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Students' Error Analysis in solving Contextual Problem of Flat-Sided Geometry Based on Nolting's Theory Depends on Gender

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Abstract: *When students solve math problems with flat-sided geometry, there are still many errors made by students. This is because mathematics has mathematical concepts and principles that students do not understand well, so that it can cause errors in solving mathematical problems of flat-sided geometry. The purpose of this study is to analyze the types of student errors in solving the problem of flat-sided geometry depends on Nolting's Theory. This research uses a qualitative approach. The instrument used is a flat-sided geometry test and interview guidelines. The results of this study can be used as an effort to improve students' ability in solving contextual problems in the material of building a flat side space. Based on the results of the study, information was obtained that there were 5 types of errors, namely reading instructions errors, carelessness errors, conceptual errors, application errors, students' test errors in solving contextual problems based on Nolting's theory. Male student subjects in solving contextual problems of flat-sided wake-up material made a lot of reading errors, carelessness errors, conceptual errors, and test-taking errors. Female student subjects in solving contextual problems with flat-sided geometry make a lot of errors, including carelessness, application errors, and test-taking errors..*

Keyword: Error Analysis, Nolting's Theory, Gender

INTRODUCTION

Education is the most important thing in life, its presence carries a role as a forum for humans to develop the abilities and potentials inherent in them. Education should be applied to humans from an early age. Education itself is a process of interaction that occurs between educators and students both in formal education, non-formal education, and informal education. The formal education that students learn is mathematics (Dewi, 2020). Mathematics is a subject that is studied starting at the elementary school (SD), junior high school (SMP), high school (SMA) level, and even up to university. Mathematics supports various aspects of human life as well as various sciences and has a relationship so that mathematics is considered important to human life. Mathematics needs to be taught to all students, from childhood to university level (Sumiati & Agustin, 2020).

Mathematics is an important subject, but there is a negative view that accompanies mathematics lessons in the minds of students. The possibility of students' dislike of mathematics subjects is because they think that mathematics is a boring, confusing, complicated and scary subject so that in the end many students try to avoid mathematics subjects (Sarwoedi, 2019). With problem solving in everyday life, students are required to be able to think more concretely. But in reality, students have not been able to fully

implement their mathematical knowledge for solving problems that occur in everyday life (Hasibuan, 2018).

Mathematics is classified as an important subject, so the concept of mathematics must be built in the minds of students through meaningful learning, not transferred directly, or pressure students to memorize it. One of the processes related to these conditions is mathematical abstraction, where this process can build concepts in the minds of students through initial experience and knowledge. In mathematics, students are not only required to master the concepts in mathematics, but students are also required to be able to apply these concepts in everyday problems. (Fitriani, 2018).

Oktafia & Sutama (2019) stated that there are not a few students who have difficulty understanding mathematics learning. These difficulties have an impact on the low achievement of students. Students' difficulties allow for errors to occur in solving problems on certain materials. According to Rosyidi & Fazzilah (2020), an error is a form of deviation from what has been considered correct based on previously established procedures.

Based on the initial research/observations the author did at SMPN 1 Kwadungan, it can be seen that the daily test results from the answers of class VIII students where students make a lot of mistakes based on the Nolting's Theory procedure, namely reading instructions errors, careless errors, conceptual errors, application errors. Errors often experienced by female and male students are wrong in determining the formula in solving the problem, some female and male students on the subject are not understanding the concept correctly how to determine the surface area of a cube. There are still many male and female students who make mistakes when asked to solve problems related to problem solving. It is necessary to strive for a good relationship between students and teachers in the learning process because it is considered a true learning resource. The learning process makes students lazy to study and boring because the learning process makes students as listeners to lectures from the teacher. The lazy attitude of students turns out to be not only in certain subjects, but almost all subjects including mathematics (Rahmawati, 2017).

Based on the results of interviews with several mathematics teachers at SMPN 1 Kwadungan, that in solving math problems, especially the subject of flat-sided geometry, there are still many students who experience difficulties, causing errors in solving problems. Errors usually occur because the level of understanding of students' concepts about the material is still low so that students find it difficult to remember the material that has been delivered by the teacher.

The cause of the lack of students in mastering the flat-sided geometry material is because the learning carried out by the teacher emphasizes memorizing existing formulas without finding out the origin of the formula, as a result students ignore the basic concepts of the material. According to Hasan (2019), if students do not understand a material concept, an error will occur when working on a question. This has a bad impact on the way students think because they often look for or use instant ways to understand a problem from the questions given.

