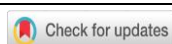# Profile of Problem-Solving Ability in Junior High School Students on Global Warming Lesson Material

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Sections Info	ABSTRACT
	Objective: This study aims to determine the profile of problem-solving ability in junior high school students on global warming. **Method:** This research is preliminary. The study used a quantitative-descriptive research type and a purposive-sampling method. The instrument included a problem-solving ability test with four questions based on the Polya indicator on global warming lesson materials. The research sample consisted of 33 students from class VII-B, JHS Al-Miftah 4 Karang Anyar Ketapang Timur Sampang District East Java Province, who had previously received global warming lesson materials. The research data was analyzed by calculating the average score of the indicator student's problem-solving ability in the form of a percentage. **Result:** The results were as follows: the interpretation of problem-solving abilities in students is still dominant in the "Very Less" category with a score of 43%, and the overall average value of problem-solving abilities obtained based on indicators of problem-solving abilities gets of 32.25% belonging to the category "Not enough." **Novelty:** Analysis of problem-solving abilities can be a reference and a means of developing self-ability related to problem-solving abilities in the school environment, considering that solving abilities have yet to be highlighted too much, especially in remote areas. Problem-solving abilities are still a problem in the world of education, so further research is needed as a means to improve students' problem-solving abilities.

INTRODUCTION

Education involves the process of individual guidance so that they grow and develop into human beings who are independent, responsible, creative, knowledgeable, healthy, and have noble characters in the 21st century, where science and technology are increasingly developing. Essential abilities that must be mastered in the 21st century are critical thinking and problem-solving, creativity and innovation, collaboration, and communication. One must also master technology, information, and communication literacy (Andrews-Todd & Kerr, 2019). This literacy is very important for someone in choosing, criticizing, evaluating, synthesizing, and using information (Redhana, 2019). According to (Lawi & Putra, 2020), the ultimate goal of learning is to produce students with knowledge and skills in solving problems. Problem-solving ability involves high intellectuals who are more complex in thinking compared to other intellectual abilities. Students need problem-solving skills to solve problems in learning and everyday life (Nurita et al., 2017). Solving ability has indicators, including understanding problems, being able to plan to problem-solve, implementing problem-solving plans that have been made, and re-examining problem-solving that has been implemented (Palennari & Rachmawaty, 2021). When students are given general science questions, students will have no difficulty solving them (Savitri et al., 2021). However, the problem is that when students are given problem-based questions, students tend to find it challenging to solve the problems given in these questions.

Problem-solving is the primary goal of education, not just a mere learning method. Problem-solving provides understanding by stimulating students to pay attention, examine, and think about a problem to analyze the problem further to develop problem-solving skills (Utaminingsih et al., 2022). Students' problem-solving abilities will positively increase achievement, skills, and self-confidence (Rahma & Windyariani, 2020; Cindikia et al., 2020). Students who experience problems can increase positive attitudes by using problem-solving methods (Chao et al., 2017). The ability to solve real-world problems and to transfer problem-solving strategies from specific to general or vice versa is considered a vital competency that must be developed while students are in school. Problem-solving is a complex process that requires dynamic and flexible thinking. Therefore, problem-solving is a high-order thinking skill (Sajidan et al., 2022). In solving problems, students can use a variety of tactics to find solutions that fit the problem at hand (Pane & Dasopang, 2017; Anagün, 2018). The stages of problem-solving, according to Polya, as quoted by Kang (2015), include: (1) understanding the problem, (2) making a settlement plan, (3) implementing the plan, and (4) looking back. Students who can apply these four stages will achieve a good learning process, ultimately giving good results.

Science learning is one of the learnings that encourages students to acquire knowledge through interaction with the surrounding environment so that this knowledge is processed based on previously obtained knowledge (Utaminingsih et al., 2018). In science learning, of course, it involves interaction between the teacher and students. The interaction must bring a comfortable learning atmosphere so that students enjoy learning (Juniati & Widiana, 2017). Good science learning packaging by the teacher will create an effective learning atmosphere so that students can develop their mindset as desired (Bybee & Trowbridge, 2014). Integrated science learning has essential competencies in the form of climate change and its impact on global warming material ecosystems. Climate change is weather that changes over time (Houghton, 2015). Climate change material was chosen because it is closely related to everyday life, so the problem-solving questions in this material are suitable for application (Utaminingsih et al., 2018).

