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Analysis of student problem-solving errors based on Newman's theory in terms of learning interest and gender

Anas Ma'ruf Annizar^{1*}, **Dewi Fatma Kumala²**^{1,2}Tadris Matematika, Universitas Islam Negeri Kiai Haji Achmad Siddiq Jember, Jawa Timur 68136, Indonesia^{1*}anasannizar28@gmail.com, ²d3wq.fatma@gmail.com

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*Corresponding author

Abstract:

Errors often occurred when students solve mathematical problems solving, exceedingly when students are faced with contextual story problems. Newman's procedural error analysis classified errors in solved story problems into five categories: reading errors, encoding errors, transformation errors, comprehension errors, and processing skill errors. There were several factors on errors worked by students when solving problems, such as student interest in learning and gender differences. This study aims to describe the problem-solving errors of students, both men, and women, who have high, medium, and low interest in learning to solve story problems on SPLTV material. According to the Newman's procedure. The research type is a qualitative approach with descriptive. And the research subjects were obtained by using a purposive sampling technique. The results of this study include 1) Students of high interest in learning and are making Encoding Errors, and Processing Skill Errors, while students with low interest in learning make Processing Skill Errors, Transformation Errors, and Encoding Errors. 2) Students with a great interest in learning and making encoding errors and processing skills errors. Students with low interest made Comprehension Errors, Encoding Errors, Processing Skill errors, and Transformation Errors.

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Introduction

Education is an activity that significantly contributes to creating quality human beings. If these human resources have educational provisions, it will make it easier to receive new information more effectively and adapt in the face of the development and progress of modern technology that is getting faster and faster. The world of education has been significantly impacted by the current technology's quick development and advancement. According to the intent of UU RI No. 20, education has a crucial role in the development and improvement of high-quality human resources (Presiden Republik



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Indonesia, 2003). One of the education designated as 9 years of compulsory education is mathematics.

Mathematics has made a crucial contribution to the expansion of technology and science. In line with Suandito (2017) claims, which contend that mathematics is one of the universal sciences and has significantly influenced the advancement of both science and modern technology. Kharis et al. (2021) said that mathematics is one of the fields of science in the world of education that must be studied and pursued at every level of education, starting from elementary, middle, and even tertiary levels. On the other hand, mathematics also acts as a reference for skills in solving problems in everyday life, so there is a need for development and quality improvement in mathematics learning. One of the things that must be considered in improving the quality and development of mathematics learning is errors in the problem-solving process.

Errors contradict well-defined methods or procedures and have an incidental, regular, and systematic nature (Shinariko et al., 2020). The Big Dictionary Indonesian interprets error as a mistake, an incident, and a deviation. In mathematics learning, students often make mistakes in the problem-solving process. This is a natural thing for students. If the student's mistakes are ignored, students may make the same mistakes when completing the problem-solving process. Problem-solving is the basic ability to learn mathematics. From solving this problem, students are trained to think skillfully, critically, as well as thoroughly. In line with the opinion of Ramaley (2007) who argues the main of that one goal of learning mathematics is to make students' abilities more skilled in solving various mathematical problems in detail. However, the majority of students still experience difficulties when solving math problems, especially when faced with story problems.

Emanuel et al. (2021) stated that the story problem is a problem where the work is done using a problem-solving solution that applies mathematical sentences, namely numbers, relations, and counting operations. In mathematics learning, contextually integrated story problems are usually found in the material of a three-variable linear equation system (SPLTV). This material is considered to have a fairly difficult stratum. According to Ilhan & Akin (2022), SPLTV is one of the other lessons that is used as a scourge of lessons for students because of the difficulty when doing questions on the material, let alone questions in the form of stories. Several factors contribute to mistakes made by students while working on the process of solving problems, like the students' gender differences and proclivity for learning.

Interest in learning is a condition of a person who has more interest and a sense of something that is accompanied by a desire to learn, know and prove it (Annizar & Arifin, 2021; Wong & Wong, 2019). Interest in learning arises because of a feeling of pleasure, interest, attention, and involvement in a certain thing. When students already have an interest in learning and are trying to learn it, God will show good results from the efforts they have made. As Allah says in Surah An-Najm verses 39-40, which reads.

