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Analysis Of Mathematics Learning Difficulties In Solving Story Problems Based On Newman's Error Analysis

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ABSTRACT

This study aims to analyze the difficulty of learning mathematics in solving story problems based on Newman's Error Analysis. A total of 22 students were selected by 6 students to be interviewed subjects. The method used in this study is descriptive qualitative with data collection techniques in the form of tests and interviews. Data were analyzed using miles and Huberman data analysis which included data collection, data reduction, data presentation, and conclusion. The results showed that subjects in the high category experienced difficulties at the Transformation, Process Skill, and Encoding stages. Meanwhile, subjects with moderate categories experience difficulties in the Reading, Comprehension, Transformation, Process Skill, and Encoding stages. As well as subjects in the low category also experience difficulties in the Transformation, Process Skill, and Encoding stages.
Keywords : Mathematics Learning Difficulties, Story Problem, Newman's Error Analysis.

ABSTRAK

Penelitian ini bertujuan untuk menganalisis kesulitan belajar matematika dalam menyelesaikan soal cerita berdasarkan Newman's error analysis. Dari 22 siswa dipilih 6 siswa untuk menjadi subjek yang diwawancarai. Metode yang digunakan dalam penelitian ini yaitu deskriptif kualitatif dengan teknik pengumpulan data berupa tes dan wawancara. Data dianalisis dengan menggunakan analisis data Miles dan Huberman yang meliputi pengumpulan data, reduksi data, penyajian data dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa subjek dengan kategori tinggi mengalami kesulitan pada tahap transformation, process skill, dan encoding. Sedangkan subjek dengan katogori sedang mengalami kesulitan pada tahap reading, comprehension, transformation, process skill, dan encoding. Selanjutnya subjek dengan kategori rendah juga mengalami kesulitan pada tahap Transformation, Process Skill, dan Encoding.
Kata kunci: Kesulitan Belajar Matematika, Soal Cerita, Newman's Error Analysis.

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PRELIMINARY

Education has an important role in life, education can give birth to intelligent and civilized generations through the transfer of knowledge from generation to generation in the form of teaching or training, but that does not mean education is only with the guidance of others but can be done alone based on experience. Education can be done formally, non-formally, or informally. Education held in schools is referred to as formal education with levels of education starting from elementary, junior high, high school, and higher education by teaching various subjects.

Learning activities do not always run smoothly, because everyone has different abilities in learning. Some people easily accept and absorb lessons, and some people are not easy to accept and absorb lessons or in other words find it difficult to accept lessons.

Laily (2014) states that learning mathematics at the elementary school level is aimed at developing a practical, logical, critical, honest mindset that is oriented towards the application of mathematics in solving problems because in mathematics there are questions in the form of fillings, readings, and stories or problem discourse that must be solved by reasoning. This is also supported by the opinion of Umam (2014) that to solve math problems in the form of a story problem, not only computational ability is needed but also reasoning ability.

In mathematics, students often have difficulty solving problems, one of which is solving math problems in the form of stories. Math word problems are math problems that are expressed in story form and can be converted into mathematical equations. Rahmawati (2019) states that the difficulty of solving story problems can be proven by mistakes in working on the questions. So in determining student learning difficulties can be seen based on the mistakes they made in working on the questions.

Learning difficulties (Suwarto, 2013) are failures to achieve learning objectives, which are characterized by low learning outcomes or achievements (grades obtained less than seventy-five). Khanifah and Nusantara (Tiyas, 2017) suggest that student learning difficulties can be seen from the mistakes made in solving questions on certain materials. The same thing was also expressed by Hadi (2021) that learning difficulties occur if students make mistakes when working on or solving problems. Errors are deviations from what is considered correct or from what has been determined or agreed upon before (Wijaya & Masriyah, 2013). Besides that, learning difficulties according to Hadi (Arifin, 2017) are weaknesses that students have when solving questions that have been prepared by the teacher.

The difficulty of learning mathematics is a condition characterized by obstacles in learning (Devi, 2019). Meanwhile, according to (Koswara, 2013), learning difficulties experienced by children are divided into two groups: groups of learning difficulties related to child development and groups of learning difficulties related to academics. Learning difficulties in mathematics are classified as learning difficulties in the academic field, where in the academic field children are required to master reading, writing, and arithmetic skills. Learning difficulties in the academic field can be characterized by a child's lack of success in achieving learning outcomes or achievements. Based on the background above, this study aims to analyze the difficulty of learning mathematics in solving story problems based on Newman's Error Analysis.

Newman's Error Analysis procedure is a procedure that was first introduced by Anne Newman in 1977, she is a mathematics teacher in Australia. According to (Suradi & Djam'an, 2021) mistakes made by students when solving problems related to essay questions can be identified using Newman's Error Analysis (NEA). So Newman's Error Analysis is a method that contains procedures or steps to analyze errors in solving math problems or problems.

The stages proposed by Newman to analyze errors made by students can be identified through the stages of reading, comprehension, transformation, process skills, and encoding. Newman (Permatasari & Nuraeni, 2021) recommend that there are five activities carried out to classify errors that occur in student work in solving a problem, namely:

a. Please read the question (reading).
b. Tell the questions you are asked to answer (comprehension).
c. Describe the method you used to answer the question (transformation).
d. Show how you did the question. Explain what you're doing. (Process skills).
e. Write down your answers to these questions (encoding).

According to Singh (Kristanti, 2017), the steps for analyzing errors according to Newman's Error Analysis are described as follows:

a. Reading Error

   Reading errors can occur when students read the questions. This error occurs when students are unable to read words or symbols as the main information in the problem, cannot use this information when working on questions, and answers from students are not following the intent of the problem.

b. Comprehension Error

Errors in understanding occur after students can read the questions but students do not understand what is needed to work on the questions, misinterpreting the information contained in the questions so they cannot solve the problem

c. Transformation Error

Transformation errors are errors when students understand the questions from the problem but fail to change the problem into the correct mathematical form, also characterized by students failing to choose the right mathematical operation to solve the problem.

d. Process Skills Error

Process skill errors occur when students can choose the action or operation needed to solve a problem but fail to carry out the solving procedure correctly. This error can also occur because students are not proficient at counting.

e. Encoding Error (Error writing answer)

It is possible that errors still occur even after students solve math problems, namely that students write wrongly what is meant. This error can also occur because students make mistakes in the process of solving it.

