The Digital learning environments to promote information literacy in higher education: Designing and Instruction framework

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Abstract: People in the 21st century live in a technology and media-suffused environment, media and information literacy is an important prerequisite for fostering equitable access to information and knowledge and promoting free, independent and pluralistic media and information systems. The purpose of this research is to synthesize theoretical framework and designing framework of the digital learning environments that promote information literacy in primary school. The developmental research: Phase I: Product and tools research (Richey and Klein, 2007) was employed in this study. Several methods used were document analysis and survey. The procedures are as follows: (1) Examining and analyzing principles and theories, (2) Synthesizing the theoretical framework of the digital learning environments which promote information literacy in primary school, and (3) Synthesizing the designing framework of the digital learning environments which promote information literacy in primary school. The results revealed that this model consisted of nine elements as follows: (1) Problem base and learning task, (2) Learning resource, (3) Information Operations Centre, (4) Coaching, (5) Scaffolding, (6) Collaboration.

Keywords: Learning environments, information literacy, 21st Century skill, higher education

1. Introduction

Information literacy is important owing to the amount of information that is available in contemporary society. Simply being exposed to a great deal of information will not make people informed citizens; they need to learn how to use this information effectively, ACRL (2000). Data Smog refers to the idea that too much information can create a barrier in our lives. Especially students and the society require a special skill to handle this fast increasing information, in order to use their educational and economical purposes more effectively. Information literacy is considered as the solution for the data smog (ACRL, 2006). Information literacy allows us to cope with the data smog, by equipping us with the necessary skills to recognize when we need information, where to locate it, and how to use it effectively and efficiently. Consequently it will help decision-making and productivity that is beneficial to the society.

Due to the information explosion and data smog all students and the society face many difficulties to locate, evaluate, use, and communicate information. Due to the expansion of Internet services we receive a lot of information that is not evaluated, unlike the printed sources. Hence the authenticity, validity, and reliability of this information is in doubt. Student centered, inquiry based, problem solving, and critical thinking proactive learning environment with the help of information literacy skills, will develop deep learners in the society. Furthermore, information skills are vital to the success in education, occupation, and day-to-day communication of all citizens. In the twenty- first century, lifelong learning has become one of the main themes in the higher education sector. Therefore the students need to be educated with regard to the abilities and skills of how to learn, or learning to learn, by developing the aspects of reasoning and critical thinking. Information literacy skills will help students to achieve this target in a broader sense, in student centered learning. Traditionally, we assume

that the students will gain information literacy skills automatically by themselves. But it is not. In fact, information literacy skills need to be inculcated among the students, by the teachers and librarians.

Learning mainly focuses on achieving knowledge, skills and attitudes, associated with particular subject areas. Irrespective of the disciplinary stream, each and every student should be able to access, use and communicate information in an innovative manner. The Information literacy curriculum plays a major role in order to cultivate these skills among the university and school students. The library professionals with the help of academic and administrative staff can implement the curriculum.

2. The Purpose of This Research

To synthesize the theoretical and designing framework of the digital learning environments enhancing the information literacy in higher education.

3. Methodology

3.1 Research Design

The developmental research Type I: Product and tools research (Richey and Klein, 2007) was employed in this study. Several methods were used such as document analysis, survey, and case study.

3.2 Research Instruments

The instruments used of in this study were 2 kinds as following details:

1) The document examination and analysis recording form. The scope of document analysis regarding with Constructivist theories, information literacy framework, and web based learning theory.

2) The expert review for evaluation of the designing framework. The framework of this instrument consists of 3 major issues which are: Learning content, Instructional design, and Web-Based learning environments.

3.3 Data Collection and Analysis

1) Synthesis of theoretical framework of the digital learning environments learning environment to enhance information literacy. The data were collected by analyzing principle, theories related research of the Constructivist theories, Cognitive constructivist theory, Information literacy framework, Web-Based learning environment theory and Technological theory.

2) Synthesis of designing framework: The above theoretical framework was taken into this process. The underlined theories such as, Cognitive theories, Problem solving transfer, Cognitive constructivist, Social constructivist, and the Constructivist learning

4. Information Literacy in Higher Education: Definitional Issue

Information literate in higher education researchers will demonstrate an awareness of how they gather, use, manage, synthesize and create information and data in an ethical manner and will have the information skills to do so effectively.