The solution that must be done to improve student learning outcomes is to study what weaknesses are experienced by students by means of analysis. Errors made by these students need to be analyzed in order to know what types of mistakes are often made and why these mistakes are made by students. If the cause of the error is known, then the student concerned is expected to be able to avoid the error and also a teacher can provide assistance to his students.

To help find the causes and types of errors that occur in student work when solving problems in the form of mathematical problems in the form of story descriptions, in this study the author uses an analysis based on Nolting's Theory. The grouping of student errors

is based on the theory proposed by Nolting in Bambang Irawan & Daniel Chandra (2017). Nolting's theory is a type of student error in taking the test, there are 5 types, namely errors in reading instructions (Misread-Directions Errors), Careless Errors, Concept Errors, Application Errors, Testing Errors.

Based on previous research, no one has described the analysis of junior high school students' errors in solving contextual problems on flat-sided geometry materials based on the Nolting's theory depends on gender. Aims to describe the types of errors made by students as well as alternative solutions in solving contextual problems on flat-sided geometry based on Nolting's Theory depends on Gender, to overcome or minimize these mistakes so they don't happen again in the future.

METHOD

This research is using a descriptive qualitative research method. The research was carried out in the even semester of the 2021/2022 Academic Year, namely from March 2022 to July 2022 at SMPN 1 Kwadungan, Jl. Raya Kwadungan, Simo, Kec. Kwadungan, Kab. Ngawi, East Java. The subjects in this study were class VIII F students at SMP Negeri 1 Kwadungan. Taking the subject in this study using a purposive sampling technique, namely the subject obtained through certain considerations. Subjects were taken based on the results of the flat-sided building test that had been done. The research instrument used by the researcher in this study consisted of the main instrument and the supporting instrument, the main instrument being the researcher himself. The supporting instrument used is interviews. In this study, the type of test used was in the form of a mathematical question sheet in the form of a story description. Interview is a technique of collecting data by asking questions verbally and the answers are also verbal and answered immediately when the questioner asks. In qualitative analysis there are three flow of activities that occur simultaneously. Activities in data analysis are: data reduction, data presentation, and drawing conclusions and verification.

RESULT AND DISCUSSION

The research began with the work on the questions, a written test was carried out by providing a question sheet for the material to build a flat side room which was also related to error analysis based on Nolting's Theory. The students selected to be the subject of the research were class VIII F students of SMP Negeri 1 Kwadungan which totaled 26 students, there are 13 female students and 13 male students. The test questions are given directly in the form of a description with a total of 3 items of flat side room building questions. After the students have worked on and collected the test results, the researcher conducts the selection of the students' answers. Based on the test results, there is 1 male student and 1 female student who has the most answers to make mistakes, namely in question number 3. The results of the written test are the basis for analyzing students' mistakes in solving problems. The selection of subjects is based on the answers of the most mistakes and gender differences. The names of the research subjects that have been selected are found in the table below.

Table 1. List of Names of Research Subjects

Name	Gender
RAP	Male
BM	Female

Based on table 1, the selected subject is who makes the most mistakes based on the types of errors according to nolting. The selected subject who made the most mistakes was found in question number 3.

a) Male Subject Test Results

3. Diketahui = $p = 90 \text{ cm}$
 $l = 50 \text{ cm}$
 $t = 70 \text{ cm}$
 t air yang diambil 40 cm
 Ditanya = Berapa besar perubahan volume air di aquarium tersebut?
 Jawab :
 $V_{\text{air awal}} = p \times l \times t$
 $= 90 \times 50 \times 70$
 $= 310.000 \text{ cm}$
 $V_{\text{air akhir}} = p \times l \times t$
 $= 90 \times 50 \times 30$
 $= 180.000 \text{ cm}$
 perubahan volume air
 $= 310.000 + 180.000$
 $= 490.000.$

Figure 1. Male Subject Answer Sheet

1) Error Reading Instructions

$V_{\text{air akhir}} = p \times l \times t$
 $= 90 \times 50 \times 30$
 $= 180.000 \text{ cm}$

