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Analysis of Student Errors in Solving Word Problems using Polya Steps

Vanesa Aftina[1], Susi Herawati [2], Listy Vermana[3]*
[1,2,3]Department of Mathematics Education, Universitas Bung Hatta, Sumatera Barat, Indonesia
*Correspondence: listyvermana@bunghatta.ac.id

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ABSTRACT

This research was motivated by the many difficulties experienced by students in the mathematics learning process which had an impact on the occurrence of errors in working on mathematics story problems. This research aims to determine the types and causes of errors made by students in solving mathematics story problems on single interest and compound interest material using Polya steps. This research method is qualitative with descriptive research type. The research subjects were 2 students from 13 class XI students at TKP SMKN 1 Pariaman, with the criteria being 1 student from each medium group and 1 student from the low group. Data collection techniques include tests and interviews. The results of the research show that the percentage of errors made by students in solving math story problems on single interest and compound interest material using the Polya steps is: in question number 1, the biggest error made in the step of understanding the question was 23.08%. Question number 2, the biggest error made at the re-checking stage was 15.38%. In question number 3, the biggest mistake made in the step of understanding the problem was 19.23%. Factors that cause students to make mistakes include not being used to writing question information using their own words, not writing down what they know and being asked in the question correctly, not focusing when working on the question, not being careful when presenting the question. out of the calculation process, not used to calculating anymore, and rushing through the settlement process.

Keywords: error analysis, Polya steps, word problems

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Introduction

Mathematics is one of the lessons taught at every level of education. Mathematics plays a role in the formation and development of thought patterns into intelligent, independent and creative ones. The formation and development of this mindset can be seen from the results of the thoughts expressed and the ability to solve various problems. By studying mathematics, students are expected to be able to think logically, analytically, systematically, critically and creatively, have cooperative abilities and the ability to solve problems both in the field of mathematics, other fields of science and everyday life.

An error is a mistake regarding a problem that is assumed to be correct or has been confirmed to be correct with previous evidence (Fauziah & Astutik, 2022). According to Runtukahu & Kandou (in Rofiah, Ansori, & Mawaddah, 2019) in the world of education, especially in mathematics education, to solve various mathematical problems, problem solving can be used as a learning approach. Story

problems are usually used to determine students' abilities in learning to solve mathematical problems According to (Anggari & Rufiana, 2020) story problems in mathematics learning require more understanding than other problems. According to (Hijrilliawanni, Kuncoro, Nihmah, & Riswari, 2023) mathematics story problems require more understanding than other problems. Math story problems are solved in a rather complicated way. Students who can solve story problems are considered to have skills regarding problem solving in everyday life.

Mistakes made by students when solving math story problems can be an indication of how students master the material on the problem. Specific identification needs to be done to be able to find out the mistakes made by students. To make it easier to identify errors made by students, researchers used error classification based on problem solving steps by George Polya. There are four Polya steps, namely (1) understanding the problem, at this stage students are required to be able to interpret or identify the problem presented so that students can interpret questions about what is known and asked about the problem; (2) make plans, in this section students are required to be able to arrange the steps or procedures that will be used to solve the problem, students must investigate the methods and calculation operations used to solve the problem; (3) carry out planning, at this stage, students realize the problem solving plan that has been prepared in the previous stage by paying attention to the calculation process carried out in each procedure or solution step; (4) checking again, in this section the thing that needs to be paid attention to is re-matching the calculation operation process and carrying out reflections regarding the solution obtained whether it has answered the questions given or not (Nuryah, Ferdianto, & Supriyadi, 2020).

In observations at SMKN 1 Pariaman on March 17 2023, it was seen that students lacked independence and willingness to learn which had an impact on students' understanding of arithmetic sequence and series material. Many students are less able to understand the problems and mistakes experienced by students mostly because they are not careful enough. This happens because there are certain factors that become obstacles in the student learning process. Apart from that, the author also conducted interviews with teachers, it was found that what caused students to make mistakes in doing the exercises was because students were not focused on the ongoing learning process which was caused by various factors, one of which was sleepiness and the teacher had not fully analyzed the causes of

students' learning errors. Therefore, further research needs to be done on the factors that cause students to make these mistakes.

