

Designing Framework of Constructivist Web-Based Learning Environment to Enhance Problem Solving

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ABSTRACT

The purpose of this research was to synthesize theoretical framework and designing framework of constructivist web-based learning environment to enhance Problem Solving. The procedures were as follow: 1.) To study and analyze principles, theories and related researches. 2.) To synthesize the theoretical framework 3.) To survey instructional context 3) To synthesize the designing framework. The results revealed that 1) The theoretical framework consisted of 6 bases as following: (1) Psychological base (2) Pedagogical base (3) Technological base (4) Media theory base (5) Problem Solving base and (6) Learning and Teaching Contextual base. 2) The designing framework consisted of 4 steps and 7 elements included: 1) To activate Cognitive structure and promotes problem solving. 2) To support for adjusting cognitive equilibrium 3) To support for enlarging cognitive structure 4) To promote the knowledge construction and problem solving. 5) To support and enhance knowledge construction and Problem Solving. And 7 elements of the constructivist web-based learning environment as following: 1) Problem base 2) Resource 3) Collaboration 4) Cognitive tools 5) Problem Solving Center 6) Scaffolding and 7) Coaching.

Key words: Learning environment, Problem Solving

INTRODUCTION

The important and the need of the recent Education. The learners should be given a high- Higher-Order Thinking Skills such: Critical thinking, Analysis thinking, problem solving, and information transfer which focus on the use of methods. Simulation, discovery, problem solving and collaboration. Learners were receive the authentic experience, it can be congruent with the real life. Therefore, the instruction design must be changed in order to foster Problem Solving and information seeking skills and knowledge construction rather than passively receive the knowledge.

Instructional Design Theory (ID Theory) was used in this design. Essential theories used as foundation were as follows: Constructivist Theories, problem solving, transfer knowledge theories and media attribute, symbol system of web-base comprises of hyperlink hypertext , and hyperlink media my support the knowledge construction and problem solving.

THE PURPOSE OF THIS STUDY

To synthesize the designing framework of constructivist web-based learning environment model to enhance Problem Solving.

Research design

Document analysis and survey research were employed in this study

Target Group

The target groups of this study consisted of 3 experts to assess the designing framework of the Constructivist web-based learning environment model to enhance Problem Solving.

Research instruments

The instruments in this study consisted of 2 instruments as following:

- 1) The expert review record form for checking the quality of the designing framework.
- 2) The synthesis of the designing framework record form for record the data for synthesis of the designing framework of the web-based learning environments model to enhance the learner's Problem Solving.

Data collecting and analysis

The procedure of gathering and analysis data were as follows: 1) Synthesis of theoretical framework of the constructivist web-based learning environment model to enhance Problem Solving. The data were collected by using the recording from for synthesis of the theoretical framework. Summarization, interpretation and analytical description were used to analyze the data. 2) Synthesis of designing framework of cognitive web-based learning environment model to enhance Problem Solving. The data were collected by using the recording

from for synthesis of the designing framework. Summarization, interpretation and analytical description were used to analyze the data.

Research Results

1. The stage of the designing framework According to this study, the findings of synthesis of the designing framework of the constructivist learning environments model to promote problem solving. showed 5 stages were as follows: (1) Activating cognitive structure and promoting problem solving (2) Supporting for adjusting of cognitive equilibrium (3) Supporting for enlarging cognitive structure (4) Promoting the knowledge construction and problem solving (5) Supporting and enhance knowledge construction and problem solving. The details of these 5 stages as the following:

Activating cognitive structure and promoting Problem Solving

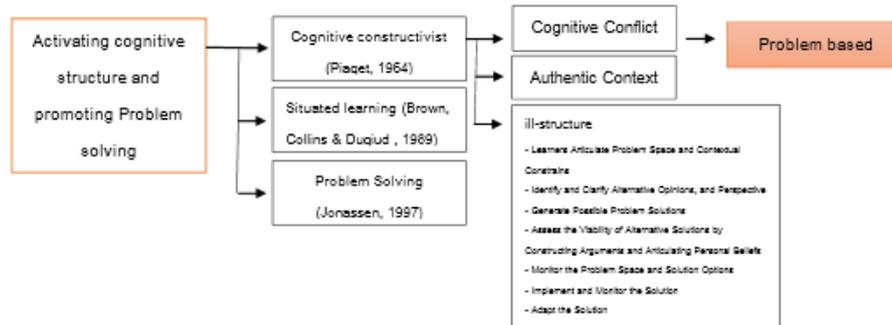


Figure 1. The designing framework: Activating cognitive structure and promoting Problem Solving