Figure 2. Analysis of Error Reading Instructions by Male Subjects

The male subject made a mistake in reading the instructions, this happened because he misunderstood the instructions given to the question. It is caused by the lack of accuracy in reading the commands in the questions. Based on the results of the test analysis research of students who experienced incorrect reading instructions, several factors were found to cause the error, including:

- Students' low reasoning ability
- Weak ability of students to identify information in the form of contextual problems
- Students lack understanding of the material and practice questions, especially those that are contextual in nature

Fathiyah (2020) who states that the form of error in reading instructions is generally that students only write down the final answer without a description, misinterpret the intention of the question, are unable to mention. Components that are known and asked in the question, do not know the meaning of the symbols in the question, and are unable to read the captions on the images listed in the questions. Misunderstanding in understanding the clues given to the question. It is caused by the lack of accuracy in reading the commands in the questions.

2) Carelessness Error

$$\begin{aligned} \text{Vair awal} &= p \times l \times t \\ &= 90 \times 50 \times 70 \\ &= 310.000 \text{ cm} \\ \text{Vair akhir} &= p \times l \times t \\ &= 90 \times 50 \times 30 \\ &= 180.000 \text{ cm} \end{aligned}$$

Figure 3. Analysis of Carelessness Error by Male Subjects

The male subject makes a careless mistake, this happens because he carelessly writes down the unit. It is noticed that the subject of RAP is wrong in writing down units, incorrectly looking for the volume of the beam by units of cm. Based on the results of the analysis of the test subjects who experienced carelessness errors, several factors were found to cause the error, including:

- Students are too hasty and not meticulous in doing the questions
- Students do not re-examine the previous answers submitted to the researcher
- Students do not focus on doing questions because of the noise in the school

This is in line with the results of Faturrochmah's research (2021) because he was too hasty in doing the questions so that he was not careful and did not re-examine the answers. Human error can be seen from various reasons, due to lack of concentration, hasty thinking, full memory or failure to record the important thing when learning.

3) Misconceptions

$$\begin{aligned} \text{Pembahasan volume air} \\ &= 310.000 + 180.000 \\ &= 490.000. \end{aligned}$$

Figure 4. Analysis of Misconceptions by Male Subjects

The male subject makes a misconception, this happens because he lacks mastery and lacks understanding of mathematical concepts and principles in answering problems. Male subjects can answer the questions that have been given but do not know what formula will be used in solving the problem. Based on the results of the test analysis and interviews with subjects who experienced carelessness errors, caused by a lack of deep understanding of the concept. In line with the results of research by Oktafia & Utama (2019) which states that conceptual errors are caused by students using the wrong formula in answering the problems presented in the problem and the use of formulas that are not in accordance with the conditions or prerequisites for the enactment of the formula

4) Implementation Errors

Male subjects are able to solve the given questions. So that there are no errors in the category of application errors. Application errors usually occur when translating formulas. Although he understands the components of the formula, but does not know how to apply it to the problem.

5) Test Work Error

$$\begin{aligned}
 \text{Vair awal} &= p \times l \times t \\
 &= 90 \times 50 \times 70 \\
 &= 310.000 \text{ cm} \\
 \text{Vair akhir} &= p \times l \times t \\
 &= 90 \times 50 \times 30 \\
 &= 180.000 \text{ cm} \\
 \text{Pembahan volume air} \\
 &= 310.000 + 180.000 \\
 &= 490.000.
 \end{aligned}$$

Figure 5. Analysis of Test Working Errors by Male Subject

The male subject made a mistake in solving all the answers to the given questions. So there is an error in the category of test work error. The results already written by the male subject are still wrong. Based on the results of the test analysis and interviews with subjects who experienced test work errors, several factors were found to cause the error, including:

- Students are not used to writing down the final answer with a conclusion sentence
- Students are not careful in working on the questions
- Students are less able to manage time and do problems unable to complete their work correctly.

