

Error Analysis of Class VIII Students in Understanding Mathematics Problems in the PISA Model at MTS Terpadu Nurul Hidayah Tangen for the 2020/2021 Academic Year

Nanda Mudi Astuti^{1,a)}, Slamet Hw^{1,b)}

¹Muhammadiyah University of Surakarta, Indonesia

Corresponding author: ^{a)} A410170001@student.ums.ac.id

^{b)} slamethw4648@gmail.com

Abstract. This study was conducted with the aim of knowing and describing the causes of students making mistakes in understanding the PISA model math problems on the Number Pattern material. This type of research is descriptive qualitative research. The subjects in this study were class VIII MTs Terpadu Nurul Hidayah Tangen students for the 2020/2021 academic year. Data collection techniques used in this study were tests, interviews, and documentation. The validity of the data using triangulation techniques. The data analysis technique was carried out in three stages, namely data reduction, data presentation, and data verification and conclusion drawing. The analytical framework was developed based on the Newman error category. The results showed that the number of errors made by students in understanding the PISA model questions was 23.29%. Factors causing these errors in general are due to the ability of students who cannot interpret the meaning of the questions properly, and the level of understanding and creativity of students is low in identifying problems.

INTRODUCTION

PISA (The Programme for International Student Assessment) is an assessment carried out for junior high school students aged 15 years every 3 years organized by the Organization for Economic Cooperation and Development (OECD) or the organization for economic cooperation and development. PISA is an international level assessment that aims to assess abilities, reading skills, mathematics, and science using a literacy approach (OECD, 2019). Mathematical literacy is defined as the ability of students to formulate, apply and interpret mathematics into various contexts.

Mathematics is a subject that is taught from elementary school to university. Mathematics is a field of science which is a tool for thinking, communicating, and a tool for solving various practical problems (Abdurahman, 2009: 256). Nugroho (2017) said that mathematics has an important role because mathematics is the basis for quantitative reasoning and solving. In the 2013 curriculum, mathematics learning is required to use problem solving methods, because students are expected to be able to solve high-level mathematical problems.

In math problems, the PISA model measures reasoning, problem solving, and argumentation skills more than ordinary questions that measure standard technical abilities related to memory and calculation. Therefore, problem solving must be taught from an early age in schools, with the aim of students being

able to think critically, thoroughly, logically, systematically, carefully, effectively, and efficiently in solving a problem.

However, the results of international research on student achievement in Indonesia in solving problem solving problems are still far from expectations. Indonesia is far from the international average, even compared to Malaysia, Singapore and Thailand. Problem solving, critical thinking, and creative abilities of Indonesian students are still low, so students are weak in solving problems related to proving, reasoning, generalizing, and determining the relationship between the facts provided (F. Bidasari 2017). Wardhani (2011).) said that the cause of the weak ability of students to solve problems using the PISA model was that students were not accustomed to doing the correct problem solving process, namely by understanding the problem, implementing problem solving and checking the results of problem solving.

Education has an important role in this. Education is a means of learning that includes knowledge, creativity, and the ability both individually and in groups to educate humans and is also one of the most important factors in increasing competent and competitive human resources. For the final result is not important, but the process in education is the most important, because with this process students can understand and understand better. In Law no. 20 of 2003 concerning the education system, that the purpose of education in Indonesia is to be able to develop students' abilities to become human beings who are useful, responsible, and have faith in God Almighty.

Wijaya (2014) said that in connection with analyzing errors in solving problems in real contexts such as PISA questions, Newman developed a model known as Newman Error Analysis which consists of five categories of errors, namely reading errors, understanding problems, transformation errors, process skill errors. , and errors in writing conclusions.

Utami (2017) revealed that from the many mistakes made by students in working on questions, it can be used as a benchmark for the extent to which students master the material. Therefore, it is necessary to have an analysis of student errors in working on PISA model math problems. So that they can find errors and fix them so that the same error does not occur. Based on this description, the researcher wants to analyze and describe the mistakes of class VIII MTs Terpadu Nurul Hidayah Tangen students in understanding mathematics problems using the PISA model. In the research of Najim Wikan and Sutarna (2020), said that errors in understanding were included in the high category. The cause of errors made by students in understanding is the ability of students to understand which is still low and unable to understand keywords well. Ability understanding in understanding the meaning of the question is needed, because if an error occurs it will affect the next work.