There are factors that influence students to make mistakes in solving mathematics problems, namely learning factors. According to (Slameto, 2015) here are two factors that influence student learning, namely internal factors and external factors. Internal factors are factors that exist within an individual which consist of physical factors or physical conditions and psychological factors or conditions that exist within the student. Physical conditions include health conditions and the five senses. Meanwhile, psychological factors include intelligence or wit, interests, talents, and others. Meanwhile, external factors are factors that exist outside the individual, consisting of family factors, school factors and community factors. Family factors relate to habits carried out in the family so that they will have an impact on student behavior. School factors relate to the facilities and infrastructure that support learning activities. Community factors related to student interactions can have an influence on students. The factors that cause students' errors in solving mathematics story problems referred to in this research are limited to factors that cause internal errors.

Research on error analysis in solving word problems based on Polya's steps has been widely carried out in junior high schools Pertama (Rofiah et al., 2019; Lukas, Salajang, Manurung, & Sulistyaningsih, 2021; Asrofiyah, Rahmawati, & Cahyadi, 2022; Khoirunnisa, Artanti, & Hayati, 2022; Sendinganeng, Monoarfa, & Sulistyaningsih, 2022; Dian, Wena, & Puspadewi, 2023) which shows that there are four types of errors made by students in solving mathematics story problems based on Polya's solution steps, namely errors in understanding the problem, including mistakes with small category and errors in preparing plans, errors in completing plans, and errors in rechecking are included in the fairly high category of errors. Several other researchers did this in elementary schools (Rozianita, Kartinah, & Wardana, 2022; Ihtiari, 2018; Hijrilliawanni et al., 2023; Galuh, Kurniawan, & Budiharto, 2023) which showed that there were also four types of elementary school students' errors in solving questions. mathematics story, that is, at the stage of understanding the problem most students make mistakes because the students do not yet know the meaning of the problem, at the planning stage most students are not able to write their plans due to a lack of understanding, accuracy and concentration, at the implementation stage most students are unable to do it because of the previous stage It has not been

done perfectly and at the re-examination stage students make many mistakes because they are not thorough and in a hurry.

Research in Senior High Schools has been conducted by (Nuraina, Rohantizani, & Hawa, 2023; Pay, Noviyanti, & Noviantari, 2022; Nuryah et al., 2020). (Nuryah et al., 2020) analyzed student errors in solving word problems at SMAN 1 Gegesik on absolute value equations and inequalities based on Polya's solution steps. The results of his research stated that the biggest mistake students made was 38% of the time they misunderstood the questions. Furthermore, (Pay, Noviyanti, & Noviantari, 2022) did it at SMKN 4 Lewa on three-variable linear equation systems based on the Polya procedure. The results of the research stated that the most mistakes made by students were in the re-checking step, namely 43.28%. The causes of students making mistakes are students not being careful, students being too hasty, students not understanding the meaning of the questions, students not practicing enough questions, students not using their time well, students lacking self-confidence and students not understanding how to use methods or formulas. Meanwhile (Nuraina, Rohantizani, & Hawa, 2023) did not carry out error analysis according to Polya's steps but used the Newman method.

Based on the problems that have been stated previously and research results that show different results for two studies conducted in different places and materials and (Nuryah et al., 2020) did it in SMA while (Pay, Noviyanti, & Noviantari, 2022) did it in SMK, the researcher will conduct an analysis of student errors in solving story problems on single interest and compound interest material at SMKN 1 Pariaman. Researchers hope that with this research teachers can find out how students make mistakes in solving math story problems on single interest and compound interest material and what factors cause students to make these mistakes. It is hoped that later the teacher can provide appropriate assistance to overcome the student's mistakes.

Methods

This research uses qualitative research methods with descriptive research type. The research subjects consisted of 2 students from 13 class XI TKP SMKN 1 Pariaman students, with the criteria being 1 student each from the medium group (SP-08) and 1 student from the low group (SP-03) because high group students don't make many mistakes. Data collection techniques include tests and interviews Data collection techniques include tests and interviews. The research instrument was validated by a validator from a lecturer at the Faculty of Teacher Training and Education, Universitas Bung Hatta.

