

Analysis Mathematical Problem Solving Skills of Student in the Class XI Vocational High School of Sartika

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Abstract

This study aims to see the level of problem solving skills of students of class XII SMK on statistical materials. This type of research used qualitative descriptive research. The research data were obtained from the appropriate test of problem solving indicator. Subjects of students of SMK Sartika Rantauprapat class XII as many as 35 students. The result of the research is from 5 indicators of problem solving ability, 4 of them reach score $<65\%$. and 1 achieved a score of $\geq 65\%$ and from score of each student who has problem solving ability is from 35 students there are 14 students who achieve score $\geq 65\%$ and 21 students reach score $<65\%$.

Keywords: Student Ability, Problem Solving.

1. Introduction

In the current era, national education is undergoing changes to a better direction. One of the main factors driving this change is the development of science and technology. For that, it needs qualified human resources and has the ability to process information so that it can be used to develop science and can compete in facing global challenges.

Education has a very strategic role in improving the quality of human resources and efforts to realize the ideals of the Indonesian people in realizing the common welfare and educating the nation.

The Government formulated in the Law of the Republic of Indonesia No. 20 of 2003 on the National Education System which explains that education is done in order to get the shared goals are: "National education functions to develop capabilities and shape the character and civilization of dignified nation in order to educate the nation, for the development of the potential of learners to become human beings who believe and cautious to God Almighty, have noble character, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible.

Therefore, every educational institution is required to improve the quality of national education. The realization of improving the quality of education is primarily to prepare learners as a subject that increasingly plays the role of displaying excellence in accordance with the function of national education. For that every educational institution is required to improve the quality of education.

Speaking of education, it is incomplete if it does not involve mathematics as one of the compulsory subjects taught in schools and has a major role in education. The existence of mathematics became a central position for two reasons, namely (1) Science and technology (IPTEK) since 1940 asserted that we live in the civilization of science and (2) Scientific tools that support the civilization of science and technology such as physics, chemistry, engineering, management, economics, biological and medical sciences, and behavioral science, all of which require mathematics for further understanding and development (Wahyudin, 2008).

In line with the above, Santosa (Hudojo, 2001) states that one aspect of the drivers of developed countries can grow up to now, it is 60% - 80% because it relies on math. Likewise for Indonesia as a developing country should have involved involving mathematics in education. In the process of teaching and learning, mathematics is an arena for students to solve a problem and gain the confidence that to produce a correct solution not only from the words of the teacher, but because of the logic of thinking of the student and the process of solving the problem it passes. According Sumarmo (1994) problem-solving ability is one of the learning outcomes that will be achieved in teaching mathematics at any school level.

Students who can solve problems are students who have the ability to look at things in different ways so that students can solve problems creatively in order to compete fairly and able to work together with other students. Ironically the problem solving ability of students and even students is still lacking.

2. Discussion

2.1. Problem Solving Ability.

Problem-solving learning is described Cooney et al. (197 :242) as follows "... the action by which a teacher encourages students to accept a challenging question and guides them in their resolution". This suggests that problem-solving learning is an action done by the teacher so that the students are motivated to accept the challenges that exist in the questions and lead the students in the process of solving them. So in problem solving activities students must have curiosity, willingness, and feel challenged to solve the problems given. If students

feel motivated to solve a given problem, then students can themselves do problem-solving activities and teachers can provide assistance according to the needs of students, and at the same time assessments can solve the problem solving teacher.

The famous mathematical problem-solving step was put forward by G. Polya, in his book "How to Solve It". The four steps of solving mathematical problems according to G. Polya are: (1) Understanding the problem, (2) Devising plan, (3) Carrying out the plan, (4) Looking Back. "

A situation can be said to be a problem if one realizes that the situation requires action and that person can not find the solution immediately. Gaugh (Fatah, 2008) defines the problem as a task which, when we read it, sees it or hears it at a certain time, and we are unable to resolve it immediately. According Polya (1985) problem solving is defined as an attempt to find a way out of a difficulty to achieve a goal that is not easily attainable.

From the definition described above can be said that problem solving as a learning approach, which is used to reinvent (reinvention) and understand the material, concepts, and principles of mathematics. Learning begins with the presentation of problems or situations that are contextual then through the induction of students find the concept / principle of mathematics.

2.2. Problem Solving Problem Indicators

Sumarmo (1994) describes there are several indicators that must be considered in problem solving, including as follows:

- Identify the elements that are known, asked, and the adequacy of the necessary elements.
- Formulate mathematical problems or arrange mathematical models.
- Apply strategies to solve problems (new types and problems) within or outside mathematics.
- Explain or interpret the results according to the original problem.
- Use mathematics meaningfully.

