

Running Head: INTERACTIVITY IN E-LEARNING

Incorporating Interactivity in e-Learning

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## Incorporating Interactivity in e-Learning

### *Introduction*

The focus of the ADED 4F08, Moving Forward in Adult Education course at Brock University is to analyse roles of educators and trainers, develop understanding of different perspectives on adult education and further examine issues impacting the practice of adult education throughout the world (Brock University, n.d.). The purpose of this research project is to present a research question of personal interest as it relates to the field of adult education. The question will be supported by providing background information pertinent to the topic, examining underlying values and power issues and by revealing information sources. The paper will provide a summary of literature linked to the research question and an analysis of the findings. Finally, the paper will conclude by providing the significance of the findings to adult educators and implications to practice.

### *Research Question*

How can e-learning be designed to be interactive? This question is of particular interest to me because I continuously strive to improve my abilities to design effective digital learning objects and online environments. Throughout this paper the terms *e-learning* and *online learning* will be used interchangeably and are defined as computer enhanced learning

that does not take place in a traditional classroom setting. E-learning or online learning may be offered strictly at a distance or integrated into a blended model that incorporates computer enhanced learning and a classroom setting (Falconer & Littlejohn, 2007). The knowledge gained through this experience will be of assistance to me in my professional practices.

### *Background Information*

Personal and professional interests of mine reside in pedagogically sound uses of educational technology and effective design approaches for creating learning objects and e-learning environments in adult education. My experiences working at an institute of higher learning have allowed me the privilege of seeing many different online learning environments. However, much of what I have seen is a little more than posting course outlines and links to readings into a Learning Management System (LMS) such as WebCT or BlackBoard. Thus, this so-called e-learning lacks critical elements to effective instructional design such as interactivity, a humanistic approach and authentic tasks (Woo, Herrington, Agostinho, and Reeves, 2007, pp. 41-42). It has been noted that students in e-learning report different levels of learning satisfaction than do students in a classroom (Zhang, Zhou, Briggs & Nunamaker, 2005) and that not all students are satisfied with their online experiences (Hill, Wiley, Nelson, & Han, 2004, p. 438). A common complaint from

students enrolled in online courses is that they receive poor, late or very little feedback from tutors which leaves them feeling confused, overwhelmed and unsupported (Hill, et al., 2004, p. 446). In a recent study, students revealed that "there was either no reply or a delayed response that did not actually clarify their doubts" (Lee, Hok Tan & Sen Goh, 2004, p. 11), when asked about their experiences questioning teachers in online courses. In my opinion, this is problematic and provides insight into why e-learning can be perceived as second rate. A discerning approach to the design, implementation, use and support of e-learning is important to its long-term success, recognition and acceptance as a worthy alternate to traditional forms of delivery.

#### *Underlying Values and Power Issues*

It is unavoidable that underlying values and issues of power will be present in educational environments. However, recognition and acknowledgement of these values and issues will assist in effective online course management. I believe that, in-order for students to interact in a learning environment, values and power balances must first be revealed and a principled approach taken that engages the psychomotor, affective and cognitive domains of learning (Cranton, 2000, p. 60).

At the macro level, values of senior management shape and direct actions and intents within an organization. Institutional and program values are dictated from corporate vision statements, marketplace positioning, administrative agendas, and funding structures. Issues of power such as intellectual copyright agreements are generally drafted by senior administrators and dictate ownership of learning resources, curriculum designs, learning plans, research innovation and so on. Of course, macro level issues usually filter down to the micro. For example, funding, insight and foresight may affect student support structures for online courses. Levin reports institutional support as one of five key elements of effective learner scaffolding in online education (1995) and if access to support systems such as technical support, library services, registration or access to bookstore is challenging or non-existent, student success and contentment will suffer.

Additional power issues at the micro level include student relationships with peers, teachers, content and electronic interfaces. Similarly, language barriers, cultural differences, non-recognition or accommodation of disabilities and prior learning assessment recognition (PLAR) have historically all been causes of power in-balances and hegemonic relationships in education.

