

Research Article

Improving mathematic creative thinking skill using creative problem solving learning model

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Abstract

The purpose of this research is to analyze the achievement and improvement of student's mathematical creative thinking skill using the Creative Problem Solving learning model. This research is a quasi-experiment method with nonequivalent control group design. The research was conducted in the even semester of the 2019/2020 school year in eighth-grade students of SMP Negeri 1 Mande. Class VIII A was taken as an experimental group and class VIII C was taken as a control group. The selection of class VIII A and VIII C is based on the purposive sampling method. Pretest and posttest are the instruments used in this study and are quantitative data. Data analysis techniques will be carried out by independent sample t-test. The results of this research concluded that the achievement and improvement of mathematical creative thinking skill of students who use the Creative Problem-solving learning model are better than students who do not get special learning treatment.

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Introduction

Education is an activity that never stops and is important for the progress of a country. Quality education will produce quality, competitive, and high competitiveness human resources and be able to compete in the development of science and technology. At the other hand, the competitiveness of a nation is largely determined by the creativity of its human resources (Moma, 2016). So to improve the creativity of a nation's human resources, it must improve the quality of its education.

School is a formal educational institution that plays a role in building human resources. Schools are required to be able to answer the challenges of life along with the times and technology (Granberg & Olsson, 2015; Maskur et al. 2020). Schools are also required to be able to develop the thinking skills of students so that they can think critically, be logical, and be creative. Those abilities can be developed with the learning of mathematics.

Mathematics is the knowledge that underlies the development of technology and becomes one of the knowledge that has an important role in everyday life. Therefore, the education curriculum in Indonesia requires mathematics from elementary to high school. This becomes important for students to be able to understand mathematical concepts and structures (Kristofora & Sujadi, 2017).

Today, the ability to think creatively has become an important focus developed in mathematics learning. Students will be able to face and solve problems in various alternative ways if they are able to think creatively. Meanwhile, the development of student's creative thinking skills at school aims to make students better understand and interpret the concepts of learning mathematics (Krulik & Rudnick, 1999; Malisa, Bakti, & Iriani, 2018). Creative thinking is closely

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related to creativity because creativity is a product of creative thinking. Students who have the ability to think creatively can be said to students who have creativity (Krulik & Rudnick, 1999; Muhammad, Septian, & Sofa, 2018; Zakiah & Kusmanto, 2017). Creativity is the ability to think about things in new and unusual ways and produce unique solutions to a problem (Mursidik, Samsiyah, & Rudyanto, 2015).

At this time needed renewal of creativity in mathematics learning (Putra, Zulkardi, & Hartono, 2016). Renewal of mathematics learning requires creativity (Putra, Nugroho, & Puspitarini, 2016). In fact, creativity is still rarely considered in learning mathematics in schools so that student’s mathematical skills in creative thinking does not develop well. This is because mathematics learning is still centered on the teacher and the teacher is still lacking in the use of other learning tools such as laboratories, libraries, media, environment, and the internet (Hariawan, Kamaluddin, & Wahyono, 2014). So, students only follow the procedures given by the teacher, without being given the opportunity to express their knowledge or answer questions in their own way or in their own language.

Learning in that way can inhibit the development of student creativity and activities such as communicating his ideas (Isaksen, Dorval, & Treffinger, 2010; Sugilar, 2013). This is contrary to the purpose of learning in school that should make students think creatively. Furthermore, learning objectives will be achieved if the planning and methods used during learning can maximize the potential and abilities of students. One of the ways is to invite students to actively participate in learning in class.

Based on the previous explanation, innovation in classroom learning is needed so students can be more creative and more active in learning. One of the learning models that can improve student’s creative thinking skill is the Creative Problem-solving learning model. The Creative Problem Solving learning model was first developed by Alex Osborn, founder of The Creative Education Foundation (CEF) and co-founder of the highly successful New York Advertising Agency (Louis Lee & Johnson-Laird, 2004; Septian, Komala, & Komara, 2019). Osborn first introduced the Creative Problem Solving structure as a method for solving problems creatively (Muhammad et al. 2018). Creative Problem Solving learning model is a learning model that focuses on teaching and problem-solving skills, followed by strengthening skills and setting solutions creatively (Malisa et al. 2018). Creative Problem Solving learning models prioritize student’s skills in solving problems so that student’s creative thinking skills more developed (Septian et al. 2019).

The application of the Creative Problem Solving learning model can increase student interest, creativity, and motivation in the learning process. So the processes and student learning results can be maximized (Hartantia, Hayus, & Nugroho, 2013; Isaksen, 2012). Creative Problem Solving learning model is considered more effective because students will find ideas through the process of thinking, find ideas that are useful for finding solutions, and get support for correct answers (Wijayanti & Sungkono, 2017).

