

Designing Framework of Constructivist Augmented Reality Web-based Learning Environments to Enhance Creative Thinking for Design and Create Three-Dimensional for Secondary School

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Abstract: This research study aimed to synthesize theoretical framework and designing of constructivist augmented reality web-based learning environments to enhance creative thinking on topic design and create three-dimensional for secondary school. The target group consisted of 3 expert reviewers for content, web-based learning and learning environment designing. Research methodology is developmental research; developmental research consisted of 3 processes: (1) designing process, (2) developing process research methods are document analysis, (3) Evaluate the efficiency of the design framework. And survey. The procedures were as following: (1) to examine and analyze the principles and theories, (2) to synthesize theoretical framework, (3) to synthesize designing framework. The result revealed that: 1) to synthesize theoretical framework comprise of 6 components as following that. Contextual base, Psychological base, Technologies base, Creative Thinking base and Pedagogies base Model learning environments. 2) To synthesize theoretical design framework of constructivist augmented reality web-based learning environments to enhance creative of 6 components i.e., (1) Problem base, (2) Resource, (3) Creative Thinking Center, (4) Collaboration, (5) Coaching, (6) Scaffolding. The efficiency of this learning environment was evaluated by expert review. It was found that the learning environment is appropriate on 3 aspects: content, web-based learning design and learning environment design.

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

1. Introduction

Thailand society stepped into the digital world. Economic social activities are carried out quickly, Competition was increasing. Data access of information through the online world more. Human Development to prepare to face the change is important. Education is an important tool in improving the quality of human resources in the country. The important mechanism for economic development, in the economic arena national and international through education. Creativity is a required skill in the global society in 2020. Enhancement of creative thinking on learner based on the web-based learning environment was achieved using the principles and theories for synthesizing the theoretical framework and the environmental design which promote creative thinking (Samat Charuni and Chaijaroen Sumalee, 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. Augmented reality technology can be used for promoting learner's creative thinking in order to have meaning verbal learning. This accordingly happen from interaction with learning environment. That can create virtual images that appear in a 3D animation, sound, and

hypertext hypermedia. In this paper, are presenting the principles related to the basis of creative thinking and innovation skills for producing students in Thailand 4.0 and the basic context of students training in Thailand that would lead to development of innovation the enhance creative thinking for students in the world economic 2020.

Thus, this research was aimed at designing framework of constructivist augment reality web-based learning environment to enhance creative thinking, from synthesize of theoretical framework and learning environment. In order to obtain the basis for constructing the appropriate and efficient learning environment models for the learners.

2. Methodology

This study was aimed to synthesize theoretical framework and design of Constructivist augment reality web-based learning environment to enhance creative thinking. Research methodology is developmental research consisted of 2 process; (1) Designing process and (2) Developing process research methods are document analysis, (3) Evaluate the efficiency of the design framework The procedures were as following: (1) To examine and analyze the principles and theories. (2) To synthesize theoretical framework. (3) To synthesize designing framework. (4) To evaluate the efficiency of the learning environments.

2.1. Target Groups

Target Group in the design and development process consisted of 3 expert reviewers. (1) Experts in content validity. (2) Experts in web-based learning design. (3) Experts in learning environment design.

2.2. Research Instruments

The instruments in this study as following details: (1) The document examination and analysis recoding form to synthesize a theoretical framework, (2) The recoding form for synthesis of the design framework to learning environment to enhance creative thinking, and (3) The evaluation form for synthesize theoretical framework and designing of constructivist augmented reality web-based learning environments to enhance creative thinking.

2.3. Data collecting and analysis

The researchers collected the data as follows: (1) Synthesis of theoretical framework and Components of the learning environment. The data were collected by analyzing principles, theories, related research of the constructivism theory, cognitive theory, media and technology theory, pedagogy and contextual study, (2) Synthesis of Designing framework of the learning environment: The above synthesized theoretical framework was taken into this process. The underlined theories base such, Contextual base, Psychological base, Technologies and media base (AR: technology and media symbol system), Creative thinking base, and Pedagogies base. (3) Designing and develop of the learning environment based on foundation of creating designing framework was adopted. (4) Evaluate of the learning environment by experts. The analytical description, summarization and interpretation were used to analyze data.