In line with Faturrochmah (2021) which states that students make mistakes by not writing conclusions or writing conclusions but wrong, not completing answers.

b) Female Subject Test Results

$$\begin{aligned}
 \text{③ Diket:} \\
 p &= 90 \text{ cm} \\
 l &= 50 \text{ cm} \\
 t &= 70 \text{ cm} \\
 t \text{ air yg diambil} &= 40 \text{ cm} \\
 \text{Dit:} \\
 \text{Berapa besar perubahan volume air droquarium tersebut?} \\
 \text{Jawab:} \\
 \text{Volume air awal} &= p \times l \times t \\
 &= 90 \times 50 \times 70 \\
 &= 315.000 \text{ cm}^3 \\
 \text{Volume air akhir} &= p \times l \times t \\
 &= 90 \times 50 \times 40 \\
 &= 180.000 \text{ cm}^3 \\
 \text{perubahan volume air} &= \text{Vair awal} - \text{Vair akhir} \\
 &= 315.000 - 180.000 \\
 &= 135.000.
 \end{aligned}$$

Figure 6. Answer Sheet by Female Subject

1) Error Reading Instructions

The female subject is correct in writing down what is known in the matter. Already able to understand the information contained in the problem. Female subjects are able to solve contextual problems, so that there are no errors in the category of errors in reading instructions.

2) Carelessness Error

$$\begin{aligned}
 \text{Volume air awal} &= p \times l \times t \\
 &= 90 \times 10 \times 70 \\
 &= 325.000 \text{ cm}^3 \\
 \text{Volume air akhir} &= p \times l \times t \\
 &= 90 \times 10 \times 40 \\
 &= 180.000 \text{ cm}^3 \\
 \text{perubahan volume air} &= V_{\text{air awal}} - V_{\text{air akhir}} \\
 &= 325.000 - 180.000 \\
 &= 145.000
 \end{aligned}$$

Figure 7. Analysis of Carelessness Error by Male Subjects

The female subject made a careless mistake, this happened because she carelessly wrote down the units when working on the soal in writing the units, and was not careful in the calculation operation. So there is an error in the category of carelessness errors. Based on the results of test analysis and interviews with subjects who experienced carelessness errors, several factors were found to cause the error, including:

- Students are too hasty and not meticulous in doing the questions.
- Students do not re-examine the previous answers submitted to the researcher.
- Students do not focus on doing questions because of the noise in the school.

This is in line with the results of Faturrochmah's research (2021) because he was too hasty in doing the questions so that he was not careful and did not re-examine the answers. Human error can be seen from various reasons, due to lack of concentration, hasty thinking, full memory or failure to record the important thing when learning.

3) Misconceptions

The female subject is correct in writing down the formula. He is able to know the formula to be used in solving the problem. So that there are no errors in the category of draft errors.

4) Implementation Errors

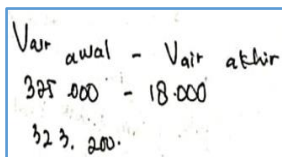
$$\begin{aligned}
 \text{perubahan volume air} &= V_{\text{air awal}} - V_{\text{air akhir}} \\
 &= 325.000 - 180.000 \\
 &= 145.000
 \end{aligned}$$

Figure 8. Analysis of Implementation Errors by Female Subject

The female subject made a mistake in application, this happened because the subject already knew the formula to be used to solve the problem but could not apply it correctly. The subject is able to write down the formula to be used, but in its application it is wrong. Based on the results of test analysis and interviews with subjects who experienced test work errors, caused by lack of practice questions that should be able to help students in improving their ability to apply the concepts and formulas learned to the questions. This is in line with research conducted by

Bambang Irawan & Daniel Chandra (2017), students only write down the known components and formulas used, but students have difficulty in answering questions.

5) Test Work Error



$$\begin{array}{r} \text{Vair awal} - \text{Vair akhir} \\ 305.000 - 18.000 \\ \hline 323.000 \end{array}$$

Figure 9. Analysis of Test Working Errors by Female Subject

The female subject made a mistake in working on the test, this happened because the subject did not solve the answer correctly to the problem. The subject is able to do the given question to find the volume of the block using the formula, but is able to solve the answer to the given question correctly. Based on the results of the test analysis and interviews with subjects who experienced test work errors, several factors were found to cause the error, including:

- a. Students are not used to writing down the final answer with a conclusion sentence
- b. Students are not careful in working on the questions
- c. Students are less able to manage time and do problems unable to complete their work correctly.

This is in line with Faturrochmah (2021) which states that students make mistakes by not writing conclusions or writing conclusions but being wrong, not completing answers.