The problem now is students' need for more awareness and knowledge. It impacts students' weak problem-solving skills in science subjects (Rubini & Yuningsih, 2018; Nurhayati et al., 2020). Knowledge leads students to know how to learn according to themselves to add insight and knowledge. The knowledge develops into a form of sensitivity to problems in the environment and learning and then solves these problems consciously (Sakdiah et al., 2018). Students who can position their abilities in learning, monitoring, and recalling their understanding, then apply it to solve problems form student problem-solving abilities (Ijirana & Supriadi, 2018; Wardhani et al., 2022).

Problem-solving abilities in Madura, especially in remote areas, still need to be the center of attention in education and tend to refer to rote abilities. This is the opinion of (Firnanda & Pratama 2020; Mariam et al., 2019) that problem-solving abilities need to be improved in students to solve problems both in learning and everyday life. The novelty that can be taken in this study is to find out how far the students' solving abilities in science learning, especially learning materials about global warming; remember that in the areas where the research is carried out, it is rare that educators highlight the solving abilities.

RESEARCH METHOD

This research is quantitative and descriptive. This research explores a phenomenon in a group of individuals (Sukardi, 2015; Sugiyono, 2017a). The object studied is the ability to solve science problems in junior high school students. This research was carried out in the 2022/2023 academic year involving 33 research subjects in class VII-B JHS Al-Miftah 4 Karang Anyar Ketapang Timur Sampang District East Java Province. Subject selection was carried out by purposive sampling or selected based on specific considerations, namely, paying attention to the abilities of students who found the most cases of low science learning outcomes. The steps in this research can be seen in **Figure 1**.
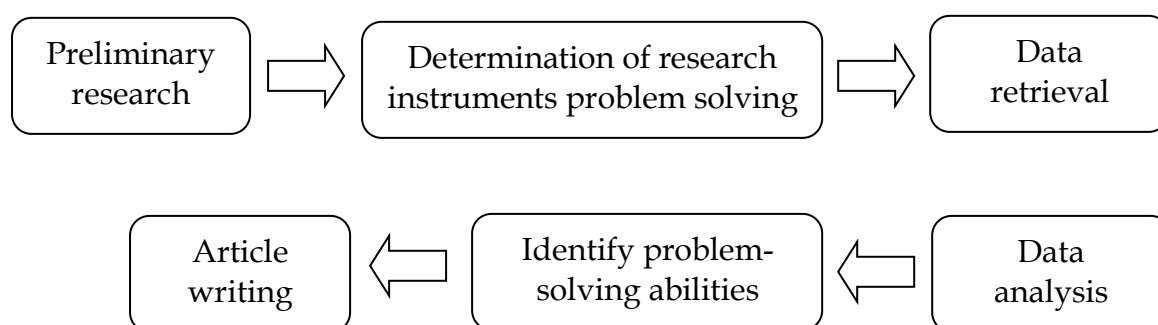

Figure 1. Research method.

This research is preliminary. This study aimed to determine students' problem-solving skills at JHS Al-Miftah 4 Karang Anyar using a problem-solving ability test. The instrument used has been validated by two validators and obtained valid results with a validation value of 92.00% with a reliability of 0.97. After the instrument was declared valid, data collection was implemented by giving tests to students to determine students' problem-solving abilities, then conducting data analysis and collecting the results of students' problem-solving abilities.

The research instrument used was a test of students' problem-solving abilities which consisted of 4 description items adapted to 4 indicators of problem-solving ability according to Polya (2013), including (1) understanding the problem, (2) making a settlement plan, (3) implementing the plan, and (4) looking back. Two items represent each indicator to obtain more valid and relevant data. Each item is related to one another because the ability to solve problems must be trained sequentially. Therefore, the preparation of each item is also arranged sequentially based on the order of the indicators. First, the research begins with preliminary activities, including the planning stage and determining the research subject. The second is the preparation stage of problem-solving ability test questions. The third is the process of collecting data obtained from student activities and working on test questions. The fourth is the data analysis stage, a data processing activity carried out by the researcher. The fifth is drawing conclusions which is the final stage; from this stage, the answers to this research are obtained (Sugiyono, 2017b; Purwasih et al., 2018).