METHODS

This study uses qualitative research. Qualitative research is research or research that is descriptive in nature (Rukin, 2019). Meanwhile, according to (Devi, 2019) that qualitative research is a type of research that displays the results of its research in the form of descriptive words. This study used a descriptive research design, in which the researcher described or explained the difficulties experienced by students in solving math story problems on the subject of flat shapes.

The subjects of this study were 22 students, 6 students were selected as interview subjects based on predetermined categories, 2 students from the high ability category, 2 students from the medium ability category, and 2 students from the low ability category.

Data collection techniques were used to obtain information in this study, namely written tests, and interviews, then the data and information obtained were analyzed in a descriptive form. The test used in this study is a written test related to flat shape material. The test sheet used is designed to analyze errors based on Newman's Error Analysis so that students can find out the learning difficulties experienced by students in solving math story problems on the subject of flat shapes, square, rectangle, and triangle material. The

indicators of student learning difficulties based on Newman's Error Analysis are listed in the following table 1:

Table 1. Indicator of Learning Difficulties on Newman's Error Analysis

No	Newman's Error Analysis Steps	Indicators of Learning Difficulties
1	*Reading*	a. Cannot read the words, symbols, or units in the problem correctly.
		b. Unable to determine the keywords in the question
2	*Comprehension*	a. Do not write down what is known in the problem
		b. Do not write down what is asked in question
		c. Write down what is known in the problem but is not correct
		d. Write down the things that are asked in the question but are not correct
3	*Transformation*	a. Improper in choosing formulas or calculation operations to be used to solve problems
4	*Process skills*	a. Error in the calculation process
		b. Wrong in using the right formula or mathematical rules
		c. Do not continue or further process the problem-solving procedure
5	*Encoding*	a. Wrong conclusion
		b. Do not write conclusions
		c. Did not write down the exact units of the final answer

The interviews in this study were carried out after students took the test. Interviews in this study are by asking questions to respondents (in this case students). The researcher recorded all the answers as they were from the respondents. Interviews were used to find out more about students' mistakes when working on math story problems on the subject of flat shapes. The interview further strengthens the data that has been collected through the test results.

The data analysis technique used in this study is based on qualitative data analysis by Miles and Huberman. Miles and Huberman's data analysis consists of several stages, namely:

1. Data Collection

   Data collection in research is done in various ways. Data in this study were collected by conducting tests, interviews, and triangulation of research subjects. After the researcher collects the data, the next step is the researcher reduces the data.

2. Data reduction

   Reducing data means summarizing, selecting the main ones, focusing on the main ones, and focusing on the important ones. The reduced data provides a clearer picture and makes it easier for researchers to collect further data (Sidiq, Choiri & Mujahidin, 2019). At this stage, the researcher summarizes the data that has been obtained by

focusing on important things obtained from the results of tests and interviews which are then simplified by removing data that has nothing to do with research.

3. Data Presentation

   After reducing the data, the next step is presenting the data. In qualitative research, the process of presenting data can be in the form of brief descriptions, charts, relationships between categories, or narrative text. Presenting data helps the researcher understand what happened. In this study, the researcher presents data from the data reduction process in narrative form. In this study, to test the validity of the data, researchers used triangulation. Triangulation is testing the validity of the data by comparing and matching data obtained by researchers in the field with data obtained through interviews. Researchers use technical triangulation, namely different data collection techniques to obtain data from the same source (Hardani, 2020).

4. Conclusion Drawing

   After presenting the data by Miles and Huberman, the next step is to conclude. Conclusions are drawn based on the results of presenting the data that has been done. Conclusions in qualitative research can answer the formulation of the problem formulated. Schematically the data analysis process using the Miles & Huberman data analysis model is described as follows (Yusuf, 2017):

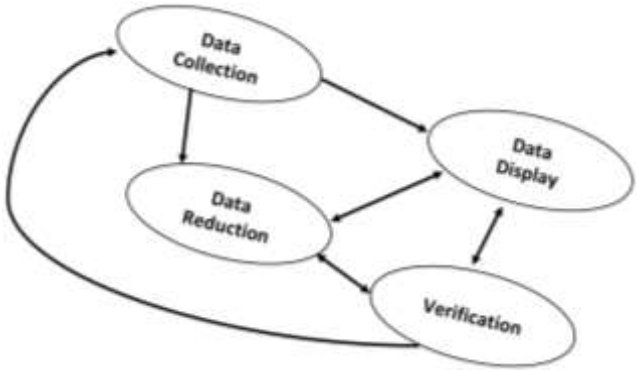


Figure 1. Model of Data Analysis from Miles and Huberman

RESULTS AND DISCUSSION

Giving a description test of 5 numbers is used to find out the difficulties experienced by students in solving story problems. Of the 22 students who were given the test, 2 students were found to be in the high test result category, 7 students were in the moderate test result category and 13 students were in a low category. Furthermore, these

difficulties are detected based on their type, namely R (Reading), C (Comprehension), T (Transformation), P (Process Skill), and E (Encoding) can be seen in the following table 2:

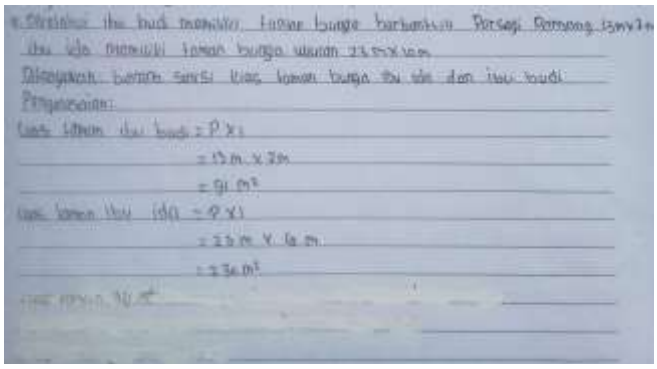
Table 2. Types of Student Difficulties

No	Student Initial	Types of Student Difficulties				
		Soal 1	Soal 2	Soal 3	Soal 4	Soal 5
1	AR	RC	TPE	TPE	TPE	RCTPE
2	ARF	TPE	TPE	RCTPE	TPE	RCTPE
3	AM	TPE	TPE	TPE	TPE	RCTPE
4	AA	—	—	TPE	—	RCTPE
5	A	TPE	TPE	TPE	TPE	RCTPE
6	AT	—	—	—	TPE	TPE
7	AU	—	—	—	TPE	TPE
8	AL	—	—	TPE	TPE	RCTPE
9	D	TPE	TPE	TPE	TPE	RCTPE
10	IR	TPE	TPE	TPE	TPE	RCTPE
11	FP	TPE	TPE	TPE	TPE	RCTPE
12	HH	TPE	TPE	RCTPE	TPE	RCTPE
13	HK	TPE	TPE	TPE	TPE	RCTPE
14	JR	TPE	TPE	TPE	TPE	RCTPE
15	MA	RCTP	RCTPE	TPE	RCTPE	RCTPE
16	MC	TPE	TPE	TPE	TPE	RCTPE
17	MH	TPE	TPE	TPE	—	RCTPE
18	MAN	—	TPE	TPE	TPE	RCTPE
19	MU	TPE	TPE	TPE	TPE	RCTPE
20	M	—	TPE	TPE	TPE	RCTPE
21	NP	—	—	TPE	—	RCTPE
22	VK	E	TPE	E	E	TPE

Based on table 2, it was found that in question number 1 students experienced many difficulties at the Transformation, Process Skill, and Encoding stages. In addition, there was 1 student who had difficulty at the Reading and Comprehension stages and 1 student who had difficulty at the Reading, Comprehension, and Transformation stages. There was also 1 student who only experienced difficulties at the Encoding stage. In question number 2, students experienced many difficulties in the Transformation, Process Skill, and Encoding stages. There was 1 student who had difficulty at all stages. In question number 3, students experienced many difficulties in the Transformation, Process Skill, and Encoding stages. 2 students experienced difficulties at all stages, and there was also 1 student who only experienced difficulties at the Encoding stage. In question number 4, students experienced many difficulties in the Transformation, Process Skill, and Encoding stages. There is also 1 student who has difficulty at all stages and there is 1 student who only has difficulty at the Encoding stage. In question number 5, students experienced many

difficulties at all stages, starting from the Reading, Comprehension, Transformation, Process Skill, and Encoding stages. 3 students experienced difficulties at the Transformation, Process Skill, and Encoding stages.

Test and Interview Test Result of subject 1 (S1)



Given : Mrs. Budi has a rectangular flower garden with a size of $13m \times 2m$ while Mrs. Ida has a flower garden which is $23m \times 10m$.

Problem : What is the difference in the area of the flower garden owned by Mrs. Budi and Mrs. Ida?

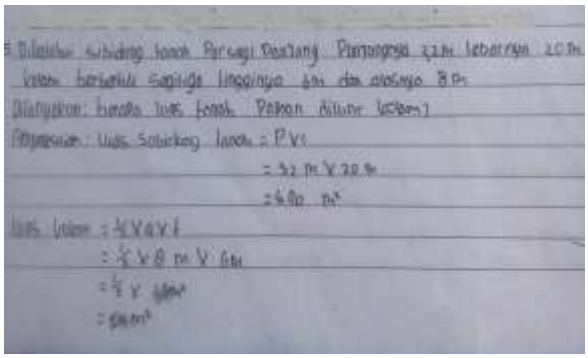
Solution : The area of Mrs Budi's flower garden $= p \times l$
$= 13m \times 7m$
$= 91m^2$

The area of Mrs Ida's flower garden $= p \times l$
$= 23m \times 10m$
$= 230m^2$

Flower garden area $321m^2$

Figure 2. Test Result of S1 (Number 4)

Based on Figure 2, it can be seen that the S1 subject in solving question number 4 has written down what is known correctly. Subject S1 showed that what was known from the problem was that Budi's mother had a rectangular flower garden with a size of $13m \times 7m$. Meanwhile, Ida's mother has a flower garden measuring $23m \times 10$. S1 has also shown that what is asked in the question is the difference in the area of the flower garden of Mrs. Ida and Mrs. Budi (Reading and Comprehension). In the problem-solving process, the S1 subject only wrote down 2 of the 3 formulas that should be used. Subject S1 only wrote down the formula to determine the area of Mrs. Budi's garden and the area of Mrs. Ida's garden by multiplying the length and width of the garden, S1 subject did not write down how to determine the difference in the area of the garden (Transformation). In the next stage, subject S1 only carried out the calculation process to determine the area of Mrs. Ida's and Mrs. Budi's flower gardens by multiplying the length and width of each garden, subject S1 did not write down the calculation process to determine the difference in the area of the garden (Process Skill). In the final stage, subject S1 wrote conclusions with incorrect answers where subject S1 wrote that the area of the garden was $321m^2$ (Encoding).



Given : The land is rectangular in shape with a length of 32m and a width of 20m. The pond is triangular in shape with a height of 6m and a base of 8m

Problem : The area outside of the pool

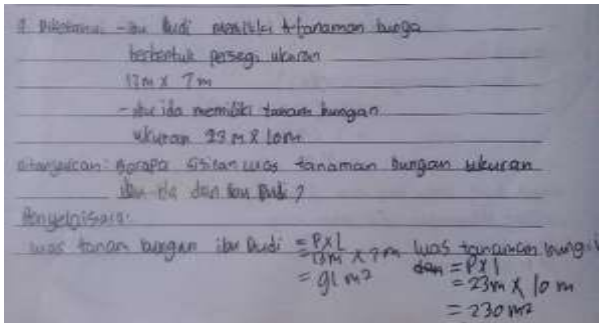
Solution : The area of land $= p \times l$
$= 32m \times 20m$
$= 640m^2$

The area of pond $= \frac{1}{2} \times a \times t$
$= \frac{1}{2} \times 8m \times 6m$
$= \frac{1}{2} \times 48m$
$= 24m^2$