After the instrument is valid, the next stage is to carry out a test. The test was taken by 13 class XI students at TKP SMKN 1 Pariaman. After the test was carried out, the author analyzed the mistakes made by students according to Polya's steps by calculating the percentage of students' mistakes. After that, the researcher conducted interviews with 2 research subjects. The percentage of students' errors in solving mathematics problems is calculated using the following formula (Viona, 2018):

$$P_k = \frac{\sum S}{\sum N \, x \sum J} \, x \, 100\% \qquad (1)$$

Information:

P_k = percentage type error (k)

$\sum S$ = number of student errors type (k)

$\sum N$ = number of students taking the test

$\sum J$ = number of types of type errors (k)

Results and Discussions

Based on the results of 13 students, researchers were able to find out the types of errors students made when solving single interest and compound interest problems. Calculation of types of student errors is based on Polya's steps as in Table 1.

Table 1. *Number of Students Making Mistakes*

Number Question	Understand Problem	Develop a Solution Plan	Carry out Problem Solving Plan	Carrying out checks Return
1	12	13	13	13
2	3	2	4	8
3	10	2	13	8

Based on the table above, the error percentage based on the Polya steps is presented as in Figure 1, Figure 2 and Figure 3.

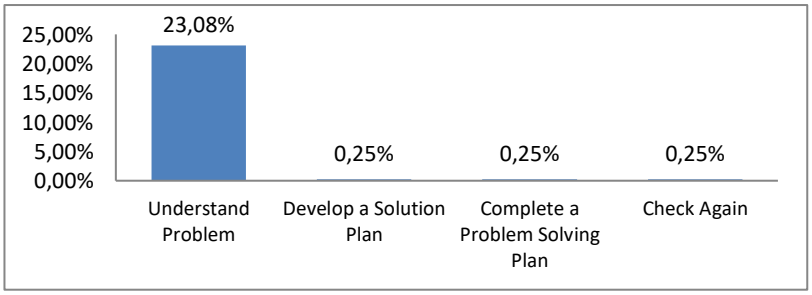

Figure 1*. Percentage of Student Error Types on Question Number 1*

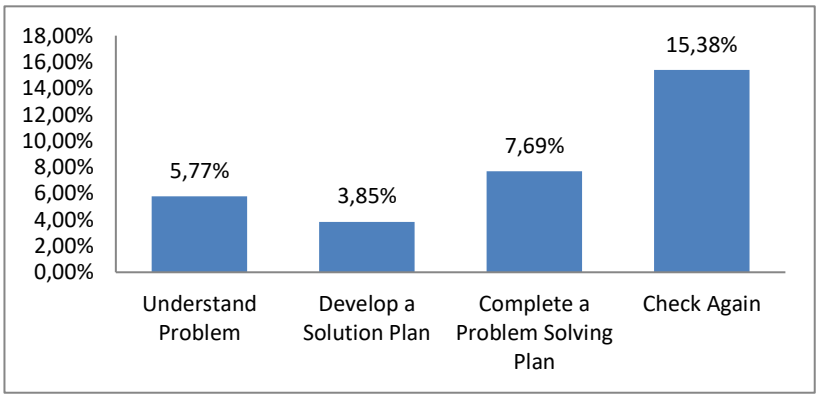

***Figure 2**. Percentage of Student Error Types on Question Number 2*

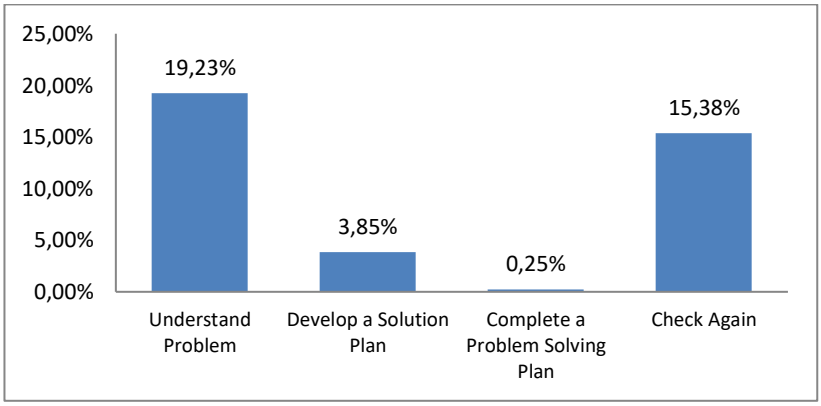

***Figure 3**. Percentage of Student Error Types on Question Number 3*

Based on the three graphs above, in question number 1, the biggest error was in the step of understanding the problem at 23.08%. Question number 2, the biggest error was in the step of checking again at 15.38%. In question number 3, the biggest error was in the step of understanding the problem at 19.23%. The results of this research are in line with the results of research conducted by (Fauziah & Astutik, 2022; Dian et al., 2023; Rofiah et al., 2019).

The following is data related to errors made by students in solving single interest and compound interest questions obtained from the test answers.

Question number 1:
Inggar borrowed IDR 1,000,000.00. After one year, Inggar returned IDR 1,300,000.00. If the interest is single, determine the monthly interest rate.

1. Inggar borrowed IDR 1,000,000.00.
   Is known : $M_0 = 1.000.000,00$
   $B = 1.000.000,00$
   Asked : B = ?
   Answer :
   $\frac{B}{M_0} = 100\%$
   $\frac{1.300.000}{1.000.000} = 100\%$
   $= 1,3\%$

Figure 4*. SP-08 answer for question number 1 in the medium category*

