Electronic Learning and Constructivism: A Model for Designing Effective Learning Experiences

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ABSTRACT

Educators are challenged to teach students to become competent professionals, who have both in-depth knowledge and decision-making skills. The use of electronic learning methods has been found to facilitate the teaching-learning process in education. Although learning theories are acknowledged as useful guides to design strategies and activities of learning, integration of these theories into technology-based courses appears limited. Constructivism is a theoretical paradigm that could prove to be effective in guiding the design of electronic learning experiences for the purpose of providing positive outcomes, such as the acquisition of knowledge and decision-making skills. Therefore, the purpose of this paper is to present a model of designing electronic learning using constructivism for effective learning outcomes. Further implementation of the proposed model, using the electronic technologies needs to be investigated based components of the model and its practical ability.

Keywords: e-learning; constructivism; education
INTRODUCTION

Focus of education nowadays has been shift from teaching to learning (Forman, Nyatanga, Rich, 2002). Throughout the evolution of educational approaches, educators play an important role in managing a program achievement. Since knowledge and decision-making skills are recognized as essential professional competencies for graduated students (Fullerton et al., 2005), it is imperative that educators design educational experiences that address these learning needs.

As information technology has developed and expanded, the benefits of electronic learning (e-learning) extensively have become recognized. These benefits include: providing consistency with the delivery of educational activities, reducing instruction time, enhancing cognitive recall and mastery of learning, and increasing students’ motivation and satisfaction (Herriot et al., 2003; Lewis et al., 2005). In addition, the use of information technology can provide convenient, economical and active teaching-learning methods (Huckstadt & Hayes, 2005) that are more learner-centered than some of the more traditional teaching methods, i.e. giving lectures (Al-Dujaily & Ryu, 2006). Although e-learning strategies have many advantages, integrating their use into education programs remains a challenge.

Technology alone will not promise effective teaching-learning outcomes. Both Thurmond (2002) and Oliver (2002) state that the use of learning theories can contribute to quality e-learning courses by providing a framework for the development and implementation of appropriate teaching-learning activities. While there are a number of teaching-learning theories, such as behaviorism, cognitivism, and constructivism (Woo & Reeves, 2007) this article only will address constructivism. Constructivism emphasizes the creation of new knowledge by the learner, as well as a focus on active learner-centered experiences (Young & Paterson, 2007). Understanding the contributions of constructivism can provide educators in preparing better teaching-learning activities within the e-learning environment. Therefore, the purpose of this article is to present a model of designing electronic learning using constructivism for effective learning outcomes.

Electronic learning

E-learning is a combination of content and instructional methods via computers to facilitate a building of knowledge and skills (Rovai, 2004). It assists acquisition and comprehension of knowledge by interactive technology, offline or online (Wilkinson et al.,
There are a variety of technologies utilized in e-learning, i.e., internet, intranets, videos, blogs, streaming video, CD-ROM and iPhones. In addition, there are several approaches to e-learning including: online learning or web-based instruction, computer-assisted instruction and virtual classrooms.

The use of online learning or web-based learning in education is increasing in many disciplines, due to its benefit of convenience. Online courses are always open and can be accessed anywhere and at anytime via an internet connection. Thus, this innovation is recognized as a useful tool for educators to provide and facilitate high quality and flexible teaching (Reilly & Spratt, 2007; Sargeant, et al., 2006; Woo & Reeves, 2007).

**Link between learning theories and learning outcomes**

Although a number of studies have been conducted on the outcomes of e-learning in education, few studies have been conducted on the relationship between outcomes and the use of theories (Reilly, & Spratt, 2007). Failure to use a learning theory when designing an e-learning experience could affect learning outcomes. According to Glen (2005), while technology has advanced, teaching-learning activities still tend to focus on presentation of content rather than ensuring students are fully engaged in learning. Therefore, technology alone will not promote effective teaching-learning outcomes.

Learning theories have been recognized as useful for guiding strategies within the teaching-learning process (Glen, 2005). Thus, educators need to design teaching-learning activities based on learning theories, so as to enhance positive learning outcomes. Constructivism is a learning theory that has been proved useful for designing and developing an e-learning program (McMahon, 2007).

**Introduction to constructivism theory**

Currently, the educational environment emphasizes the need for student-centered learning (Young & Paterson, 2007). Constructivism theory, influenced by the work of Piaget and Vygotsky (Woo & Reeves, 2007), encourages learners to build their own body of knowledge based on individual experience and to apply this knowledge directly to their environment. In constructivism, the individual is at the center of the social process, with the focus on learning rather than on teaching (Ali et al., 2004). The theory states that there are multiple ways of understanding knowledge; reality is created by an individual; and, knowledge comes from a personal interpretation of interactions with the world.
The structure of the learning environment based on constructivism is to promote opportunities that encourage and support the building of understanding. The constructivist’s perspective indicates the educator plays the role of facilitator, while the learner's role is that constructing reality through interactions with the environment (Hiemstra, 2007). Constructivism espouses students are to: be active in the learning environment; develop social and interpersonal skills; enjoy learning; have an understanding of the content being taught; and, learn to think in an efficient manner (Kelsey, 2007). Knowing how to think is enhance decision-making with real-world issues, and facilitates the development of social and interpersonal skills.