Figure 3. Test Result of S1 (Number 5)

Figure 4 provides information that the S1 subject in solving question number 5 has been able to write down what is known in the problem correctly. It is known that the problem is a rectangular piece of land with a length of 32 m and a width of 20 m, and a triangular pond with a height of 6 m and a base of 8 m. S1 subject was also able to write down that what was asked in the question was the area of uncle's land outside the pond (Reading and Comprehension). Furthermore, subject S1 only wrote down 2 of the 3 formulas or solutions that should be used to solve the problem, namely subject S1 only wrote down the formula or solution to determine the area of the uncle's land which is rectangular in shape by multiplying the length and width of the land, and subject S1 also wrote down the formula or a solution for determining the area of a triangular pond by multiplying the number 1/2 by the size of the triangular pond base and multiplying by the height of the triangle, subject S1 did not write down the formula or solution for determining the area of uncle's land outside the pond (Transformation). In the next stage, subject S1 wrote down the calculation process to determine the area of a piece of land by multiplying the length of the land (32 m) and the width of the land (31 m), and also wrote down the calculation process to determine the area of the pond by multiplying the number 1/2 by the size of the pond base triangle (8 m) and multiplying by the height of the triangle (6 m), subject S1 did not write down the calculation process to determine uncle's land area outside the pond (Process Skill). In the final stage, the S1 subject does not write conclusions on the answer sheet (Encoding).

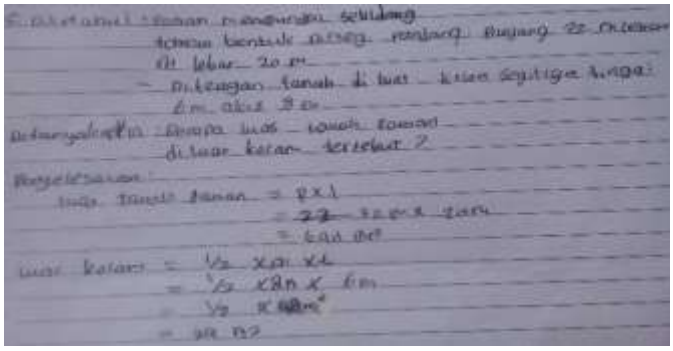
Test and Interview Test Result of subject 2 (S2)



Given : Mrs. Budi has a rectangular flower garden with a size of $13m \times 2m$ while
Mrs. Ida has a flower garden which is $23m \times 10m$.
Problem : What is the difference in the area of the flower garden owned by Mrs. Budi and Mrs. Ida?
Solution : The area of Mrs Budi's flower garden $= p \times l$
$= 13m \times 7m$
$= 91m^2$
The area of Mrs Ida's flower garden $= p \times l$
$= 23m \times 10m$
$= 230m^2$

Figure 4. Test Result of S2 (Number 4)

The picture above shows that subject S2 in solving problem number 4 has written down what is known, namely Mrs. Budi has a flower garden in the shape of a square measuring 13 m × 7 m and Mrs. Ida has a flower garden measuring 23 m × 10 m. Subject S2 also wrote down what was asked in the question, namely the difference in the area of the flower gardens of Mrs. Ida and Mrs. Budi (Reading and Comprehension). Furthermore, subject S2 was only able to write 2 out of 3 formulas or solutions to solve the problem, namely only writing how to determine the area of Mrs. Ida's flower garden and the area of Mrs. Budi's flower garden by multiplying the length and width, subject S2 did not determine the formula or solution to determine the difference the area of the flower garden of Mrs. Ida and Mrs. Budi (Transformation). In the next stage, subject S2 wrote down the calculation process to determine the area of each flower garden of Mrs. Ida and Mrs. Budi by multiplying the length and width of each flower garden, subject S2 did not write down the calculation process to calculate the difference in the area of flower gardens for Mrs. Ida and Mrs. Budi (Process Skills). In the final stage, subject S2 did not write a conclusion in the final answer, so the questions were not resolved in complete and perfect stages (Encoding).



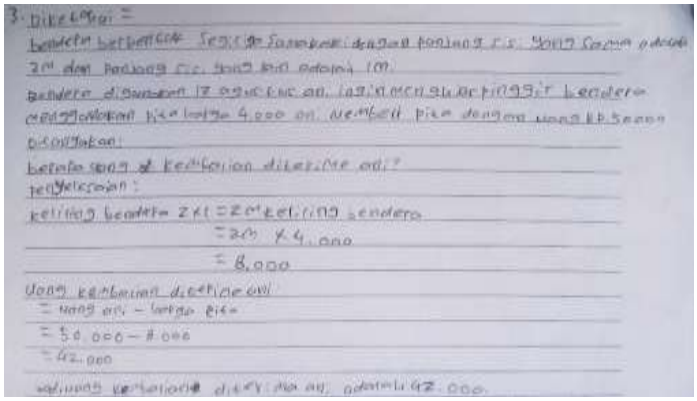
Given : Uncle has the land is rectangular in shape with a length of 22m width of 20m. In the center of land build the triangular pond with a height of 6m and a base of 8m
Problem : The area outside of the pond
Solution : The area of land $= p \times l$
$= 32m \times 20m$
$= 640m^2$
The area of the pond $= \frac{1}{2} \times a \times t$
$= \frac{1}{2} \times 8m \times 6m$
$= \frac{1}{2} \times 48m$
$= 24m^2$

Figure 5. Test Result of S2 (Number 5)

Figure 6 shows the answer to number 5 subject S2 has succeeded in determining what is known uncle has a rectangular plot of land that is 32 m long and 20 m wide, in the

middle of the land a triangular pond is made with a height of 6 m and a base of 8 m. S2 also wrote that what was asked in the question was the area of uncle's land outside the pond (Reading and Comprehension). Next, S2 only writes 2 of the 3 formulas that must be used to solve the problem. S2 writes down the formula or solution to solve the problem first by determining the area of the uncle's land by multiplying the length and width of the uncle's land, then writes down the solution or formula for determining the area of a triangular pond by multiplying 1⁄2 by the size of the base of the triangular pond and multiplying by the height. triangle, S2 does not write down the solution to determine the area of Uncle's land outside the pond (Transformation). Next, S2 carries out the calculation process to determine the uncle's land area by multiplying the length and width of the land, then performs the calculation process to determine the area of the triangular pond by multiplying 1⁄2 by the size of the triangular pond base and multiplying by the height of the triangle, S2 does not write down the calculation process to determine uncle's land area outside the pond (Process Skill). Finally, S2 did not write a conclusion at the end of the answer which indicates the problem was not resolved properly (Encoding).