The medium category student's answer to question number one is as in Figure 4. Figure 4 shows that SP-08 misunderstood the problem (made a mistake on the first Polya step). In the SP-08 answer, it is known that $M_0 = 1.000.000,00$is correct, and it is known that $B = 1.000.000,00$ is incorrect. The value B should represent interest (p). SP-08 was only able to translate the initial capital value, for what was known SP-08 was wrong, but SP-08 seemed to work on the answer until it was finished. In this answer it can be seen that SP-08 does not understand the problem, so the next step is definitely not correct (made mistakes in all of Polya's steps).

1. Is known : $B . \frac{b}{m}$
   Answer :
   $B = 1.000.000,00$
   $n = 12\ month$
   $m = Rp1.300.000,00$
   $\frac{B}{M_0} = 100\%$

Figure 5. *SP-03 answer for question number 1 in the low category*

In Figure 5, it can be seen that SP-03 was unable to understand the problem in the questions well. In the SP-03 answer, what is known is the formula, while what is answered is what is known in the question which is translated into notation that is not related to the formula used. SP-03 also did not complete the problem-solving plan that had been made which means SP-03 makes mistakes at every step of Polya.

From the answers made by SP-08 and SP-03, there was an error using the formula. The author also held discussions with the subject teacher who taught in class XI TKP SMKN 1 Pariaman, it was discovered that the formula used by the teacher was different from the formula used by the author.

Question number 2:
Arasy saved his money in the bank amounting to IDR 1,200,000.00. The bank provides compound interest of 4% per year. After 5 years, Arasy took all the money. The total amount of Arasy's money is?

3. Is known : $M_0 = 1.200.000{,}00$
   B = 4% 5 0,04
   $n = 5\ year$
   Asked : $m^5 =$
   Answer :
   $\mathrm{mn} = \mathrm{m}(1 + b)$
   $m^5 = 1.200.000(1 + 0{,}04)^5$
   $= 1.200.000(1{,}04)^5$
   $= 1.200.000\ (1{,}217$
   $= 1.216.700$

Figure 6. *SP-08 answer for question number 2 in the medium category*

Figure 6 shows that SP-08 is able to understand the problems in the questions (made a mistake on the first Polya step), but the formula writing is not precise which means SP-08 made a mistake in Polya's second step. In the SP-08 answer, write $\mathrm{M}_n = M(1 + b)$ which should be $\mathrm{M}_n = M_0(1 + p)^n$. However, SP-08 seems to be able to carry out the problem-solving plan until it is completed correctly even though there is a slight deficiency in the 3rd line of the solution, namely the lack of brackets which means SP-08 did not make a mistake in the third Polya step. SP-08 also does not re-check the final results obtained so it cannot be ascertained whether the results are correct or not which means SP-08 made a mistake in the fourth Polya steps. P-03 did not solve question number 2 at all.

