

The Effects of Convergence Education based STEAM on Elementary School Students' Creative Personality

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Abstract: The purpose of this study is to improve creative personality of elementary school students with convergence study program based STEAM education. Creative personality is an intersection between creativity and personality. Recently creativity in education is a global trend. But personality is as important as that. Many research about creativity in education have been done, but research about personality aspect of creativity are not enough. That is STEAM education. STEAM is one of convergence study and based STEM. STEM is a convergence with Science, Technology, Engineering, Mathematics. STEAM is adding Art to STEM. This Art means linguistic, liberal, manual, physical, fine art. Many researches about fine art in edu, music in edu, physical in edu, and etc. indicate that art exert a favorable influence on personality of students. So, Art of STEAM will develop creative personality of elementary school students.

Keywords: Convergence Education, Creative Personality, Educational Robot, Project Based Learning.

Introduction

Scholars have researched about improving students' creativity since Guilford spoke for importance of creativity at APA in 1957. Guilford improved character of creative thinking ability and its measuring tools, Calvin W. Taylor and Brenster Ghiselin studied creativity standard problem & education for improving creativity. Also, personality is very important in recent studies about creativity[1].

Arthur Cropley added personality aspect in elements of creativity, Mike Martin said it is very important that persuing creativity and personality at the same time in especially science sphere.

Goldman suggested that improving personality is very important task that children adapt in given environment and make a balance, show each social capability properly. But good & holistic education is achieved when intelligence and personality are harmonizing properly. So, separate-educated subjects have to fusion for harmonizing[2].

One being representative convergence education is STEAM.

STEAM is Science & Technology interpreted through Engineering & the Arts, all understood with elements of Mathematics. Accordingly, I will apply to improve creative personality of elementary school students with developing convergence study program based on STEAM[4].

1. Theoretical Contemplation of Convergence Education

1.1 The Definition of Convergence Education

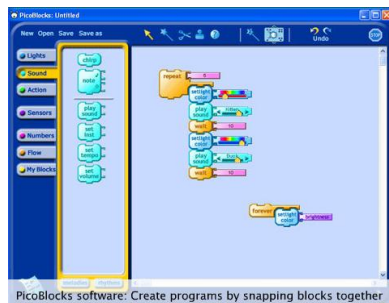
Convergence is the approach toward a definite value, a definite point, a common view or opinion, or toward a fixed or equilibrium state[5]. Sung-ho Kwan(2009)have presented that convergence study is a new study provided by converged two of more area of knowledge and study[6].

It is not that linking two or more kind of subjects, adding shortage of one than others. It means to make a new concept of curriculum by fusion of two or more kind of subject based on common principle between subjects or common issue, common interest. For example, A and B are subjects. Convergence education means 'A+B=C+α'. 'α' means creative products[7]. Relationship between integrated education and convergence education is shown below to help understand of this study.

2. Educational Robot

Educational robot has been developed for algorithm education through direct experience. Robotics includes all types of programmable machines that perform actions based on inputs from sensors[8].

Pico-Cricket is designed for more artistic and expressive projects. The Pico-Cricket can control not only motors but also multi-colored lights and music-synthesis devices, so children can use Pico-Cricket to build their own musical instruments and light sculptures.



[Figure 1] Picoblock software



[Figure 2] Picocricket Hardware

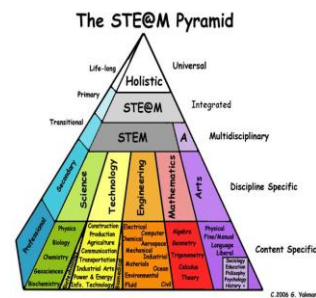
3. STEAM Education

STEAM is one of convergence study, an advanced concept of STEM. STEM is fusioned with Science, Technology, Engineering, Mathematics.

STEAM is an expanded concept of STEM, added Art from Georgette Yakman, Virginia Tech.

[Figure 3] is the STEAM Pyramid, the concept of STEAM.

STEAM is Science & Technology interpreted through Engineering & the Arts, all understood with elements of Mathematics.



[Figure 3] The STEAM Pyramid

4. Creative Personality

Creative Personality is an attempt to enact creativity in personalized aspect.

Subordinate factors of creative personality is enacted various point of view.

Davis put together common properties of creative personality that definite differently among many scholars. They are self-confidence, adventure, persistence, humor, curiosity, wide interests, imagination. Research in Creativity, recognize and personalize aspect are both important. Those are complementary relation.

5. Methodology of the Convergence Study Program

5.1 Directivity and select content of Study program

- Prepare standards and emphasis on convergence study, Project based learning, STEAM.
- Recognize using capability and limitation of educational robot.
- Consider elementary school students' interest, study level, learning ability.

5.2 Designing the Model for Teaching

[Table 1] Convergence PBL based on STEAM and Content[9]

PBL (Kim Dae-Hyun)	Convergence PBL based on STEAM	Content
Introduction	Introduction	Introduction Project based learning program Motivation
Decide project	Decide project and make a plan	Decide topic
Make a plan		Decide subtopic and make teams Secure study sources
Investigation and expression	Project and me	Investigate and research, sharing datas, Meeting and collaboration, sharing and expanding thinkings, Express topic with Art elements
Finish	Present result and find Art elements	Present research result Find Art elements
evaluation	Finish and evaluation	Evaluate various methods Finish and reconstruct

6. Conclusion and Future Work

In this study,

First, we developed the Convergence PBL Study program to improve creative personality of elementary school students' with Art elements of STEAM.

Second, Study of STEAM is not enough. Art of STEAM could improve creative personality.

Third, it would be positive effects on learner's attitude through using educational robot.

To inspect the effect of convergence study program based STEAM, we have to apply this method to real class. Developed convergence study program will be taught to students in class and we'll observe the students' learning activities and analyze outcomes of learning.

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