SAVI and RME Learning Models to Improve Mathematical Problem Solving Skills

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Abstract

Realistic mathematics is a very important approach that links the real world with student learning activities. This quantitative study aims to obtain information related to improving the SAVI learning model with RME on students' mathematical problem solving abilities. This research involved 60 students (30 students VIIIc and 30 students VIIIa) who were positioned as research subjects. Students' mathematical problem solving abilities were collected using a rubric in the form of an essay consisting of 5 questions. The collected data was tested using the t-test. The results of this study inform that students' problem solving abilities on cube and cuboids with RME learning are better than students who follow SAVI learning in class VIII students of MTs Nurul Iman Tanjung Morawa Deli Serdang.

Keywords: *SAVI; RME; Mathematical Problem Solving Ability.*

Abstrak

Matematika realistik merupakan pendekatan yang sangat penting yang mengaitkan dunia nyata dengan kegiatan pembelajaran siswa. Studi kuantitatif ini bertujuan untuk memperoleh informasi terkait dengan peningkatan model pembelajaran SAVI dengan RME terhadap kemampuan pemecahan masalah matematis siswa. Penelitian ini melibatkan 60 siswa (30 siswa VIIIc dan 30 siswa VIIIa) yang diposisikan sebagai subjek penelitian. Kemampuan pemecahan masalah matematis siswa dikumpulkan dengan menggunakan rubrik berbentuk essay yang terdiri dari 5 soal. Data yang terkumpul diuji dengan menggunakan uji t. Hasil penelitian ini menginformasikan bahwa kemampuan pemecahan masalah siswa pada materi kubus dan balok dengan pembelajaran RME lebih baik daripada siswa yang mengikuti pembelajaran SAVI pada siswa kelas VIII MTs Nurul Iman Tanjung Morawa Deli Serdang.

Kata Kunci: *SAVI; RME; Kemampuan Pemecahan Masalah Matematis.*

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INTRODUCTION

A job field will assess graduates based on the ability to produce critical and creative thinkers, produce ideas that can be used, useful, desirable, economically feasible, technologically feasible, and sustainable (Alkhatib, 2019; Crumpler, 2014). In the twenty-first century, a successful institution is one that is able to prepare its graduates by equipping an adequate higher level of thought processes in the form of critical inquiry, innovative thinking skills, reflectivity, and problem-solving skills.

In learning at school, mathematics is a subject that is able to train students to think logically, solve a problem in real life, be able to think creatively and critically. Thus, the lessons of mathematics need to be mastered and studied by students. In addition to mathematics needs to be mastered and studied, students must also have several abilities. Mathematical ability can be classified into five main aspects, namely: mathematical understanding, mathematical communication, mathematical connections, mathematical reasoning, and mathematical problem solving (Tanjung et al., 2020). In this case, the problem-solving ability will be studied in more detail.

Some of mathematical literature explains that problem solving as some activity that makes patterns, interprets numbers, develops geometric constructions and proves the theorem (Amalia et al., 2017; Siswadi, 2019). Problem solving is the initial stage to engage in higher-order thought processes. A common skill related to identifying a solution tactic or strategy in problem solving is called a heuristic (Alkhatib, 2019). Problem-solving ability encourages students to try to find a way out in achieving goals, designing preparation, inventiveness, information and abilities and their application in daily life (Latifah et al., 2021). The ability to break down is one of the abilities that students should have, as this will provide a tremendous advantage for students in seeing the significance between science and different subjects, as is the case in real life (Nurhasanah & Luritawaty, 2021). Students are said to be able to solve problems if they are able to understand, choose the right method, which is continued by applying it in problem solving.