وَأَنْ لَّيْسَ لِلْإِنْسَانِ إِلَّا مَا سَعَىٰ {39} وَأَنَّ سَعْيَهُ سَوْفَ يُرَىٰ {40}

That is to say: (39) And that men acquires only what He has sought. (40) And indeed his efforts will one day be shown (to Him).

From this verse, the interest in learning affects the process of solving students' problems in solving math problems. Another factor contributing to student mistakes when working on the problem-solving process is gender differences.

Maccoby and Jacklyn stated that women and men have dissimilarities in their abilities, namely: 1) men are less superior in their potential power than women, which means that women have higher potential power than men; 2) women are less superior in spatial visual power than men; 3) men are superior in terms of their mathematical power compared to women (Annizar & Zahro, 2020; Apriyono, 2016). Regardless of this, to determine the location or position of students' mistakes when completing the process of problem-solving, researchers use problem-solving error analysis based on Newman's procedures. According to Prakitipong & Nakamura (2006), a method for analyzing problem-solving errors in problem descriptions in mathematics learning is the meaning of Newman's procedure. White (2010) argues that the analysis of problem-solving errors builds upon Newman's procedures has the highest integrity. Newman's classified mathematical problem-solving errors into 5 categories, namely: reading errors, transformation errors, comprehension errors, final answer writing errors (encoding errors), and skill errors (processing skill errors) (Annizar et al., 2020; Harniati et al., 2019; Khairunnisa et al., 2020).

Based on a preliminary study conducted by researchers through interviews with resource persons, namely mathematics teachers in Tunas Luhur senior high schools Probolinggo, it was obtained that: 1) At the linear equation in three variable SPLTV material meeting the learning process was still less effective and from the results of student scores obtained 48% of students were still below KKM and 51% of students above KKM. According to Nastiti, based on the percentage category, the response of media users stated that the percentage $p \leq 50\%$ is in the category of very lacking and

the percentage $50\% < p \leq 65\%$ is in the category of not good. So it can be concluded that students still experience difficulties when completing the problem-solving process in the material story problem because the learning process is not effective. 2) There are differences in the completion process worked on by female and male students. Based on the narration of the speakers, male students are more dominant in making problem-skill errors. In terms of students' interest in learning, male students tend not to be interested in learning mathematics in terms of their behavior when in the classroom.

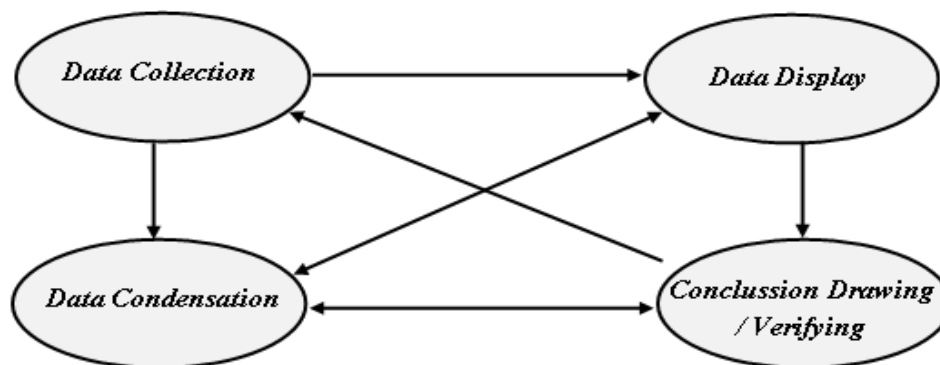
Lestari (2021b) research thesis analyzes students' mistakes when the student solving mathematical literacy problems based on their cognitive level. The error analysis used is an error analysis observed in Newman's procedure. The thesis concluded that students with high cognitive ability were not making mistakes in understanding, transforming, and reading. Students with a moderate cognitive level do not make mistakes in reading and understanding. Students with low cognitive levels make mistakes based on Newman's indicators of the procedure. Topa (2019) analyzed the mistakes of 10th-grade student students at SMEN Jenggawah in solving exponent function problems in terms of gender. The results from the study indicate that men students made misconceptions, principle errors, and operating errors. Women students make mistakes in concept as well as mistakes in principle. The difference with previous studies lies in the variables and subjects used. This study analyzes student problem solving in solving story problems on linear equation in three variable (SPLTV) material

build upon Newman's procedure in terms of gender at Tunas Luhur High School, 10th-grade student science 1.

