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ANALYSIS OF PSEUDO THINKING PROCESS SKILLS IN ELEMENTARY SCHOOL STUDENTS THROUGH ETHNOMATHEMATICS BASED PROBLEM SOLVING

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Abstract

This study aims to analyze the pseudo-thinking process skills of elementary school students through ethnomathematics-based problem solving. Four students from SD Negeri 76 Muaro Jambi's class IVB participated in this study. There were two male and two female participants who believed the pseudo-true, and there were two male and two female subjects who believed the pseudo-false. Tests, interviews, and documentation were the data collection methods used in this study. Data analysis is used in this study for presentation, reduction, and conclusion making. The pre-field, fieldwork, and data analysis phases of this study are all included. The findings demonstrated that when addressing math problems, the four participants used different pseudothought processes. Each subject has abilities in several aspects of process skills in pseudo-true thinking, such as observing information, however, they still have shortcomings and difficulties in explaining the calculation process, communicating results, and understanding mathematical concepts as a whole. Consequently, further development is required to improve their processing skills in pseudo-thinking.

Keywords: Ethnomathematics, Problem Solving, Pseudo Thinking

INTRODUCTION

Enhancing the accomplishments, dispositions, and caliber of human resources requires education. Education, according to Rosidin et al. (2019), is a lifelong learning process that occurs through social interaction with the aim of improving a person's knowledge, talents, attitudes and thinking abilities along with personal growth. One of the subjects that is widely taught in the education system is mathematics. In large and middle schools, mathematics is a subject that studies quantity, structure, space and change (Jatmiko, 2018). Students studying mathematics develop their ability to think clearly, methodically, and solve difficulties in everyday life. Therefore, mathematics is very important for humans (Kamid et al., 2021).

Each person's understanding of mathematical concepts is different, and this has a significant influence on their ability to solve mathematical puzzles (Mauleto, 2019). For most students, mathematics is still challenging and boring. Therefore, for children to easily learn mathematics, they need to have process skills. Process skills are a type of learning that requires students to solve problems critically and methodically (Ratnaningdyah, 2018). The aim of this

process is for students to understand ideas and facts and relate them to their own beliefs and perspectives (Gunawan et al., 2019).

Students who engage in “pseudo” thought processes usually relate to related issues. (Wibawa, 2016). The way students think "pseudo" can be judged from their answers, there are two ways this happens: students give the right response but are not able to explain it, or students give the wrong response but are then able to give the correct response after reflecting (R. Subanji & Supratman, 2015). According to research (R. Subanji & Supratman, 2015), elementary school students experience pseudo when they are spontaneously able to solve their own problems. They are also unable to address difficulties by assigning students to solve problems based on their previous knowledge, allowing students to use fake methods, and classifying material. Many students in elementary school experience this. These errors are often corrected and ignored because they do not understand other thinking errors or false thinking errors. According to (S. Subanji & Nusantara, 2016), false intelligence will reduce student achievement, low performance can be an indicator of how well students perform in terms of content and awareness (S. Subanji & Nusantara, 2016). So that students do not get used to pseudo or false thinking, this error must be corrected immediately. Therefore, researchers believe that these thinking errors must be corrected from elementary school so that students do not repeat them until first school or even higher levels.

Initial observations at SD Negeri 76 Muaro Jambi Class IVB showed that teachers only explained the subject matter about procedures, rules, and techniques for solving math problems, without explaining the reasons why they used these techniques. As a result, students simply mimic the steps the teacher gives them to solve problems without understanding the reasons why they are doing so. This happens especially when it comes to math problem solving.

