The Impact of Search, Solve, Create and Share (SSCS) Learning Model On Mathematical Visual Representation Ability Of Junior High School Students

D Nurjannah✉1 , S Prabawanto✉2

1,2 Mathematics Education Department, Universitas Pendidikan Indonesia, Bandung, Indonesia
✉ 1dinanurjannah5011@gmail.com, ✉ 2sufyani@upi.edu

Abstract. Representation ability is one of the important abilities that should be developed by students. Based on the some reports, it can be seen that the students' visual representation ability is still low. It is necessary to apply a learning model that can improve the students' ability. The learning model that can be predicted to improve the students' ability is Search, Solve, Create, and Share (SSCS). This research aims to find out whether the junior high school students achievement of representation ability of mathematical visual is better than the students who got conventional learning. The method of this research was a quasi experiment method. There were two groups in this research, the first was experimental group who used Search, Solve, Create and Share (SSCS) learning model and the second was control group that used conventional learning model. The instument for collecting data were instrument of representation ability of mathematical visual and observation sheet. The result of this study showe that students who got Search, Solve, Create and Share (SSCS) learning model are better than students who got conventional learning model.

Keywords: SSCS, Representation, Mathematical Visual, Visual Representation, Learning Model.

INTRODUCTION ~ Learning is an effort conducted by an individual to obtain certain change, in terms of knowledge, understanding, skills as well as value of attitudes, where in these changes cannot be separated from the teacher's role as an instructor.Tarhadi (2007) stated that learning mathematic is a mental activity for understanding, connection and symbols contained in mathematics systematically, cereful and precise, then apply the concepts produce to solve problems in daily life, or real situations.

The National Council of Teachers of Mathematics (NCTM, 2000) stated that in the implementation of mathematics subject in schools, it is necessary for teachers to consider the five mathematical abilities, namely: problem solving, reasoning, communication, connections, and representation abilities.

NCTM (2000) claimed that representation is one of the crucial elements to assist students understand mathematical concepts and their correlations. According to Goldin (Rangkuti, 2014), representation is a configuration (figuration or arrangement) that can describe,represent,or symbolize.Based on the description representation ability is an important ability students should have.

Villegas (2009) said that mathematical visual representation ability divided into three types : 1) Verbal representation of the word problem: consisting fundamentally of the word problem as stated, whether in writing or spoken; 2) Pictorial representation: consisting of drawings, diagrams or graphs, as well as any kind of related action; 3) Simbolic representation: being made up of numbers, operation and relation sign, algebraic symbols, and any kind of action reffering to these.

This research was focused on the visual representation ability of the students. Giaquinto (2007) stated that visual imagination seems to play important role in extending geometrical knowledge.

The ability of mathematical visual representation is the ability of students to create mathematical ideas or notions generated from their thinking process and expressed into a form of diagrams, graphs or tables as models or substitute forms to represent the problem situation being faced to understand and determine solutions to these problems.

Considering that one of the causes of the low mathematical visual representation ability of the student is the teacher-centered learning and passive students. In Prabawanto (2018) stated that validation on solution can be viewed from two main perspectives, nemely in relation to the verification and activity of students who do after obtaining the solutions.

Certain method is needed to improve the visual representation ability of students. One learning method that can be used is the SSCS (Search, Solve, Create, and Share).

Pizzini, et al., (in Irwan, 2011), stated that "SSCS (Search, Solve, Create, And Share) learning model refers to four phases/steps to solve problems in which the sequence begins by investigating the problem (search), planning the problem solving process (solve), constructing the problem (create), and the lastly the communicating the solution obtained (share)".The benefits of learning model Search, Solve, Create, and Share (SSCS) that is 1) Students can evaluate each others and sharing their idea, 2) students can practice to express an opinion or representing their result, 3) students can be improve their critical and creative thinking 4) students get input from others.

Utilizing the SSCS learning model assisted by visual media is an ideal collaboration that can support each other. . After students were stimulated with visual media, then students were given worksheets that contain a problem related to daily life. In its completion students werw required to solve these problems used a problem solving approach. If students can solve a given problem, it will indirectly affect student learning outcomes in mathematics and can improve students' self quality and meaningful learning in mathematics can be achieved.

