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The Effect of SSCS Learning Model on the Mathematical Problem Solving Ability of Junior High School Students, Kampar Regency

Muhammad Syafri[1,2*], **Zulkarnain**[2], **Maimunah**[2]

[1]*Pondok Pesantren Assalam, Naga Beralih, Airtiris, 28461, Indonesia*
[2]*Faculty of Teacher Training and Education, Universitas Riau, Pekanbaru, 28293, Indonesia*

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Problem solving ability is a very important ability possessed by students in solving school mathematics problems. The purpose of this study is to determine the mathematical problem solving ability of students who use the Search, Solve, Create and Share (SSCS) learning model and the students who study with conventional learning. This research was a quasi-experimental study with a non equivalent control group design. The subjects in this study were all Kampar Junior High School students. The analysis technique used was the One-Way Anova Test and Two-Way Anova Test. The results showed the mathematical problem solving ability of students who learned to use the SSCS model was better than students who learned to use conventional learning models. However, there is no interaction observed between SSCS learning model and students mathematical problem solving ability (KPMM) level on students' mathematical problem solving abilities in Kampar Regency

1. Introduction

Mathematics is one of the subjects that has an important role in developing students' mathematical abilities. As a scientific discipline, mathematics has a learning goal. Standards process in mathematics put forward by the National Council of Teachers of Mathematics (NCTM), namely the ability to solve problems (problem solving), reasoning ability, communication skills, the ability to make connections (connections), and the ability to represent (representation) (NCTM, 2000). This ability is needed so that students have the ability to obtain, process, and utilize information to survive in ever-changing and competitive circumstances. Then, in Permendikbud number 21 of 2016, the purpose of

* Corresponding author. Tel./Fax.: +62 852-7207-7024
E-mail: muhammad.syafri7372@grad.unri.ac.id
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learning mathematics in secondary schools is explained in detail, so that students have the following abilities:

1. Demonstrate logical, critical, analytical, careful and thorough, responsible, responsive, and does not give up easily in solving problems.
2. Having curiosity, continuous learning enthusiasm, self-confidence and an interest in mathematics.
3. Have a sense of trust in the power and usefulness of mathematics, which is formed through learning experiences.
4. Having an open, objective attitude in group interactions and daily activities.
5. Having the ability to communicate mathematical ideas clearly.
6. Identify patterns and use them to infer general rules and provide predictions.

One of the goals of mathematics learning is students must have mathematical problem solving abilities. The ability to solve problems is the ability to solve routine problems, non routine, applied routine, non applied routine, non routine applied in mathematics (Rianti et al., 2020). Then, according to Ulya (2016), problem-solving ability is the ability to apply previously-owned knowledge into new situations that involve high-level thought processes (Ulya, 2016). Students' thinking skills must be developed to understand mathematics correctly (Heleni et al., 2018). The mindset is done by trying to find solutions to problems independently, as a concrete experience that can be used to solve other similar problems, because these experiences provide special meaning for students. One way to practice KPMM skills is to get students used to solving story problems. Therefore, a teacher must strive for students to have good mathematical problem solving skills.

Problem-solving ability is the most complex level of individual cognitive activity that requires efforts to solve problems that involve all parts of an individual's intellectual (Hobri et al., 2020). A good KPMM will make mathematics learning outcomes better, because the ability to solve mathematical problems can help in solving problems both in other subjects and in everyday life. Lack of students' mathematical problem solving abilities causes the mathematics learning process does not achieve the expected learning outcomes (Ayu, 2016). According to Purbaningrum, the ability to solve mathematical problems is strongly influenced by the level of thinking ability of students themselves (Purbaningrum, 2017). By trying to find solutions to problems independently, it will provide a concrete experience that can be used to solve other similar problems, because these experiences provide special meaning for students. At present, most schools do not teach students to think critically or solve problems (Ningsih et al., 2020). From the 2015 PISA results, Indonesia is still ranked 61 out of 72 participating countries. This indicates that students' mathematical problem solving ability (KPMM) is still low. This is in line with the opinion of Bernard (2018) that students' mathematical problem solving abilities are still low. The low ability of students' problem solving because students are less able to identify main ideas, analyze arguments, and show the use of things that are known to answer all questions (Kurniati et al., 2016). In addition, mistakes due to carelessness, misinformation in understanding questions is also a factor in the low KPMM of students (Sumartini, 2016).