Problem-solving skills can improve when students have the opportunity to solve their problems and see those problems solved. Furthermore, problem solving can provide a place to learn new concepts and to practice the skills learned. Thus, problem solving is important as a way of doing, learning and teaching mathematics. In general, mathematical problem-solving skills are strategies displayed by a person how to be able to understand, decide on approaches and solving strategies and complete models for solving problems. There are four basic steps in troubleshooting, such as: 1) determine the problem; 2) come up with alternative solutions; 3) evaluate and select alternatives; and 4) implement and follow up on solutions.

Unfortunately, the reality obtained from the school shows that students' mathematical problem-solving ability is still very low (Asih & Ramdhani, 2019; Suryani et al., 2020). Students are only given routine questions, so when faced with nonroutine questions students have not been trained in solving these problems (Wulandari et al., 2020), where students are still not able to understand the problem well, how to design solutions from the problems given (Giawa, 2021). The low solving ability occurs, one of which is due to the way students learn.

Mathematics learning still tends to be textbook-oriented. There are many mathematics teachers in schools whose learning process activities use conventional models, namely: presenting learning materials, giving sample questions and asking students to do practice questions contained in the textbooks they use in teaching and then discussing them with students. Learning like this will not maximize the development of students' math problem-solving skills. Students will only do math problems based on what the teacher exemplifies. If they are given different problems they will have difficulty in solving them. Therefore, a model that is varied and of course efficient is needed.

One of the models that will be used is the SAVI learning model. The learning model is SAVI (Somatic, Auditory, Visual, Intelectual), which is a learning model in the Accelerated Learning approach or how to learn fast and natural, meaningful. Somatic: learning by moving and doing, Auditory: learning by speaking and hearing, Visual: learning by seeing and observing, and Intelectual: learning by solving problems and reflection (Septian et al., 2020). The SAVI learning model (Somatic, Auditory, Visual, Intellectual) is very suitable and appropriate for various types of student learning both for students who learn Visually, Auditorily, and Kinesthetically (Suhartiningsih, 2019). Therefore, students are not only silent, but also do activities by using all their senses. The SAVI learning model requires students to use their senses of sight, hearing, oral, and all limbs.

In addition to the SAVI model, the model that will be used in this study is the RME model. RME recommends students should be given opportunities that allow them to rediscover knowledge of mathematics. The experience of learning mathematics is made to be fun and useful for students; therefore, a connection must be made between the real world and mathematics (Siswandi, 2018; Turgut, 2021). When children realize how mathematics can be used in real life, they will learn better. Informal knowledge that children have may be effective in developing their formal knowledge (Reni Astuti et al., 2020). Students rediscover math while solving real-life problems. Therefore, the teacher associates the teaching of mathematics with the knowledge that exists in the students. The teaching of mathematics should be organized as a process of rediscovery in a way that resembles the experience of the process of how mathematicians discover mathematics (Laurens et al., 2018).

RESEARCH METHODS

This research is a quasi-experimental study which conducted from July to August 2020. The free variable in this study is a learning model, while the bound variable is the ability to solve students' mathematical problems. This research involved class VIII MTs students Nurul Iman Tanjung Morawa Deli Serdang as the research population. There are a total of 3 classes VIII in this school with the ability of students in each class to have the same level. Therefore, a simple random sampling technique is used in the sampling process. The results of classes

VIIIc and VIIIa were selected as samples in this study. The number of students in class VIIIc is 30 and VIIIa is also 30.

This research involves 2 classes, namely class VIIIc and VIIIa. The two classes are positioned as experimental class 1 and experiment class 2. Class VIIIc obtained SAVI learning (experiment 1) while VIIIa with RME (experiment 2). Although the two classes were given different learning, the research in both classes was carried out with many of the same meetings, namely six meetings. The material of the two classes is also the same, namely cubes and cuboids. Pretest and posttest are performed at the initial and final meeting of both classes.