The research data was analyzed by calculating the average achievement score of the indicator students' problem-solving ability in the form of a percentage (Makhrus et al., 2019). The average score achieved is then categorized based on the problem-solving scoring criteria in **Table 1**. The way to calculate the percentage value of the average achievement score for the student's problem-solving ability is to use the following formula.

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

(Fitri et al., 2017)

Information:
P: Percentage of the final grade
n: The number of scores obtained
N: Maximum number of scores

Meanwhile, to see the interpretation of problem-solving abilities, which will later be connected with problem-solving indicators, can be seen in **Table 1**.

Table 1. Interpretation of the percentage of problem-solving ability.

Qualification	Percentage (%)
Very less	0-20
Not enough	21-40
Enough	41-60
Well	61-80
Very good	81-100

(Husna & Burais, 2018; Sari et al., 2021)

RESULTS AND DISCUSSION
Results
Based on **Figure 2**, the percentage of students' ability to answer problem-solving ability questions, almost half of the students are in the "very less" category of 43% with 14 students, the "not enough" category 24.00% with eight students, the category "sufficient" by 15% with five students, the "well" category was 3.00% with one student. In comparison, the "very good" category was 15.00% with five students. Students in the less significant category align with previous research, which concluded that practical problem-solving skills on the problem-solving ability test are in the lower enough category (Rahma et al., 2020; Ariana & Wijaya, 2018). Then based on the value, students who are in the "very less" category have an average score of 0, in the " not enough " category has an average value of 25, in the "fair" category has an average value of 50, in the "well" category has an average value of 75, and in the "very good" category has an average value of 100. In order to obtain an average overall value of 50.
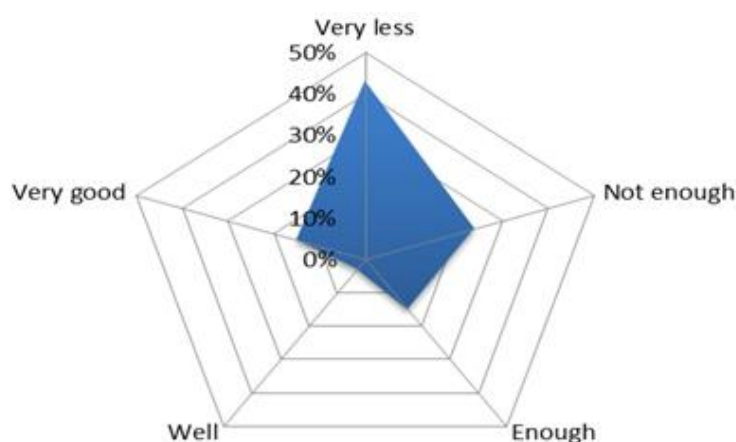

Figure 2. The percentage of the number of students is based on the grouping of problem-solving ability categories.

Discussion

The research results that have been carried out are data on problem-solving ability indicators of class VII-B students of JHS Al-Miftah 4 Karang Anyar Ketapang Timur categorized as lacking, as presented in **Table 2.**

Table 2. The average value of students is based on indicators of problem-solving abilities.

Polya's Steps	Value Percentage	Category
(1) Understand the problem	51.00%	Enough
(2) Create a settlement plan	24.00%	Not enough
(3) Carry out the plan	33.00%	Not enough
(4) Looking back	21.00%	Not enough
Average	32.25 %	Not enough

Table 2 shows that the overall percentage of problem-solving ability indicators for class VII-B students of JHS Al-Miftah 4 Karang Anyar Ketapang Timur on global warming material is in the less category with an average (of 32.25%). The indicator of understanding the problem (51.00%) is in the sufficient category, while the indicators for making a settlement plan (24.00%), implementing the plan (33.00%), and looking back at it (21.00%), and applying conclusions (56.88%) are classified as lacking. Based on **Table 2** shows that all problem-solving indicators, which consist of understanding the problem, making a settlement plan, implementing the plan, and looking back, have a percentage in the less category. The highest score was obtained on the understanding of the problem indicator getting an average score of 51; this high score is also in line with the results of previous research. Namely, the understanding of the problem indicator gets the criterion value "enough" (Septiani et al., 2020), while the lowest score obtained on the looking back indicator is 21, which is also in line with previous research, namely the looking back indicator gets the lowest score (Palennari et al., 2021). Understanding the initial problem is the capital for students to solve a problem (Sa'diyah & Istiandaru, 2021; Sajidan et al., 2022). The problems given in the questions will be easily solved by students if, at the initial stage, the problems have been identified and understood. Understanding the problem is considered easier to do than to solve. Conversely, students will find it challenging to evaluate problem-solving because, at this stage, students will use relatively high intellectual abilities (Usman et al., 2022; Valen & Satria, 2021).