A problem-solving study is required to find out the location or position of mistakes do it by students in solving story problems on linear equations in three-variable (SPLTV) material (Annizar, Lestari, et al., 2021; Masruroh et al., 2021; Sakdiyah & Annizar, 2021). As displayed in the previous presentation, the researcher assessed the importance of conducting research by saying, "Analysis of Student Problem-Solving Errors builds upon Newman's Theory in Terms of Learning Interest and Gender." With the direction of the study, which is to describe the problem-solving errors of students, both men and women, who have a high, average, or low interest in solving story problems in linear equations in three variables (SPLTV) material, build upon Newman's procedures.

Research Methods

The research type uses a qualitative approach with descriptive. The method that describes the research results with the aim of analyzing an event under study is the definition of descriptive research. The qualitative descriptive data analysis technique is a research method that utilizes qualitative data and is described descriptively (Creswell, 2012). Thus, this research was conducted to describe the problem-solving errors of students, both men and women, who have a high, medium, or low interest in solving story problems in linear equations in three variable (SPLTV) material built upon Newman's procedures. The research subjects in this study were selected according to the research criteria studied based on consideration and direct agreement by the researcher with the mathematics teacher. The subjects chosen were students of 10th-grade student science 1 senior high school Tunas Luhur because 10th-grade student science 1 is a class suggested by mathematics teachers through interviews conducted when researchers carry out for the reason that 10th-grade student science 1 is more diverse in terms of interest in learning and mathematical ability. The subjects is Six person of 10th-grade student science students and one senior high school were used as research subjects. Tunas Luhur Probolinggo was studied using purposive sampling techniques, which means that samples were studied based on specific criteria. The subjects in this study consisted of 12 subjects with considerations used to determine the research subjects, including: The willingness of students to be the subject of research, dissemination of learning interest questionnaires to all students of 10th grade student science 1 senior high school Tunas Luhur to classify the criteria for high, medium and low interest in learning, the classification of criteria is in accordance with the predicate range on the midterm examination score mathematics 10th-grade student Science 1 senior high school Tunas Luhur and discussion with mathematics teachers with the aim of selecting 12 subjects, namely 2 male students with high, medium, low learning interests and 2 female students with high, medium, low interest in learning. Data was collected through learning interest questionnaires, written tests of linear equation in three variable (SPLTV) materials, interviews based on Newman's procedures, and documentation. Data analysis using the Miles, Huberman, and Saldana models The revised components of data analysis according to Miles, Huberman, and Saldana in the meanwhile: data collection, data condensation, display data, and conclusion drawing or verifying, as follows (Subakri & Annizar, 2021).



Picture 1. Components of Data Analysis by Miles, Hubermen, and Saldana

The written test instrument (linear equation in three variable story questions) used is as follows: On March 2, 2023, Dewi will celebrate its 22nd anniversary. Franda will give Porta a gift on condition that he solves the given puzzle. The mystery is as follows: There are three numbers, namely the first, the second, and the third. The sum of six times the 1st and 2nd numbers plus four times the 3rd number is 10. If the 2nd number is reduced six times by the sum of twice the first and six times the 3rd numbers, that is 4.4. If the 3rd number is reduced twice by adding the 1st number four times and the 2nd number six times, then 2. Help Dewi will find the values of those numbers.

Results and Discussions

Obeded on data the results analysis of the story question test on the SPLTV material and the interview results according to Newman's procedure error analysis, student error data presented in Table 1 is as follows:

Table 1. Student Mistakes in Solving Story Problems on SPLTV Material Displayed on Newman's Procedure

Subject	Reading Errors	Comprehension Errors	Transformation Errors	Processing Skill Error	Encoding Error
L1	-	-	-	✓	✓
L2	-	-	-	✓	✓
L3	-	-	✓	✓	✓
P4	-	-	-	✓	✓
P5	-	-	-	✓	✓
P6	-	✓	✓	✓	✓

The research types of errors subjects based on interest in learning and gender are as follows.