Test and Interview Test Result of subject 3 (S3)

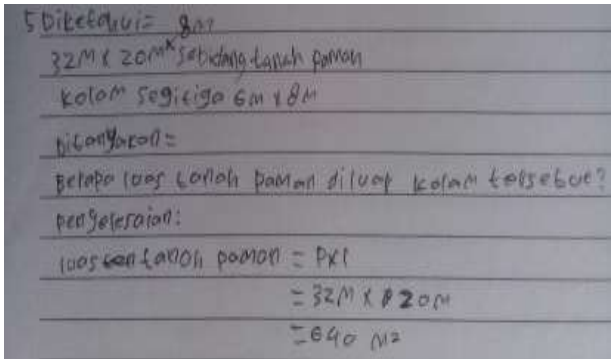


Given : flag in the shape of an isosceles triangle. The length of the same side is 2m and the other side is 1m. The flag used to celebrate 17 August 1945. Ani decorated the edge of the flag with ribbons. The price of the ribbon is Rp.4000. Ani buyed ribbond using Rp.50.000.
Problem : how much is Ani's change?
Solution : perimeter of the flag 2×1 = 2m Flag perimeter
= 2m × 4000
= 8000
Change =Ani Money-Ribbon Price
= 50000 − 8000
= 42000
So, Ani's change is 42.000

Figure 6. Test Result of S3 (Number 3)

Subject S3 in answer number 3 has written down what is known that the flag is in the shape of an isosceles triangle with the same side length of 2 m and the length of the other side is 1 m. 4000, -, Ani bought ribbons with Rp. 50.000,-. The S3 subject also wrote down exactly what was asked or what to look for in the questions, namely the change received by Ani (Reading and Comprehension). In the next stage, subject S3 wrote down the formula to determine the circumference of the flag but the formula was not correct, namely by multiplying 2 cm by the circumference of the flag. Apart from that, the S3 subject also wrote down the formula for calculating the correct change that Ani received, namely by subtracting the money that Ani had with the ribbon price. The solution to this problem uses 3 formulas, subject S3 does not write down the formula to determine the

overall price of the tape to be used (Transformation). Next, subject S3 made a mistake in carrying out the calculation process to determine the circumference of the flag. Subject S3 calculated the circumference of the flag by multiplying the length of the same side (2 m) by the price of the tape per meter (Rp.4000,-). The S3 subject to calculate the change that Ani received also made a mistake in her calculations by subtracting Ani's money (Rp. 50,000) from Rp. 8000,-. Also at this stage, subject S3 does not write down the calculation process to determine how much the entire band will cost (Process Skill). In the final stage, subject S3 wrote an incorrect conclusion, namely S3 wrote that the change Ani received was 42,000,-



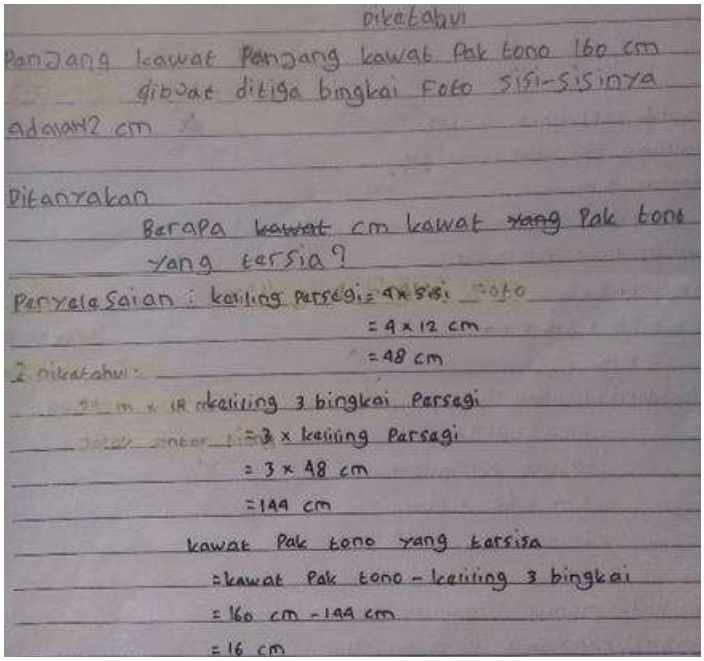
Given : 32m × 20m uncle's land. Triangular pond 6m × 8m
Problem : The area outside of the pond
Solution : The area of land $= p \times l$
$= 32m \times 20m$
$= 640m^2$

Figure 7. Test Result of S3 (Number 5)

In number 5 subject S3 did not correctly write what was known in the question correctly and correctly, subject S3 wrote that what was known in the problem was 32 m × 20 m × 8 m uncle's land, and a triangular pond 6 m × 8 m. As for those who are being asked or will be looking for from the questions, subject S3 writes down how much land his uncle has outside the pond (Reading and Comprehension). In the next stage, subject S3 only wrote down the formula or solution to find the total area of Uncle's land by multiplying the length and width of the land. Subject S3 did not write down the formula or solution to determine the area of the triangular pond and the area of the uncle's land outside the pond (Transformation). Then, in the next stage subject S3 only carried out the calculation process to determine the overall area of Uncle's land by multiplying the length (32 m) of Uncle's land by the width (20 m) of Uncle's land. Subject S3 did not write down the calculation process to determine the area of the triangular pond and the area of Uncle's land outside the pond (Process Skill). At the end of the answer, subject S3 did not write a conclusion which meant that this problem was not solved in perfect stages (Encoding).