2. Supporting for adjusting of cognitive equilibrium

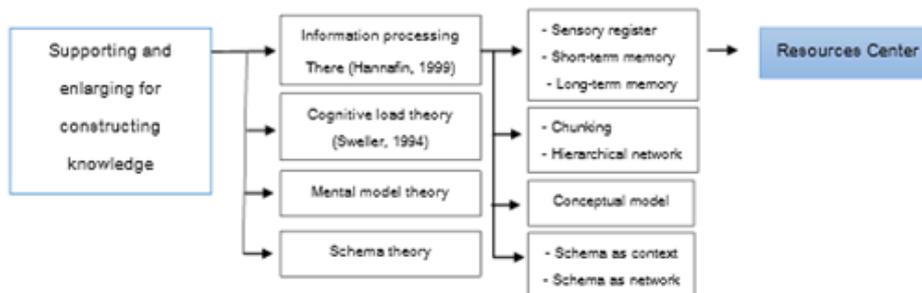


Figure 2. The designing framework supporting for adjusting of cognitive equilibrium

3. Supporting for enlarging cognitive structure

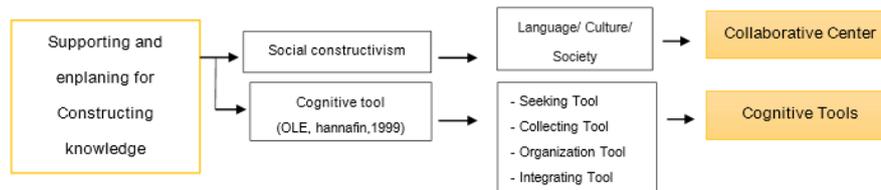


Figure 3. The designing framework supporting for enlarging cognitive structure

4. Promoting the knowledge construction and problem solving

Element elements	Describe the	Describe the designing elements of the Constructivist Learning Environment model
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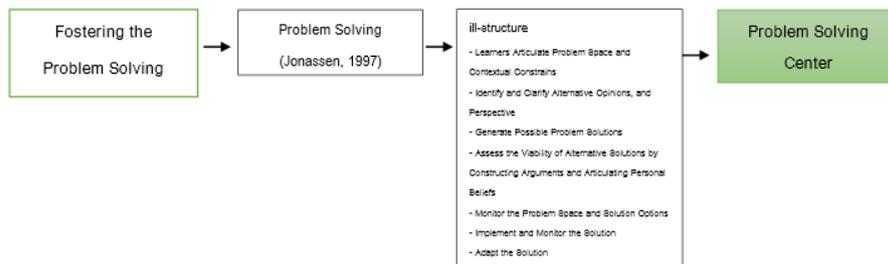


Figure 4. The designing framework Promoting the knowledge construction and problem solving

5. Supporting and enhance knowledge construction and problem solving

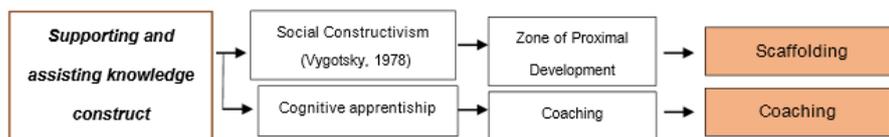


Figure 5. The designing framework supporting and enhance knowledge construction and problem solving

2. The elements of the designing framework

The designing framework of the constructivist learning environments models to promote problem solving showed 7 elements as following details:

Problem Base	Problem base was designed frame work to activate cognitive structure into disequilibrium by using enabling contexts: Externally Induced and Individually Induced (Hannafin, 1999) as open problem situation in order to induce the learners into discovery learning process and 4 abilities of Creative Thinking (Guilford,1967): Fluency, Flexibility Originality, Elaboration were used to design learning task for promoting Problem Base.
Resources	Resources was designed to support for adjusting cognitive disequilibrium by using essential principles and theories as following: information processing theory (Klausmeier, 1985), SOI model (Mayer, 1996), Mental model theory (Johnsonlaird, 1983), Schema theory (Anderson, 1990; Smith, 1989), and Cognitive load theory. (sweller, 1994), media attribution, symbol system of multimedia, These theories were applied to design the learning resources for providing information for the learners to construct the knowledge. This may help the learners processing information effectively and understand easily.
Collaboration	Social Collaboration base was designed to support for enlarging cognitive structure and promoting Problem Solving . Social constructivism(Vygotsky, 1962) was used to design the Social Collaboration base. It may help support the learners for sharing experiences, multiple perspectives, adjust misconception, and collaboration problem solving.
Cognitive Tool	Cognitive Tool base was designed to support the learners to enable and facilitate the cognitive processing tasks associated with open-ended learning. Cognitive Tool (OLE, hannafin, 1999) was used to design the Cognitive Tool base. This may help the learners to enlarge their cognitive structure (Hannafin,1999)
Problem Solving Center	Problem situation in order to induce the learners into discovery learning process. And 7 abilities of Problem Solving (Jonassen, 1997) as following: ill-structure 1) Learners Articulate Problem Space and Contextual Constrains 2) Identify and Clarify Alternative Opinions, and Perspective 3) Generate Possible Problem Solutions 4) Assess the Viability of Alternative Solutions by Constructing Arguments and Articulating Personal Beliefs 5) Monitor the Problem Space and Solution Options 6) Implement and Monitor the Solution 7) Adapt the Solution were used to design learning task for promoting Problem Solving.
Scaffolding	Scaffolding was designed to support and encourage knowledge construction of the learners. 4 scaffolding (Hannafin, 1999): Conceptual Scaffolding, Metacognitive Scaffolding, Procedural Scaffolding, Strategic Scaffolding were used to design Scaffolding. It may help the learners to guide and support learning efforts in their knowledge construction process.
Coaching	Coaching base was designed to support for providing hints and helps when needed, monitor learners, performance and help learners reflect on their performance. Cognitive apprentice (Collins, Brown and Newman, 1989) used to design Coaching Center. It may help the learners to conduct their performance effectively and prevent misconception of the learners.

3. Assessment of the designing framework of the Constructivist web-based learning environment model to enhance Problem Solving by experts. It showed the congruence between the underlined theories and the design of all 7 elements.

CONCLUSION

The designing framework of the constructivist web-based learning environment to enhance Problem Solving. The procedures were as follow: 1.) To study and analyze principles, theories and related researches. 2.) To synthesize the theoretical framework 3.) To survey instructional context 3) To synthesize the designing framework. The results revealed that 1) The theoretical framework consisted of 6 bases as following: (1) Psychological base (2) Pedagogical base (3) Technological base (4) Media theory base (5) Problem Solving base and (6) Learning and Teaching Contextual base. 2) The designing framework consisted of 4 steps and 7 elements included: 1) To activate Cognitive structure and promotes problem solving. 2) To support for adjusting cognitive equilibrium 3) To support for enlarging cognitive structure 4) To promote the knowledge construction and problem solving. 5) To support and enhance knowledge construction and Problem Solving. And 7 elements of the constructivist web-based learning environment as following: 1) Problem base 2) Resource 3) Collaboration 4) Cognitive tools 5) Problem Solving Center 6) Scaffolding and 7) Coaching This finding was consistent with Chaijareon, S., Samat, C., Kanjug, I., (2012); Techapornpong, O., Chaijaroen,S., (2017) These previous research found that the students showed their Problem Solving and the framework of constructivist web-based learning environment models. As for this research finding may be the result of Instructional design Theory (ID Theory) . This was shown in the designing framework of the Constructivist web-based learning environments model to enhance Problem Solving. The designing framework of the Constructivist web-based learning environments model was recognized as the important one. Since it can support and help the designers to design effectively and clearly. If lacking of this framework how can the designer perform it effectively. This study focuses on theoretical synthesis of theoretical framework. It is the first factor that is critical to the design and development of a learning environment based on a Constructivist learning environment. To Enhance the Problem Solving. The next effective, It also allows designers to perform clearly based on theoretical frameworks. As well as the use of research processes as a basis for design and development.

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