Since the educational environment is moving from teacher-centered to student-centered teaching-learning, the constructivist perspective increasingly is being used to design and develop e-learning experiences (Kelsey, 2007; McMahon, 2007). For example, Conceicao and Taylor (2007) utilized, in an online course for nursing students, constructivism with concept mapping and self-reflective journaling. They found these two activities provided learning experiences that allowed students to integrate content, make new knowledge connections, integrate prior knowledge and validate current knowledge. Reilly & Spratt (2007) utilized constructivism in the development of a simulation-based learning experience for the purpose of practicing professional skills in a safe environment, prior to clinical placement. The students indicated that simulation promoted their ability to learn actively and fostered their professional competence, prior to entering the real setting.

**Designing e-learning models based on constructivism in education**

E-learning, based on constructivism, forces learners to be actively involved in the educational process and to use creative thinking to build a knowledge base (Kelsey, 2007; Low, 2007). However, development of constructivism models, for the purpose of designing effective e-learning experiences, is lacking. Therefore, a model has been proposed (See Figure 1).
DESCRIPTION OF THE MODEL

Integration of electronic learning and constructivism

The model addresses the integration of constructivism learning theory and e-learning technologies for the purpose of guiding teaching-learning activities. In this model, e-learning technologies are used as cognitive tools for the purpose of assisting learners to engage in learning and to create their own knowledge base from their experiences. Constructivism...
learning theory is used to encourage learners to build a knowledge base within their learning environment.

**Educator’s roles**

According to constructivism theory, educators have an essential role in facilitating an environment suitable for problem-solving activities and the social process of learning. Three factors of importance for creating an effective teaching-learning environment are: 1) enhancing active learning; 2) facilitating social interaction; and, 3) creating quality learning materials.

1) Enhancing active learning involves facilitating learners’ involvement in the teaching-learning environment. Active involvement in the learning process is crucial in order for positive learning outcomes to occur. Thus, learners in a constructivist environment need to articulate what they know, reflect on what they have learned and construct personal representations of meaning. Problem-based learning, for example, is a teaching-learning strategy that has been shown to enhance active learning (Rogal & Snider, 2007). With problem-based learning, learners work and learn in groups in order to solve problems that address practical issues. This strategy helps create a synthesis of ideas that leads to practical solutions relevant to learners’ lives. Learners might be asked to express their ideas about how to solve a specific patient care problem. Through the use of interaction and responses to each others’ ideas and questions, learners are able to improve problem-solving skills and gain new knowledge from experiences within the learning environment.

Other activities that have been shown to facilitate active learning are: case studies (Pullen, 2006); gaming (Royse & Newton, 2007); concept-mapping (Conceicao & Taylor, 2007); and, simulated-based learning (Reilly & Spratt, 2007). All of these teaching-learning modalities require the learner to be actively engaged in the educational process. Case studies require intense examination, reflection and assessment of case content; while gaming requires physical and mental engagement in order to complete the process of the gaming experience. Concept-mapping involves visualizing relationships among concepts, which can develop the learners’ ability to synthesize information, generate new ideas and be creative. Simulated-based learning, often involving mannequins (computerized and non-computerized), allows learners to practice psychomotor skills, solve problems, plan and evaluate their learning outcomes.

Online tools, i.e. quizzes and discussion boards, allow learners to interact with content and each other, as well as test their knowledge. In addition, linking to appropriate
online resources allows learners to take a journey of discovery. These tools help educators to provide learners with activities that require active involvement.

2) Facilitating social interaction involves creating and supporting opportunities to learn from one another, as well as from the experiences within the environment. Constructivists believe social situations enhance effective learning. Meaningful social interactions can be created within an e-learning environment. There are several synchronous and asynchronous modes of facilitating meaningful social interactions within an e-learning environment which include: e-mail, online discussion boards, blogs, podcasting, online videos, MP3 players, iPhones, and virtual communities. E-mail, discussion boards and virtual communities enable learners to share ideas, pose questions to one another, collaborate on problem-solving, create new perspectives and gain new knowledge. Blogs (personal websites) provide the opportunity to create content and share it with others; while podcasting allows for downloading and sharing of media files related to a specific course. MP3 players and iPhones are electronic devices that allow learners to watch or listen to materials, i.e. videos or music, at anytime in any location. It is the educators’ decision regarding which technological innovations to use in e-learning. However, selection needs to be based on appropriateness for supporting interaction.

3) Creating quality learning materials involves designing content and multimedia components in regards to the learners’ perceptual knowledge. For example, the educator would not design content and multimedia components in the same manner for both a second year and fourth year learner. Learning materials need to be designed in such a manner that content and multimedia components increase in breadth and depth, as the learner progresses within the academic program.

In addition, designing learning materials should involve a thorough assessment of the actual content being presented, as well as the techniques to be used within the e-learning environment. For example, a formative evaluation should be carried out to assess content validity and the technical format of each e-learning activity. Then a summative evaluation of the course effectiveness and learning outcomes should take place.