Test and Interview Test Result of subject 4 (S4)

The results of the S4 subject test showed that the subject had difficulty solving all questions. The sample we show is as follows



Given : Mr. Tono's wire length is 160 cm. Three photo frames with sides of 2 cm will be made
Problem : How long is Mr. Tono's remaining wire?
Solution : Perimeter of square $= 4 \times side$
$= 4 \times 12cm$
$= 48cm$

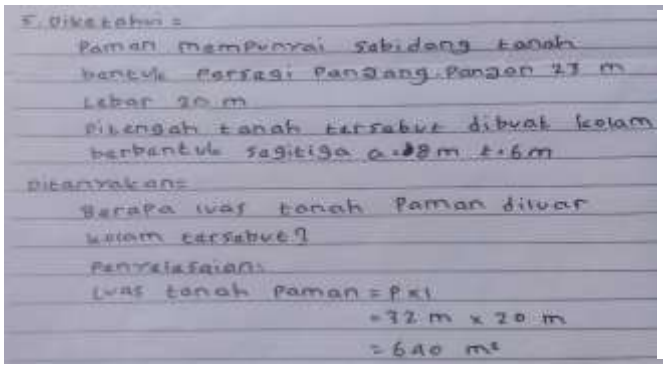
Perimeter 3 frame $= 3 \times Square\ Perimeter$
$= 3 \times 48cm$
$= 144cm$

Mr. Tono's remaining wire = Mr Tno Wire-Perimeter of 3 frame
$= 160cm - 144cm$
$= 16cm$

Figure 8. Test Result of S4 (Number 1)

In question number 1, subject S4 had written down the initial information, namely Mr. Tono's wire length was 160 cm. Three photo frames were made with sides of 12 cm. In addition, S4 also knows that the problem is "the remaining length of Pak Tono's wire" (Reading and Comprehension). In the next stage, S4 is right in determining formulas or solutions to solve problems. S4 writes the formula for determining the perimeter of 1 square by multiplying the number 4 by the length of the side of the square, then writes the formula for determining the perimeter of 3 square frames by multiplying it by 3. The last one is to determine the remaining length of the wire, s4 subtracts the initial length of the wire with a circumference of 3 frames (Transformation). Furthermore, S4 performs the calculation process completely and precisely. S4 wrote that the calculation process to determine the perimeter of 1 square is to multiply the number 4 by the side length (12 cm) so that the resulting perimeter of 1 square is 48 cm, then the calculation process to determine the perimeter of 3 square frames by multiplying the number 3 by the circumference of 1 square frame (48 cm) so that the resulting circumference of 3 square frames is 144 cm, and the calculation process to determine the remaining wire is done by subtracting the initial length of the wire (160 cm) with the circumference of 3 square frames (144 cm) so that the remaining wire length is 16 cm (Process Skill). S4 does not

write a conclusion or final answer, meaning that the problem is not resolved in perfect stages (Encoding).



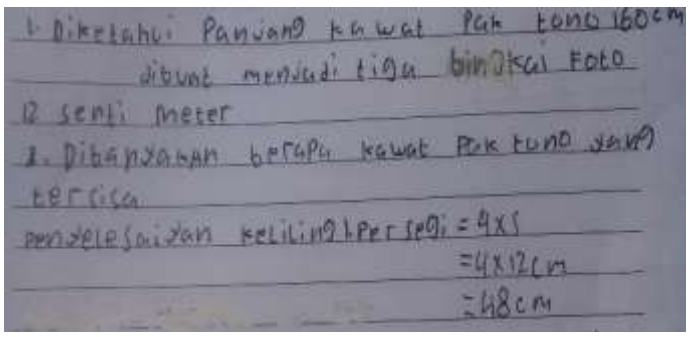
Given : Uncle has the land is rectangular in shape with a length of 22m width of 20m. In the center of land build the triangular pond with a b= 8m and a h= 8m
Problem : What is the area outside of the pond
Solution : The area of land $= p \times l$
$= 32m \times 20m$
$= 640m^2$

Figure 9. Test Result of S4 (Number 5)

Subject S4 had written down the initial information correctly, namely that the land owned by his uncle was rectangular in shape with a length of 23 m and a width of 20 m. A triangular pond would be made in the middle of his uncle's land with a height of 6 m and a base of 8 m. S4 also shows that the problem is the area of land outside the pond (Reading and Comprehension). S4 only wrote down the formula for determining the total area of Uncle's land, namely by multiplying the length and width of the land. S4 did not write down the formula to determine the area of the triangular pond and did not write down the formula to determine the area outside the pond (Transformation). Furthermore, S4 only wrote down the calculation process to determine the total area of the land by multiplying the length (32 m) and width (20) to produce 640 m2. S4 does not write down the calculation process to determine the area of a triangular pond and does not write down the calculation process to determine the area of land outside the pond (Process Skill). In the final stage, S4 did not write a conclusion, which means the problem was not completely resolved (Encoding).

Test and Interview Test Result of subject 5 (S5)

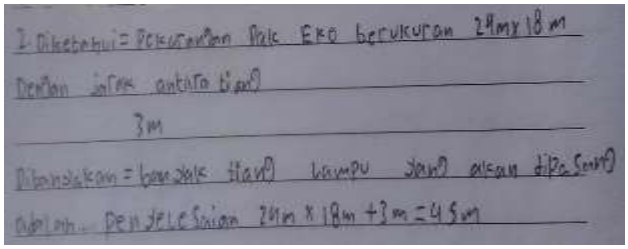
The results of the S5 subject test showed that S5 had difficulty in working on all the questions. The samples we show are as follows:



Given : Mr. Tono's wire length is 160 cm. Three photo frames with sides of 12 cm will be made
Problem : How long is Mr. Tono's remaining wire?
Solution : Perimeter of square $= 4 \times side$
$= 4 \times 12cm$
$= 48cm$

Figure 10. Test Result of S5 (Number 1)

In question number 1, S5 wrote down the initial information, namely Mr. Tono's wire length is 160 cm and also knows how to use the wire, namely that it will be made into 3 photo frames with sides of 12 cm. S5 also correctly wrote down the problem, namely the remaining wire pack (Reading and Comprehension). Subject S5 only wrote down the formula for determining the perimeter of one square which should be followed by determining the perimeter of three square frames. S5 also doesn't write down the formula to determine the remainder of the wire (Transformation). In the calculation process, subject S5 only wrote down the calculation process to determine the circumference of 1 square by multiplying the number 4 and the length of the side of the square frame (12 cm) to obtain a Test Result of 48 cm, subject S5 did not write down the calculation process to determine the perimeter of 3 square frames and the calculation process for determining the length of Pak Tono's remaining wire (Process Skill)In the last stage, subject S5 did not write conclusions on the answer sheet so that the questions were not completely resolved (Encoding).