Question number 3:
Tata saves money in Cooperative A with compound interest of 15% per year. If today the amount of money Tata saves is IDR 1,000,000.00, then 3 years 4 months from now the amount of money Tata will have?

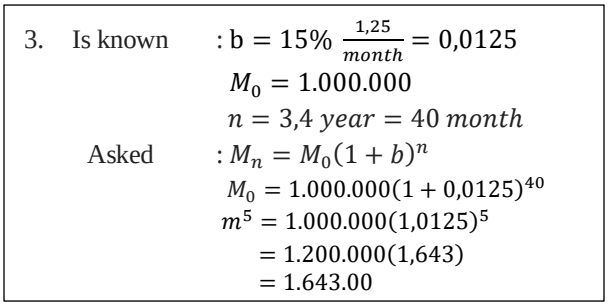

Figure 7. *SP-08 answer for question number 3 in the medium category*

Figure 7 shows that the SP-08 understands the problem. What is known is that b = 15% 1.25 per month = 0.0125 is correct, but it is not correct, which should be b = 15% = 1.25% per month = 0.0125. SP-08 also wrote that what was asked was a formula. The next step is to prepare a problem-solving plan correctly by choosing the right formula to use. However, during the step of implementing the problem-solving plan, a calculation or algorithm error occurred where the value of $(1{,}0125)^{40}$ should be 1.644, whereas what was written in SP-08 was 1.643, thus affecting the final results obtained. SP-08 also incorrectly wrote the notation asked for M_{40} which should have been written as M_0. The SP-08 answer also did not check again. SP-03 also did not solve the questions at all for question number 3.

The following is a snippet of the author's interview with SP-08 who made mistakes in understanding the problem, preparing a problem-solving plan, implementing the problem-solving plan, and not checking again. This is in accordance with the research results (Fauziah & Astutik, 2022).

P : Do you know what the question is asking?
SP-08 : *A little ma'am*
P : What do you understand?
SP-08 : *For question number 2, the question is what the total amount of Arasy's debt will be after 5 years*
P : That is it?
SP-08 : *Number 3 is also the amount of Tata money after 3 years and 4 months, ma'am. Number 1 asked how much interest*
P : Are you having difficulty working on the questions?
SP-08 : *Yes ma'am*
P : Where is it difficult?
SP-08 : *I'm not very good at rounding exponents, ma'am*
P : Do you know how to solve it?

SP-08 : *I know ma'am*
P : Try explaining
SP-08 : *Just enter all the numbers ma'am, later if anything is added, add it. If you multiply, multiply*
P : Try to pay attention to your answer number 2. Why did you answer it that way?
SP-08 : *Number 2 is correct, ma'am*
P : Is the formula used correct?
SP-08 : *The formula doesn't match the solution, ma'am. There are also not enough brackets here, ma'am*
P : What about question number 3?
SP-08 : *For question number 3, there is no percent sign and there is an equal sign, ma'am*
P : Here, why did you write what was asked as M0?
SP-08 : *I don't know why I answered like that ma'am. I'm in a hurry ma'am*.

Excerpts from the author's interview with SP-03 who made mistakes in understanding the problem, made mistakes in preparing a problem-solving plan, did not implement the problem-solving plan, and did not check again. This is in accordance with the research results (Fauziah & Astutik, 2022).

P : Do you know what is asked in the question?
SP-03 : *Mmmmm, just a little ma'am*
P : What don't you understand? Try explaining.
SP-03 : *mmm, I don't know ma'am*
P : This means you don't understand all the questions?
SP-03 : *No ma'am*
P : Please see your answer. What number of questions are you working on?
SP-03 : *Question number 1 ma'am, but not finished yet*
P : Why are you not resolved?
SP-03 : *I don't understand it yet ma'am*
P : Please look at your answer to question number 1. Why did you answer that?
SP-03 : *I don't know ma'am, that's all Irvan can do*
P : Do you think the explanation is correct?
SP-03 : *No, ma'am, I haven't finished answering yet, ma'am*
P : Do you know where you went wrong?
SP-03 : *I know, ma'am, the formula is wrong*

Based on the interview excerpt above, it can be seen that the causes of students making mistakes include, among other things, not being used to writing question information using their own words, not

writing down what is known and asked in the question correctly, not focusing when working on questions, not being careful in solving problems, making mistakes in the calculation process, not being used to checking again, and rushing through the solving process.