Related to these problems, there needs to be improvements and updates in the learning process. At present there have been many proposed mathematical learning models that can actively involve students in building mathematical problem solving abilities. The SSCS learning model is a teaching proposed by Pizzini on the idea that to make a problem meaningful to students, it needs to be identified and solved by students themselves (Ningsih, 2019). The SSCS learning model according to Pizzini in Irwan (2011) is a learning model that involves students at each stage. In the search stage, students are involved in gathering ideas and asking questions and formulating the problems given. At the solve stage, students are involved to solve the problems found. In the create phase, students are involved in summarizing the answers they get. While at the share stage, students are involved to present the results of their answers so that there is an interaction between the presenter and the listener. The application of the Search, Solve, Create and Share (SSCS) learning model gives a very large role to students so that it encourages students to think critically, creatively, and independently.

SSCS learning model helps students to develop advanced cognitive abilities one of which is problem solving ability (Chen, 2013). Application of the SSCS learning model can develop students' curiosity about a concept. Students are given the opportunity to express their ideas individually in advance with the aim that students can develop their own potential. Furthermore, students discuss in groups with the hope of increasing student activity in the learning process. In addition to being responsible for the problems found, students can also interact and communicate effectively with other students. Through this discussion activity it is also expected that each student can help each other if experiencing difficulties, exchange information obtained, and equate in order to find the right solution for a problem. Thus the level of mastery of the material in each student is more evenly distributed so as to enable students to improve their problem solving abilities. The purpose of this study is to determine whether or not the ability to solve mathematical problem solving of students learning with the SSCS learning model with students learning with conventional learning.

2. Methodology

This research was a quantitative study using a quasi-experimental research method. The design used was Nonequivalent Control Group Design. In this design the treatment between the experimental group and the control group was not the same and the subjects were chosen not randomly (Sugiyono, 2011). The population in the study were all Kampar Junior High School students. Before the sample was taken, the school grouping was based on the school level based on the 2016/2017 National Examination results. School groups were divided into three groups, namely top level schools, middle level schools and lower level schools. For the determination of school groups based on levels can be seen in Table 1.

Table 1. School Level Criteria Criteria

Average School Level Grades	Criteria
Total UN scores $\geq \overline{X} + 0,5$ SB	Top
$\overline{X} - 0,5$ SB $\leq$ Total UN scores $< \overline{X} + 0,5$ SB	Middle
Total UN scores $< \overline{X} - 0,5$ SB	Low

Note: $\overline{X}$ = average
SB = Standard Deviation

Based on the National Examination data for Kampar district at UN 2016/2017 academic year, it was found that the average total score ($\overline{X}$) of four subjects presented was 53.62 with a standard deviation (SB) of 9.45. By using the rules above, the school level category used is as presented in Table 2.

Table 2. School Level Results Results

Average School Level Grades	Criteria
$UN \geq 58,35$	Top
$48,90 \leq UN < 58,35$	Middle
$UN < 48,90$	Low

After being grouped, the determination of the sample was done by purposive sampling. It was known as the sampling technique of consideration, as stated by Akdon et al. (2010) that the sampling technique has certain considerations in its taking. The sample schools selected can be seen in Table 3.

Table.3 School Research Subjects

No	School Level	School name	Experimentation Class	Control class
1	Top	SMP N 1 Kampar	VIII.C	VIII.G
2	Middle	SMP N 4 Rumbio Jaya	VIII.A	VIII.B
3	Low	SMP N 1 Rumbio Jaya	VIII.A	VIII.B

The learning tools used in this study consisted of a Syllabus, Learning Implementation Plan (RPP) Student Worksheet (LKS) and tests of students' mathematical problem solving abilities. These three devices were validated by the validator. The data collected in this study was the data of students' mathematical problem solving abilities through a test description in the form of a problem solving ability problem. The data obtained in this study were quantitative data. The test of the hypothesis used different test or t-test proposed by (Akdon, 2010)