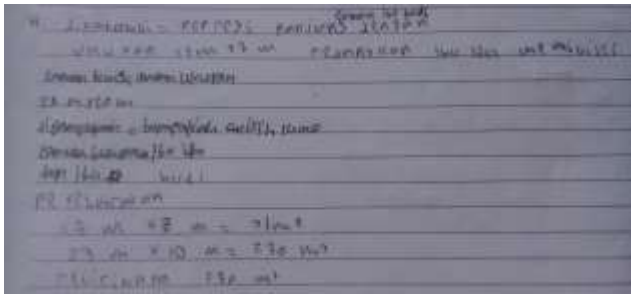


Given : Mr. Eko's Garden size is $24m \times 18m$. Distance between pole are 3m
Problem : The number of pole
Solution : Perimeter of square $= 24 \times 18m + 3m$
$= 45m$

Figure 11. Test Result of S5 (Number 2)

In question number 2, subject S5 was able to write down the initial information correctly and precisely. S5 can show that the size of the yard is 24 m × 18 m. The yard will be fitted with poles with a distance of 3m between the pillars. S5 also shows that the problem is the number of lampposts to be installed (Reading and Comprehension). S5 did not write down any formulas or solutions used to solve the problem (Transformation). S5 wrote an incorrect calculation process, namely 24m × 18m + 3m = 45m (Process Skill). In the final stage, S5 did not write conclusions on the answer sheet so it could be interpreted that the questions were not solved perfectly (Encoding).

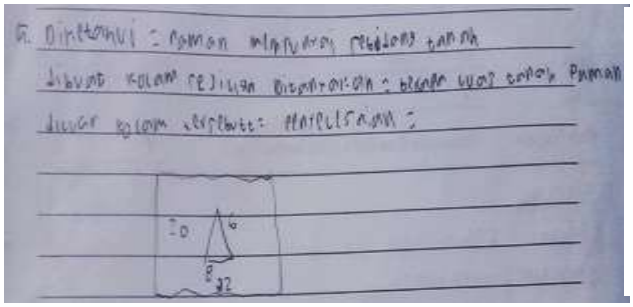
Test and Interview Test Result of subject 6 (S6)



Given : Mrs. Budi has a rectangular flower garden with a size of $13m \times 7m$ while
Mrs. Ida has a flower garden which is $23m \times 10m$.
Problem : What is the difference in the area of the flower garden owned by Mrs. Budi and Mrs. Ida?
Solution : $13m \times 7m = 91m^2$
$23m \times 10m = 230m^2$
Difference $230m^2$

Figure 12. Test Result of S6 (Number 4)

Subject S6 in question number 4 wrote down the initial information correctly, namely Mrs. Budi's flower garden is rectangular with a size of 13 m × 7 m, while Mrs. Ida has a flower garden with a size of 23 m × 10 m. S6 also wrote down exactly the problem, namely the difference in the area of the flower gardens of Mrs. Ida and Mrs. Budi (Reading and Comprehension). S6 did not write down the formula or solution used to solve problem number 4 (Transformation). S6 wrote down 2 of the 3 calculation processes that had to be carried out so that the questions could be answered. S6 only wrote down the calculation process to determine the area of the flower garden by multiplying the length and width of each garden, namely 13 m × 7 m, so that a garden area of 91 m2 was obtained, then for the other garden area, namely 23 m × 10 m, the result was 230 m2. S6 did not write down the formula to determine the difference in the area of Mrs. Ida's and Mrs. Budi's flower gardens (Process Skill). S6 in his final answer wrote a conclusion but it was not correct, S6 wrote that the difference was 130 m2 (Encoding).



Given: Uncle has the land. Build the triangular pond problem: What is the area outside of the pond. Solution:

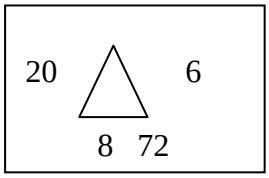


Figure 13. Jawaban tes subjek S6 nomor 5

S6 initial information was incomplete, S6 only wrote that "a plot of land is made into a triangular pond" without writing down the size of the garden and triangular pond that will be made. S6 is precise in determining the problem: the area of land outside the pond (Reading and Comprehension). S6 does not write formulas or solutions to solve these problems (Transformation). S6 also does not write down the calculation process to solve the problem (Process Skill). In the final stage, S6 also does not write conclusions

(Encoding). On the answer sheet, S6 only re-illustrated the pictures in the questions without clear explanations.

Difficulty in learning mathematics is a condition characterized by obstacles in learning (Devi, 2019). A person's learning difficulties can be seen from the mistakes made in solving a given problem. The same thing was expressed by Khanifah and Nusantara (Tiyas, 2017) that learning difficulties can be seen from the mistakes made in solving problems on certain materials. These errors can be identified by using Newman's Error Analysis (Suradi and Djam'an 2021).

Referring to the results of the tests and interviews with the selected subjects, the following discusses the difficulties in learning mathematics experienced by class V.B. students at SDN 020 Pombuntang in solving story problems based on Newman's Error Analysis.

Subjects in the high category experienced difficulties at three stages, the first had difficulty at the Transformation stage where the subject did not write down the complete formula used to solve the problem because they did not know the next formula or solution so the problem could be resolved. According to opinion of (Hadi, 2020) that at this stage, difficulties can be known from the subject's mistakes in choosing the right formula to solve the questions in the problem. The next stage is the difficulty at the Process Skill stage where the subject does not write down the complete calculation process to solve the problem because students do not know the next formula which also affects the calculation process. This is supported by research conducted by (Sesanti, 2020) that the cause of students experiencing difficulties at the Process Skill stage occurs due to the difficulties experienced by the subject at the previous stage. The last stage is the difficulty in Encoding where the subject does not write down and is wrong in writing the conclusions that occur because the subject makes mistakes in the previous stages. In line with the statement that at this stage there were difficulties because the subject did not write down the final answer or was unable to display or show the correct answers to the questions given (Fitriani, et al., 2018).

