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Integration of cloud-based mobile learning to improve students' creative thinking in a visual arts course

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Abstract: Recently visual arts education has been influenced by technology development and delighted research attention. This study focuses on cloud-base mobile learning in visual art teaching, to improve the ability of creativity for high school students. The findings showed that student performance on scales of fluency, and resistance to premature closure in Torrance Creative Thinking test have been improved.

Keywords: G Suite for Education、Creative Thinking、Mobile Learning、Visual Arts

1. Introduction

Arts courses have the potential for fostering creativity in schools. The process of creating arts needs to be simulated by a lot of visual materials such as images and videos (Xu, 2019). However, it is difficult to prepare teaching materials and present artworks during course time (Ulger, 2016). The integration of visual arts and digital technology is one of the trends in recent years (Ceng, & Chang, 2013）. By using digital resources for visual arts teaching can solve these problems and stimulate students' creative thinking by multimedia (Chang, Chen, Yu, Chu & Chien, 2017).

Integration of cloud-based teaching resources into the classroom, provide students a flexible way in mobile environment (Clmrompton, Burke, & Gregory, 2017). The G Suite for Education is a combination of online tools and available at all levels of schools. Teachers and students can share unlimited cloud space and Internet resources to make learning contents more valuable (Iftakhar, 2016). They can also use the Internet platform to interact with each other. The National Curriculum for England encourages teachers use Internet resource to improve art and design techniques to help students learn visual arts, and develop creativity and imagination.(UK National Curriculum Online, 2010). Through active participation in art appreciation, students could develop new ways to enhance their power of creative thinking and presentation skills (Pateman, 2016).

The purpose of this study was to integrate cloud-based mobile learning in high school visual arts course to promote students' creativity. The main research question was that did students who learn with cloud-based mobile learning have better creative thinking than students who learn with traditional learning?

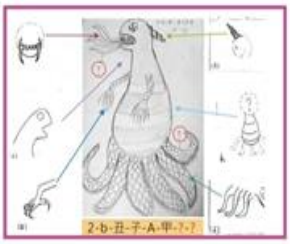
2. Methodology

2.1 Research Design

The 12-week experimental course had conducted for grad 10 students in the south of Taiwan. There were 40 participants in the experimental group and 35 in the control group. The experimental group used cloud resources with mobile learning. The control group used paper handouts and the textbook. G Suite for Education was used in experiment group that was cloud-based enterprise communications tools. Teachers integrated learning resources on the Internet to provide arts gallery and multimedia. The students in the experimental group could connect to G Suite for Education at anytime and anywhere through the mobile device. The control group learned from textbook and handouts.

The whole teaching experiment process was divided into four stages, namely, “Creative design”, “Art skills accumulation”, “Creation thinking practice” and “Creative achievement”.

1. The creative design-" assemblage graphic": The element of art was modeling. The teaching objective was to familiarize students with graphic recombination techniques
2. Art skills accumulation-"perspective drawings": The elements of art were color, texture material, space. The teaching objective was to build the concept and experience of arts techniques.
3. Creative thinking practice-" association": The element of art was form. The teaching objective was to familiarize students’ creative techniques
4. Creative achievement-" Creating reality ": The elements of art were color, texture, and space. The teaching objective was applying creative techniques and complete a creative arts work.



1. Creative design

2. Art skills accumulation

3. Creative thinking practice

4. Creative achievement

Figure 1. The arts work of four stages.

2.2 *Research Instrument*

The Torrance Tests of Creative Thinking (TTCT) is a test of creativity that reflected a person’s attitude to creativity, problem solving and decision making (Torrance, 1974). The figural version of the test was used in this study that consists of activities to drawing (Tan, 2007).

3. Research Results and Discussion

The pre-test of the TTCT, the average score of the experimental group was 84.17 points, and the control group was 82.12 points, the overall result of *t*-test showed no significant difference (*t*= 0.78, *p*= .43> .05). The mean of the experimental group and the control group are 91.06 and 83.15, respectively; moreover, the post-test scores of the two groups reached a significant difference with *t*=3.36 (*p*= .00< .05). There were significant differences in scale of fluency (*t*= 4.46, *p*= .00<.05); and resistance to premature closure (*t*= 3.47, *p*= .00< .05).

Table 1

Independent sample t – test of the *post-test for Experimental group and control group*

Scale	*Group*	*Mean*	*SD*	*t*	*p*
Fluency	*Experimental*	*122.35*	*18.18*	*4.46***	*.00*
	Control	*105.03*	*15.00*		
Creative strengths	*Experimental*	*116.00*	*23.97*	*1.74*	*.07*
	Control	*108.06*	*13.16*		
Elaboration	*Experimental*	*64.20*	*8.91*	*-.75*	*.44*
	Control	*65.49*	*5.19*		
Abstractness of titles	*Experimental*	*61.60*	*25.68*	*.83*	*.40*
	Control	*57.31*	*17.42*		
Resistance to premature closure	*Experimental*	*91.13*	*14.94*	*3.48***	*.00*
	Control	*79.86*	*12.84*		
Overall	*Experimental*	*91.06*	*11.67*	*3.36***	*.00*
	Control	*83.15*	*8.08*		

The results of this study show that the results are similar to the research that picture books could improve the creativity and have significant difference in scales of "Fluency" (Yang, & Chang, 2013). By using digital resources, the students of the experiment group get obvious effects which is consistent with the previous study (Wang & Zhang, 2014).

4. Conclusions and Suggestions

The results show that integration of cloud-based mobile learning in arts course could improve creative thinking. Therefore, teachers can design mobile learning experiences and create a paperless classroom by integrating digital resources to enhance students' creative ability in the arts courses. The G Suite is a cloud-based productivity tool that helps teacher organize the digital resources and communicate with students. To evaluate the effects on creativity, 12 weeks might be too short to get significant results (Wakil, Omer, & Omer, 2017). Further research could extend research periods to get better results

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