3. Results and Discussion

The pretest and posttest data results were then analyzed using prerequisite tests before hypothesis testing. The prerequisite test analysis used is the normality test and homogeneity test. The results of the normality of data pretest and posttest students' problem solving abilities can be seen in Table 4:

Table.4 Results of KPMM Pretest Data Normality

Hypothesis	Data	N	Mean	SD	K-S	Sig.	Information
Hipotesis 1	Experiment (X_1)	69	37,59	18,616	1,523	0,019	Abnormal
	Control (K_1)	60	32,5	18,796	0,945	0,333	Normal
Hipotesis 2	High Experiments (X_{11})	27	47,41	19,21	0,672	0,757	Normal
	High Control (K_{11})	19	46,95	21,8	0,744	0,638	Normal
	Medium Experiments (X_{12})	23	30,35	15,54	1,398	0,04	Abnormal
	Medium Control (K_{12})	16	31,38	14,58	0,682	0,74	Normal
	Low Experiment (X_{13})	19	32,42	15,53	0,635	0,815	Normal
	Low Control (K_{13})	25	29,44	15,03	0,684	0,738	Normal

If the significant value of P > ∝ (0.05), it can be concluded that the data are normally distributed. Conversely, if the significant value of P <∝ (0.05), it can be concluded that the data are not normally distributed. Based on the pretest data it is obtained that the experimental and control class data are normally distributed. Except the experimental data (X1) and Medium Experiment data (X12) are not normally distributed. Furthermore, for the results of the normality of the posttest data can be seen in Table 5

Table.5 Results of KPMM Postest Data Normality

Hypothesis	Data	N	Mean	SD	K-S	Sig.	Information
Hypothesis 1	Experiment (X_2)	69	71,09	22,279	1,124	0,159	Normal
	Control (K_2)	60	54,57	24,757	1,073	0,2	Normal
Hypothesis 2	High Experiments (X_{21})	27	92,93	5,00	0,857	0,455	Normal
	High Control (K_{21})	19	85,79	8,04	0,744	0,637	Normal
	Medium Experiments (X_{22})	23	69,57	8,612	1,109	0,17	Normal
	Medium Control (K_{22})	16	54,56	8,27	0,838	0,484	Normal
	Low Experiment (X_{23})	19	41,89	11,42	0,663	0,772	Normal
	Low Control (K_{23})	25	30,84	7,57	0,834	0,489	Normal

Based on the posttest data it was found that all experimental and control class data were normally distributed. The results of the hypothesis test analysis can be seen in the following Table 6.

Table.6 Test Results for Hypothesis Analysis 1

Data		**N**	**Average**	**SD**	U_{count}	t_{count}	**Sig.**	**Decision**
Pretest	X_1	69	37,59	18,62	1941,5		0,543	H_0 accepted
	K_1	60	32,5	18,80				
Postest	X_2	69	71,09	22,28		3,989	0,000	H_a accepted
	K_2	60	54,57	24,76				

Based on the results of the table above, for the pretest data the significance of P> ∝ is 0.543> 0.05 so that it can be concluded that there is no difference between the students' initial problem solving abilities in the experimental class and the control class. For the posttest data, based on the table above it can be seen that the significance value of P <∝ or 0.00 <0.05, so it can be concluded that Ha is accepted or the problem solving ability of students who learn to use the SSCS model is better than students who learn to use conventional learning. Furthermore, the results of the analysis of hypothesis II can be seen in Table 7.

Table.7 Test Results for Hypothesis II

Data			**N**	**Average**	**SD**	t_{count}	U_{count}	**Sig.**	**Information**
KPM high level	pretest	X_{11}	27	47,41	19,21	0,076		0,94	H_0 accepted
		K_{11}	19	46,95	21,8				
	postest	X_{21}	27	92,93	5,01	3,711		0,001	H_a accepted
		K_{21}	19	85,79	8,04				
KPM medium level	pretest	X_{12}	23	47,41	19,21		149,0	0,314	H_0 accepted
		K_{12}	16	46,95	21,8				
	postest	X_{22}	23	69,57	8,61	5,438		0,000	H_a accepted
		K_{22}	16	54,56	8,27				
KPM low level	pretest	X_{13}	19	47,41	19,21	0,642		0,524	H_0 accepted
		K_{13}	25	46,95	21,8				
	postest	X_{23}	19	41,89	11,42	3,858		0,000	H_a accepted
		K_{23}	25	30,84	7,57				

