problems is understanding the concept. If students do not understand the concept, then the student is just mastering the solution procedure without clearly understanding the nature of solving the problem (Komariyah et al., 2022). Lack of conceptual understanding can result in students being unable to convert a problem into a mathematical model so that students often make mistakes in solving problem solving problems (Manalu, 2021).

If students are given questions that are different from the questions that have been demonstrated by the teacher, students tend to make mistakes. The mistakes made by students generally lie in the use of formulas, understanding or the ability to understand mathematical models and the ability to apply concepts to a problem.

Apart from that, in problem solving abilities there is also an affective aspect that plays a role in solving mathematical problems, namely mathematical disposition. This is because in solving mathematical problems students need self-confidence or interest in solving a problem so that students can solve the problem.

Based on the explanation above, it can be concluded that one aspect that supports students' ability to solve problems is understanding concepts. However, in reality there are still many students whose ability to understand concepts is still low so they often make mistakes in solving mathematical and these mistakes also come from students' mathematical disposition. If the student's mathematical disposition is low then the student's problem solving ability will also be low.

This was reinforced in research conducted by Maulana (2020) regarding the analysis of students' errors in solving mathematics story problems in terms of mathematical disposition abilities, two forms of errors were obtained by students, including principle errors and conceptual errors. The principle error can be seen from the calculation error that almost all research subjects made this error. This is because students are less careful in carrying out calculations and are in a hurry to complete them. Conceptual errors can be seen from the use of formulas by students. Students only use one formula and the cause of this conceptual error is because they memorize the formula instead of understanding the material that has previously been presented.

Apart from that, in research conducted by Pangesti (2021) regarding the analysis of students' mathematical problem solving abilities in comparative material in terms of mathematical disposition, data was obtained that students who had low dispositions were unable to fulfill all problem solving indicators, students with medium mathematical dispositions had still problem solving abilities. One of the indicators lacking is reviewing problem solving and students with a high mathematical disposition are able to solve problems but they are still not used to writing down what is known and asked in questions. This also applies to students who have a low and medium mathematical disposition.
CONCLUSIONS AND SUGGESTIONS

The results of data analysis on qualitative data showed that conceptual errors in solving story problems based on the Newman procedure were in line with the criteria for mathematical disposition and in quantitative data it was found that one factor was formed in the factor analysis test and there was a significant influence between mathematical disposition and conceptual errors in solving word problems based on the newman procedure.

REFERENCE