- a. Men students with a high interest in learning were obtained from research subject 1 (L1). On the results of data analysis, achievement by men students, high interest in learning, mistakes in writing the final answer, and skill errors. This can be observed from the results of tests and interviews that have been reduced as follows.

The image shows handwritten mathematical work for two systems of linear equations in three variables (SPLTV). The work is divided into two parts, labeled 1+2 and 3-2.

Part 1+2:

$$\begin{aligned} 6x + 6y + 4z &= 10 \\ -6x + 10y - 10z &= 12 \end{aligned}$$

$$\begin{aligned} 24y - 14z &= 22 \\ 12y - 7z &= 12 \end{aligned}$$

Part 3-2:

$$\begin{aligned} 2z - 4x + 6y &= 2 \\ -10z - 4x - 12y &= 2 \end{aligned}$$

$$-10z - 6y = -6$$

On the right side, there are two elimination steps:

Step 1:

$$\begin{aligned} 12y - 7z &= 12 \quad | \cdot 1 \\ 6y + 10z &= -6 \quad | \cdot 2 \end{aligned}$$

$$\begin{aligned} 12y - 7z &= 12 \\ 12y + 20z &= -12 \end{aligned}$$

$$-27z = 0$$

$$z = 0$$

Step 2:

$$\begin{aligned} 6y + 10z &= -6 \quad | \cdot 7 \\ 12y - 7z &= 12 \quad | \cdot 10 \end{aligned}$$

$$\begin{aligned} 42y + 70z &= -42 \\ 120y - 70z &= 120 \end{aligned}$$

$$162y = 78$$

$$y = 0$$

Picture 2. L1 Skill Error

- P1 : Can you solve question number 2 after determining the distribution, equations, and methods?
- S1 : I can, but it's not complete. (while pointing out the work).
- P1 : "Well, here you solve the values of the variables y and z, but how do you solve for x?"
- S1 : I haven't worked on it since x, but I know who the finisher is, and the completion is similar to this y and z. It's not as fast as working on the x because the time is up, sis.
- P1 : Do you have any difficulties answering question 2? Where is it? Please show me!
- S1 : "Number 2 is difficult in the problem, sis; it is a bit difficult to understand from the sentence if the number is six times the first and so on."
- P1 : Why don't you write the final answer's conclusion?
- S1 : As you can see, it's not finished yet, sis, hehe.

According to the data from the analysis above, it can be observed the consistency between the test results and the interview results shows encoding errors and skill errors. Encoding errors and skill errors are made because students are not quite right in completing the calculations, namely in the division of the results of the elimination of equations to 1 and 2, L1 answers $12y - 7z = 12$ should be $12y - 7z = 11$, so the final answer is also not quite right. Then concluded that men students of high interest in learning do fulfill mistakes in writing the final answers, transformation errors, and skill errors.

- b. Men students with an average interest in learning are obtained from research subject 2 (L2). Obeyed on the results of data analysis obtained by men, students who have an average interest in learning are doing or fulfilling the mistakes of writing the final answer and skills. This can be observed from the results of tests and interviews that have been reduced as follows.

Jawab = 1 = $6y - (2x + 6z) = 4 \quad | \times 2$
 $2z - (4x + 6y) = 2 \quad | \times 1$
 $= 12y - (4x + 12z) = 8$
 $2z - (4x + 6y) = 2$
 $= 12y - (4x + 12z) = 8$
 $6y - (4x + 2z) = 2$

 $6y - 10z = 6 \quad | \textcircled{1}$
 $2 = 6x + 6y + 4z = 10$
 $6y - (2x + 6z) = 4$

 $6x + 6y + 4z = 10 \quad | \times 1$
 $2x - (6y + 6z) = 4 \quad | \times 3$

 $6x + 6y + 4z = 10$
 $6x - (18y + 18z) = 12$

 $24y - 14z = -2$
 $\Rightarrow 6y - 10z = 6 \quad | \times 4$
 $24y - 14z = -2 \quad | \times 1$