3. Research results

The designing and development of the learning environment that promote student's creative thinking are follows:

3.1. Synthesis of theoretical framework

The results show that the theoretical framework of constructivist augmented reality web-based learning environments comprised of 5 theoretical base. (1) Contextual base are follows: basic education curriculum in Thailand, Course content. (2) Psychological base are follows: Constructivist theory; cognitive constructivist (Samat Charuni and Chaijaroen Sumalee, 2009). and social constructivist (Piaget, J, 1992). and Cognitive Theory; information processing theory. (3) Technologies and media base are follows: Web-based learning (Vygotsky, L, 1962), Augmented Reality (Khan. B.H, 1998), the system of media (Donald, D.M., 2014), (4) Creative Thinking base are follows: creative thinking theory [6] consisted of 4 abilities of thinking as follows; Fluency, Flexibility, Originality and Elaboration. (5) Pedagogies base Model learning environments are follows: OLEs Model (Guilford, 1967), SOI Model (Hannafin M., 1999), Situated learning (Mayer, R.E., 1996), Cognitive apprenticeship (Mayer, R.E., 1996) Fig.1. Showed theoretical framework of constructivist augmented reality web-based learning environments to enhance creative thinking on topic design and create three dimensional grade 9 students.

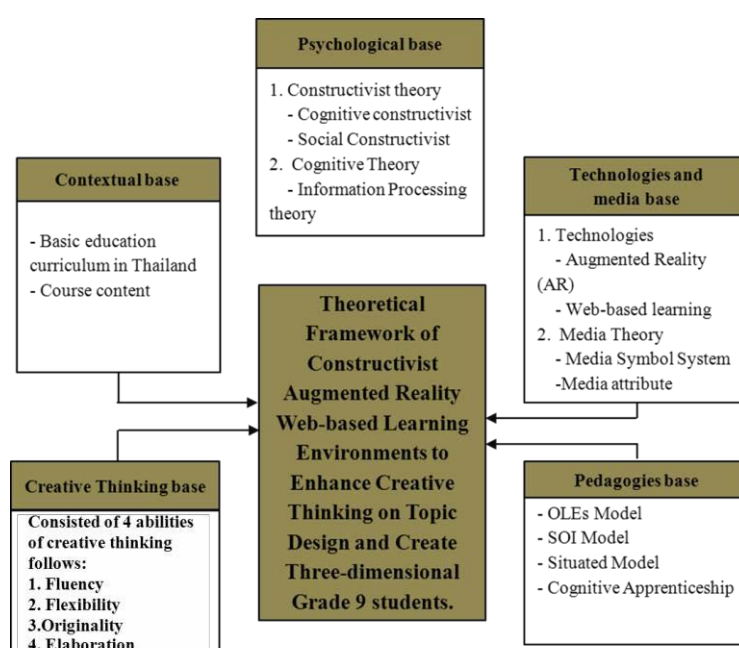


Figure.1 Theoretical framework of the learning environment for enhance creative thinking.

3.2. Synthesis of Design framework

- 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.2.
- Supporting cognitive equilibrium. It was illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure.3.
- Enhancing knowledge construction and creative thinking. It was illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure.4.
- Supporting enhancement for construction knowledge. It was illustrated the relationship between the underlined theories. The underlined theories and components of the model were shown in Figure.5.