CILIP have defined information literacy in higher education as “Information literacy knows when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner.” They have also created more in depth guidance on the skills required to be information literate. The Society of College, National and University Libraries (SCONUL) developed the Seven Pillars of Information Literacy model in 1999. It was designed to be a practical working model that would help develop ideas amongst practitioners and generate discussion. It was updated in 2004 and again in 2012. SCONUL define Information Literacy as: “Information literate people will

demonstrate an awareness of how they gather, use, manage, synthesize and create information and data in an ethical manner and will have the information skills to do so effectively."

The Association of College & Research Libraries (ACRL) defines information literacy as: "the set of skills needed to find, retrieve, analyze, and use information." The ACRL has created a set of standards that outline in detail the skill set needed to be information literate. The website also provides guidance on collaboration, curriculum design and pedagogy. The Australian and New Zealand Institute for Information Literacy (ANZIIL) have developed an information literacy framework that outlines what makes information literate citizen. The Illinois Mathematics and Science Academy define "Digital Information Fluency (DIF) as the ability to find, evaluate and use digital information effectively, efficiently and ethically."

Conclusion of information literacy in higher education is can be used to examine critically knowledge and understandings. Through the research process, students can revise their understandings, perceive weaknesses in information, and make better sense of their world. People in the 21st century live in a technology and media-suffused environment, marked by various characteristics, including:

1) *Access and Evaluate Information:* (1) Access information efficiently (time) and effectively (sources); (2) Evaluate information critically and competently
2) *Use and Manage Information:* (1) Use information accurately and creatively for the issue or problem at hand; (2) Manage the flow of information from a wide variety of sources; and (3) Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information.

5. The digital learning environments

5.1 The digital learning environments base on constructivist theory

A framework provides a basis for designing instruction. Sometimes it is referred as philosophy or the theory behind a specific design. Three schools of thought have been widely used and explored to provide guidance for instructional practice: behaviorism, cognitive psychology and constructivism (Villalba and Romiszowski 2001). However of the three, constructivism has been identified as the most suitable one for online learning environments (Hung, 2001; Oliver, 1999; Hung and Nichani, 2001). Constructivist learning environments, Lebav (1993) suggests, should have the following minimum requirements:

- Provision of the experience of the knowledge construction process;
- Provision of experience in and appreciation of multiple perspectives;
- Creation of learning tasks which are relevant and authentic;
- Encouragement of ownership and voice in the learning process;
- Encouragement of the development of multiple modes of representation; and
- Encouragement of self-awareness of the knowledge construction process.

The constructivist-learning paradigm transforms the 'teacher-directed learning' to 'student-directed learning'. As such it holds the following premises (French et al, 1999):

- Objectives are written with student collaboration based on the learner's need;
- All the learners are unique and bring their own social understanding to learning context;
- Problems are solved when they have personal relevance to learning;
- Knowledge is individually and socially constructed; and
- Learning can only be measured through direct observation and dialogue.

While web enables to transform constructivist tasks to be used in online learning (Table 1), the design framework (Mishra, 2002) for the digital learning environments is an eclectic one where the three learning theories and their basic instructional approaches have been used. Figure 1 depicts the design framework used in the digital learning environments.

5.2 The Digital Open Learning Environments: Foundations, Methods, and Models

Salomon (1991) describes a learning environment (LE) as a system consisting of interrelated components that jointly affect learning in interaction with (but separate from) relevant individual and

cultural differences. He suggests that when technology is introduced to the LE, the changes in the individual will depend on the changes distributed over the whole learning environment.

Hannafin (1999) describes a theory for situations where divergent thinking and multiple perspectives are valued over a single "correct" perspective. It is appropriate for heuristics-based learning and for exploring fuzzy, ill-defined, and ill-structured problems.

Some of the values upon which this theory is based include: (1) Personal inquiry and divergent thinking and multiple perspectives, (2) Self-directed learning and learner autonomy with metacognitive support, (3) Mediating learning through individual experience and personal theories, (4) Hands-on, concrete experiences involving realistic, relevant problems, and (5) Providing tools and resources to aid the learner's efforts at learning.

These are the major methods this theory offers: (1) Enabling contexts (to establish the perspectives taken in the environment), (2) Resources (to provide the domain of available information sources), (3) Tools (to provide the basic means for manipulating information), and (4) Scaffolds (to guide and support learning efforts)

While this theory does offer some guidelines (conditions under which different methods should be used), much of it is presented here as a taxonomy of methods, where the practitioner needs to figure out when to use each.