 $24y - 110z = 24$
 $24y - 14z = -2$

 $-26z = 26$
 $z = 1$

Picture 3. L2 Skill Error

- P2 : Are you having difficulty answering question 2?Where should it be displayed?
 S2 : Yes, I'm not sure how to fix it, brother.(showing the working process on the written down) want to move the sectionI forgot how, sis, so I can't get the answer.
 P2 : Why don't you write down the conclusion of the final answer?
 S2 : I don't know the answer, sis, just like you.

According to data from the analysis above, it can be observed the consistency between the test results and the interview results show errors in writing the encoding and skill errors. Encoding errors and skill errors are made because students cannot continue the stages of the complete procedure used (restrained or stagnant), namely after getting the z L2 score not continuing it and L2 is not quite right in completing the calculation, namely, the L2 subject is wrong in transferring the subject segment writing $2z = (4x + 6y) = 2$ in the section move to $6y - (4x + 2z) = 2$ should be $-6y + 4x + 2z = 2$ and the student is also not quite right in completing the calculation as a result The final answer was not found (the answer was not completed). So it can be concluded that men students of average interest in learning are doing, fulfilling mistakes in writing the final answer, misunderstanding errors, skill errors, and transformation errors.

- c. Men students with low interest in learning were obtained from research subject 3 (L3). As displayed on the yield of data analysis obtained by men, students of low interest in learning perform or fulfill all the mistakes of skilling, transformation, and final answer writing. This can be observed from the display of interviews and tests that have been reduced as follows.

2. Diket = $x = \text{bilangan pertama}$
 $y = \text{bilangan kedua}$
 $z = \text{bilangan ketiga}$

Ditanya

Dijawab. ① = $6x + 6y + 4z = 10$
 ② = $6y - 2x + 6z = 4$
 ③ = $2z - 4x + 6y = 2$

$z = 3x - 3y + 1$
 $6x + 6y + 4z = x - 3y + 17$
 $6x + 6y + 2x = 12y$
 ④ $14x - 6y = 6$
 $2x - 3y + 7 = 4$
 $6y - 2x - 12y + 10y - 6 = 4$
 $24y - 14x = 10$
 $-6y + 14x$

 $18y = 6$
 $y = \frac{6}{18} = \frac{2}{9}$

Picture 4. L3 Skill Error

- P3 : What should be copied from the second question?
 S3 : The 1st as x, the 2nd as y, and the 3rd number as z.
 P3 : What kind of mathematical model do you get in question number 2?
 S3 : There are three parallels here. This the equals (This shows the solution.)
 P3 : Why did you write the mathematical model wrong?
 S3 : Because I skimmed over the problem.
 P3 : Try to figure out where you went wrong!
 S3 : The mistake is only in the two kaks' equation: fewer closing brackets equals fewer opening brackets, sis.
 P3 : Can you solve the story problem after making the parables and using the mathematical models and methods used?
 S3 : I can't do it because I can't how calculate it, and I forget the method.
 P3 : Did you have any difficulties when solving question number 2?
 S3 : Yes, sis, when you want to calculate it, you don't know because I forgot how.
 P3 : Why don't you write down the conclusion of the final answer?
 S3 : Because I didn't complete it either, sis, hehe.

According to data from the analysis above, it can be observed the consistency between the test results and the interview results shows transformation errors, writing final answers, and skill errors. The transformation error is made because L3 is not quite right in transforming the mathematical model on the 2nd and 3rd equations. In the error

of skill L3 cannot pass on the stages of the completion procedure used (restrained or stagnant) and the student is also not quite right in completing the calculation, namely L3 is wrong in the transfer of segments and division in the 3rd equation which is in $2z - 4x + 6y = 2$ divided by 2, L3 answers $z = 3x + 3y + 1$ should be $z = -2x - 3y + 2$, as a result of which the final answer was not found (answer was not completed). Then it can be concluded that men students of low interest in learning do, meet all the indicators of mistakes i.e. final answer writing errors, transformation errors and skill errors.