2.3. Assessment of Problem Solving Abilities

Statistika is a science that deals with data collection, analysis, drawing conclusions and decision-making based on data and facts that have been analyzed. Statistics material in class XII SMK discusses the mean (median value), median (middle data value) and mode (the most common value in data) for single data and group data.

This research is done by giving 3 questions given to students to be answered, this is done to see student problem solving ability on statistical material for class XII SMK Sartika. Problem-solving abilities that are measured by looking at indicators that match the answers given by the students.

Table 1. Sample Key Answers and Rating Rubric

Steps	Indicators of Problem Solving Ability	Score																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Value</th> <th>f</th> <th>x</th> <th>f.x</th> </tr> </thead> <tbody> <tr> <td>11 – 15</td> <td>2</td> <td>13</td> <td>26</td> </tr> <tr> <td>16 – 20</td> <td>X</td> <td>18</td> <td>18x</td> </tr> <tr> <td>21 – 25</td> <td>4</td> <td>23</td> <td>92</td> </tr> <tr> <td>26 – 30</td> <td>6</td> <td>28</td> <td>168</td> </tr> <tr> <td>31 – 35</td> <td>Y</td> <td>33</td> <td>33y</td> </tr> <tr> <td>Amount</td> <td>20</td> <td></td> <td>286 + 18x + 33y</td> </tr> </tbody> </table>	Value	f	x	f.x	11 – 15	2	13	26	16 – 20	X	18	18x	21 – 25	4	23	92	26 – 30	6	28	168	31 – 35	Y	33	33y	Amount	20		286 + 18x + 33y	1 dan 2	4
Value	f	x	f.x																											
11 – 15	2	13	26																											
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21 – 25	4	23	92																											
26 – 30	6	28	168																											
31 – 35	Y	33	33y																											
Amount	20		286 + 18x + 33y																											
$\sum f = 20$ $x + y = 8$	3	1																												
$\bar{x} = \frac{\sum f_i \cdot x_i}{\sum f_i}$ $23,75 = \frac{286 + 18x + 33y}{20}$ $389 = 18x + 33y$	3 dan 4	3																												
By solving the equation system (1) and (2) obtained x = 5 and y = 3.	5	2																												
Amount		10																												

To determine the problem solving ability to meet the indicator, the researcher uses the formula that is adapted from the student's learning mastery formula, Usman (2002: 64) as follows:

$$K = \frac{(\text{student/s indicator score})}{(\text{max value of indicator})} \times 100\%$$

Information: K = problem solving ability

By criterion:

0% ≥ K < 65% Troubleshooting capability not fulfilled

65% ≥ K < 100% Problem solving capability is fulfilled

The problem used as a benchmark of 3 items, which each item has a maximum score of 10, and for each indicator has a score of 2. Thus the maximum score of indicators for all questions is 30.

Table 2. Assessment of problem solving indicators for each item

Items Problem	Indicators Ability Problem Solving					Total score
	1	2	3	4	5	
1	2	2	2	2	2	10
2	2	2	2	2	2	10
3	2	2	2	2	2	10

2.4. Results of data obtained.

The result of data that has been obtained shows that the problem solving ability of class XII students of Sartika Rantauup in the material is from 5 indicators of problem solving ability, 4 of them reach score < 65%. and 1 achieved a score of ≥ 65%.

Table 3. Percentage of Problem Solving Capability Indicators

Indicators of Problem Solving Ability	Average percentage of indicators
Identify the elements that are known, asked, and the adequacy of the necessary elements	52,5%
Formulate mathematical problems or arrange mathematical models.	56,5%
Apply strategies to solve problems (new types and problems) within or outside mathematics	54,7%
Explain or interpret the results according to the original problem	66,7%
Use mathematics meaningfully	54,8%

And if seen from the score of each student who has problem-solving ability is from 35 students there are 14 students who achieved the score ≥ 65% and 21 students reached the score < 65%.

Table 4. Problem-solving abilities

Percentage of indicators	Many students	Percentage of Students	Information
≥ 65 %	14	40%	Fulfilled
< 65%.	21	60%	Not Fulfilled

3. Conclusion

Sumarmo (1994) describes there are several indicators that must be considered in problem solving, including as follows:

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Based on the calculations diproleh, the authors concluded still the lack of (not fulfilled) ability problem solving on students for class XII class material SMK Sartika Rantauuprapat.

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