6. Research results

The research found that the theoretical framework consisted of 4 crucial bases as follows:

6.1 The Theoretical Framework of the Digital Learning Environments to Information Literacy in Higher Education

The theoretical framework consist of 4 precious bases which compose of: (1) psychological learning base: constructivist theory and framework of information literacy in higher education, (2) pedagogical base: web based learning environment and constructivist learning model--OLEs model, CLEs model, and SOI model, (3) technological base: web based which helps to enhance information literacy, and (4) contextual instruction base: Thailand higher education. These all of 4 bases are analyzed, and synthesized the relationships between each of them show in Figure 1.

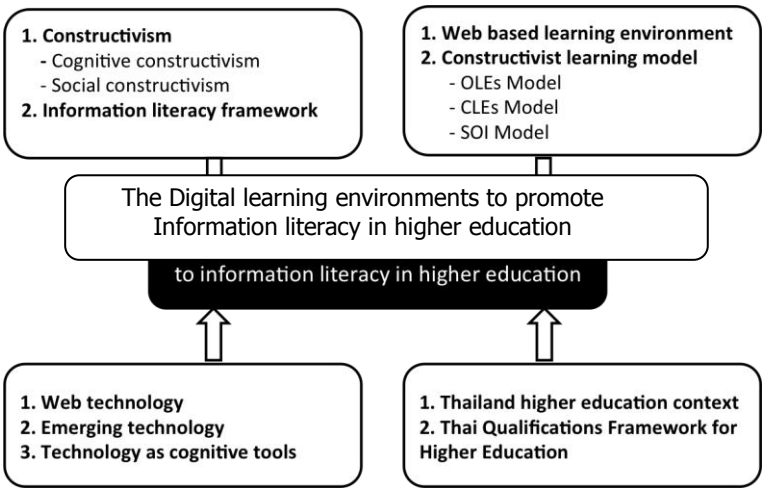

Figure 1. The theoretical framework of the digital learning environments to information literacy in higher education.

6.2 Designing Framework for the Digital Learning Environments to Promote Information Literacy in Higher Education

The theoretical framework that was used as foundation in synthesizing the designing framework of the digital learning environments to promote information literacy in higher education. It is found 5 crucial bases for enhance information literacy as follows:

1) Cognitive structure and information literacy activate: It is illustrated the relationship between the underlined theories as follows: cognitive constructivist, OLEs Model, information literacy and the components of innovation which used Problem base.

2) Support for equilibrium of cognitive structure and information literacy: It is illustrated the relationship between the underlined theories as follows: cognitive constructivism, SOI Model, and the components of the digital learning environments Learning Resource.

3) Enhance for information literacy: It is illustrated the relationship between the underlined theories as follows: cognitive constructivism, CLEs Model and the components of the digital learning environments which called Information Operations Centre.

4) Promote and support equilibrium: It is illustrated the relationship between the underlined theories as follows: cognitive constructivism, CLEs Model, OLEs Model and the components of the digital learning environments which Scaffolding, Collaboration, and Coaching.

7. Discussion and Conclusion

The frameworks of the digital learning environments to promote information literacy in higher education consist of 4 aspects: (1) psychological learning base, (2) pedagogical base, (3) technological base, and (4) contextual instruction base. As for this study the result illustrates the designing framework of the digital learning environments to promote information literacy in higher education consist of 4 process: (1) activate cognitive conflict and information literacy, (2) support for adjusting cognitive conflict and problem solving transfer, (3) support for problem solving transfer, and (4) promote and support equilibrium. According to the synthesis of the designing framework base on theoretical framework that is applying theories into practices. The five components in designing the digital learning environments to promote information literacy in higher education are as following details: (1) Problem base and learning task, (2) Learning resource, (3) Information Operations Centre, (4) Coaching, (5) Scaffolding, (6) Collaboration.

There consistent with Shaharuddin et al.(2012), Chaijaroen et al.(2008), Lesley-Jane et al.(2012), Kanjug (2012) and Samat (2012). The results of this study, design elements of the learning environment that promotes student cognitive skill. That there is a theoretical basis.(1) the basic psychology of learning, including constructivist theory ,cognitive theory (2) basic science instruction focusing on learning environment designed along constructivist and cognitive skills and information literacy theory (3) fundamental of media symbol systems (4) based technology such as learning with web-based learning environment and (5) based on this principle into context such as graduate desirable features, guidelines for teaching and the essence of the analysis and design courses.

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