- d. Women students with a high interest in learning were obtained from research subject 4 (P4). Based on data from analysis collected by female students with an increased interest in learning, they produce or encounter errors when writing final answers and skills. This can be observed from the data of tests and interviews that have been reduced as follows.

$$\begin{cases} 6x + 6y + 4z = 10 \\ 6y - (2x + 6z) = 9 \\ 8x - 2z = 6 \end{cases} \rightarrow \text{sama}$$

$$\begin{cases} 6x + 6y + 4z = 10 \\ 2z - (4x + 6y) = 2 \\ 2x + 2z = 8 \end{cases} \text{ metode gabungan}$$

$$\begin{cases} 8x - 2z = 6 \\ 2x + 2z = 8 \end{cases} \rightarrow$$

$$6x = 14$$

$$x = \frac{14}{6} = \frac{7}{3}$$

$$\begin{cases} 2x + 2z = 8 \\ 2(\frac{7}{3}) + 2z = 8 \\ 1\frac{7}{3} + 2z = 8 \\ z = \frac{10}{6} = \frac{5}{3} \end{cases}$$

$$\begin{cases} 6x + 6y + 4z = 10 \\ 6(\frac{7}{3}) + 6y + 4(\frac{5}{3}) = 10 \\ 14 + 6y + \frac{20}{3} = 10 \\ y = \frac{-32}{18} = \frac{-16}{9} \end{cases}$$

Picture 5. P4 Skill Error

- P4 : Are you having difficulty answering question 2? Which section? Please show!
- S4 : Yes, sis, it's a bit difficult to get sick after meeting the equation. I'm confused about how to eliminate it because there are brackets too. While showing the second and third equations written, the second equation is the same as the third.
- P4 : What do you make of question number two?
- S4 : The values of the numbers are: $x = \frac{7}{3}$, $y = \frac{-16}{9}$, and $z = \frac{5}{3}$, but the answer is incorrect.

P4 : The method is correct, but the calculation method is wrong from the beginning, so the answer is finally wrong, hehehe.

P4 : Yes, sis, because I'm perplexed by the brackets.

As displayed in the data analysis above, it can be observed the consistency between the test results and the interview results shows encoding errors and skill errors. Skill errors are made because students are not quite right in completing their calculations, namely in reducing the value of z, which should be -10 z, but P4 answers -2z. So the final answer is also not quite correct. So, it can be inferred that female students who are highly motivated to learn also make faults in their ability to write final responses.

e. Women students with an average interest in learning are obtained from research subject 5 (P5). Based on the data, the analysis found that female students with ordinary motivation in learning are making or fulfilling errors in final answer writing and skills. This can be observed from the results of tests and interviews that have been reduced as follows.

Handwritten mathematical work for a system of three linear equations in three variables (SLKV). The student shows several steps of elimination, including multiplying equations and subtracting them. There are several errors in the calculations, such as incorrect signs and arithmetic mistakes. The final answer is given as $x = 4$, $y = 7$, $z = \frac{7}{6}$.

Initial equations:
 $6x + y + 4z = 10$
 $6y - 2x + 6z = 4$
 $2z - 4x + 6y = 2$

Student's work includes:
 $6x + 30 = 6x + 30 - 30$
 $6y - 20 = 6y - 20 - 20$
 $x = -\frac{10}{6}$
 $x = -3,3$

Other steps shown:
 $15 - 15 + 6z = 4$
 $6z = 4$
 $z = \frac{4}{6}$
 $z = \frac{2}{3}$

Final answer:
 $x = 4$
 $y = 7$
 $z = \frac{7}{6}$

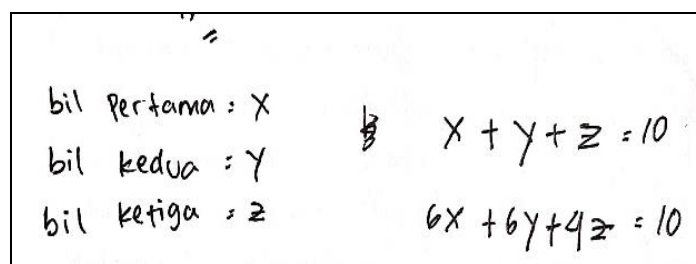
Picture 6. P5 Skill Error

P5 : Can you solve this problem number 2 after making a parable? The equation is the same as the mathematical model.