Course effectiveness

Course effectiveness is an important indicator that used to evaluate the successfulness of e-learning courses based on constructivism. In educational environment, course effectiveness entails assessment of e-learning experiences and involves the use of two types of evaluation processes: 1) quality of the learning materials; and, 2) learning outcomes.
1) The quality of learning materials addresses the effectiveness and appropriateness of the e-learning technologies used. In other words, did the learners find the technologies used to be: accessible, easy to use, appropriate, informative and helpful? If the answer is “no” to any of these aspects of assessment, then revisions are in order.

2) Evaluation of learning outcomes addresses the educational goals and learners’ achievements related to the e-learning experiences. Outcome assessment needs to include, but not be limited to, competency in: problem-solving, decision-making, carrying out psychomotor skills and understanding professional knowledge.

**Application of the model in designing effective learning experiences**

In order to integrate the model to design the effective e-learning based on constructivism, educators need to choose e-learning technologies as cognitive tools (input). Nurse educators' roles in the model is used to guild the design of learning activities based on constructivism and also to assure the quality of learning material that created (process). Finally, the evaluation of course effectiveness is investigated.

Application of the model to create effective e-learning environment based on constructivism is presented in the context of health care education as an example:

a) A use of electronic technologies, such as a blog, e-mail, a discussion board and/or video streaming is presented as cognitive tools for a nursing course to enhance their professional competency. A blog is a personal website maintained on a regular basis, usually by an individual, in which regular entries are made involving comments, descriptions of events and other materials (videos or graphics). The entries are in reverse chronological order and typically combine text, images and links to other blogs or web sites. E-mail, or electronic mail, is a method of sending messages to others, by way of computers, that are connected to the internet. Discussion boards are specific websites, designed around a specific topic or for a specific group, for posting messages for others to read and respond. Video streaming is a sequence of moving images, with sound, that are sent in a compressed form over the internet and displayed by the viewer as they arrive.

b) The educators’ roles is revealed by consider the creation of constructivism learning environment that focused on enhancement of active learning, facilitating social interactions and creating quality learning materials as the following.

*To enhance the active learning,* educators assign the learning activities as follows:

- Learners are given four patient care scenarios (one per week).
- Learners create their own blogs to express their understanding of nursing knowledge. For example: nursing care related to a specific patient care problem.
- Learners search for and place in their blogs relevant references, images, texts, audios, and videos.
- Through the resources obtained, learners submit solutions for problem-solving for each scenario.
- Learners participate in a discussion board to express ideas about their peers’ respective blog entries.

To facilitate social interactions, educators need to provide interactions platform and encourage learners’ interaction as follows:
- Learners’ social interaction is facilitated through tools such as blogs, e-mail and a discussion board. At the beginning of their usage, learners are taught how to use each tool and then encouraged to introduce themselves to each other and to post their respective expectations for learning.
- Educators can encourage learner interaction by asking for expression of ideas and responses to peers’ perspectives.
- Learners can e-mail their peers and/or the nurse educator as personal communication, for example, asking for assignment clarification.
- Educators may communicate to students in class as a whole or directly to each student via e-mail, the discussion board and each blog.
- Learners are encouraged to reflect upon their experiences of learning by posting, each week on the discussion board, relevant comments.

To create quality of learning materials, educators need to consider prior knowledge of learner in order to structure learning experience that appropriate to them. Scenarios are created considering the representative cases of the real situation. Multimedia and attractive design is used to promote students’ maintenance in learning through the course. Strategies to create quality of learning material are created as follows.
- Educators create four scenarios related to specific types of patient care needs.
- The scenario descriptions and content require review, by nursing colleagues, for validity.
- Streaming video is then used to portray each scenario.
- The video’s text, images, and audio materials are evaluated for appropriateness by nursing colleagues.
- After the final modification of each video scenario, they are placed online, during the appropriate timeframe, for learner usage.

- Assessment, by the learners, of each scenario’s usefulness to the teaching-learning process is carried out.

c) The evaluation of course effectiveness is performed to assess students’ satisfaction of the program, appropriateness of the program, and learning outcomes. The students’ perspective might be consisted of satisfaction in terms of activities in the program, time consuming, and usefulness of the program. An appropriateness of the e-learning course can approve by experts’ validation that focused on functional of the program. Learning outcomes through the course is used to assess students’ competency. Educators can measure students’ achievement of electronic learning course by giving scores of their solution submitted on the scenarios. The students’ participation of discussion and express throughout the course also might be counted to assess their learning outcome.

CONCLUSION

The use of the learning theory, constructivism, has been proved to be an effective guide for developing teaching-learning activities within an e-learning environment. By using a constructivism approach in an e-learning environment, learners have the opportunity to create new knowledge based upon personal experiences through active involvement and interaction. This article has proposed a model for designing effective e-learning in education, using constructivism as a paradigm. Further implementation of the proposed model, using the electronic technologies based on constructivism as a model for e-learning programs, needs to be investigated its effectiveness in educational environment.

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