One relevant research by Abdullah, N., Zakaria, E., & Halim, L. (2012). The Effect of a Thinking Strategy Approach through Visual Representation on Achievement and Conceptual Understanding in Solving Mathematical Word Problems. Abdullah, Zakaria & Halim (2012) stated that students who obtain learning by Thinking Approach can visualize problems through representation and solve mathematical problems according to the procedures required. The stages in Thinking Approach are understanding the problem, planning the strategies, applying the strategies, and checking the solution. These stages are similar to the SSCS stages namely search, solve, create and share. This research indicated that using Thinking Approach may encourage students to implement thinking strategies through visual representation. Students can get a better conceptual understanding which ultimately increases their learning achievement. This is because students are actively involved during the learning process.

The another relevant research was by Walker, Winner, Simmons, and Goldsmith (2011) said that people who trained with visual training showed good result about geometry reasoning. In this studi also said that visual training can be improve geometry reasoning through cognitive learning visualization ability.

The achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning.

To test this hypothesis, the following statistical hypotheses are formulated:

H_0 : $\mu_{e1} = \mu_{e2}$, the achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is no better than the mathematical visual representation ability of students who obtain conventional learning.

H_1 : $\mu_{e1} > \mu_{e2}$, the achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning. This research aims to obtain a description on improving students' mathematical visual representation abilities with the Search, Solve, Create, and Share (SSCS) learning methods.

METHOD

The research method used wasquasi-experimental method. The subjects were 32students of a Junior high School in Bandung, Indonesia. In this research, the independent variable was the Search, Solve, Create, and Share (SSCS) learning method, whereas the dependent variable was the students' mathematical visual representation ability.

This research uses two groups. The first group was an experimental group treated with the Search, Solve, Create, and Share (SSCS) learning method and the second one was a control group treated with the conventional learning method. The test of mathematical visual representation ability is given to the experimental and control group in the form of pretest and posttest questions.

The instrument for collecting data had been tested, and it was used to find out whether the instrument was appropriate or not to be applied at the time of the data collection. The instrument of data collection was analyzed to determine the validity, reliability, difficulty index and distinguishing features.

The instrumentwas then tested to students of the experimental and the control groups to determine the comparison of mathematical visual representation abilities. From this process, students' scores were collected. Normality, homogeneity, and t-test are then conducted to determine the average difference.

RESULTS

Data analysis on the pretest results of the students' mathematical visual representation ability was performed to determine whether or not the initial abilities of the two groups, namely the experimental class and the control groups, had significant differences. From the calculation of the normality test using the Shapiro-Wilk test on SPSS 18.0, it is found that the experimental class has a significance value of 0.05 and the control class has a significance value of 0.06. Both value are greater or equal to 0.05. Because of the significance (sig.) ≥ 0.05, H0 is accepted and H1 is rejected. It can be concluded that the two samples derived from the populations were normally distributed.

Homogeneity test using Levene's test on SPSS 18.0. The results of homogeneity test calculations using Levene's test indicated that the significance value of the data was 0.73. Because the significance value (sig.) ≥ 0.05 then H0 is accepted and H1 is rejected. It can be concluded that both classes have the same or homogeneous variance. Accordingly, the t-test was performed using SPSS 18.0 with a significance level of a = 0.05. The following are the statistical hypothesis from the pretest data of students' mathematical visual representation abilities:

$H_0 : \mu_{e1} = \mu_{e2}$, there is no significant difference in the initial ability of the mathematical visual representation of the experimental class and control class students.

$H_1 : \mu_{e1} > \mu_{e2}$, there is a significant difference in the initial ability of the mathematical visual representation of the experimental class and control class students.

Data processing using SPSS 18.0 software obtained a significance value of 0.27 from the pretest data of students' mathematical visual representation ability. Because the significance value (sig.) ≥ 0.05 then H0 is accepted and H1 is rejected. It can be concluded that there is no significant difference in the initial ability of the mathematical visual representation of the experimental class and control class students.

Posttest data analysis of the students' mathematical visual representation abilities was conducted to determine whether or not the ending ability of the two classes, namely the experimental class and the control class, had significant differences when the experimental groups were assigned with the treatments.

The normality test of the post-test data of mathematical visual representation abilities of these students using the Shapiro-Wilk test on SPSS 18.0 indicated that the experimental class had a significance value of 0.44 and the control class had a significance value of 0.32, both of which were greater than 0.05. Because of the significance (sig.) ≥ 0.05, H0 is accepted and H1 is rejected. It can be concluded that the two samples derived from populations were normally distributed.