The bound variable in this study is problem-solving ability. Students' mathematical problem-solving ability is measured using a test instrument consisting of 3 essay questions. The formulation of the questions is based on cube and cuboids with cognitive levels of C2 to C4. Student scoring uses a rubric that refers to Hart with a score scale of 0-4. Before as a research instrument, the essay questions have been tested first. The data from the item trial were analyzed using Pearson's Product-Moment Correlation test to obtain the level of validity of each question item and the lilliefors test to determine the reliability of the instrument. From the results of the question validity test, all question items are valid and the question instrument has a reliability value of 0.65 so that the instrument is categorized as reliable.

Before doing an independent t-test between the RME and SAVI models, it is necessary to test the analysis requirements first which consists of a normality test and a homogonity test of the two classes.

RESULTS AND DISCUSSION

This research began with the implementation of learning in both classes with cubes and cuboids in three dimensions. At the end of learning, both classes are tested to determine the problem-solving ability of students. The test was conducted in Experimental Group 1 and Experiment Group 2 with the same questions. The evaluation test questions are written tests in the form of descriptions of three questions with a time allocation of 90 minutes. Before the test, the test questions are given, especially if you can test it to determine the validity, reliability, differentiating power, and level of sustenance of each test item in the trial class. In this case, the evaluation test questions used in Experimental group 1 and group 2 have been qualified. so that the test questions can be said to be good for measuring the ability of the learners of class VIIIc and VIIIa MTs Nurul Iman Tanjung Morawa Deli Serdang. After being given a problem-solving ability test, the learner's score is obtained which is then analyzed. After conducting different treatments in each class, data on the results of the student's problem-solving ability test were obtained in table 1 below:

Table 1. Description of N Gain Problem Solving Ability

Statistics	Experiment 1	Experiment 2
N	30	30
Value	1865	2143
Mean	62,166	69,3
Standard Deviation	6,9683	5,73645
Variance	48,557	32,9069

Based on the results of the student's problem-solving ability test in Table 1, a hypothesis prerequisite test can then be carried out. The first step is a normality test and the results can be seen in table 2 below.

Table 2. Normality Test Results of Problem Solving Ability Test

Group of Sample	L_{count}	L_{table}	Criteria
Experiment 1 pre-test	0.136	0,161	Normally distributed
Experiment 2 post-test	0.150	0.161	Normally distributed
Experiment 2 pre-test	0.135	0.161	Normally distributed
Experiment 2 post-test	0.122	0.161	Normally distributed

Based on Table 2, it can be concluded that the data on the results of the student's problem-solving ability test are normally distributed. Furthermore, a homogeneity test was carried out using the F test. From the calculation results in obtained the result of F_{count} = 1.40 for pre-test then F_{count}= 1.47 for post test and F_{tabel} with α = 5% is 2.41. Because $F_{count}<F_{tabel}$, it can be concluded that the results of pre-test and post-test in both samples are homogeneous.

After testing normality and homogeneity on the data, then hypothesis testing was carried out, namely: (1) $H_0 : \mu_1 \leq \mu_2$, the mathematical problem-solving ability of students taught using the RME learning model is not better than that taught with SAVI on the subject matter of cubes and cuboids; and (2) $H_a : \mu_1 > \mu_2$, students' mathematical problem-solving ability taught with the RME learning model is better than the learning outcomes of students taught with the SAVI model on the subject matter of cubes and cuboids of class VIII.

Table 3. Summary of Postes Data Test Calculations

Class Data	Average	t_{count}	t_{table}	Conclusion
Experiment 1	62,166	4,37	2,002	Accepted H_a
Experiment 2	69,3			

Based on the table above, the results of the calculation of the average similarity post test of experimental class 1 and experimental class 2 at a significant level of 5% so that t_{count} = 4.37 and t_{tabel} = 2.002, $t_{count} > t_{tabel}$ means Ha is accepted so that the conclusion is obtained that, "the mathematical problem solving ability taught using RME is better than by using the SAVI model in class VIII".

