



Developing students' mathematical creative thinking skill through joyful learning strategy in algebra

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Abstract

Along with the rapid development of technology in the 21st century, students must have some skills that must be mastered by each student, called 4C. Creative thinking skill is the ability to solve a problem through many ways. Creative thinking skills can be implemented in many subjects in school, included in mathematics, applied in algebraic topic. This study aims to find out the development of student's mathematical creative thinking skills in algebra. Joyful learning strategy was done for this study. To get data, researchers used qualitative descriptive approach based on literature review. The data sources were selected from research paper published from 2015 until 2018 in accordance with the problems of the study. The abilities of students' creative thinking are divided into five different skill levels, from not creative until very creative, and also divided into three categories based on their prior knowledge. Students feel the interesting atmosphere in learning, relax, and attractive so as to make the student spirit and high concentration during lessons. This study concluded that creative thinking skills can be developed through joyful learning.

Kata kunci:

Creative thinking skills, joyful learning, algebra

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1. Introduction and Background

Along with the rapid development of technology in the 21st century, students must be able to face the challenges that exist. In order to survive and compete with technology, students must have some skills that must be mastered by each student, called 4C, which are critical thinking, collaboration, communication, and creativity. One of them is creative thinking skills. Creative thinking skill is the way of thinking to solve a problem with various ways. Noriza et al. (2017) stated that creativity is important on learning in all subjects in school, including mathematics. Runisah et al. (2016) stated that mathematics' creativity is different with creativity in another science. In mathematics, creativity does not always create a new thing. Student who has various ways to solve a problem can be called as a creative student.

Creative thinking skill is one of the skills that will make student to be able to survive and compete with technology. Creative thinking skill can be implemented on a wide range of subjects, such as mathematics. Runisah et al. (2016) concluded that mathematics is the science of thinking and can enhance thinking potential in the learning process. This is because creative thinking skill is needed to learn concepts and solve the problem in mathematics well. Qadri et al. (2019) said that creative thinking skill is important to make the mathematics concepts to be understood by students. By developing creative thinking skills in learn mathematics, students can use it in solving the problem creatively in their life. One of the research materials in mathematics is algebra.

Algebra is one branch of mathematics that studies symbols, variables, and equations that do not directly have a rule or algorithm that can be used to determine the answer immediately. Najihah et al. (2015) stated that each student has a different ability to solve algebra problems. Students who have low algebraic abilities

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will find difficulties to solve algebraic problems such as simplifying equations and algebraic expressions, and interpreting quadratic graphs.

Noriza *et al.* (2017) said that the improvement of methods, learning models, and strategies in teaching mathematics is one of the strategies to develop creative thinking ability. Joyful learning is one of strategies in teaching to facilitate students' learning so students can be faster in understanding the material or concept with a joy classroom. A kind of learning process or experience which could make learner feels pleasure in a learning scenario/process is called as joyful learning. The application of joyful learning in class can be done in many ways, such as find the pleasure in learning, music and rhythm, give students choice, let students to choose. Let students create things, show off students' work, towards holistic learning, get outside, read good books, go outside of book, and funny environment in class.

2. Discussion

Nowadays, creative thinking is needed by students to survive and compete in the 21st century in technological development. Mathematics is one subject that plays a role in the development of creative thinking, but not all students like mathematics. Therefore, in the classroom a pleasant atmosphere must be created so that students are willing and interested in learning mathematics deeper.

Noriza *et al.* (2017) said that the development of creativity is a though that is called the divergent thinking. In divergent thinking, 4 main components assessed in creativity are fluency, flexibility, originality, and elaboration. Zubaidah *et al.* (2017) concluded that fluency is the ability to generate many relevant ideas, suggestions, and alternate answers within a certain time. Flexibility is the ability to generate various ideas and abilities to change the ways of thinking and the approaches used. Originality is the ability to solve a problem or make combination of parts or elements which are unusual, unique, uncommon or different from another. Elaboration is the ability to develop, increase, describe, or specify details of the object, idea, product, or situation to make it more interesting. Novianti *et al.* (2018) stated that five levels of students' creative thinking abilities are:

Tabel 1. Levels of students' creative thinking abilities

Very Creative	Students are able to show aspects of fluency, flexibility, elaboration, and novelty or originality in solving a problem.
Creative	Students are able to show aspects of fluency and flexibility, or fluency and originality in solving a problem.
Creative Enough	Students are able to show aspects of flexibility or originality in solving a problem.
Less Creative	Students are only able to show aspects of fluency in solving a problem.
Not Creative	Students are not able to show the aspects of creative thinking in solving a problem.