Subjects with moderate categories experience difficulties at all stages. At the Reading and Comprehension stages, the subject in the category is having difficulty which is marked by incorrectly writing down what is known in the problem because they cannot find information or keywords that are presented in the form of pictures. This is supported by the expression of (Noutsara, Neunjhem & Chemrutsame, 2021) that students are categorized as having difficulty at the Reading stage if the subject is unable to find

complete and precise information on the problem. Seng (2020) said that difficulty at the Reading stage affects the Comprehension stage, when the subject experiences a bad Reading stage, the subject will not clearly understand what is in the problem. Comprehension difficulties include the subject's inability to identify what is known and what is asked in the questions (Fitriani, Turmudi & Prabawanto, 2018). At the Transformation stage, the subject in the category is experiencing difficulty which is marked incorrectly and does not write down the complete formula to be able to solve the problem because they do not know and are confused about which formula to use. This is in line with the opinion of (Permatasari & Nuraeni, 2021) who say that difficulties at this stage are marked by students/subjects making mistakes in determining formulas. The Transformation stage is continuous with the Comprehension stage, where it is said that at the Transformation stage, there can be difficulties due to failure to know what is needed so that the problems can be solved. At the Process Skill stage, subjects in the category are experiencing difficulties which are marked by the wrong calculation process in writing formulas and incomplete. According to (Suradi & Djam'an, 2021) said that process skill can occur when the subject cannot perform calculations correctly and occurs because he is wrong in determining the formula to be used. At the Encoding stage, the subject with the category is experiencing difficulties marked by the wrong subject, does not write conclusions, and does not know how to write conclusions as the final stage of working on the problem. In line with the research conducted by Sesanti (2020), that is the reason why students do not write conclusions because they do not understand what is meant by conclusions.

Subjects with low categories also experienced difficulties at all stages. At the Reading and Comprehension stages, subjects in the low category experience difficulties at this stage in several numbers that occur because the subject is unable to read the information presented in the form of images so they cannot write down what is known and asked in the questions correctly. According to (Yuzalia, 2021), one of the indicators of Newman's Error in the Reading stage is not being able to find the keywords contained in the problem. Where in question number 5, keywords are presented in the form of pictures. The Reading and Comprehension stages are related to each other, such as opinions

The results of (Hadi, 2021) research said that the reading stage and the comprehension stage are stages that are continuous with each other, which means that if difficulties occur at the Reading stage, students may experience difficulties at the Comprehension stage. The next stage is Transformation, subjects with low categories

experience difficulties at this stage where the subject is wrong and does not write down the formula used to complete the problem which occurs because the subject does not know the formula. This is in line with the opinion of (Noutsara, et al, 2021) that one of the characteristics of the difficulties of Transformation is that the subject is unable to determine solutions to overcome problems or fails to determine the strategies and procedures to be used (Junaedi, Suyitno, Sugiharti & Eng, 2015). In addition, difficulties at this stage can occur due to failure to know what is needed so that the problem can be solved (Zamzam & Patricia, 2017). The next stage is Process Skill, subjects with low categories experience difficulty at this stage marked by the subject not writing down the complete calculation process so that questions can be answered that occur because the subject experienced difficulties at the previous stage. The last stage is Encoding, subjects with low categories experience difficulties that are marked by the wrong subject and not writing conclusions at the end of their answers which can occur due to errors in the previous stage. Difficulties in writing down the solving procedures at the previous stage also affected the subject so they could not find the correct answer, one of which was difficulty writing symbols in mathematical sentences or writing wrong formulas (Seng, 2020).

CONCLUSION

The research that has been done analyzes the difficulty of learning mathematics in solving story problems based on Newman's Error Analysis so that it can be concluded that the difficulties in solving story problems are:

1. Subjects in the high category experience difficulties at the Transformation, Process Skill, and Encoding stages. Difficulties at the Transformation stage where the subject does not write down the complete formula used to solve the problem because he does not know the next formula so that the problem can be resolved. The next stage is difficulty at the Process Skill stage where the subject does not write down the complete calculation process to solve the problem because students do not know the next formula that affects the calculation process. The last stage is the difficulty in Encoding where the subject does not write down and is wrong in writing the conclusions that occur because the subject makes mistakes in the previous stages.
2. Subjects in the category are having difficulty at all stages. At the Reading and Comprehension stages, the subject in the category is having difficulty which is marked by incorrectly writing down what is known in the problem because they cannot find

information or keywords that are presented in the form of pictures. At the Transformation stage, the subject in the category is experiencing difficulty which is marked incorrectly and does not write down the complete formula to be able to solve the problem because they do not know and are confused about which formula to use. At the Process Skill stage, subjects in the category are experiencing difficulties which are marked by the wrong calculation process in writing formulas and incomplete. At the Encoding stage, the subject with the category is experiencing difficulties marked by the wrong subject, does not write conclusions, and does not know how to write conclusions as the final stage of working on the problem.

3. Subjects with low categories have difficulty at all stages. At the Reading and Comprehension stages, subjects in the low category experience difficulties at this stage in several numbers that occur because the subject is unable to read the information presented in the form of images so they cannot write down what is known and asked in the questions correctly. The next stage is Transformation, subjects with low categories experience difficulties at this stage where the subject is wrong and does not write down the formula used to complete the problem which occurs because the subject does not know the formula. The next stage is Process Skill, subjects with low categories experience difficulty at this stage marked by the subject not writing down the complete calculation process so that questions can be answered that occur because the subject experienced difficulties at the previous stage. The last stage is Encoding, subjects with low categories experience difficulties that are marked by the wrong subject and not writing conclusions at the end of their answers which can occur due to errors in the previous stage..

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