CONCLUSION

Based on the results of the discussions that have been carried out in this study, it can be concluded that the analysis of errors of junior high school students in solving contextual problems of flat side room building materials based on the theory of nolting in terms of gender is as follows:

- 1) Male subject in solving contextual problems of flat-sided space building material make many mistakes found in misreading instructions, carelessness errors, draft errors, and test work errors. The error of reading the instructions contained in the questions that have been given, is not careful in reading a contextual question. Careless errors occur because students are careless at the time of working on the saol, one writes down the units and is not careful in the calculation operation. Concept errors occur because students do not understand the concepts that will be used in solving problems. The error of working on the test of male students in inferring answers to the questions done.
- 2) Female subject in solving contextual problems of flat-sided space building materials make many mistakes found in carelessness errors, application errors, and test work errors. Careless errors occur because students are careless at the time of working on the saol, one writes down the units and is not careful in the calculation operation. The application error occurs because you already know the formula to be used to solve the problem but cannot apply it correctly. Mistakes in working on the female student test in inferring answers to the questions done.

Suggestions as an effort to develop similar research results include: For subsequent researchers, it is expected to be able to analyze more deeply related to student errors in

solving contextual problems of material building flat side rooms based on zeroing theory and can develop knowledge related to error analysis, with a note that any shortcomings in this study can be corrected and use different subjects and materials.

REFERENCES

- Bambang Irawan, E., & Daniel Chandra, T. (2017). *Kesalahan Siswa Smp Dalam Menyelesaikan Soal Bangun Datar Segiempat Berdasarkan Teori Nolting*.
- Dewi, D. K., Khodijah, S. S., Zanthi, L. S., Siliwangi, I., Terusan Jenderal, J., & Cimahi, S. (2020). *Analisis Kesulitan Matematik Siswa Smp Pada Materi Statistika*. 04(01), 1-7.
- Fathiyah. (2020). *Ifa Fathiyah, 2020 Analisis Kualitatif Kesalahan Pengerjaan Soal Matematika Tipe Hots Berdasarkan Teori Nolting Pada Siswa Smp Universitas Pendidikan Indonesia | Repository.Upi.Edu | Perpustakaan.Upi.Edu*.
- Faturrochmah. (2021). *Kesalahan Siswa Dalam Mengerjakan Soal Materi Bangun Datar Berdasarkan Teori Nolting Pada Siswa Kelas Iv Sd*. 8, 310-321.
- Fitriani, N., Suryadi, D., & Darhim, D. (2018). Analysis Of Mathematical Abstraction On Concept Of A Three Dimensional Figure With Curved Surfaces Of Junior High School Students. *Journal Of Physics: Conference Series*, 1132(1). <https://doi.org/10.1088/1742-6596/1132/1/012037>
- Hasibuan, E. K. (2018). Analisis Kesulitan Belajar Matematika Siswa Pada Pokok Bahasan Bangun Ruang Sisi Datar Di Smp Negeri 12 Bandung. *Axiom : Jurnal Pendidikan Dan Matematika*, 7(1), 18-30. <https://doi.org/10.30821/Axiom.V7i1.1766>
- Hasan, N., Subanji, S., & Sukorianto, S. (2019). Analisis Kesalahan Siswa Kelas VIII dalam Menyelesaikan Soal Cerita Terkait Teorema Pythagoras. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 4(4), 468-477.
- Oktafia, R., & Utama, M. P. (2019). *Analisis Kesalahan Dalam Menyelesaikan Soal Geometri Berorientasi Pisa Ditinjau Dari Gender Pada Siswa Kelas VIII Smp Muhammadiyah 2 Masaran* (Doctoral dissertation, Universitas Muhammadiyah Surakarta).
- Rahmawati, N. K. (2017). Penerapan Model Pembelajaran Matematika Menggunakan Model Savi dan Vak Pada Materi Himpunan Terhadap Prestasi Belajar Siswa Kelas VII. *Jurnal Ilmiah Pendidikan Matematika*, 5(2), 21-24.
- Rosyidi, A. H. (2020). Analisis kesalahan siswa kelas II MTs AlKhoiriyah dalam menyelesaikan soal cerita yang berkaitan SPLDV. *Surabaya: Tesis UNESA*.
- Sarwoedi, S. (2019). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matematika Berdasarkan Kriteria Watson. *Jurnal Mathematic Paedagogic*, 4(1), 12.
- Sumiati, A., & Agustini, Y. (2020). *Analisis Kesulitan Menyelesaikan Soal Segi Empat dan Segitiga Siswa SMP Kelas VIII di Cianjur*. 04(01), 321-330.