Based on research abilities of creative mathematical thinking have been done by Noriza *et al.* (2017), there are 3 types of students, namely students with high prior knowledge, students with middle prior knowledge, and students with low prior knowledge. The characteristics will be shown in the table below:

Tabel 2. Analysis of ability research ability of creative thinking mathematically

Student with high prior knowledge	Learners can solve problems and provide various answers to the problem correctly (fluency). Learners can generate ideas to solve the problems with the completion strategy vary, and also find some alternative settlement solutions (flexibility). Learners can resolve the problem by using a new strategy but the solution is still not quite right. Elaboration yet to be seen.
Student with middle prior knowledge	Learners can solve problems, provide answers to the problem correctly, and also solve the problem with the other strategies (fluency). Learners capable of using various strategies of completion but not yet able to provide the

	settlement of a variety of problems (flexibility). Originality and elaboration yet to be seen.
Student with low prior knowledge	Learners can solve problems and provide answers to the problem, but students cannot provide another solution to solve the problem (fluency). Flexibility, originality and elaboration yet to be seen.

A paper that discussed about what joyful learning in the classroom stated that joyful learning is engaging, empowering, and playful learning of meaningful content in a loving and supportive community. Through the joyful learning process a student is always improving knowledge of self and the world. Research conducted by Setiyadi *et al.* (2017) states that the literacy ability increasing of students who get learning with the joyful learning approach is better than students who get language learning in a normal way.

Sidi & Yuniarta (2018) conducted a study to improve student mathematics learning outcomes in algebra material through joyful learning strategies. In this research, joyful learning was implemented with the teacher's strategy to provide learning motivation videos, used power point text as a medium to deliver material related to daily life and used leaf manipulatives and student worksheets with lecture methods, group discussions, assignments, question-answer, and the teacher also made games during learning process. The study was said to be succeed if it achieved the success indicator, that was 75% of the students got ≥ 60 grade in algebra's material. Before conducting the study, the average of students in the classroom is 26.41, and after the study was conducted, the average increased to 77.41. This showed that the joyful learning strategy can improve student mathematics learning outcomes in algebra subjects.

Arvyati *et al.* (2015) also did a research about the effectiveness of joyful learning in developing students' creative thinking skill. The research used peer tutoring as their method of joyful learning. It concluded that using peer tutoring learning process, students' mathematics creative thinking skill was increased significantly. The average increase of creative thinking skill components was 1.06, with the greatest increase in flexibility component, in the amount of 1.53. In using hands-on learning approach, students' fluency also increased in the amount of 0.84.

An article about the influence of joyful learning on elementary school students by Anggoro *et al.* (2017) concluded that the students got to experience positive cognitive learning through useful learning materials, methods and appropriate learning media, as well as a good teacher. The interesting learning could support students to have a positive desire to learn science include mathematics. Students who thought that learning both have a benefit for their self and fun would have a desire to study more. But, if they thought that learning was a burden, they didn't have any desire to study. Thus, joyful learning could help students to learn. Because, joyful learning delivered a relax and fun environment. The existence of it didn't create a tension or stress on students, and it made students felt free to apply something wrong to achieve success.

3. Conclusion

From the various studies, it is known that joyful learning is one of the important aspects in classroom learning. Joyful learning is needed in learning so that the classroom atmosphere becomes fun and students can learn mathematics better so that it can improve student understanding. Joyful learning in algebra classes can be done in several ways, such as motivation videos, power point as a medium to deliver material, leaf props, students' worksheets with lecture methods, group discussions, assignments, question-answer, and games in between learning. In addition, joyful learning can also be applied through the peer tutoring learning process. By peer tutoring learning process, students' mathematics creative thinking skill was increased significantly. Thus, joyful learning can develop mathematical creative thinking skill in algebra based on discussion.

Based on the results of the discussion, the researcher can give suggestions that to develop creative thinking students in learning mathematics should apply a variety of learning strategies and make students feel happy in participating in learning. This can not only be applied in algebraic material, but can also be applied in other materials such as geometry, statistics, and so on.

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