The learner-to-content and learner-to-teacher relationships are often strained when the learner-to-technology rapport is questionable. Thus, accessibility is commonly affected by such things as minimum computer requirements, competing internet browsers, java software incompatibilities, media players, pop-up blockers and low-bandwidth internet access, to name a few. Furthermore, "students rarely used a linear or regularly systematic approach in searching" (Herrington & Oliver, 2000, p. 16) for data in online applications. Thus, effective use of metadata and well indexed chunks of information is important for realizing the potential of online systems (Zhang, et al., 2006). A study completed in 2004 by Hill, et al. supports this idea by stating that the "proper availability and use of controls is particularly important for learners" (p. 435). Similarly, Hill, et al. write that a "learners inability to successfully interact with the mediating technology had the potential of being a significant source of frustration" (p. 435).

Purposeful design of e-learning spaces at instructional, technical and support levels will increase the transparency of learning technologies, scaffold learners and further increase interactivity, comprehension and student success. Competing issues of power and values must first be acknowledged, evaluated and accommodated in order to achieve a rich, engaging, and effective e-learning environment.

*Information Sources / Approach to Research*

Information sources for this research study have included books, peer reviewed journal articles, web sites and academic symposia. Resources such as the Educause Connect web portal, Eric Scholars Portal, a book titled *e-Learning and the Science of Instruction*, Bloom's taxonomy, online and face-to-face lectures and course readings have all contributed to my research findings.

*Findings from Research*

There were several themes discovered in this literature search including engagement, constructivism, situated learning model, problem solving activities and student scaffolding. If engagement is defined as the ability "to occupy the attention or efforts of (a person or persons)" (dictionary.com, n.d.) it should not be confused with interaction, which is defined as "reciprocal action, effect, or influence" (dictionary.com, n.d.). Rather, from my perspective, engagement would be the result or bi-product of sustained interaction. Therefore, one can hypothesize that learner engagement is increased with interactivity, as opposed to no interactivity, thus, sustained or regular interactivity can lead to enhanced e-learning outcomes.

In an educational context, interaction can be categorized into four types: learner-to-learner, learner-to-instructor, learner-to-content and learner-to-interface. Therefore, facilitators and instructional designers have multiple avenues for incorporating interactivity into educational activities. In regard to interaction, Berge (2002) writes, "it is widely believed that a high level of interaction is desirable and positively affects the effectiveness of education, it is not clear from research of evaluation that interaction improves the quality of instruction in most distance education programs" (p. 181). However, despite this lack of research Berge goes on to say that "interaction will continue to be seen as a critical component of formal education" (p. 181).

Other prevalent ideas about interaction include the concept that "increasing interactivity in an e-learning environment can reinforce concepts learnt and provide the ability for on-demand learning" (Zhang, et al., 2006). Hill et al. write that "interaction with the teacher is the most significant contributor to perceived learning in students" (2004, p. 438) and that by adding interaction in learning "students shall become engaged participants instead of being passive recipients" (Lee, Hok Tan & Sen Goh, 2004, p. 8).

As reported earlier, students in e-learning often report different levels of learning satisfaction than students in a classroom. A recent study by Zhang, et al. (2006) compared learning outcomes of three groups: (a) student using online video lecture with user controls; (b) students using online video lecture without user control; and (c) students attending a live lecture in a classroom. In that study they found that students viewing online video with interactive controls rated higher performance than students in the classroom. Furthermore, students viewing online video without interactivity rated the same as those in the classroom. Therefore, one can conclude that increasing participation through a variety of interactive exercises (Taran, 2008) will engage participants in the creation of information rather than being passive recipients (Lee, et al., 2004, p. 8).

#### *Analysis of Findings Related to Question*

An analysis of initial findings related to this research question creates a rather clear outline for including interactivity into online learning. Although we have not determined that interaction alone will improve teaching or learning, we can hypothesis that certain types of interaction will improve student engagement. Increased student-to-student and student-to-faculty interactivity will increase one's social presence, which will increase a feeling of connectedness,

increase satisfaction and decrease the likelihood of dropout (Hill, et al., 2004). A by-product of increased feelings of connectedness is a "sense of community among students" that is critical "in ensuring the success for online learning" (Lee, et al. 2004, p. 8). To effectively create opportunities for interactivity I have discovered constructivism, situated learning model, near and far transfer problem solving activities, and learner scaffolding as four predominant themes throughout the literature. These themes are examined below.

