

Effects of the Combination of Synchronous Web-Based Teaching with Visually Creative Teaching on Art Students' Creativity

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ABSTRACT

The 21st century is the society of information technology and knowledge-based economy. To cope with the information society, teaching methods would be changed. Traditional chalk and talk can no longer adapt to the changing society. In addition to pass down the tradition, new ideas should also be introduced. In the informational age, the Internet becomes an essential living element and synchronous web-based teaching breaks through the obstacle of space, provides instant and multiple communication channels, and creates alternative creativity learning environment. With experimental design, total 208 students in Fujian University of Technology, as the research objects, are proceeded 15-week (3 hours per week for total 45 hours) experimental teaching. The research results show significant effects of 1.synchronous web-based teaching on creativity, 2.visually creative teaching on creativity, and 3.the combination of synchronous web-based teaching with visually creative teaching on the promotion of creativity. According to the results, suggestions are proposed, expecting to construct courses stressing on interdisciplinary integration and inspiring creativity as well as encouraging students to develop creativity through the "originality" of art.

Keywords: synchronous web-based teaching, visually creative teaching, art, creativity

INTRODUCTION

Innovation and technology do not simply enhance the quality of life, but also drive national economic trend and social development. To outperform on the international stage, it is necessary to cultivate national creativity and transfer excellent abilities of making changes into the token to enhance the international status. Creativity environment is a key in promoting students' technological creativity. In addition to designing appropriate course contents, it is primary to construct learning environment beneficial for the cultivation of creativity. In the informational age, the Internet becomes an essential living element and synchronous web-based teaching breaks through the obstacle of space, provides instant and multiple communication channels, and creates alternative creativity learning environment.

The 21st century is the society of information technology and knowledge-based economy. Changes in teaching methods are required for coping with the information society. Traditional chalk and talk could no longer adapt to the changing society that it is necessary to create new ideas in addition to passing down the tradition.

Along with the development of information technology, the era of global village, and the diversification of society, "creativity" has become the basis of talent development in various countries, which actively cultivate the next-generation creativity to enhance national quality and thicken national competitiveness for developing knowledge-based economy. To pursue living satisfaction, people have to solve old problems with innovative methods or more effectively utilize resources and even develop personal potential to the higher level. Such ideas rely on the cultivation and presentation of creativity. Individual creativity or group creation ability has become the major source of competitiveness of the society or a nation. It is therefore worth of emphasis to enhance creativity. Art is closely related to life. Art educators should match modern information technology, integrate creative ideas into art learning and teaching to cultivate students' independent inquiry and innovative thinking, enhance the life

Contribution of this paper to the literature

- Group discussion and cooperation could help discover others' different creation and ideas, mutually inspect and evaluate the schedule, and enhance team efficiency and thinking skills with cooperation.
- A teacher should provide more analysis and comparison practice, e.g. team discussion, for students discussing problems and expressing ideas. Or, a teacher could propose open-ended problems and encourage students present the opinions.
- Team creativity contest would be a good choice for students learning teamwork skills and applying learned knowledge to actual problem-solving.

cognition and problem-solving abilities, and further construct courses stressing on interdisciplinary integration and inspiring creativity to encourage students developing creativity through "originality" or art.

LITERATURE REVIEW

Synchronous Web-based Teaching

Synchronous web-based learning, as a learning model "in different place at the same time", utilizes the combination of the Internet and computer-related software and hardware for instructors and learners, who are in different places, proceeding teaching and learning activities at the same time through the functions of instantaneity and two-way communication offered by electronic equipment (Chou, Lunsford, & Thomson, 2015). Under synchronous web-based environment, teachers and students get online at the same time and properly use network synchronization platforms, e.g. audio or video conference, electronic whiteboard, chatroom, and stream media, for real-time interactive learning activity (Molano & Polo, 2015). Interaction is the key in effective learning and information exchange, and the major characteristic of synchronous web-based learning lies in simulating the face-to-face interaction in traditional classrooms through audio and video interaction tools (Cela, Sicilia, & Sánchez, 2015). In synchronous learning, teachers could transmit materials, sound, and images to students through multimedia; meanwhile, teachers could acquire students' audio and video responses. Such presentation with multimedia breaks through the communication with texts, allowing students and teachers, who are in different places, shortening the distance, reducing the sense of loneliness of individual learning, and enhancing learning effect (Jansen, Scherer, & Schroeders, 2015). Ricoy and Feliz (2016) indicated that synchronous web-based teaching, similar to traditional face-to-face learning, was a real-time, lecturer-led online learning pattern, where all learners had to get online learning and communicating at ruled time and the lecturer had to manage the classroom. Xu, Huang, and Tsai (2014) explained the interaction being proceeded through visual classroom, video conference, Internet phone, chatroom, stream media, or two-way broadcasting system. Synchronous web-based learning environment would not be restricted the space as "traditional classrooms" and could save the time and costs for traveling back and forth schools. Yilmaz (2016) described that teachers and students merely combined personal computers and the Internet, at the same time, to effectively apply the tools offered by network synchronization platforms, e.g. chatroom, electronic whiteboard, audio or video conference, and visual classroom, to achieve the high-interaction effect as face-to-face instruction (de-Marcos et al., 2016).

