Effect of Social Media Learning Environments (SLME) on Learners' Expertise Mental Model in Computer Programming Subject for High School Students

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Abstract: With the ease of use and linking various knowledge resources, social media technologies have been widely used for educational area and societies to promote lifelong learning. Consequently, this paper presents the design social media learning environments for enhancing mental model in computer programming course. The target group consisted of 40 high school students. The research design was Pre-experimental with One Shot Case Study. For qualitative data, they were analyzed by using an in-depth interview and students' answering responsibility while they were studying by protocol analysis. The research findings showed that the students were able to construct expert mental model representing understanding as: (1) ability to explain various stories or incidents, (2) ability to change the rules and processes into problem solving, and (3) ability to express the association of fact and studied rules with different situations. Besides, it was found that the students could be able to organize the categories of constructed mental model as well.

Keywords: cognitive process, learning technology, social media, mental model

1. Introduction

In recent years, computers and communication technologies have been playing a crucial role in human daily lives. Because human need information to make decision. Communication with convenience and speed are more effectively in human lifestyle. In the UK, studies from Internet Information Research (IIR), Social Science Research Network, Center for Genetic Engineering and Biotechnology, and National Electronics and Computer Technology showed that there were 23,846,315 Internet users. In 2013, the Office of electronic transactions reported the behavior of Internet users such as student interacting with e-mail and officer interacting with electronic transactions. In Thailand, there is likely increasing in using Internet. Obviously, the computers and communication technologies are more vital to human life. With the rapid development of communicative technology and information in making the transition into the era of globalization and the impact of changes in the country, as well as other countries around the world in the 21st century, the world economy towards the economy, knowledge based economy, the use of knowledge and innovation is a major factor in the development and production of more capital and labor. Such that gaining knowledge may be influenced by Social Media. In particular, a popular medium for marketing communication has been promoted. And online marketing activities in many forms such as Facebook, You tube, and twitter. In this paper, "Media" refers to materials or tools used for communication, "Social" refers to a society in the context of social media. Social sharing means in society in which it may or share content on social interaction

In other hands, the findings of instructional design model enhancing knowledge construction as mental model which was the students' mental representation would be changed and constructed throughout the time. Specifically, if the students' mental representation was the mental model using for explaining the stories or real world sensed by them. This model also be able to explain the changing between an object or incident affecting the changes of other objects or incidents. The students' characteristics and specific domain of knowledge would affect the construction of mental model (Mayer, 1996). The researchers suggested that when the mental model was stimulated while

knowledge was constructing, the students would be able to associate the relationship between knowledge units of different topics in the brain as called complex schema (Dreyfus and Dreyfus, 1986). As a result, the students were able to solve complex problems efficiently. According to Mayer's (1996) study, it was suggested that the mental model is constructed by students. It means that the students understand and learn in the things by themselves. In summary, if the students were able to construct mental model, it would show complete understanding which is major outcome of knowledge management. However, the students' mental model development sometimes would not be able to occur immediately, especially, in the content need complex skills or phenomena to solve. Such that it is difficult to occur or adjust mental model. In this vein, teachers may provide learning environment by stimulating the construction and improvement of mental model as well as support the students in developing good mental model.

Based on above concerns, the social media environment was special designed for enhancing expertise mental model. That is the integration of social network and learning method was proposed by extending previous study (Kanjug, 2008) and focusing on developing mental model with following conceptual idea: (1) stimulating the mental model; (2) supporting the creation of mental models; (3) promoting division of expertise mental model; (4) promoting and supporting the creation of mental model. Because the learning and teaching programming focusing on remembering algorithm code was caused students with menthol model. Such that the students might not be expertise in applying the knowledge to design and develop programs. It would be better if the students are encouraged the mental model by using the social media in the topic.

2. Methods

2.1 Research design

To examine the leaner's mental model leaning with social media learning environments enhancing mental model (SLME), there were 40 high school students participating in this study. This study was pre-experimental design as one shot case study. Therefore, after experiencing in the SLME, the students were interviewed to respond their mental model.

2.2 The Construction and Development of Social Media Learning Environments (SLME) Enhancing Mental Model

The SMLE was designed and developed as following details (Figure 1): (1) examine and analyzed principles, theories and research related to social media and mental model of computer programming topic; (2) synthesize theoretical framework of learning environments enhancing expert mental model consisting of 5 foundations such as psychological base, pedagogies base, technologies base, and contextual base; and (3) create designing framework of learning environments enhancing expert mental model.