Indicator 1, namely understanding the problem with a score of 51.00%, shows that students are categorized as sufficient to formulate the problem but still need improvement. Some students need help understanding the problem and instead rewrite the text in the problem. This shows that problem-solving is the basic process of identifying problems, considering options, and making choices based on information obtained by students (Dwi & Anitah, 2018; Rahayuningsih et al., 2020). Understanding the problem is the easiest part because it does not involve high intellectuals (Nur & Palobo, 2018). Students will quickly identify problems because the essential part that always appears in text and images is a source of information that presents the problem. This is to research (Zahra et al., 2022) that identifying problems only requires one's basic abilities because it is still in the early stages.

In indicator 2, namely making a settlement plan with a value of 24.00% and categorized as lacking, this is reflected in the student's answers when making a

problem-solving plan; there are still problem-solving plans that are out of the topic of the problem contained in the text. The indicators make a settlement plan (Graesser & Liao, 2017; Tambunan, 2019). states that the plan will be good if students explain well based on the problem under study. Planning a solution to a problem is a mindset and the first step before implementation. The implementation of a solution is likely to be successful if the previous planning is carried out in a structured manner (Özreçberoğlu & Çağanağa, 2018). Problem-solving planning is an initial description before completion (Naza et al., 2020).

On indicator 3, namely implementing the plan, getting a result of 33.00% and categorized as lacking. The implementation of students is classified as lacking because they are still not able to carry out the plans made; it can be seen from the students' answers that are connected to the previous indicator, namely making plans that are still out of the topic of the problem so that the process of carrying out plans is also somewhat out of topic and considered less effective, this is in line with research previously (Primadoni et al., 2020) which stated that the implementation of problem-solving could be done if students can understand the problem and carry out problem-solving plans correctly. If students need help solving problems, it is necessary to look at the previous stage to determine whether problem identification and problem-solving plans are appropriate; if not correct, problem-solving will also be accurate and effective (Bariyyah, 2021).

The percentage on indicator 4, namely, looking back, gets 21.00% in the less category and is classified as the lowest among the other indicators. These results are because students do not understand the problem, so students cannot plan to problem-solve and cannot look back at the problem-solving that was made whether it was effective to do; this is by the opinion (Kim et al., 2018; Oktariani et al., 2020) the ability to solve problems is based on the ability to solve problems from step The initial stage is understanding the problem to the final stage, namely evaluating. The evaluation stage requires high intellect and the ability to assess everything done and repair if something is lacking (Ismet et al., 2021). the ability to evaluate is minimal for students because students tend only to complete problem-solving and are reluctant to realize whether their work is good (Nurul & Haerudin, 2022; Gunawan et al., 2020).

CONCLUSION
Fundamental finding: The conclusion from the results of this preliminary research shows that the profile of students' problem-solving abilities is still in the poor category. This can be seen from the percentage of problem-solving ability, which is still significant in the very poor category; besides that, the average value of problem-solving ability obtained from the problem-solving ability indicator is classified in the less category. These results indicate that students' problem-solving abilities still need to be improved. **Implication:** The analysis of this research can be used as a reference and a means of developing self-ability related to problem-solving abilities in the school environment, considering that problem-solving abilities have yet to be highlighted too much, especially in remote areas. In developing problem-solving abilities, educators can take advantage of everything supporting students' abilities, such as teaching methods and the facilities and infrastructure needed. **Limitation:** This research is limited to only analyzing students' problem-solving abilities on global warming learning materials at the junior level class VII-B SMP Al-Miftah 4 Karang Anyar Ketapang Timur academic year 2022/2023 without the need to expand on other topics of discussion. **Future**

Research: In practice, educators must be able to guide students to improve problem-solving skills as a provision in learning and everyday life. Educators need to choose a more effective learning model or method to help improve students' problem-solving abilities, especially in Madura Karang Anyar Ketapang Timur as a remote village area, and problem-solving abilities still not highlighted seem foreign to students and educators. In addition to an effective model or method, media and a learning environment are also needed, which is essential in improving students' problem-solving abilities.

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