Visually Creative Teaching

Dong, Zhang, Dai, and Guan (2014) indicated that visually creative teaching was integrated into general painting creation and color courses to provide the thinking with creative visual image. Although the goal was to develop visual creativity, the basic training of painting skills and color knowledge could not be neglected. In this case, the grasp of creation modeling and the training of color application in teaching activity should be emphasized. Shadiev, Hwang, Huang, and Liu (2015) mentioned that visual thinking was an ordinary human behavior; visual thinking was required in daily life for either abstract theories or specific entities. When people were at visual thinking, visual and thinking present initiative and purposiveness. Chen (2015) considered that visual thinking could assisting the construction of mental model and the connection with creative thinking. Visual experience could have affairs and objects become explorable and allow learners presenting imagination space to expand the learning depth. Yamada et al. (2016) concluded that "visual thinking" could explain learners' thinking and problem-solving, enhance the comprehension and analysis of complex problems, and promote the expression, communication, and creative thinking abilities through visual elements of pictures, colors, charts, graphs, and fantasy. Katz, Eilot, and Nevo (2014) explained that the creation of visual art covered from internal creation to external creation and from thinking to performance; creators could compose internal intention as well as specifically present imagery that the work was the result of visual creation. Visual creation was to apply the training in creativity to visual performance with visual creativity, present the ability of visual thinking, and transfer idea or emotion into specific color structure

with image performance strategies (Pellas, 2014). Clark (2015) referred visually creative teaching to using perceived imagery records for generating images by applying imagination combination in the brain. Mental imagery could be divided into two layers; one was clearness, including the grasp of the image, freshness, and contained details of subjects, and the other was control, as the degree to manipulate thinking image. Park and Lee (2014) pointed out visually creative teaching as applying drafts, graffiti, sketches, or picture writing to record the thinking process or communicate with others. Paining, the communication of thinking imagery, could thoroughly apply visual thinking ability to record, store, manipulate, and communicate imagery.

Creativity

Lai and Chen (2014) regarded creativity as the ability of people with excellent creative performance, i.e. reflecting people's idea of creativity being the intuitive opinion of ability. You (2015) considered that creation was to discover facts, problems, ideas, and acceptable solutions with cognition, imagination, and assessment, i.e. creative problem-solving. García-Saiz, Palazuelos, and Zorrilla (2014) regarded creativity as creators, for special needs or useful purposes, combining connectable elements to become new relationship. Paule-Ruiz et al. (2015) defined creativity as the psychological process to exceed existing experiences in the problem situation, break through habitual limits, and form brand-new concepts as well as the ability to solve problems by flexibly applying experiences, without being limited by rules. Darwin and Norton (2014) argued that creativity could not be simply regarded as personality tendency or ordinary ability, but the integration of personality traits, cognitive ability, and social environment. In this case, problems could be effectively solved by the integration of work motivation, special skills, and creativity related skills. Sheorey (2014) pointed out the characteristics of creative products as unique, goal-definite, and not conflict to or match with other goals, needs, and value of human beings. Hwang, Kongcharoen, and Ghinea (2014) indicated that creativity was an innate ability of an individual; although it appeared individual differences with personal traits, creative thinking ability, under the support of creative environment, could be cultivated and induced creative products through the reflection of creation process; the so-called creative products, regardless of specific products or abstract cognition and emotion, were the presentation of creativity. Paver et al. (2014) also regarded creation as the changing process of an individual or a group as well as the performance of cognition, affection, and will that the performance result allowed oneself, an individual, or the created field changing to a higher level. Creativity normally contained several basic cognitive abilities, including divergent thinking.

Referring to Chen, She, Kameda, and Ohno (2015), three indicators for evaluating individual creativity are applied to this study.