Figure 1. The designing of social media learning environments to enhance learners' expertise mental model in computer programming subject for high school students

3. Research results

According to the interview questions, we found that the students were able to construct expert mental model by understanding the computer programming topic as follows:

- It was representative of understanding different topics or incidents explaining as model which could be seen from the statement of interview as *"because when we try to understand, we construct the map and hide it such as C language structure and condition"*
- For understanding, there were explanation of changes from the things one understood to other things by being able to change rules and processes to problem solving one facing immediately such as that *"it was not a long time, after reading a little bit, it was known that what kind of knowledge would be used such as the situation in the analyzed condition that the specified algorithm, which algorithm would be applied for write program."*
- The ability to explain with reasons showing expression which was not only rationale and theories. But, there was an association between facts and studied rules with different facing situations.

According to the findings, we found that the students constructed expert mental model. It might be due to the design of learning environments with having factors for enhancing the development of expert mental model. Specifically, the problem situations with multi task levels enhancing development of expert mental model and the scenario model from real incidents were provided. The students had to make their decision and manage with specified situations and contexts. For that situation, the related information technology had to be presented as well as considered together with the context so that it could be basic information for making decision by students. Moreover, the conditions of techniques or strategies under limited time to be chosen by the students had to be specified as expert type based on Dreyfus and Dreyfus's (1986) expert development approach as well as Resources of designed knowledge by transforming the knowledge content into conceptual models explaining those contents as the cause-effect model by the Figure or graphic. As a result, the students could be able to more easily and efficiently construct their mental model (Mayer, 2003). In addition, it was a decrease of cognitive load in integrating the students' information technology of working memory while they were working. In this situation, the expert type would be developed. Consequently, cognitive resource could be quickly retrieved as an automatic. It could be seen from interviewing information that *"The resources constructed as concept map would develop easy understanding and retrieving that model immediately."* Moreover, the similar case which was the presentation of experience in daily life which could be suddenly associated by the students in their daily life. Therefore, expert mental model was supported because the proposed environment constructed the students' understanding as meaningful structure for themselves in pattern of facing situations. When the students were faced with problems, the incidents immediately retrieved or adjusted for use. It was supported by Jonassen's (2000) who suggested that the understanding of each problem was like a stimulation of experience relating that problem and constructing mental model of problem. In case of the students had a little experience, the expert would not have characteristics as Cho, Lee and Jonassen's (2011) statement. If there was a design allowing students in constructing various kinds of experience. The similar case would be important tool as the interviewing statement that: *In case of similar case, it would help to think for solving problems quickly because when we entered it, we could adjust to apply with the problem situation immediately since there was a guideline we could apply it suddenly."* There was a Center of expert development with cognitive training with experts or Apprenticeship. In case of the students training to be as expert based on Dreyfus and Dreyfus's (1986) approach, learning and perception were quickly developed. When facing situations, one could be able to make decision and express very efficiently and automatically (occurring by nature). The center would present the problem solving model, decision making model, and strategies used by the experts in designing instructional design. The researcher transcribed the mental model of designing through the performance of experts as national instructors in various learning substance groups which the students understood and could retrieve immediately while they were facing different incidents. For the proposed environmental design, it would be different from general teaching which focused on transferring the content. Thus, the students would memorize only the presented information technology which was not their understanding constructed by themselves. As a result, they could not be able to apply in their daily life. Besides, the above research studies, it was found, in this study, that the students could be able to organize the

constructed mental model group as well as the statement that *"Yes, it was like channel dividing each topic and there was map in it."* According to all of above findings, the efficiency of learning environments enhancing expert mental model could be confirmed that it could very well improve mental model development.

4. Conclusions

The results revealed that the learner can construct expert mental model. It is mental representation of knowledge which the learner constructed. Three aspects of expert mental model were found as following aspects: (1) the mental model which the learner constructed was representation of objects, situation or even in whatever the model describes; (2) the mental model illustrated how changes in one object effect changes in another that is the learner can transform from rules and procedure into problem solving action immediately; and (3) the learner can explain the casual relation of the situation not only exploitation of theory and principle but also connecting between fact and rule with encountering situations. In summary, the proposed learning environment could promote mental model experts. There are elements that help promote mental model experts. Since the design of the problems with many of the characteristics of experts to learn the 5 levels novice, advanced beginner, competence, proficiency, and expert and a training center for professional help develop the intellectual and professional. Suggested strategies could use to make decisions. Mental models proposed in the design of teaching professionals. Such that the students could learn how to think about the design and function that occur while instructional design experts. Moreover, training to increase the level of experts from Novice to expertise allowed the students to experience access problems. That can be taken as a reference. The experiences related to them. And design information in Knowledge Bank are extremely effective in helping learners build mental models easily. However, the study is only preliminary findings, which will be used to build and develop the learners to complete and bring to trial the students in the real world.

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