To overcome these difficulties, students' mathematical understanding must be modified by taking into account the errors caused by the pseudo-thinking understanding process. According to (S. Subanji & Nusantara, 2016), students often have difficulty with the composition and solving of mathematical problems for a number of reasons. Among the main causes of this problem are basic errors, pinpoint errors, incomplete vision, and lack of information. Problem solving is a basic mathematics skill that is very important for students (Sariningsih & Purwasih, 2017). This problem-solving ability can be extended to the ability to choose the optimal action for each particular situation encountered outside the field of mathematics (Fuady, 2017). Being able to resolve difficulties with appropriate steps minimizes the possibility of engaging in pseudo-thinking.

Poor problem solving skills will produce poor quality human resources (Dewi et al., 2019). According to (Mawaddah & Anisah, 2015) Mathematics problems are difficult to solve because the learning model used is not in accordance with local cultural standards and because people do not have the habit of solving problems in the real world. Therefore, mathematics learning must be applied to culture-based learning, or "ethnomathematics".

Students are positioned as real-world objects or problems in ethnomathematics learning, namely cultural aspects that are connected to everyday life and contain

mathematical understanding (Susanto et al., 2022). Students will indirectly gain a deeper understanding of math by using everyday objects or cultural elements.

Researchers are drawn to a study titled "Analysis of Pseudo Thinking Process Skills in Elementary School Students Through Ethnomathematics-Based Problem Solving" because of the background information mentioned above.

METHOD

This study is a form of qualitative research that use a descriptive methodology. Through ethnomathematics-based problem solving, the pseudo-thinking process skills of primary school pupils are to be analyzed in this study. Four students from SD Negeri 76 Muaro Jambi's class IVB participated in this study. They were chosen based on their aptitude for answering exam questions related to ethnomathematics and their knowledge of area and volume measurement. There were four subjects involved in this study: two male and female pseudo-true thinking subjects, and two male and female pseudo-false thinking subjects. Table 1 shows the students selected as research subjects.

Table 1. Subjects of Research

Subject Name	Subject Gender	Results	Subject Code
A	Male	Pseudo True	S1
IAN	Female	Pseudo True	S2
MM	Male	Pseudo False	S3
AS	Female	Pseudo False	S4

The data collection methods used in this study are tes, wawancara, and documentation.. Tests for validity and reliability of qualitative research findings include membercheck, negative case analysis, triangulation, enhanced persistence, extended observation, and the use of reference materials. Three types of data analysis were used for the purpose of this study: (1) data reduction; (2) data presentation; and (3) conclusion drawing. The steps in this study procedure are: (1) Pre-field stage; (2) Field work stage; and (3) Data analysis stage.

RESULTS AND DISCUSSION

Based on the information received from the four research subjects' written responses and interviews. Each subject has a different way of solving questions. The four subjects S1, S2, S3 and S4 have solved mathematics problems quite well, but there are still some errors in solving ethnomathematics-based questions. Below are the answer sheets for the four subjects:

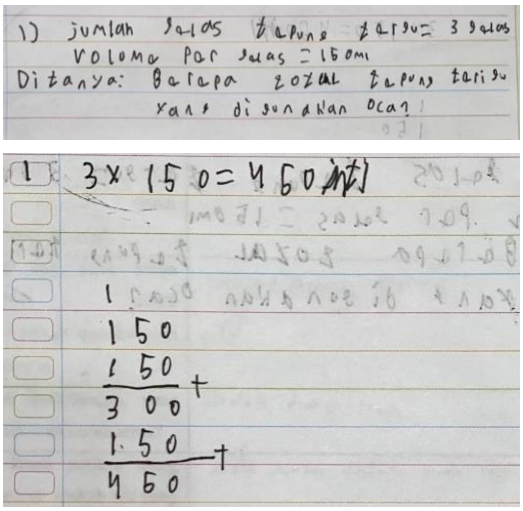

Figure 1. S1 response sheet

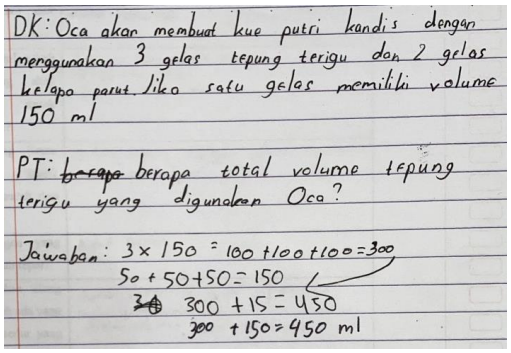

Figure 2. S2 response sheet

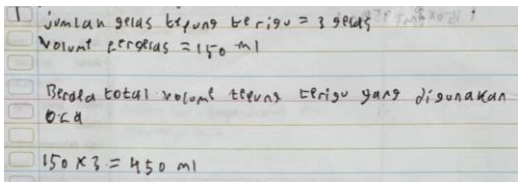

Figure 3. S3 response sheet

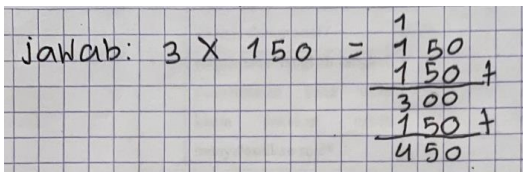

Figure 4. S4 response sheet

Based on the answer sheets and interview transcripts from the four research subjects, it was found that the research subjects showed pseudo-thinking processes that solved problem solving. This pseudo thinking process is described in the following table 2 as an indicator of process skills in pseudo thinking:

Table 2. The results of pseudo thinking

Subject	Pseudo Thinking Indicator	Process Skills Indicator						
		K 1	K 2	K 3	K 4	K 5	K 6	K 7
S1	Pseudo-True	√	√	–	√	√	–	√
	Pseudo-False	–	–	–	–	–	–	–
S2	Pseudo-True	–	√	–	√	√	–	√
	Pseudo-False	–	–	–	–	–	–	–
S3	Pseudo-True	√	√	–	√	√	–	√
	Pseudo-False	–	–	–	–	–	–	–
S4	Pseudo-True	√	√	–	√	√	–	√
	Pseudo-False	–	–	–	–	–	–	–

Information:

(√) = Subject successfully meets the pseudo-thinking and processing skills indicators

(–) = The subject failed to meet the pseudo-thinking process skill indicators

K1 = Observation Ability

K2 = Classification Ability

K3 = Predictive Ability

K4 = Ability to Apply Concepts

K5 = Calculation Ability

K6 = Measuring Ability

K7 = Communication Ability

After each subject is grouped based on indicators of process skills and pseudo thinking found in the answer sheet and interview transcript, it will be analyzed and explained how process skills in pseudo thinking influence ethnomathematics problem solving.

Indicators of Observing Process Skills in Pseudo Correct Thinking

Based on the research results from the written tests and interviews above, it can be seen that S1, S2, S3 and S4 show good observation skills and understand the information given in the questions correctly. However, there are differences in the level of clarity and intelligence in conveying information.

S1 showed a lack of deep understanding regarding the information in the question, which resulted in S1 thinking pseudo-correct. S2 shows good observation skills and is able to state all existing information correctly. S3 was initially unable to mention the information in the question, but when asked again, he only stated what was written on the answer sheet. S4 was able to mention all the information in the question, but he immediately worked on

the question without writing down the information in the question first.

Thus, it can be concluded that S1, S3, and S4 meet the indicators of observing process skills in pseudo-true thinking, while S2 shows good understanding and does not appear to experience the indicators of observing process skills in pseudo-true thinking.

The theory expressed by (Wibawa, 2016) supports this research, which states that pseudo-true occurs when the subject can give the answer correctly, but cannot explain how the subject got the answer.

