

Analysis of Errors in Answering Story Questions Based on Polya in Rectangle and Triangle at SDN Yosorati 02 Jember

Erlina Ika Sari¹, Sunardi², Ridho Alfarisi³

¹Elementary School Teacher Education, University of Jember, 37 Kalimantan Street, Jember 68121

e-mail : erllinear@gmail.com

²Mathematics Education, University of Jember, 37 Kalimantan Street, Jember 68121

e-mail : sunardifkipunej@yahoo.com

³Elementary School Teacher Education, University of Jember, 37 Kalimantan Street, Jember 68121

e-mail : alfarisi.fkip@unej.ac.id

Abstract : *This study aims to examine how many percentages and causing factors of the types of errors of fourth grade students at Public Elementary School of Yosorati 02 Jember in solving story questions according to Polya in rectangles and triangles subject. This research is a descriptive study with a qualitative approach. Data collection methods used were tests and interviews. Research respondents consisted of 34 students. Based on data analysis, it is known that 12,73% of students make errors in understanding problems because they are not careful in reading and understanding story questions; 17,41% of students make errors in planning problem solving because they are not accustomed to writing and making a plan beforehand; 29,46% of students make errors in carrying out the problem solving plan because they make errors in the calculation so that it does not get the final answer correctly; 40,40% of the students make errors in re-checking because they are not accustomed to checking the answers which are already obtained.*

Keywords: Analysis and Factors Causing Errors, Story Question, Polya, Rectangle and Triangle

1. INTRODUCTION

Mathematics is one of the subjects that needs to be given to students since elementary school. The role of mathematics in everyday life is highly important because the mastery of mathematics can help to be able to think logically, critically, and creatively. This is in line with Cockroft's opinion (cited in Abdurrahman, 2003:253) that mathematics needs to be taught to students because it is always used in every aspects of life; all fields need mathematical skills and mathematics can improve logical thinking abilities. Suyastini (2017:61) stated that mathematics has an important role in various scientific disciplines. can improve human thinking power and universal science that underlies the development of thinking in the implementation of mathematics in everyday life. According to Susanto (2016:186), mathematics learning is a teaching and learning process formed by teachers to increase creativity, students' thinking abilities, new knowledge construction abilities in an effort to improve better mastery of mathematics. The objective of learning mathematics at elementary school level is to train students to be ready in facing life changes. Based on this, mathematics is considered having a good effect on the development of students to be able to have the skills that will be carried at the next level or at the community. The purpose of learning mathematics according to the 2013 curriculum is to use a scientific approach as an emphasis on the modern pedagogic dimension in learning. Mathematical learning activities are carried out so that learning can be more meaningful in the process of observing, asking, trying, reasoning, presenting, and creating. To be able to achieve the goals of mathematics learning, the teacher is expected to create an active situation when learning that makes students play an active role in

shaping, determining, and developing the knowledge that students have to carry out learning activities that deal with problem solving. Based on these objectives, it is expected that elementary school students can solve mathematical problem solving on questions. Mathematical problem solving questions are in the form of story that are applied in daily life, students are required to understand the problems that arise in the questions.

The reality that actually happens in the field is that there are still elementary school students who have not been able to solve mathematical problem solving on questions. According to Dalyono (cited in Hidayah 2016:185), learning difficulties experienced by students are caused by two factors namely internal factor and external factor. Internal factors are such as talent, interest, motivation, and physical health. External factors are such as family factors (the way parents educate, relationships between families, etc.), school factors (teaching methods, curriculum, teacher-student relations, student-student relations, school discipline, etc.), and community factors (student activities in the community, mass media, social partners and community life).

Related to problem solving based on the 2013 curriculum, geometry is one of the mathematical materials that must be studied at the elementary school level. One of the geometry materials related to daily life is plane material with rectangular and triangular subjects that are generally presented in the form of story questions and students are required to understand the purpose of the question before answering it. This is in line with the opinion of Raharjo and Astuti (2011:8) stating that the story contained in mathematics are questions that are closely related to problems that exist in everyday life that can be resolved

with mathematical sentences. Mirestika (2016:155) states that rectangle is a rectangular plane shape with four right angles and is bounded by four sides facing the same length. While triangle, according to Mustaqim (2008:105), is a plane shape that has three sides and has three vertices. Problem solving, according to George Polya, is one of the models that can be used to be able to teach students to solve story questions in rectangular and triangular subject.

According to Polya (1973:06), there are four stages in solving mathematical problems, namely as follows:

- 1) understanding problem
At this stage, students must understand the problem related to what is known and what is asked about the question.
- 2) devising a plan
At this stage, students form plans and write down stages of completion that will be used to solve the problems.
- 3) carrying out the plan
At this stage, students carry out plans that have been devised in the second stage.
- 4) looking back
At this stage students re-check the answers obtained in the third stage to ensure the answers obtained are correct.