RESEARCH METHODOLOGY

This study uses descriptive qualitative, the researcher chose this type of research because it is very suitable for the purpose of researchers who want to obtain natural and in-depth data about students' errors in understanding mathematical problems using the PISA model. The research was carried out at MTs Terpadu Nurul Hidayah Tangen located in Sragen Regency, precisely in Genengsari, Rt 18, Dukuh, Tangen District, Sragen Regency, Central Java Province, 57261. The time from the test to the interview was carried out in the even semester of the 2020/2021 academic year, namely March to April 2021. The subjects of the research were class VIII MTs Terpadu Nurul Hidayah Tangen students. The data collection techniques in this study are, 1) The test is given to obtain data on student work,

The validity of the data using the technique of triangulation method by comparing the results of interviews with tests. This study uses data analysis according to Miles and Hubberman (in Sugiyono, 2010: 337) with the following stages: 1) data reduction, 2) data presentation, 3) conclusion/verification. Data reduction in the form of test results and interviews conducted with students. Then the data is presented in the form of narrative text. Then conclusions were drawn regarding student errors in solving PISA model math problems on the Number Pattern material.

RESULTS AND DISCUSSION

After conducting research and analyzing student test results, it can be seen that students still make many mistakes in solving PISA model math problems on the Number Pattern material. The test questions tested consist of 5 questions in the form of descriptions. The following table and data on student work

from the questions that have been tested are presented. From the results of the analysis of student work, 5 students were selected whose types of errors represented Newman's types of errors, namely reading errors, understanding transformation errors, process skill errors, and errors in conclusions. The following is the number of each type of error in each question.

Table 1. Percentage of Types of Student Errors

About	Reading Error	Misunderstanding	Transforming Error	Error process	Final Answer Error	number of respondents
1	1	7	2	4	3	19
2	1	7	3	5	4	19
3	2	0	3	6	7	16
4	2	2	4	5	8	14
5	0	1	1	4	1	5
	6 (8.22%)	17 (23.29%)	13 (17.81%)	24 (32.88%)	23 (31.51%)	73

Based on the table, it can be seen that students who made errors in reading were 8.22%, who made errors in understanding were 23.29%, who made errors in transformation were 17.81%, who made errors in process skills were 32.88. %, and those who made an error in the conclusion were 31.51%.

Furthermore, it will describe the misunderstanding and the factors that cause errors made by students in understanding the PISA model math problems on the Number Pattern material based on the results of analysis and interviews.

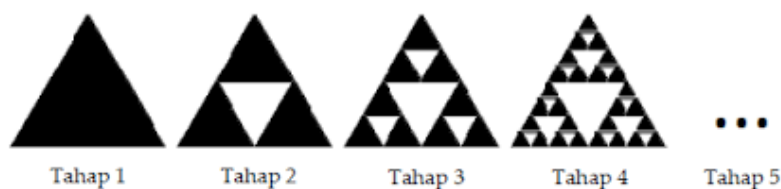
1. Errors in Understanding Problems (Comprehension Error's)

Errors in understanding the questions, namely the stage where students are able to read all the words in the problem but do not master the overall understanding of the words, so that students cannot go further on the right problem solving pattern or students do not know what the questions are about. In understanding the problem, the location of student errors can be seen when students work on questions that are not in accordance with what was asked in the question.

The following are the results of student answers supported by interviews that show the location and causes of student errors in understanding the PISA model of number pattern material.

About

In the picture below is a Sierpinski triangle, which is a black triangle. The triangle divides itself into equal shapes and constantly changing sizes. Here are the stages of how the Sierpinski triangle divides itself from the beginning until it continues to change into smaller sizes. Stage 1 consists of 1 Sierpinski triangle, stage 2 consists of 3 Sierpinski triangles, and so on.



Find the number of Sierpinski triangles in step 5 and the total number of Sierpinski triangles from step 1 -5!

Students' answers to question number 4 can be seen in the picture.