- (1) Visual perceptual power: A creative person presents keen observation, could easily see what people ignore, perceive tiny visual sensation, and form more association and imagination.
- (2) Word power: A creative person could reinforce the combination between words and mind, understand how to change speaking model, often inspect the relationship between thoughts and speech, relax fixed thinking model, and change habitual thinking and speech to enhance thinking fluency.
- (3) Drawing power: Words and characters are the symbols to express information. However, most people simply pay attention to the original meaning of a word, but ignore the message delivered by fonts. A creative person with the ability of painting performance could relax thinking and give a new meaning and performance to a font with painting concepts and patterns.

RESEARCH HYPOTHESIS AND METHOD

Research Hypothesis

Wasim, Sharma, Khan, and Siddiqui (2014) regarded the necessity of supportive environment for people's creativity; without environmental support, the inner source of a person's creativity might not be seen. Hocevar, Flanagan, and Metzger (2014) proposed an effective method to enhance individual or team creative thinking as free association and delayed criticism, releasing personal ideas under pleasant and warm atmosphere, and largely acquire creativity in short period through collective thinking and idea agitation. Under synchronous web-based teaching environment, teachers and students getting online at the same time and well applying network synchronization platforms, e.g. audio or video conference, electronic whiteboard, chatroom, and stream media, to real-time interactive learning activity could effectively enhance students' creativity through collective thinking and idea agitation. Lee (2014) pointed out the importance of "environment" to creativity. The synchronous web-based environment created by synchronous platforms could achieve real-time interaction, as face-to-face, as well as provide multiple and open learning environment with the assistance of platform functions to enhance students' creativity. For this reason, the following hypothesis is proposed in this study.

Table 1. Analysis of Variance of synchronous web-based teaching

	Variable	F	P	Scheffe post-hoc
synchronous	visual perceptual power	11.237	0.000**	synchronous web-based teaching>general traditional teaching
web-based	word power	9.685	0.000**	synchronous web-based teaching>general traditional teaching
teaching	drawing power	12.418	0.000**	synchronous web-based teaching>general traditional teaching

* stands for $p < 0.05$ and ** for $p < 0.01$

H1: Synchronous web-based teaching shows significant effects on creativity.

Lindt, Corkin, and Yu (2014) mentioned that creativity was the motive to observe affairs and generate new concepts, and visual art was the activity to execute creativity. The practice of creative teaching should be implemented in visual art education to help implement students' creativity for keen, fluent, changeable, unique, and advanced characters as well as apply such characters to the problem solving and visual concept of visual creation so that the creative performance of visual art could be thoroughly developed (Xu & He, 2014). Huang et al. (2014) indicated that visual pattern was prior to language pattern; the training of visual performance was affirmed by experts to present the function to inspire creativity and was an effective creative thinking teaching strategy that visually inspiring creativity could yield twice the result with half the effort. You (2015) referred sensory as the perception of material world, i.e. the experience saw and recorded in the brain. Observation was the primary element to generate creativity; the clearer observation would result in clearer memory; such memorized images would be stored in the brain for creating new imagery. Accordingly, the following hypotheses are proposed in this study.

H2: Visually creative teaching shows notable effects on creativity.

H3: The combination of synchronous web-based teaching with visually creative teaching reveals remarkable effects on creativity.

Research Object and Research Design

To effectively achieve the research objective and test the research hypotheses, nonequivalent pretest-posttest control group design is applied in this study. Total 208 students in Fujian University of Technology are proceeded the visually creative teaching integrated synchronous web-based teaching 2x2 experiment. The experiment is grouped into visually creative teaching (visually creative teaching; general traditional teaching) \synchronous web-based teaching (synchronous web-based teaching; general traditional teaching) for the 15-week (3hrs per week for total 45 hours) experimental teaching.

Analysis Method

Analysis of Variance is utilized in this study for discussing the effect of synchronous web-based teaching on art students creativity and further understanding the effect of the combination of synchronous web-based teaching with visually creative teaching on art students' creativity.

RESULT AND ANALYSIS

Analysis of Variance of Synchronous Web-based Teaching and Creativity

According to Analysis of Variance, the difference of synchronous web-based teaching in visual perceptual power, word power, and drawing power is discussed. From **Table 1**, synchronous web-based teaching and general traditional teaching present significant differences on visual perceptual power, synchronous web-based teaching revealing higher visual perceptual power than general traditional teaching. Furthermore, synchronous web-based teaching and general traditional teaching show remarkable differences on word power, synchronous web-based teaching appearing higher word power than general traditional teaching. Finally, synchronous web-based teaching and general traditional teaching reveal notable differences on drawing power, synchronous web-based teaching presenting higher drawing power than general traditional teaching. H1 is therefore supported.