Factors Causing Student Errors in Solving Mathematics Story Problems

a. Environmental factor

Excerpts from interviews with SP-03 students who made mistakes due to environmental factors are as follows.

P : Do your parents help guide your studies at home?
SP-03 : *Never ma'am*
P : Are you told to study with your parents?
SP-03 : *Never, ma'am. Parents have other activities, ma'am*
P : Do your parents facilitate studying at home?
SP-03 : *Just stationery, ma'am*
P : Anything else?
SP-03 : *Nothing ma'am*

Based on interview excerpts, it was found that students made mistakes in solving math story problems because they were influenced by family environmental factors that did not guide students to study at home and also did not facilitate students to learn. This is in accordance with research results (Sartika, S.A.E. et al, 2024).

b. Instrumental Factors (Teacher Contribution)

Excerpt from an interview with a student who stated that he made a mistake due to instrumental factors (teacher contribution) with the interview subject

P : How does your math teacher teach?
SP-03 : *Mmmm,you can't have an opinion about people, ma'am*
P : Does your math teacher explain material you don't understand?
SP-03 : *It's understood ma'am, but I don't understand ma'am*

Based on interview excerpts, it was found that the student made a mistake in solving the math story problems because the student did not understand the material even though the teacher had explained the material again which he did not understand. This is in accordance with research (Sartika, S.A.E. et al, 2024).

c. Instrumental Factors (Student Learning Facilities)

Excerpt from an interview with a student who stated that he made a mistake due to instrumental factors (student learning facilities) with interview subject SP-08

P : Do you have a mathematics textbook?
SP-08 : *No, but sometimes the textbook is brought by my math teacher*
P : Is the book on loan or what?
SP-08 : *Yes, ma'am, I only use it when studying at school, ma'am*
P : Did you ake good use of the book?
SP-08 : *Mmm, yes ma'am*

Based on interview excerpts, it was found that the student made a mistake in solving the math story problems because the student did not have a textbook. He was only lent books at school and couldn't take them home to read at home. This is in accordance with research results (Sartika, S.A.E. et al, 2024).

d. Student Psychological Factors

Interview excerpt from SP-08 who made a mistake due to the student's psychological factors

P : Do you xperience visual and hearing problems?
SP-08 : *So far it's safe ma'am, no problems*
P : How long can you concentrate on learning?
SP-08 : *Not necessarily ma'am, it depends on the circumstances. If your friends are noisy, it's hard to do it concentrate ma'am*

Based on interview excerpts, it was found that students made mistakes in solving math story problems because students had difficulty concentrating during class because their friends were noisy. This is in accordance with research results (Sartika, S.A.E. et al, 2024).

e. Student Physiological Factors (Students' Ways of Learning)

The following is an interview excerpt from an SP-03 student who made a mistake because of the student's way of learning.

P : How do you study at home and at school?
SP-03 : *I don't study at home, but I study at school ma'am*
P : Do you study when you have an exam?
SP-03 : *No ma'am*
P : Does that mean you don't repeat lessons at home?
SP-03 : *No ma'am*

P : Why?
SP-03 : *I have difficulty opening a book at home ma'am*
P : When studying at school, do you pay attention to the teacher's explanations?
SP-03 : *Yes ma'am*
P : How do you overcome difficulties in understanding lesson material?
SP-03 : *I asked a friend. I solved this problem myself ma'am*
P : Do you ask the teacher about material you don't understand?
SP-03 : *For math lessons, no ma'am. But for another lesson, I asked ma'am*
P : Why don't you ask in math class?
SP-03 : *I'm lazy ma'am.*

Based on interview excerpts, it was found that students made mistakes in solving math story problems because students did not study at home, and did not want to ask questions in class because they were lazy. This is in accordance with research results (Sartika, S.A.E. et al, 2024).