Indicators of Observation Process Skills in Pseudo-False Thinking

The study's findings demonstrate that the four subjects did not fulfill the criteria of observation process skills in pseudo-false thinking. This is shown by the results of written tests and interviews. S1 has not provided complete information. This demonstrates that S1 did not comprehend the provided information. S2 can be considered successful based on observation because he can mention all the information in the problem correctly. S3 was initially unable to state the information in the questions, indicating a lack of observation ability. However, S3 was able to accurately mention the query information after receiving the instructions. S4 also has the ability to mention all the information in the problem correctly.

Therefore, it may be concluded that the four subjects did not meet the indicators of observing process skills in pseudo-false thinking as a whole. Pseudo errors occur when students are able to write wrong answers, but in fact the students are able to reason correctly (Rasudi et al., 2021).

Indicators of Classifying Process Skills in Pseudo-Correct Thinking

Not all subjects wrote down what they knew and were asked about the questions, as can be seen from the results of each subject's answer sheet. S1 and S3 were combined, but still not perfect in writing the known and questioned information in the problem; S2 wrote the known and questioned information completely, and S4 did not write what was known and questioned. Interviews regarding how they answer test questions, however, provide crucial information from S1, S2, S3, and S4 questions. This is consistent with studies by Septria et al. (2021), which discovered that when students write down what they know and are asked about pertinent difficulties, their work may demonstrate misunderstandings of problems. Students often ignore or don't write words. - important words or information.

Although S1, S2, S3 and S4 have the ability to find important information in problems, students' ability to identify information thoroughly must be improved so that they can avoid pseudo-correct thinking when solving problems. According to research (Rafiah et al., 2018), indicators of pseudo-correct thinking appear, namely students only use previously memorized formulas or procedures when solving mathematical problems and are able to answer questions correctly.

Indicators of Classifying Process Skills in Pseudo-False Thinking

The four subjects are not included in the indicators of classifying process skills in pseudo-false thinking, according to the results of interviews and answer sheets. This is shown by several research results: the four subjects had difficulty finding important information in the problem as a

whole or in explaining the solution steps verbally. For example, S1, S2 and S4 do not mention the information provided in the problem in several stages or do not provide an adequate explanation of the solution process. In contrast, S3 could produce the right answer, but had difficulty explaining the steps orally. This suggests that there is an error in the information classification process.. This is consistent with the theory put forth by Sopamena et al. (2018), which holds that although students may commit pseudo-errors when they provide incorrect responses, they are able to rectify their mistakes after engaging in self-reflection. Therefore, errors in the process of classifying information can lead to shallow understanding or false pseudo-thinking in responding to questions.

Indicators of Process Skills for Making Predictions in Pseudo-Correct Thinking

The results of the data presentation show that the four subjects gave correct answers, but they have not fulfilled the indicators of the process skills of making predictions in pseudo-correct thinking. S1, S2, and S4 used less structured procedures in solving problems, such as combining steps randomly without clear explanations. Meanwhile, S3, although using multiplication operations correctly, does not provide clear or systematic predictions in the solving process.

Indicators of Process Skills for Making Predictions in Pseudo-False Thinking

According to the answers on the answer sheets and the interviews, S1, S2, and S4 demonstrated faults in the process of solving problems by carrying out mathematical operations that had nothing to do with the problem. S2 tries to add multiplication results in an inconsistent way, while S4 uses procedures that are unstructured and unrelated to real mathematical concepts. On the other hand, although S3 succeeded in reaching the correct answer, it was unable to provide correct predictions in the solution process.

Indicators of Process Skills for Applying Concepts in Pseudo-Correct Thinking

Based on the presentation of the first subject's data, S1 uses the process skills of applying concepts in pseudo-correct thinking, namely using known concepts mechanically without considering their relationship to the data provided. Even though S2 used the concept of multiplication correctly, he made a mistake in interpreting the question and adding up the multiplication results. As a result, S2 shows indicators of process skills in applying concepts in pseudo-correct thinking because he uses mathematical concepts correctly but is mistaken when carrying out calculations and interpreting data.