Analysis of Variance of Visually Creative Teaching and Creativity

According to Analysis of Variance, the difference of visually creative teaching in visual perceptual power, word power, and drawing power is discussed. From **Table 2**, visually creative teaching and general traditional teaching show significant differences on visual perceptual power, visually creative teaching appearing higher visual perceptual power than general traditional teaching. Moreover, visually creative teaching and general traditional teaching present remarkable differences on word power, visually creative teaching revealing higher word power

Table 2. Analysis of Variance of synchronous web-based teaching

	Variable	F	P	Scheffe post-hoc
visually creative teaching	visual perceptual power	13.284	0.000**	visually creative teaching>general traditional teaching
	word power	10.925	0.000**	visually creative teaching>general traditional teaching
	drawing power	15.841	0.000**	visually creative teaching>general traditional teaching

* stands for p<0.05 and ** for p<0.01

Table 3. Analysis of Variance of synchronous web-based teaching on statistical learning effectiveness

Variable	visual perceptual power			word power			drawing power		
	F	P	Scheffe	F	P	Scheffe	F	P	Scheffe
synchronous web-based teaching	11.237	0.000**	Web-based > general	9.685	0.000**	Web-based > general	12.418	0.000**	Web-based > general
visually creative teaching	13.284	0.000**	Visual > general	10.925	0.000**	Visual > general	15.841	0.000**	Visual > general
網路同步*visual creativity	36.583	0.000**	11>21>12>2 2	42.162	0.000**	11>12>21>2 2	47.352	0.000**	11>21>12>2 2

* stands for p<0.05 and ** for p<0.01

than general traditional teaching. Visually creative teaching and general traditional teaching appear notable differences on drawing power, visually creative teaching presenting higher drawing power than general traditional teaching. Apparently, H2 is supported.

Analysis of the Effect of the Combination of Visually Creative Teaching with Synchronous Web-based Teaching

Applying Analysis of Variance to discuss the difference of visually creative teaching integrated synchronous web-based teaching in art students' creativity, Two-way Analysis of Variance is used for discussing the interaction of visually creative teaching and synchronous web-based teaching to test the promotion of visually creative teaching. From **Table 3**, synchronous web-based teaching integrated visually creative teaching shows the highest learning outcome, and the interaction of synchronous web-based teaching integrated visually creative teaching appear the highest learning gain that H3 and H4 are supported.

CONCLUSION

The research results show the assistance of the combination of visually creative teaching with synchronous web-based teaching in creative tendency. For the application of creative thinking teaching, it should arrange proper situations and environment, apply diverse teaching to give students more response time for creative thinking, provide appreciation and encouragement, respect individual differences, parallelly operate teamwork and independent creation, grasp the basic principle to induce students' creative thinking, well apply synchronous web-based teaching resources, and arrange long-term visually creative teaching course planning in order to appear more significant effects on the affection dimension of creativity. The synchronous web-based learning environment provides favorable individual thinking space to effectively reduce disturbance among classmates. On the other hand, with the assistance of synchronous platforms, students, without directly talking to people face-to-face, feel more comfortable, can more easily speak out the ideas, and are brave to announce personal opinions; and, the teacher-student interaction is enhanced. Synchronous web-based teaching shares sound, pictures, and even films with each other to enrich the learning media. What is more, teachers would be more convenient and fast to deal with materials or handouts or rapidly updating materials and avoiding the loss of handouts.

SUGGESTION

According to the research conclusion, the following suggestions are proposed in this study.

1. It is suggested to apply teamwork and independent creation when applying the combination of visually creative teaching with synchronous web-based teaching to teach art students. Meanwhile, group discussion and cooperation could help discover others' different creation and ideas, mutually inspect and evaluate the schedule, and enhance team efficiency and thinking skills with cooperation. In the art independent creation process, an individual has to integrate collected information and image thoughts for internalization and absorption to generate unique presentation methods. In this case, teaching methods could be flexibly adjusted depending on the situations, and cooperative learning and independent creation allow art students promote the creativity by mutually observing the work.

2. A teacher should provide more analysis and comparison practice, e.g. team discussion, for students discussing problems and expressing ideas. Or, a teacher could propose open-ended problems and encourage students present the opinions, but not criticizing students' opinions, to cultivate students' analysis and comparison abilities. Students with art creativity potential require analysis and judgment abilities to put the ideas into practice.
3. A lot of students show high interests on activity performance, while some students with excellent academic achievement could not connect the learned content. Team creativity contest would be a good choice for students learning teamwork skills and applying learned knowledge to actual problem-solving. Particularly, when the creative activity topic is correlated with students' learning courses, students would have stronger motivation to learn or search for relevant knowledge.

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