- S5 : You're doing well, but I'm not sure about the answer, ehehehe.
P5 : Please explain your response to question 2!
S5 : First, I omitted z by removing a and b. I continue to eliminate (b and c) from this result (e) $6y + 10z = 6$, then I continue to eliminate (kak sampek) to find this result (while pointing out the work), but I am not sure of the answer.
P5 : Are you still writing down the final answer's conclusion?
S5 : No way, sis, hehe. I'm too intent on working on it, you see, for fear of making a mistake.. It turned out to be wrong, hehehe. However, the outcome is this (while pointing out the work).
P5 : Okay, so you're incorrect here because you don't see these brackets, right? Yet, it's already beneficial to be able to work on it. You should look at them first because the closing brackets will also be the same as the calculation.
S5 : Hehe, because you've been concentrating on it.

According to the analysis above, it can be observed the consistency between the test results and the interview results shows errors in writing the final answers and skill errors. Writing the final answer and skill errors are carried out because students are also not quite right in completing the calculation, namely in writing the first equation to calculate the completion, P5 does not write the coefficient of the variable y, P5 answers $6x + y + 4z = 10$ should be $6x + 6y + 4z = 10$, as a result the final answer is not found (answer not completed). Thus, it can be stated that female students with average learning interests are making mistakes in both their skills and the final answers.

- f. Women students with low interest in learning were obtained from research subjects 6 (P6). Based on data from analysis performed by female students who had little interest in studying or had problems with comprehension, transformation, writing final replies, and skills. This can be observed from the results of tests and interviews that have been reduced as follows.



The image shows a handwritten note on a piece of paper. On the left side, there are three lines of text: "bil pertama : X", "bil kedua : Y", and "bil ketiga : Z". To the right of these, there are two equations: $X + Y + Z = 10$ and $6X + 6Y + 4Z = 10$. The second equation contains a skill error where the coefficient of Y is written as 6 instead of 1.

Picture 7. P6 Skill Error

- P6 : What information do you have from question 2?
S6 : There are three numbers: the 1st one, the 2nd one, and the 3rd one.
P6 : What exactly is known information?
S6 : That's all, sis. Hehehe
P6 : Which of the following questions is asked?
S6 : Tasked with determining the first, second, and third numbers.
P6 : How do you know if this is the question?
S6 : "Ee, I know from this kak" (demonstrating the issue), assist the goddess in determining the number.

- P6 : From question number two, what should I copy?
S6 : The 1st is x, the 2nd is y, and the 3rd number is z.
P6 : From question number 2, what kind of mathematical model do you get?
S6 : The sum of $2\ 6x + 6y + 4z$ equals 10, $x + y + z$ equals 10. This is sis, but I understand too, sis. I don't know.
P6 : Can you complete or do problem number 2 after determining the forecast, method, and mathematical model?
S6 : I can't, sis, because I forgot how; I'm confused.
P6 : Did you encounter any difficulties while answering this question? Where should it be displayed?
S6 : Yes, sis, that's why I don't understand it. Ehhe.
P6 : Does that mean you didn't write down the conclusion of the final answer?
S6 : Not at all, sis. I don't work on it.

According to the analysis above, it can be observed the consistency between the test results and the interview results shows understanding, transformation, final answer writing errors, and skill errors. The mistake of understanding P6 made a mistake because it was incorrect in determining and writing down the general information from the problem. In the transformation error, P6 only writes down two mathematical models, so P6 meets the transformation error indicator because students cannot or cannot write the mathematical model correctly. P6 transforms and mentions the calculation by assuming "the 1st as x, the 2nd as y, and 3rd number as z", but cannot correctly mention the mathematical model in problem number 2 "" " $6x + 6y + 4z = 10$, $x + y + z = 10$ " should be " $6x + 6y + 4z = 10$, $6y - (2x + 6z) = 4$, $2z - (4x + 6y) = 2$ ". Meanwhile, skill errors and encoding errors are made because students do not do or complete the question, as a result, the encoding answer is not found (the answer is not completed). In the context of the above, it may be said that female students with poor motivation for learning frequently commit encoding errors as well as skill, understanding, and transformation errors.