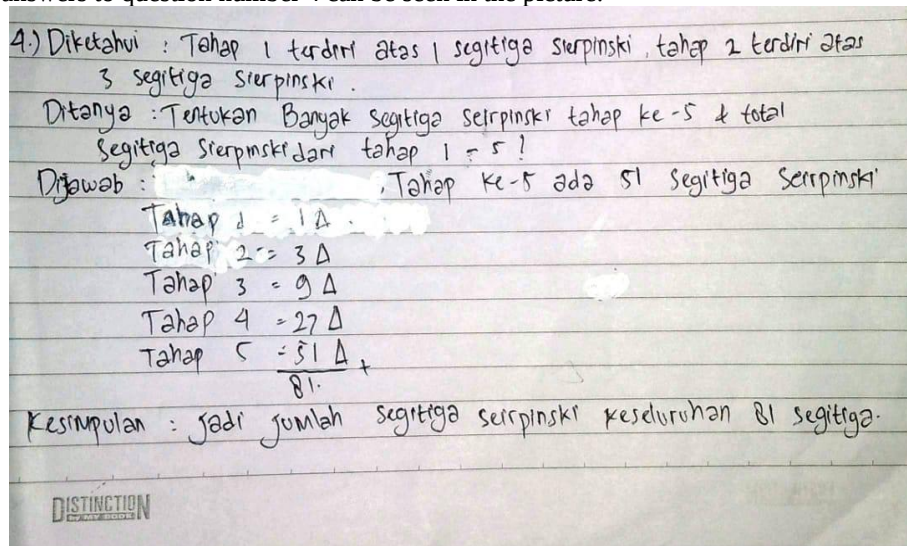


Figure 1. Result of Answer Number 4

For example: P = Researcher

S2 = Student 2

P : "Dek, what do you understand from question no. 4 ? "

S2 : "Find the fifth triangle and the sum of all the triangles ma'am."

P : "Right, then what does the deck know?"

S2 : "Stage 1 has 1 triangle, stage 2 has 3 triangles, stage 3 has 9 triangles, and stage 4 has 27 triangles ma'am."

P : "Fine, but why don't you write a deck?"

S2 : "It's been a while bu...hehe"

P : "Furthermore, if there is a question in the form of a story like this, it is better to write what is known, asked, answered, and concluded, deck, because it has value"

S2 : "Yes ma'am..."

P : "Then, do you understand the shape of the number pattern on the question?"

S2 : "Not yet ma'am, I'm confused."

P : "What makes you confused, deck?"

S2 : "I don't understand the material, ma'am, then I also rarely do questions like that."

P : "Then, how do you do the deck?"

S2 : "I'm doing what I can ma'am, then I'll just add it all right away."

P : "Is your answer correct?"

S2 : "Not yet ma'am..."

P : "Where do you think the fault lies?"

S2 : " The mistake was because I didn't write down everything that was known and I didn't use the right method ma'am.."

Based on the analysis of the results of student work regarding other errors in understanding the problem in number 4, students do not understand the question request and the form of the number pattern used to complete the work. In this case the students did not use the right steps. As said by Sekar Triyas Asih (2015), lack of understanding of question requests sometimes makes students not know what useful information is from the questions. Students who encounter conditions like this, it is possible to feel confused so that students make mistakes in writing down the information contained in the questions, both those asked and those that are known.

This is in line with the research of Suraji, et al (2018), the error in understanding mathematical concepts is caused because students think the questions are difficult and are less enthusiastic about understanding the questions. A small number of students are confused about communicating the known questions into a mathematical model so that students are confused about solving the problem. Meanwhile, in the analysis of mathematical problem solving abilities, students tend to make mistakes in calculations, so that the solution is not correct. Therefore, understanding the meaning of the question from the beginning of the work is very necessary and important, because if students cannot understand the meaning of the question, it will cause other errors at a later stage.

2. Causes of Students Making Errors in Understanding

Students make mistakes in understanding the meaning of the question because students can not interpret the meaning of the question, lack of remembering the material given by the teacher, do not understand the form of patterns used to complete the work, and students are not accustomed to solving various types of number pattern questions. (Hanipa, Akbar, and Sari, 2019) mentioned that the factor that causes students to make mistakes in solving math problems is the students' understanding is still low in mastering the concept.

Factors that cause students to make mistakes, namely internal factors and external factors. The results of interviews with mathematics teachers in this study also explained that the internal factor was from the students themselves who were less interested in the number pattern material because of the many different forms of questions and the various solutions used. While the external factor is the environment. The environment is very influential on the students themselves. If students hang out with other students who are lazy to listen to the teacher's explanation, the students will be lazy too. This results in a low level of student understanding of the number pattern material. This is in line with the research of Dian Rizky Utari, et al (2019) which states that the factors that cause difficulties in learning mathematics are internal factors and external factors. Internal factors include (1) the IQ level of different students, (2) student attitudes in learning, (3) learning motivation, and (4) body health. External factors include (1) teacher variations in teaching, (2) use of learning media, (3) facilities and infrastructure in schools, and (4) family environment.

CONCLUSION

Based on the results of the research that has been described, it can be seen what are the causes of student errors in understanding the PISA model math problems on the Number Pattern material. The cause of class VIII MTs Terpadu Nurul Hidayah Tangen making mistakes in understanding PISA model math problems on Number Pattern material because students cannot interpret the questions, do not understand the form of patterns used to complete their work, and students are not accustomed to solving various types of number pattern questions. Factors causing these errors in general are due to the ability of students

who cannot interpret the meaning of the questions properly, and the level of understanding and creativity of students is low in identifying problems.

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