Homogeneity test using Levene's test on SPSS 18.0 test showed that the significance value of the data was 0.42. Because the significance value (sig.) ≥ 0.05 then H0 is accepted and H1 is rejected. It can be concluded that both classes have the same or homogeneous variance.

Because of normal and homogeneous distribution, t-test was conducted using SPSS 18.0 and a significance level a = 0.05 was obtained. The research hypotheses proposed are as follows:

The achievement of the mathematical visual representation ability of junior high school students who obtained the SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning.

To test this hypothesis, the following statistical hypotheses are formulated:

H_0 : μ_{e1} = μ_{e2}, The achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is no better than the mathematical visual representation ability of students who obtain conventional learning.

H_1 : μ_{e1} >μ_{e2}, the achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of visual representation ability of students who obtain conventional learning

Table 1. The Results on the Mean Differences on the Posttest Scores

t-test for Equality of Means			Description	Conclusion
t	Df	Sig. (2-tailed)		
2,66	62,00	0,01	H_0 rejected	There is a significant difference
2,66	60,01	0,01		

From Table 1, it can be seen that the significance value of the posttest data on the students' mathematical visual representation abilities is less than 0.05 i.e., 0.01. Because the significance value (sig.) < 0.05 then H0 is rejected and H1 is accepted. From the results of the posttest data analysis of the students' mathematical visual representation abilities, it can be concluded that the achievement of mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning.

DISCUSSION

To find out the initial ability of mathematical representation of students in the experimental and control classes, an initial test was conducted.

Based on the results of the analysis of student pretest data, it was found that there was no significant difference in the initial ability of the students' visual mammatic representation.

It was very helpful to see the difference between the class which used Search, Solve, Create, and Share (SSCS) learning mode and conventional model.

In the learning model Search, Solve, Create, and Share (SSCS) students did several stages which were investigate the problem (search), planed problem solving (solve), constructed problem solving (create), and the last step was cummunicated the reasult to their friends (share).

Carrying out the stages of Search, Solve, Create, and Share in the SSCS learning model allows students to have a better ability to find a solution to a mathematical problem.

Analysis result showed that between the experiment and control classes have significant difference. This can be seen from the average value of each class.

Based on the data analysis can be concluded that the achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning.

CONCLUSION

Based on the results of the analysis and testing of hypotheses in the research, it can be concluded that the achievement of the mathematical visual representation ability of junior high school students who obtain SSCS learning is better than the mathematical visual representation ability of students who obtain conventional learning.

REFERENCES

Abdullah, N., Zakaria, E., & Halim, L. (2012). The Effect of a Thinking Strategy Approach through Visual Representation on Achievement and Conceptual Understanding in Solving Mathematical Word Problems. *Asian Social Science. Vol 8*, No. 16. DOI:10.5539/ass.v8n16p30.

Giaquinto, M. (2007). Visual thinking in Mathematics an Epistemological Study. *United States : Oxford University Press Inc.*, New York.

NCTM.(2000). *Principles And Standards For School Mathematics.* Reston, VA:NCTM.

______.(2003). *Principles and Standars for School Mathematics*. Reston, VA: NCTM.

Prabawanto, S (2018). *Students' Validations on Their Solution in Mathematical Problem Soving*. IOP Publishing. DOI: 10.1088/1742-6596/4/042111

Rangkuti, A.N.(2014). Representasi Matematis.*Forum Paedagogik*Vol.6 No.01. ISSN 2086-1915.

Russeffendi, E.T. (2005). *Dasar-dasar Penelitian Pendidikan & Bidang Non Eksakta Lainnya.* Bandung: Tarsito.

Tarhadi. Dkk. (2007). *Penggunaan Tes Uraian Dibandingkan dengan Tes Pilihan Ganda Terstruktur dan Tes Pilihan Ganda Biasa*. *Jurnal Pendidikan*, Vol.8, No.2. ISSN 0215-2673.

Villegas, Jose L., et al. (2009). Representations in Problem Solving: A Case Study in Optimization Problems. Electronic Journal of Research in Educational Psychology. 7(17).

Walker, C., Winner, E., Hetlands, L., Simmons, S., & Goldsmith, L. (2011). Visual Thinking: Art Students Have an Advantage in Geometric Reasoning. *Scientific Research.Vol. 2 No. 1.* 22-26. DOI:10.4236/ce.2011.21004.