The data analysis based on each indicator is as follows:

a. Reading Mistakes

According to the researcher's data analysis, none of the subjects made any reading mistakes. According to Magen-Nagar (2016), reading errors occur when pupils struggle to read and comprehend symbols, keywords, graphs, pictures, and other elements, making it difficult for them to solve problems. Based on data the definition subjects of the study did not make any reading errors.

b. Comprehension Error

Based on data analysis carried out by researchers, errors in understanding almost all research subjects did not do, but there were still those who made reading errors, namely research subjects 6 (P6). Amador (2022), Arba Abdul Rahman, and Teoh Sian Hoon contend that misconceptions develop when pupils find it difficult to comprehend the content in the questions. This is the case with the subjects of the P6 study. Subject P6 is not quite right, cannot or cannot mention, writes down the information contained in question number 2, As a result, it meets the indicators of misunderstanding, namely students are not quite right in writing and mentioning known information on the question.

c. Transformation Error

Based on data analysis conducted by researchers, reading errors almost all research subjects did not do, but there were still those who made reading errors, namely research subjects 3 (L3) and 6 (P6). The formulas and mathematical models could not or could not be appropriately written down or mentioned by subjects L3 and P6. So that the subjects of the study met the indicators of transformation errors because they were not correct in writing and mentioning the calculations and mathematical models on the problem. Transformation problems occur when students can't adapt mathematical models and procedures in order to solve them (Islamiyah et al., 2018).

d. Processing Skill Error

Based on data analysis conducted by researchers, almost all subjects did so except L1 and P4 subjects, did not make skill mistakes on question number 1. Skill errors occur if students are unable to continue the stages of the complete procedure used (restrained or stagnant), students are not right in completing calculations because they are not quite right in using mathematical rules and concepts, students cannot or cannot write down and explain the procedures or stages in completing the calculations used correctly, and the 4 subjects perform skill skills. According to Machromah et al. (2017), skill problems occur when students are unable to continue the sorting process and a math error results.

e. Encoding Error

Based on data analysis conducted by researchers, the encoding errors in almost all subjects did, except for subject P4 in question number 1. Subject P4 did not perform or meet the indicators of the encoding errors because P4 was able to conclude the encoding errors ctly (correctly), even though P4 solved or did the problem using logic, but the inferred answer was correct. So P4 does not meet the indicators of the encoding errors. At the same time, the 5 subjects made a mistake in encoding errors. According to (Annizar, Kholida, et al., 2021) who stated that encoding errors occur when students did not write the encoding final, write an incorrect answer and write an answer that does not match the context of the question. So based on that opinion, the five subjects did.

Conclusions and Suggestions

Displayed on data the results of the discussion, findings, and research on students of Tunas Luhur High School, science major, 10th-grade student, in doing or solving story questions on SPLTV material based on Newman's procedures, and observe of students learning interests and gender, the findings are as follows: 1) Men students of high interest in learning (L1) make mistakes in writing final answers as well as skill mistakes. Men students of moderate interest in learning (L2) make mistakes in writing final answers as well as skill mistakes. Men students of low interest in learning (L3) make final answer writing errors, skill errors, as well as transformation errors. 2) Women students of high interest in learning (P4) make final answer writing mistakes as well as skill errors. Women students of moderate interest in learning (P5) make mistakes in writing final answers as well as skill errors. Women students with a low interest in learning (P6) make encoding, skill, transformation, and comprehension errors.

Several suggestions can be made based on the study's findings, including 1) For teachers, it is hoped that teachers prioritize and train students in the process of developing skills and writing final answers by improving, providing, or adding examples of story questions in more varied SPLTV material so that mistakes can be minimized. 2) It is expected that students will need to practice a great deal to hone their comprehension of the concepts and carefully compose the final response so that they are used to doing or solving story questions.

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