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# Synthesis of Theoretical Framework for Augmented Reality Learning Environment to Promote Creative Thinking on Topic Implementation of Graphic Design for Grade 9 Students

**Sathaporn WONGCHIRANUWAT [a], Charuni SAMAT [b*]**
[a]*Master degree student of Educational Technology, Faculty of Education, Khon Kaen University, Thailand*
[b]*Assistant Professor of Computer Education, Faculty of Education, Khon Kaen University, Thailand*
*thaibannok@hotmail.com

**Abstract:** This study aimed to synthesis of theoretical framework for designing of learning environment to promote Creative Thinking. The document analysis method research design was employed in this study. The procedures were as follows: analyzing of theories, principle and literature review. The result revealed that: theoretical framework for designing of learning environment comprised of 5 theoretical bases as following: (1) Context of school base; policies, targets, present situation, processes, and performances, (2) Psychology base; constructivist theory, cognitive theory, (3) Pedagogical base; OLEs model, SOI model, situated learning, cognitive apprenticeship, 4) Creative thinking base; 4 ability of creative thinking: fluency, flexibility, originality, elaboration, (5) Technology and Media base; Technology: web-based learning, augmented Reality (AR), The system of media: media symbol system, media attribute,

**Keywords:** Creative Thinking, Augmented Reality, Web-based Learning Environment

## 1. Introduction

The change in the age of globalization and the advancement of technology has made information distributed evenly everywhere. Arising from the use of information and communications technology (ICT) to link data from different sources. The course correlates to the principle of creative thinking which is the major basis in the design of the instruction or the creation of education software learning innovations that responds to the course content and the needs of learners. Such instructional design corresponds to the major learning and innovation skills of the 21st Century, creativity and innovation.

Enhancement of creative thinking in learners based on the web-based learning environment was achieved using the principles and theories for synthesizing the theoretical framework and the environmental design framework which promote creative thinking (Samat, C. and Chaijaroen, S. ,2009) The theories and web-based characteristics were brought into the design of instruction that utilized the learning environment media and methods with important components of the Constructivist theory. The Augmented Reality is a technology that can create virtual images that appear in a 3D animation, sound, and hypertext features hyperlinks. In this paper, we are presenting the principles related to the basis of creative thinking and innovation skills for producing student in the 21st Century and the basic context of student training in Thailand that would lead to development

Thus, this research was aimed at designing and developing the Augmented Reality Learning Environment to Promote Creative Thinking on Topic Implementation of Graphic Design for Grade 9 Students of the 21st Century in order to obtain the basis for constructing the appropriate and efficient learning environment models for the learners.

## 2. Methodology

The theoretical framework was synthesized based on studying and analysis of principles theories, and related literature regarding design and development, cognitive theories, constructivist theories, the constructivist learning environment model, web-based learning, media attribution, media symbol system, augmented reality technology and creative thinking, The theoretical framework shows five important theoretical foundations as follows: The theoretical framework shows four important theoretical foundations as follows: (1) Context of school base, (2) Psychology base, (3) Pedagogical Base, (4) Creative Thinking Base, and (5) Technology and Media base (AR technology and media symbol system)

## 3. Results

The designing framework of web-based learning environment was synthesized based on mentioned theoretical framework as following details:

### *3.1 Activating cognitive Structure, creative Thinking*

Activating cognitive structure, creative thinking. It was illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure 1.