Previous research by Hidayah (2016) got result percentage of error in understanding problem of 5,00%, error in devising a plan 21,50%, error in carrying out the plan 22,88%, error in looking back 18,00%. Research by Irawan (2017) got result percentage of error in understanding problem of 23,31%, error in devising a plan 55,1%, error in carrying out the plan 64,53%, error in looking back 97,00%. The types of students' errors in this study are observed based on each errors found in each indicator in Table 1.

Table 1. Students' error categories and indicators

Error Category	Indicator
Error in understanding problem	<ul style="list-style-type: none"> • Error in determining what is known. • Error in determining what is asked.
Error in devising a plan	<ul style="list-style-type: none"> • Error in determining the right formula for answering story questions. • Error made by students in devising a plan namely an error in devising or determining the steps in solving problems.
Error in carrying out the plan	<ul style="list-style-type: none"> • Error in carrying out the plan to solve the story questions. • Error in computing. • Error in making conclusions.
Error in looking back	<ul style="list-style-type: none"> • Error in completing the steps at the stage of looking back namely the error in re-checking the solution obtained. • Error in mathematical calculation in re-checking the solution obtained. • Error in getting final answer.

Based on the description above, the research problems in this study are: What is the percentage of each type of error in solving the problem of Rectangles and

Triangles subject in Grade IV Students of Public Elementary School of Yosorati 02 Jember, What are the factors causing errors in solving story questions according to Polya in Rectangles and Triangles subject in Grade IV Students at Public Elementary School of Yosorati 02 Jember.

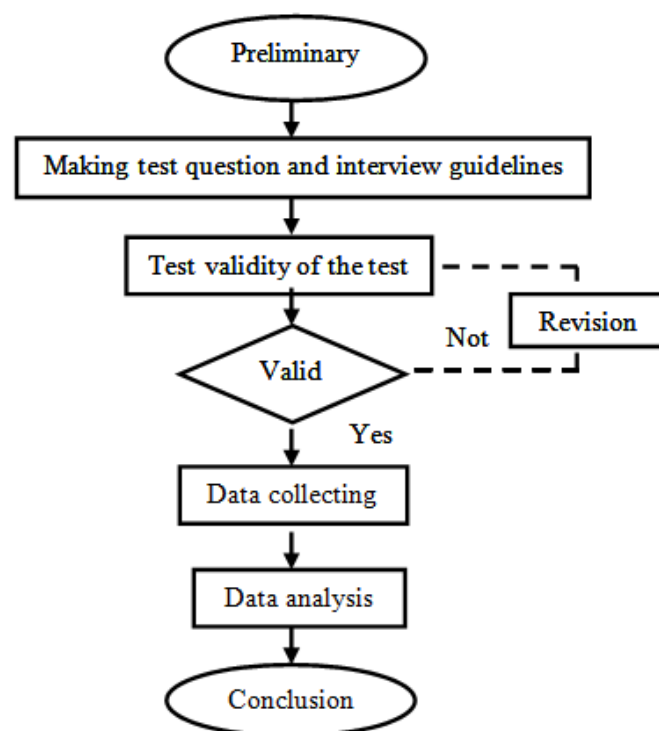
2. RESEARCH METHOD

This research is a descriptive study. According to Masyhud (2016:104), descriptive research is a research method that seeks to describe a situation or a condition scientifically.

The study was conducted at Public Elementary School of Yosorati 02 Jember with 34 respondents in grade IV consisting of 21 female students and 13 male students.

Data collection methods used were tests and interviews. The test used two questions which were presented in the form of story questions with rectangular and triangular material. The test results were used as primary data to determine the types of errors made by students. Interviews were conducted directly with students to find out what factors caused students to make errors. The steps of the research can be seen in Figure 1.

Figure 1. Research Procedure



Remarks:

- : Research activities
- : Test flow
- : Test activities
- : Test activities if needed
- : Initial and final activities

According to Ali (1990: 186), the formula used to calculate the percentage of each type of error made by students is as follows.

$$P_i = \frac{n}{N} \times 100\%$$

Remarks:

P_i = percentage of students' error types

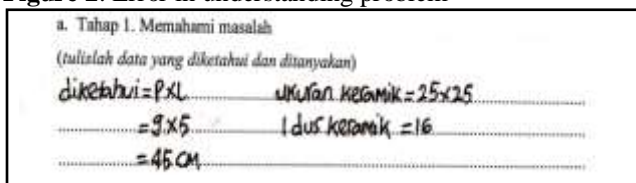
n = the number of errors in each type of error

N = the number of errors for all types of errors

3. RESULTS AND DISCUSSION

Analysis of the data shows that the type of error in understanding problem obtains a percentage of 12,73%. This error is included in the lowest number of errors. Error in understanding the problem is in each number of questions. The Error in understanding problem made by students can be seen in Figure 2.