In the end, based on the previous explanation, the purpose of writing this article is to analyze the improvement of student’s mathematical creative thinking skill using the Creative Problem Solving learning model.

Methods

Research Model

This research is a quasi-experiment with nonequivalent control group design. The design of the nonequivalent control group is illustrated as follows (Creswell, 2007):

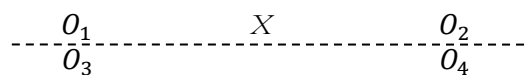


Figure 1.

Research Model Design

- O_1 = The experimental group pretest
- O_2 = The experimental group posttest
- O_3 = The control group pretest
- O_4 = The control group posttest
- X = Group that using Creative Problem Solving learning model.

Participants

The research was conducted in the even semester of the 2019/2020 school year in eighth-grade students of SMP Negeri 1 Mande. Class VIII A was taken as an experimental group and class VIII C was taken as a control group. The experimental group is a class that gets learning using the Creative Problem Solving learning model, while the control

group is a class that does not get special treatment. The selection of class VIII A and VIII C is based on the purposive sampling method.

Data Collection Tools

This research was conducted in three stages, namely preparation, implementation, and evaluation. In its implementation, it starts with giving a pretest, then giving treatment, and ends with giving a posttest. Pretest and posttest are the instruments used in this study and are quantitative data. Data analysis techniques will be carried out by independent sample t-test.

Results

Analysis of Achieving Mathematical Creative Thinking Skill

The following is a descriptive statistical posttest data

Table 1.

Descriptive Statistics of Posttest Data

Group	N	Minimum	Maximum	Mean	Std. Deviation
Experiment	28	40	90	59.82	15.122
Control	26	30	75	49.81	11.617

Based on Table 1, the average posttest score of the experimental group was 59.82 with a standard deviation of 15.122. The lowest score of the experimental group is 40 and the highest is 90. While the average posttest score of the control group was 49.81 with a standard deviation of 11.617. The lowest score of the control group is 30 and the highest is 75.

Based on statistical tests using independent sample t-tests, the following results were obtained.

Table 2.

Results of Independent Sample t-Tests from Posttest Data

<i>t-test for Equality of Means</i>	Sig. (2-tailed)	Sig. (2-tailed)	Conclusion
<i>Equal Variances assumed</i>	0.009	0.0045	H_0 ditolak

Based on table 2, it is concluded that the achievement of student’s creative thinking skill using Creative Problem Solving learning models is better than students who do not get special learning treatment

This is because, in classrooms that use the Creative Problem Solving learning model, students are accustomed to understanding the concept of the material in the material being taught. Students are asked for courage to ask questions and express their opinions and students are accustomed to solving problems creatively. In addition, students are also accustomed to discussing with their friends.

Analysis of Increased Mathematical Creative Thinking Skills

Normalized Gain (N-Gain) analysis was used to find out the improvement of student’s creative thinking skills between the two research groups before and after being given different treatments.

The following are descriptive statistics of the N-Gain data

Table 3.

Descriptive Statistics of N-gain Data

Group	N	Minimum	Maximum	Mean	Std. Deviation
Experiment	28	0.27	0.85	0.5464	0.1803
Control	26	0.13	0.71	0.4088	0.1529

Based on Table 3, the average n-gain score of the experimental group was 0.5464 with a standard deviation of 0.1803. The lowest n-gain score of the experimental group is 0.27 and the highest is 0.85. While the average n-gain score of the control group was 0.4088 with a standard deviation of 0.1529. The lowest n-gain score of the control group is 0.13 and the highest is 0.71.

Based on statistical tests using independent sample t-tests, the following results were obtained.

Table 4.

Results of Independent Sample t-Tests from N-gain Data

<i>t-test for Equality of Means</i>	Sig. (2-tailed)	Sig. (2-tailed)	Conclusion
<i>Equal Variances assumed</i>	0.009	0.0045	H_0 ditolak

Based on Table 4, it can be concluded that improving student's creative thinking skills using Creative Problem Solving learning models is better than students who do not get special learning treatment.

Conclusion

Based on the results of research and data analysis, it can be concluded that the achievement and improvement of mathematical creative thinking skill of students who use the Creative Problem Solving learning model are better than students who do not get special learning treatment. So based on these results, the Creative Problem Solving learning model can be used as an alternative in mathematics learning to improve student's creativity.ü

- Teacher training for easy creation of Creative Problem Solving activities
- It may be suggested to prepare a booklet for teachers in order to create CPS activities and to design teaching.

For future studies,

- Qualitative research may be recommended to understand the problems of using CPS more effectively.

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