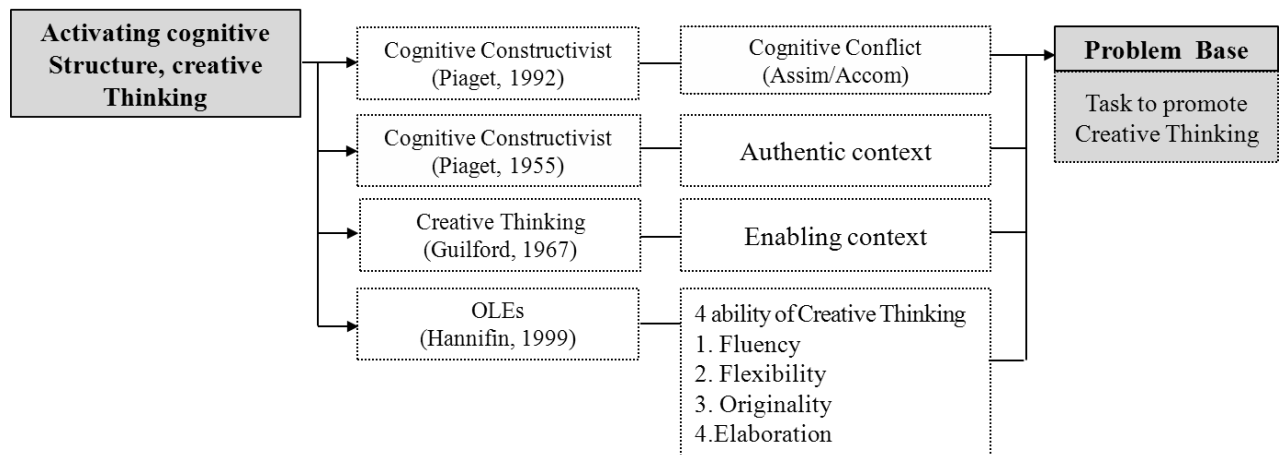


Figure. 2 Theoretical framework designing problem base

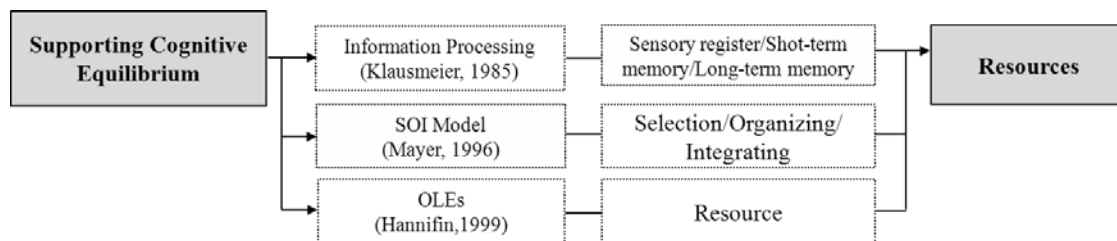


Figure. 3 Theoretical framework designing resources

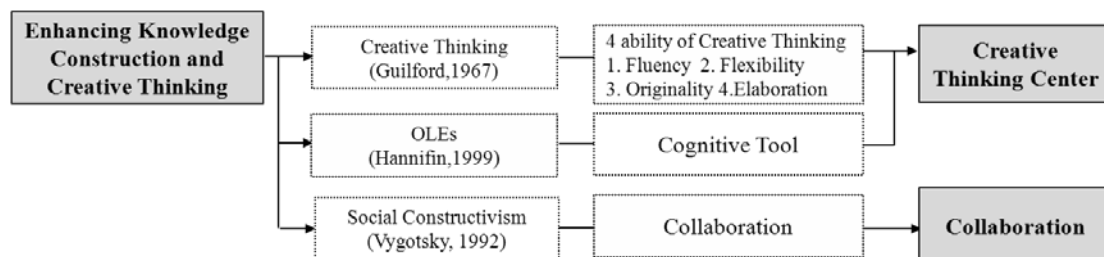


Figure. 4 Theoretical framework designing creative thinking center and collaboration

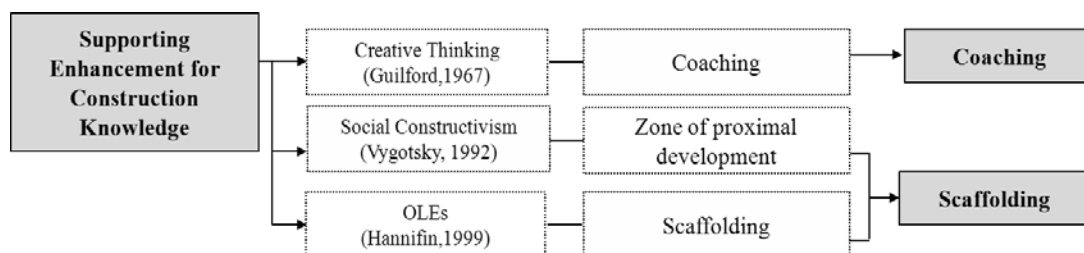


Figure.5 Theoretical framework designing coaching and scaffolding

4. Evaluate the efficiency of the design framework.

The results of an expert on learning content, the expert assessment. Theoretical framework synthesis and designing framework, it is a method of verification by an expert reviewer, the design of the learning environment, the organizing discussion groups, the design of learning is based on theoretical

principles as the basis for design. This is appropriate and can to promote knowledge based on constructivist, creative thinking. The results of the expert synthesis design were show in table 1.

Table 1. The results of an expert on learning content, the expert assessment, theoretical framework synthesis and design framework.

No.	Lists of preconception towards the Constructivist web-based learning environments	Results of the expert (Percentage)
Learning Content		
1	Appropriate learning content	80
Synthesis of theoretical framework		
2	Theoretical framework	80
Web-based learning environments components		
3	Problem base	72
4	Resource	75
5	Creative Thinking Center,	80
6	Collaboration	74
7	Coaching	82
8	Scaffolding	80
Total		77.87

According to Table 1, the results of the assessment of experts on the learning content, Synthesis of theoretical framework, and designing framework of the learning environment. Learning environment found that the learning content, Synthesis of theoretical framework, and designing framework of the learning environment. To evaluate from experts side learning content was 80 percent, Synthesis of theoretical framework was 80 percent, and web-based learning environments was 77.16 percent. The synthesis consistent design principles along constructivist. Which augment reality to promote creative thinking was 77.87 percent.

5. Discussion and Conclusion

The study of the design framework of constructivist augmented reality Web-based learning environment to enhance creative thinking on topic design and crate three dimensional grade 9 students. The 6 important components i.e., (1) Problem Base, (2) Resource, (3) Creative Thinking center, (4) Collaboration, (5) Coach, (6) Scaffolding. Which is consistent with the research of (Samat Charuni and Chaijaroen Sumalee, 2009). The conceptual framework for designing and developing a learning environment on theoretical, constructivist, and web-based learning.

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