Conclusion

Types of errors made by class. In question number 1, the biggest error made in the step of understanding the problem was 23.08%. Question number 2, the biggest error made in the rechecking step was 15.38. And question number 3, the biggest mistake made in the step of understanding the problem was 19.23%. From the three test questions, it appears that students are less capable in understanding the problem.

The factors that cause class in terms of psychological condition, students need a long time to concentrate on learning, while physiologically students are less interested in studying mathematics at home, asking the teacher about material they don't understand, and students prefer to look at friends' answers when asked questions.

Based on the results of the research that has been carried out, the researcher provides suggestions to reduce student errors in solving story problems on single interest and compound interest material, teachers should approach parents and invite parents to participate in providing material and moral support to students to study in home, ensuring whether students have understood the material provided, if there are still students who do not understand, the teacher should provide motivation and guidance so that students are willing to repeat the material and ask friends, parents or teachers, as well as maintaining a calm classroom atmosphere so that students do not concentrate disturbed.

References

Anggari, R. S., & Rufiana, I. S. (2020). Analisis Kesulitan Siswa Dalam Memecahkan Masalah Pada Soal Cerita Materi Bangun Datar Ditinjau Dari Minat Belajar, *2*(4), 122. https://doi.org/10.24269/ed.v4i2.540

Asrofiyah, R., Rahmawati, I., & Cahyadi, F. (2022). Analisis Kesulitan Siswa Dalam Menyelesaikan Soal Cerita Matematika Berdasarkan Langkah Polya Materi Volume Kelas V SD Negeri 1 Rajekwesi Jepara. *Jurnal Wawasan Pendidikan*, *2*(1), 49–60. https://doi.org/10.26877/wp.v2i1.9617

Baskorowati, H. (2021). Studi Kasus: Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Cerita Matematika Materi Sistem Persamaan Linear Tiga Variabel di SMA Negeri 1 Cerme Gresik Jawa Timur. *MATHEdunesa*. https://doi.org/10.26740/mathedunesa.v9n3.p529-539

Dian, G., Wena, I. M., & Puspadewi, K. R. (2023). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita dengan Menggunakan Prosedur Polya pada Siswa. *Jurnal Pembelajaran Dan Pengembangan Matematika*, *3*(2), 172–179. https://doi.org/10.36733/pemantik.v3i2.7041

Erfani, G. A., Rokhman, M. S., & Sholikhakh, R. A. (2020). Analisis kesalahan siswa dalam menyelesaikan soal cerita matematika materi aritmetika sosial menurut Polya. *AKSIOMA*, *11*(2), 306–314. https://doi.org/10.26877/aks.v11i2.6850

Fauziah, F. A., & Astutik, E. P. (2022). Analisis Kesalahan Siswa dalam Pemecahan Masalah Soal Cerita Matematika Berdasarkan Langkah Polya. *Jurnal Cendekia*, *6*(1), 996–1007. https://doi.org/10.31004/cendekia.v6i1.1086

Galuh, S., Kurniawan, S., & Budiharto, T. (2023). Analisis Kesalahan Peserta Didik Dalam Menyelesaikan Soal Cerita Matematika Tentang Operasi Hitung Pecahan Kelas V Sekolah Dasar. *Didaktika Dwija Indria*, *10*(6). https://doi.org/10.20961/ddi.v10i6.70964

Hijrilliawanni, D. R., Kuncoro, S. Z., Nihmah, S. Z., & Riswari, L. A. (2023). Analisis Kesulitan Pemecahan Masalah Matematis Siswa Kelas IV Pada Soal Cerita Matematika. *MAGISTRA: Media Pengembangan Ilmu Pendidikan Dasar Dan Keislaman*, *14*(4), 92. https://doi.org/10.31942/mgs.v14i2.9082

Ihtiari, D. A. T. (2018). Analisis Kesalahan Siswa Kelas VI SD Negeri Guntur Dalam Menyelesaikan Soal Cerita Pada Materi Volume Prisma Dengan Menggunakan Langkah Polya, *1*(2). Retrieved from https://www.semanticscholar.org/paper/463f6d55d79c6f946116333d85209354ffa562fc

