The Effects of Creativity and Flow on Learning through the STEAM Education on Elementary School Contexts

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ABSTRACT

This study aims to examine the effects of STEAM education on elementary school student’s creativity (creative problem solving, creative personality) and flow on learning. STEAM education is composed of 5 strands: Science, Technology, Engineering, Art, and Mathematics. The STEAM education provides convergence education to explore diverse thinking and achieve future convergence human resources. Previous studies on STEAM education have been done on the model development and concept formulation. There was very little application research. In addition, test subjects were usually middle school and high school students. Therefore, this study focused on the elementary school students to investigate the effect of STEAM lessons. This study made STEAM lesson plans that strengthen the linkages themes among the subjects. It helps students acquire the creative design and emotional experience. Based on this purpose of study, there are two research hypotheses. First, STEAM education Improves creativity (creative problem solving, creative personality) on elementary school students. Second, STEAM education enhances the flow on learning on elementary school students. The subjects in this analysis were 6th graders, two classes from elementary schools. Each class was taught for 45 minutes during 8 weeks by the same teacher and performed 3 tests as time goes by. After the test, we examine the changes in student’s creativity and flow on learning. Creativity was measured by two aspects; cognitive aspect and emotive personality. Applied statistical methods were two independent samples t-test. As the result, there were significant differences in creativity (creative problem solving, creative personality) and flow on learning through the STEAM education. The result indicates that STEAM education was helpful to improve creativity (creative problem solving, creative personality) and flow on learning.

Keywords: STEAM education, Creativity (creative problem solving, creative personality), Flow on Learning

INTRODUCTION

The wave of change occurs in fast pace in the information age. Even though the world united as one with rapid technology development, new complex problems occur by cultural diversity, environmental diversity, and multiple values. Based on these phase of times, Ministry of Education and Science Technology (MEST) published Steam education to improve the elementary school student’s creativity improvement in December 17th, 2010. STEAM education stands for convergence education in area of
Science, Technology, Engineering, Art, and Mathematics, and it aims for developing talented person with creativity and personality who can solve various problems in rapidly changing society (MEST, 2010).

STEAM education adopted in Korea to learn association of theoretical principles with reality by linking science, mathematics, and technology which are difficult subjects for students to arts and engineering. Students can practice of adopting in reality through engineering and technology, and they can grow as talented creative person through sensibility of arts (Korean Educational Development Institute, 2012).

In addition, new rising keyword in our society is creativity and communication (Noh & Ahn, 2012). There was a limitation on developing talented person with personality of communication with STEM education that developed in United States, so STEAM education that cultivates creativity and personality linking imagination and sensibility with technological education was suggested.

Educational outcome of STEAM education can be divided as cognitive side and emotive side. Improvement of problem solving, creativity, cooperative learning, concentration in subject, and critical thinking was positively influenced by educational outcome of cognitive aspects (Kim et al., 2011; Kim & Kim, 2012; Shin et al., 2013). As emotive side, there are positive influences on learner’s interest, motivation (Bae, 2011; Kim et al., 2011; Kim & Kim, 2012; Moon, 2009), and attitude (Bae, 2011; Moon, 2009).

Currently, basic research such as concept establishment and model development is in progress from STEAM education, and it lacks research in program development and application. In addition, test subjects were usually middle school and high school students. Program development and dissemination of STEAM education is priority issue for invigorating STEAM education from elementary school teacher’s research (Kum & Bae, 2012). Also, the research from HeSook Han and HwaJung Lee (2012) stated that STEAM program development and dissemination is the most needed issue for helping teacher’s comprehension of STEAM education. In addition, existing STEAM education programs were lack of links between subjects (Kim, 2012). Looking at the existing problems of subject, technical education lacks of scientific principle explanation and science education needed to strengthen the linkages themes among the subjects. Math education focused problem solving oriented class (Baek, 2011). Thus, according to the passage, this study is needed to make a STEAM lesson plan that based on real life contents and strengthen the linkages themes among the subjects. After that, we examine the effects of STEAM education about creativity and flow on learning. Creativity was measured by two aspects; cognitive aspect and emotive personality. Cognitive aspect measured by creative problem solving and emotive personality measured by creative personality. The purpose of this study is to analyze about effects of STEAM education on elementary school contexts.

Research problems

Based on this purpose of study, there are three research questions as follows:
First, does STEAM education improve creative problem solving on elementary school students?
Second, does STEAM education improve creative personality on elementary school students?
Third, does STEAM education enhance the flow on learning on elementary school students?

METHOD

Sample and procedures

The subjects in this analysis were 6th graders, two classes from elementary schools. Each STEAM class was taught for 45 minutes, once per week, during 8 weeks by the same teacher. The developed STEAM program was reviewed from 3 elementary specialists. Before and after the instruction, we examine the changes in student’s creative problem solving, creative personality, and flow on learning. Paired t-tests were used for data analysis methods.