Even though S3 used the concept of multiplication correctly, he misinterpreted the question information and did not conclude the correct answer. Because he was unable to interpret information correctly and create solutions that fit the problem, S3 showed indicators of process skills applying concepts in pseudo-correct thinking. S4 found information in the problem, such as the number of glasses of wheat flour and the volume per glass, but when asked about how to solve it, S4 gave an illogical answer. As a result, S4 meets the process skill indicators of applying concepts in pseudo-thinking (Rasudi et al., 2021). According to (Rasudi et al., 2021), a claim is pseudo-true when a student

provides the right response, but their logic is flawed.

The rationale leads one to the conclusion that the four research participants exhibited process skill traits while applying concepts in pseudo-correct thinking. Although they used mathematical concepts correctly, they failed in the reasoning process and interpreted the data correctly This is consistent with earlier research (R. Subanji & Supratman, 2015), which discovered that students might comprehend portions of concepts but not the entirety, which leaves them perplexed when responding to queries.

Indicators of Process Skills for Applying Concepts in Pseudo-False Thinking

The four research subjects did not meet the process skill requirements for applying concepts in pseudo-false thinking, as evidenced by the test and interview results. They make mistakes in information processing and problem interpretation, but this is more towards pseudo-correct thinking, where they use concepts they already know but do not understand them thoroughly or use them appropriately. If they make more basic mistakes or come up with the right answer by chance without understanding the concept thoroughly, they will develop pseudo-incorrect thinking. As a result, these four subjects did not meet the process skill indicators for applying concepts in pseudo-false thinking.

Indicators of Calculation Process Skills in Pseudo Correct Thinking

S1 shows the ability to use calculation process skills in pseudo-correct thinking. Even though he correctly calculated the volume of wheat flour used, when asked whether his calculation was correct, S1 was not sure and could not even explain how he got the result of 450 ml. This shows that S1 does not understand mathematical concepts consistently and logically.

S2 tries to calculate the total volume of wheat flour used by multiplying the amount of wheat flour by the volume per glass. However, in the calculation process, S2 made inconsistent additions. This shows that S2 may not understand the concept of calculations in depth or carry out the calculation process automatically without considering it carefully.

S3 uses the concept of multiplication based on data exposure. S3 tries to calculate the total volume of wheat flour used by multiplying the number of glasses of wheat flour by the volume per glass. S3 demonstrated adequate understanding of the concept of multiplication by producing correct answers. Even though S3's answer is correct, the reasons given do not match the multiplication process. This shows that S3 does not understand the mathematical concepts used when carrying out calculations. This shows that students have indicators of calculating process skills in pseudo-correct thinking.

S4 gave an answer that was inconsistent with the correct calculation process in answering the question. This suggests that S4 may be using a true pseudo-thinking process, where he tries to apply mathematical concepts automatically without understanding (Rasudi et al., 2021).

Indicators of Calculation Process Skills in Pseudo-Incorrect Thinking

As shown by the test and interview results, the four subjects did not meet the indicators of calculation process skills in pseudo-false thinking. These four

subjects still use basic mathematical concepts such as multiplication and addition, although there are some errors in the calculation process, such as inconsistent steps or addition errors, but these errors do not indicate a completely wrong or irrelevant understanding of mathematical concepts.

Therefore, errors that occur during the calculation process do not necessarily indicate a completely incorrect or irrelevant understanding of a mathematical concept. As a result, the four subjects did not meet the indicators of calculation process skills in pseudo-false thinking. According to previous research (Rafiah et al., 2018), students can experience pseudo-wrong when students give wrong answers, but after reflection, students can give correct answers.