Khoirunnisa, F., Artanti, R., & Hayati, S. N. (2022). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Materi Statistika Kelas VIII Berdasarkan Langkah Penyelesaian Polya. *Jurnal Pendidikan Matematika*, *1*(2), 57–65. https://doi.org/10.56916/jp.v1i2.142

Kristofora, M., & Sujadi, A. A. (2017). Analisis Kesalahan dalam Menyelesaikan Masalah Matematika dengan Menggunakan Langkah Polya Siswa Kelas VII SMP. https://doi.org/10.35194/jp.v6i1.24

Lukas, I. S., Salajang, S., Manurung, O., & Sulistyaningsih, M. (2021). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Sistem Persamaan Linier Dua Variabel Menggunakan Prosedur Polya.

Jurnal Matematika Riset Edukasi Dan Kolaborasi, *2*(2), 53–58. https://doi.org/10.53682/marisekola.v2i2.1072

Nuraina, N., Rohantizani, R., & Hawa, M. (2023). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Matematika dengan Menggunakan Metode Newman. *Asimetris: Jurnal Pendidikan Matematika Dan Sains*, *4*(2), 117–127. https://doi.org/10.51179/asimetris.v4i2.2265

Nuryah, M., Ferdianto, F., & Supriyadi, S. (2020). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Persamaan dan Pertidaksamaan Nilai Mutlak Berdasarkan Langkah Penyelesaian Polya. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, *4*(1), 63. https://doi.org/10.31331/medivesveteran.v4i1.983

Pay, M. S. R., Noviyanti, P. L., & Noviantari, P. S. (2022). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Matematika Berdasarkan Prosedur Polya Pada Siswa Kelas X SMK Negeri 4 Lewa Tahun Pelajaran 2021/2022. *Jurnal Pembelajaran Dan Pengembangan Matematika*, *2*(1), 101–115. https://doi.org/10.36733/pemantik.v2i1.3832

Rofiah, N., Ansori, H., & Mawaddah, S. (2019). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Matematika Berdasarkan Langkah Penyelesaian Polya. *Jurnal Pendidikan Matematika*, *7*(2), 120. https://doi.org/10.20527/edumat.v7i2.7379

Rohmah, S., & Rohmah, S. (2010). Analisis Kesalahan Siswa Kelas VI MI Al-Ishlah Ketapang Lor Ujung Pangkah Gresik Dalam Menyelesaikan Soal Cerita Pada Pokok Bahasan Pecahan Desimal. Retrieved from https://www.semanticscholar.org/paper/f4dffee6840d0ffe2956cb645c70f625f9469d78

Rozianita, A., Kartinah, & Wardana, M. Y. S. (2022). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Volume Kubus dan Balok Pada Siswa Kelas V SDN Kebumen 02. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, *8*(1), 322–333. https://doi.org/10.36989/didaktik.v8i1.292

Sartika, S.A.E., Suharta, I.G.P. and Astawa, I. W. P. (2024). Analisis Faktor Penyebab Terjadinya Kesalahan Siswa dalam Menyelesaikan Soal Cerita Pada Materi Bangun Ruang Sisi Datar Berdasarkan Prosedur Newman. J*urnal Pendidikan dan Pembelajaran Matematika Indonesia*, *13*(1), 1–9. https://doi.org/https://doi.org/10.23887/jppmi.v13i1.342

Sendinganeng, S., Monoarfa, J. F., & Sulistyaningsih, M. (2022). Analisis Kesalahan Siswa Berdasarkan Langkah Penyelesaian Polya Dalam Menyelesaikan Soal Cerita Operasi Hitung Bentuk Aljabar. *Sinar Dunia: Jurnal Riset Sosial Humaniora Dan Ilmu Pendidikan*, *1*(4), 212–225. https://doi.org/10.58192/sidu.v1i4.372

Slameto. (2015). *Belajar dan Faktor-faktor yang Mempengaruhinya*. Jakarta: Bima Aksara.

Viona, R. D. (2018). Analisis Kesalahan Siswa Kelas VII Dalam Menyelesaikan Soal Matematika pada Model Pembelajaran Problem Posing di SMP Negeri 9 Pariaman. *Skripsi*. Padang: Universitas Bung Hatta.

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