Figure 2. Error in understanding problem



Translation :

$$\begin{aligned} \text{known} &= p \times l & \text{ceramic size} &= 25 \times 25 \\ &= 9 \times 5 & \text{1 ceramic box} &= 16 \\ &= 45 \text{ cm} \end{aligned}$$

Interviews with students who make error in understanding problem are as follows.

P : "See number 1 in the first stage, why do not you write down what is known and what is asked? Why did you just answer it directly?"

S : "It is because I am not accustomed to writing, what is known and what is asked"

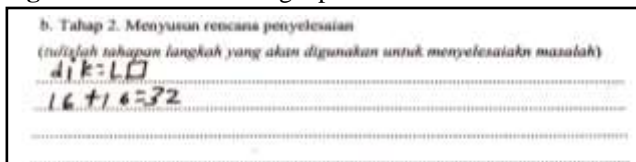
P : "How do you usually work on story questions?"

S : "Yes, I do it right away, Ma'am. I do not write down what is known and what is asked."

Based on interview is known factors that causing students to have error in understanding problems are students are not careful in reading and understanding story questions so that students do not obtain the information contained in the questions.

The result of the percentage of error in devising a problem solving is 17,41%. This error is included in the second lowest type of error. Error in devising a problem solving is found in each number of questions. Error in devising a plan by students can be seen in Figure 3.

Figure 3. Error in devising a plan



Translation :

$$\begin{aligned} \text{Dik} &= L \times L \\ 16 + 16 &= 32 \end{aligned}$$

Interviews with students who make errors in understanding problem are as follows.

P : "In question number 2 at the stage of devising a plan, what is the error??"

S : "It is the formula which is wrong. Should it use the rectangle formula and triangle?"

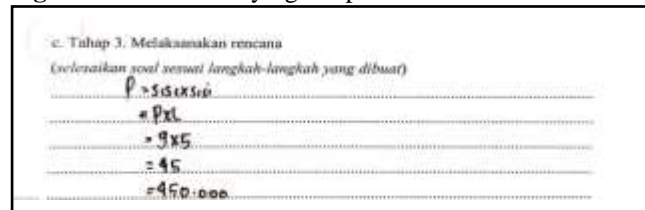
P : "Why did not you write it down earlier? Is it difficult?"

S : "Yes, it is quite difficult. I am not used to writing like that and sometimes I forget the formula."

Based on interview is known factors causing students errors in devising a problem solving are because students are not accustomed to writing and solving story questions. Students are accustomed to directly working on questions without devising a plan in advance.

The percentage of error in carrying out plan is 29,46%. Error in carrying out plan is found in each number of questions. Error in carrying out plan made by students can be seen in Figure 4.

Figure 4. Error in carrying out plan



Translation :

$$\begin{aligned} P &= \text{side} \times \text{side} \\ &= p \times l \\ &= 9 \times 5 \\ &= 45 \\ &= 450.000 \end{aligned}$$

Interviews with students who make errors in carrying out the plan are as follows.

P : "Your answer is number 2 at the stage of carrying out the plan. What is wrong with your answer?"

S : "It is incorrect in the calculation process. It should not only look for the length of the rectangle but also it should calculate the triangle and the area of the rice fields planted with rice,"

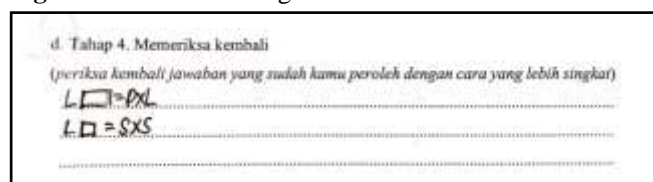
P : "You do not make conclusions from the results of your answer, do you?"

S : "No, ma'am. I did not get the final result so I did not conclude it"

Based on interview is known factors causing students errors in carrying out plan are because the students make errors in calculations so that they do not get the final answer correctly.

The percentage of error in looking back is 40,40%. This error is the highest error made by students. Error in planning problem solving is found in each number of questions. Error in looking back made by students can be seen in Figure 5.

Figure 5. Error in looking back



Translation :

$$L \square = P \times L$$

$$L \square = S \times S$$

Interviews with students who make error in looking back are as follows.

P : “See your answer sheet in number 1 at looking back stage. Why did you write the answer in step 3 to step 4. Is there no shorter way??”

S : “I do not know, Ma'am. I do not understand it, so I just re-write the formula”

P : “Why do not you understand? Is it usually not like that when working on story questions??”