Indicators of Measuring Process Skills in Pseudo Correct Thinking

The four subjects did not fit the requirements for assessing process skills in pseudo-correct reasoning, as evidenced by the test and interview results. In this case, the measuring process refers to an individual's ability to calculate or determine an appropriate volume or quantity based on the information they receive. However, in their explanations for each topic, they point out calculation problems, inconsistent additions, or inappropriate reasons for the multiplications used. This shows that the four subjects did not have the ability to measure correctly. Instead, they tend to use pseudo-true thought processes. They use mathematical concepts mechanically without paying attention to the logic of calculations (S. Subanji & Nusantara, 2016). As a result, the four subjects did not meet the indicators of measuring process skills in pseudo-correct thinking.

Indicators of Measuring Process Skills in Pseudo-False Thinking

Based on the explanation, the four subjects did not meet the indicators of measuring process skills in pseudo-false thinking. The four subjects experienced confusion or errors in carrying out consistent and logical calculations. Because they were unable to carry out calculations correctly or provide a consistent and logical explanation of the calculation process used, the four subjects did not meet the indicators of measuring process skills in pseudo-thinking. Pseudo errors arise when the subject is able to write the answer (Wibawa, 2016). However, the information obtained from understanding the problem does not match the answers given. Afterwards, subjects were given the opportunity for self-reflection, which allowed them to identify and correct their mistakes so they could produce correct answers.

Indicators of Process Skills for Communicating Results in Pseudo-Correct Thinking

Based on data from test answers and interviews. S1 succeeded in calculating the total volume of wheat flour using the multiplication concept correctly. However, when asked whether the calculation was correct, S1 was not sure and could not even explain the calculation process consistently. S2 performed the calculation procedure incorrectly, but he remained confident in his answer and communicated it clearly. When asked to double-check his answers, S2 quickly highlighted his errors and then corrected his results appropriately, indicating that S2 was able to explain his calculation procedures in detail and

quickly respond to feedback to correct his errors.

While S3 managed to get the calculations right, he was unable to explain clearly the reasons behind the results. S3 said that he used downward multiplication as the reason for his calculation results. S4 shows indicators of process skills in communicating results in pseudo-correct thinking. Although he managed to achieve the correct calculation results. S4 thought his response was correct, but his inability to give a sufficient justification indicated that he was engaging in a pseudo-thinking process in which responses were provided automatically without comprehension of the underlying concepts. This is consistent with earlier research findings that students can frequently provide the right response but struggle to adequately describe how the computation was done (S. Subanji & Nusantara, 2016).

Therefore, the four subjects showed indicators of process skills in communicating results in pseudo-correct thinking, because even though they could provide the correct answer, they had difficulty explaining the calculation process and providing an adequate explanation of the calculation process.

Indicators of Process Skills for Communicating Results in Pseudo-False Thinking

The four subjects did not fully meet the process skill markers for communicating results in pseudo-false thinking, based on the test and interview results. Pseudo-incorrect occurs when the subject does not recheck the question, but gives an incorrect answer, and the subject can correct it by reflection. Another thing happens when the subject re-examines the question, but gives the wrong answer, and the subject can correct it with self-reflection. Therefore, the four subjects are not considered to meet the indicators of process skills for communicating results in pseudo-false thinking. Instead, they were thought to face more difficulties in communicating their understanding clearly.

CONCLUSION

The results of the research findings from 22 potential research subjects available in class IV B of SD Negeri 76 Muaro Jambi, 4 subjects were selected. After analyzing the four subjects, it can be concluded that each subject shows pseudo thinking patterns. The four subjects showed various characteristics in using pseudo thinking patterns when answering mathematical questions. Each subject has abilities in several aspects of process skills in pseudo-true thinking, such as observing information, however, they still have shortcomings and difficulties in explaining the calculation process, communicating results, and understanding mathematical concepts as a whole. Consequently, further development is required to improve their processing skills in pseudo-thinking.

Teachers have a very important role in helping students acquire communication skills resulting from mathematical thinking. It is recommended that teachers not only emphasize technical learning. Instead, teachers should emphasize understanding mathematical concepts as a whole. Not only can teachers encourage students to participate and share their ideas, but they can also provide helpful criticism about the way students convey their ideas.

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