Based on the table for high level problem solving abilities, for pretest data it can be seen that the significance value is P> ∝ or 0.94> 0.05 so it can be concluded that H0 is accepted. As for the posttest data, a significant value of P <∝ or 0.001 <0.05 so that it can be concluded that Ha is accepted or the problem solving ability of students among students who learn to use the SSCS model is better than students who learn to use conventional learning at high level problem solving abilities. Furthermore, for medium level problem solving ability, for pretest data it can be seen that the significance value is P> ∝ or 0.314> 0.05 so it can be concluded that H0 is accepted. As for the posttest data, a significant value of P <∝ or 0,000 <0.05 so it can be concluded that Ha is accepted or the problem solving ability of students among students who learn to use the SSCS model is better than students who learn to use conventional learning at medium level problem solving abilities. And for medium level problem solving abilities, for pretest data it can be seen that the significance value is P> ∝ or 0.524> 0.05 so it can be concluded that H0 is accepted. As for the posttest data, a significant value of P <∝ or 0,000 <0.05 so it can be concluded that Ha is accepted or the problem solving ability of students among students who learn to use the SSCS model is better than students who learn to use conventional learning at low level problem solving abilities.

The mathematical problem solving ability of students who use the SSCS learning model is better than the mathematical problem solving ability of students who use conventional learning. These results are relevant to the results of research conducted by Rizki et al., (2013) and Rahmawati et al. (2013), in the form of students' mathematical problem solving abilities are better using SSCS learning models compared to students who do not use learning models SSCS. This happens because students who study using the Search, Solve, Create, and Share (SSCS) learning model are directly involved in each stage. In the search stage, a challenging question with a story problem can be used as an effective way to start a lesson. So students are involved in gathering ideas before asking questions and formulating the given problem in line with the learning process with a question beginning. At the solve stage, students are involved to solve the problems found by seeing how students learn from experience while trying to find solutions to these problems.

In the development phase, students are involved in concluding the answers they have gotten from the experience of solving questions that require higher thinking. Similar to what was conveyed by Ulya that problem solving ability is the ability to apply previously owned knowledge into new situations that involve high-level thinking processes (Ulya, 2016). At this stage students are actually doing and honing their problem solving abilities. While at the share stage, students are involved to present the results of their answers so that there is an interaction between the presenter and the listener. This will strengthen students 'thinking due to discussions between students so that they can deepen students' understanding of the problems they have faced. Discussion can solve problems better with the process of exchanging opinions between students. The application of the SSCS learning model gives a very large role to students so that it encourages students to think critically, creatively, and independently. This is also in line with the opinion of Purbaningrum which states that the ability to solve mathematical problems is strongly influenced by the level of thinking ability of students themselves (Purbaningrum, 2017). So that learning using the SSCS learning model can greatly assist students in solving problems involving high-level thinking processes.

In conventional learning, students are still used to being passive in the learning process. Students only wait for an explanation from the teacher. Generally students do not have the initiative to conduct discussions related to ongoing learning material. Based on the explanation that has been explained, it can be said that this is the cause of the problem solving ability of students who use the SSCS learning model better than the mathematical problem solving ability of students who use conventional learning models.

4. Conclusion

From the results of the study found that the mathematical problem solving ability of students who learn to use the SSCS learning model is better than students who learn to use conventional learning. Based on the results of research that has been done, several suggestions can be put forward: For researchers who will apply the SSCS learning model in developing other cognitive and affective abilities so that they can be further explored about the comparison of each aspect. For further researchers, it is necessary to examine how the influence of the learning of the SSCS model on other mathematical abilities, such as the ability to think critically, creatively, and reflectively. This is because the SSCS model allows students to think more critically, creatively, and reflectively to find new ways to solve mathematical problems that are given.

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