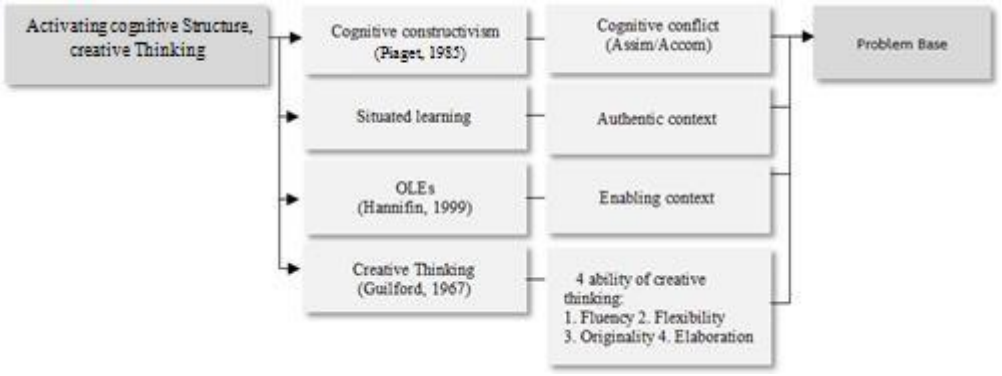


**Figure 1.** Theoretical Framework Designing Problem Base

### *3.2 Supporting Cognitive Equilibrium*

Supporting cognitive equilibrium. It was illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure 2.

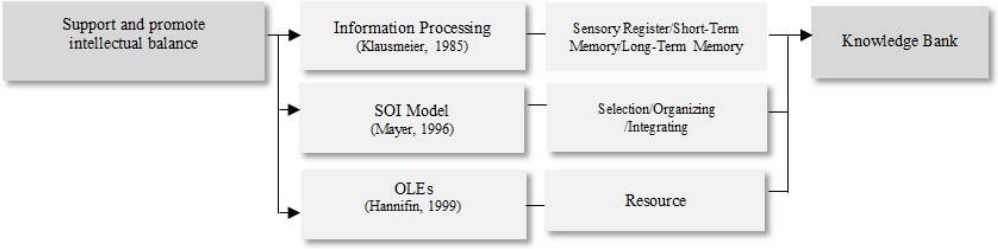


**Figure 2.** Theoretical Framework Designing Knowledge Bank

### *3.3 Enhancing Knowledge Construction and Creative Thinking*

Enhancing knowledge construction and creative thinking. It illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure 3.

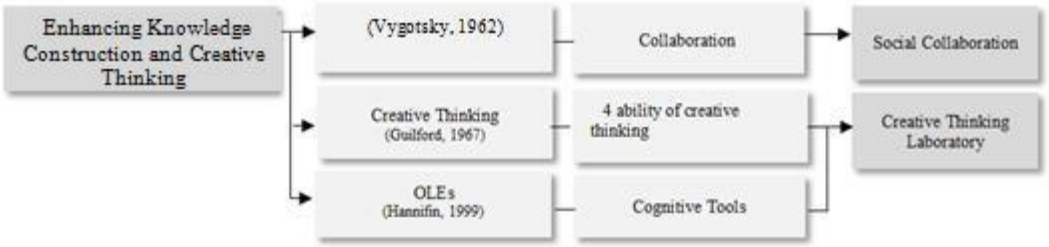


**Figure 3.** Theoretical Framework Designing Social Collaboration and Creative Thinking Laboratory

### *3.4 Supporting and enhancement for constructing knowledge*

Supporting and enhancement for constructing knowledge. It illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure 4.

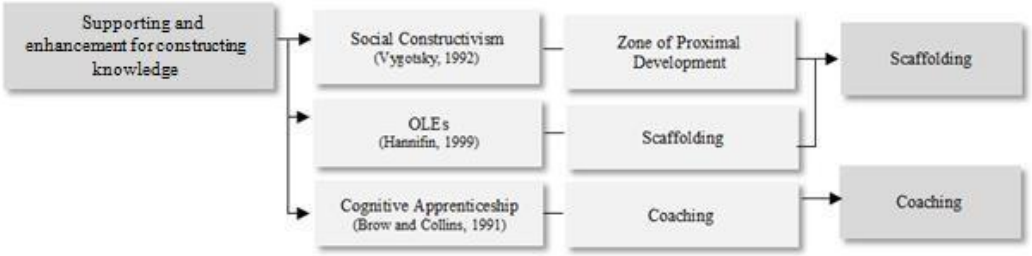


**Figure 4.** Theoretical Framework Designing Scaffolding and Coaching

## 4. Conclusions and Future Work

Designing framework of Augmented Reality Learning Environment to Promote Creative Thinking on Topic Implementation of Graphic Design for Grade 9 Students for higher education students should take into account the context of the study subjects and media features. To conform to actual conditions in the present and can be developed in the future.

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