Then, when viewed from the completeness of learning by using the SAVI and RME models, it can be seen in table 4 below:

Table 4. Percentage of Completion of Students in Experiment Class 1 and Experiment 2

Class	Total Students	Complete (≥ 75)		Complete (≤ 75)	
		Sum	%	Sum	%
Eksperimen 1	30	21	70	9	30
Eksperimen 2	30	26	86,6	5	13,4

From the results of the description and analysis of the data of the student's mathematical problem-solving ability test in table 1, it can be seen that the students in the experimental class are higher than the learning outcomes of the control class students. This can be seen from the average score of the students of experimental class 2 is higher than the average score of the students of experimental class 1. The average score of the students of experimental class 2 is 69.3 while the average score of students of experimental class 1 is 62.19.

In addition to the foregoing, it can also be seen in table 3 of the hypothesis test results using the t-test. Based on the calculations it was obtained that the reject H_0 because the t_{count} = 4.37 is greater than t_{table} = 2.002 at a real level α = 0.05. Thus, it can be concluded that students' problem-solving ability on cubes and cuboids with RME learning is better than students who take part in SAVI learning in class VIII MTs Nurul Iman Tanjung Morawa Deli Serdang students.

Then, based on Table 4, it can be seen that the percentage of completion of students in experimental class 2 is higher than the percentage of completion of students in experimental class 1. In experimental class 2, the number of completed students was 26 students or 86.6% and incomplete there were 5 students or 13.4% of the total number of students in the experimental class, which was 30 students. Meanwhile, in experimental class 2, the number of completed students was 21 students or 70% and incomplete 19 students or 13% of the 40 students. Based on this, it can be said that the learning process in experimental class 2 is better than in experimental class 1. In other words, RME learning on cubes and cuboids in class VIII MTs Nurul Iman Tanjung Morawa Deli Serdang can make students' problem-solving skills better.

In improving students' mathematical problem-solving skills, the learning models used are the RME model and the SAVI model. The RME learning model is better than SAVI because it has advantages such as presenting real conditions, can motivate students to study harder because they feel that mathematics learning is useful (Nurfadilah et al., 2021). Previously, (Mulyati (2017) in her research stated that abstract concepts of mathematics are easier to digest by students based on learning media in the surrounding environment. Participants' interest in learning mathematics has increased to utilize mathematical theories to solve mathematical problems given by the teacher. Even students also get another impact in the form of increasing self-confidence in their mathematical abilities (Widana, 2021). The self-confidence of students needs to be built by the teacher in learning. The little things that can be achieved by learners deserve appreciation. Through the application of learning models.

Meanwhile, the SAVI learning model is a model that is naturally designed to match learning activities with specific instructions based on needs when carrying out the learning process without compromising the privacy aspects of students (Kusumaningsih et al., 2019). Previously, Meier (2002) stated that the SAVI learning model aims to train students to express opinions, improve students' abilities in the material, be more active in doing assigned tasks, better social skills, and can grow students' self-confidence higher. However, the RME and SAVI models are both able to improve the mathematical problem-solving ability of students with moderate categories.

CONCLUSION

Based on the results of the study, the conclusion of this study is that the mathematical solving ability of students who obtain RME (Realistic Mathematics Education) learning is higher than that of students who obtain SAVI (Somatic, Auditory, Visual, and Intelectual) learning. There are differences in improving mathematical comprehension ability between students who obtain RME learning and students who obtain SAVI (Somatic, Auditory, Visual, and Intelectual) learning. The results of this study can be a reference or comparison material for other researchers to further examine the learning of RME (Realistic Mathematics Education) and the SAVI (Somatic, Auditory, Visual, and Intelectual) model in improving students' mathematical problem-solving ability and other mathematical abilities. Teachers can use the RME (Realistic Mathematics Education) learning model and the SAVI model (Somatic, Auditory, Visual, and Intelectual) as an alternative to learning so that students are not monotonous and bored so that students' mathematical problem-solving abilities and other abilities can be improved.

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