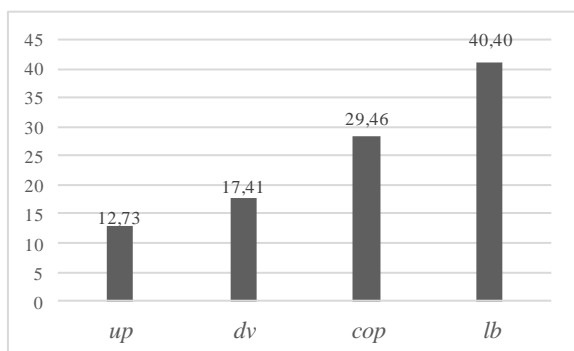
S : “No, Ma'am. I am not used to doing it like that. Usually, when I get an answer, I collect it immediately.”

Based on interview is known factors causing students errors in looking back are because students do not check the answers which are already obtained. Students are not accustomed to checking the final answers that have been obtained; students assume that when getting the final answers, they have solved the problem

The result in this study in line with research conducted by Irawan (2017), it is shown that the highest type of error is the error at the stage of looking back the answers, while the lowest type of error is the error in understanding the problem. Based on the results of the previous researches and the present research in analyzing the errors of fourth grade students of Public Elementary School of Yosorati 02 Jember in solving questions on rectangular and triangle subject according to Polya, it is known that there are still many students who make errors in solving mathematical story questions with different percentage results for each type of error.

If presented in the form of a diagram, the results of students' errors are as follows.

Figure 6. Students' errors percentage diagram



Remarks:

up : understanding problem

dv : devising a plan

cop : carrying out the plan

lb : looking back

Based on Figure 6 percentage highest error is error in looking back (lb) 40,40% and percentage lowest error is error in understanding problem (up) 12,73%.

4. CONCLUSION

Based on data analysis and discussion, it can be concluded that the highest students' errors is the error in looking back. Where as the lowest error is the error in understanding problem. The percentage of students' errors for each type of error is as follows: understanding problem by 12,73%, devising a plan by 17,41%, carrying out the plan by 29,46%, and looking back by 40,40%.

The causing factor of students' error in understanding problem is students are not careful in reading and understanding story questions. The cause of error in planning or devising problem solving is students are not accustomed to writing and planning in advance when going to solve a story question. The cause of error in carrying out the problem solving plan is the students make errors in calculations so that they do not get the final answer correctly. The cause of error in looking back is students are not accustomed to rechecking the answers that have been obtained.

5. REFERENCES

- [1] Abdurrahman, M. (2003). *Pendidikan Bagi Anak Berkesulitan Belajar*. Jakarta: Rineka Cipta.
- [2] Ali, M. (1990). *Strategi Penelitian*. Bandung: Angkasa.
- [3] Hidayah, S. (2016). Analisis Kesalahan dalam Menyelesaikan Soal Cerita Sistem Persamaan Linear Dua Variabel Berdasarkan Langkah Penyelesaian Polya. *Prosiding Seminar Nasional Pendidikan Matematika volume 1*. Program Studi Magister Pendidikan Matematika Universitas Negeri Malang.
- [4] Irawan, S. A. (2018). Analisis Kesalahan Dalam Menyelesaikan Soal cerita Menurut Polya Pokok Bahasan Luas Trapesium Dan Layang-Layang Pada Siswa Kelas V SDN Kranjingan 05 Jember. *Skripsi*. Jember: Fakultas Keguruan dan Ilmu Pendidikan Universitas Jember.
- [5] Masyhud, S. (2016). *Metode Penelitian Pendidikan*. Jember: Lembaga Pengembangan Manajemen dan Profesi Kependidikan (LPMPK).
- [6] Mirestika, Kania. (2016). *Big Book Matematika SD Kelas 4, 5 & 6*. Jakarta: Cmedia Imprint Kawan Pustaka.
- [7] Mustaqim, B. dan A. Astuty. (2008). *Ayo Belajar Matematika 4: untuk SD dan MI kelas IV*. Jakarta: Pusat Perbukuan Departemen Pendidikan Nasional.
- [8] Polya, G. (1973). *How to Solve It*. New Jersey: United States of America.
- [9] Raharjo, M dan Astuti. (2011). *Pembelajaran Soal Cerita Operasi Hitung Campur di Sekolah Dasar*. Yogyakarta: Pustaka Pengembangan dan Pemberdaya Pendidikan dan Tenaga Kependidikan Matematika.
- [10] Suyastini, P.A. (2017). Comparasion of the Effectiveness of Project Based Learning Model and Problem Based Learning in Mathematics Learning at Public Junior High Schools With A Accreditation in Makassar City. *Jurnal Daya Matematis*
- [11] Zaif, A. dkk. (2013). Penerapan Pembelajaran Pemecahan Masalah Model Polya untuk Menyelesaikan Soal-soal Pemecahan Masalah pada

Siswa Kelas IX I SMP Negeri 1 Jember Jember
Semester Ganjil Tahun Pelajaran 2012/2013. *Jurnal*

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