*Constructivist theory.*

The first major theme encountered in the literature is the application of constructivist learning theory. The constructivist approach puts "active construction of meaning grounded in their (students) own experience" (Woo, et al., 2007, p. 36) with emphasis placed on the process of learning as opposed to memorizing correct answers (Zhang, et al., 2006, p. 16). It is believed that "constructivist environments engage learners in the construction of knowledge through collaboration and individual activities that embed the learning of salient knowledge and skills in meaningful context" (Berge, 2002, p. 184) and that greater levels of understanding are constructed when learners have the opportunity to "develop representations of what they know" (Hill, et al., 2004, p. 445). The challenge in teaching with this approach is to afford learners with

environments that are abundant with relevant experiences and resources rather than simply identifying information deemed important and sequencing it for delivery (Ge & Er, 2005, p. 445).

*Situated learning model.*

According to Collins, situated cognition model implies the belief that "learning knowledge and skills in context that reflect the way the knowledge will be useful in real life" (1988, as cited in Herrington & Oliver, 2000, p. 2) and that "authentic context is the corner stone of the situated learning model" (Herrington & Oliver, 2000, p. 14). This concept was challenged in the past by Hummel who implied that "instructional designers who apply situated learning theory by implementation in electronic media should realize that they take an important step away from this theory...courseware becomes the learning environment and not the authentic situation" (1993, p. 15). Despite Hummel's argument, situated learning theory remains an integral part of instructional design for the purpose of transferring appropriate interactions amongst learners. Clark and Mayer support this notion when they write "the more the features of the job environment are integrated into the interaction, the more likely the right cues will be encoded into long-term memory for later transfer" (2003, p. 154). Therefore one can ascertain that simulated learning environments do not

need to be exact duplicates of real life. Rather they simply need to evoke a sense of realism that stimulates authentic skills, attitudes and behaviours in learners.

*Near-transfer vs. far-transfer.*

Cognitive learning theory informs us of the process in which audio and visual information received by the human brain is transferred into knowledge, skills and beliefs. New information is stored in working memory and transfers into long-term memory through a process called *rehearsal*. However, working memory in humans is limited, making it critical that new information is divided into digestible chunks to not overload working memory. Therefore, it is important to employ instructional methods that reduce cognitive load and increase available working memory (Clark & Mayer, 2003).

While adhering to the cognitive learning theory it is also important to divide desired learning outcomes into one of two types of activities. The first type, referred to as near-transfer activities, or as step-by-step activities are utilized when steps used in training are identical or similar to those used on the job. The second type, referred to as far-transfer activities, or principled based activities are leveraged when tasks do not necessarily have only one correct approach or outcome (Clark & Mayer, 2003, pp. 18-19).

Application of this practice should be guided by the amount of

prior knowledge and estimated level of meta-cognitive skills in learning cohorts. For example, an introductory undergraduate course teaching spreadsheet software would include extensive use of near-transfer activities so that learners become familiar with the software's navigation, tools and functions and the step-by-step process of leveraging them on the job. On the other hand, a graduate level statistics course would focus on principled based activities such as statistical analysis, interpretation and application of data findings.

To improve upon the process of chunking data one should not only consider activities in regard to near and far transfer. One can also categorize activities and events in relation to how they are intended to shape knowledge, skills and attitudes in learners. Although, not discussed at length here, the taxonomy of educational objectives, commonly known as *Bloom's Taxonomy*, was designed to assist us in classifying intended learning outcomes of educational activities (Bloom, 1956, p. 12) and is an effective tool when planning interaction.

Cognitive learning theory and different levels of problem solving activities that engage the cognitive, psychomotor and affective learning domains are all critical elements in the practice of instructional design. When incorporated effectively, these elements will assist in the support and scaffolding of learning and learners.

*Support and scaffolding.*

Finally, although often not explicitly stated, support and scaffolding were found to be the fourth major theme in the literature. To date, many online learning programs have not included regular direct learner-to-instructor contact (Lee, et al., 2004, p. 8) which can result in feelings of isolation and discontent which may lead to attrition of online enrolment.

As mentioned earlier, Levin (1995) lists structure as one of five key elements of effective learner scaffolding. The remaining four elements are mediation, community building and institutional support, all of which can be achieved online through one or more of the four main types of learner interactions. Increased interactivity increases the social presence of learners which enhances their feelings of connectedness. A feeling of connectedness will generally increase student satisfaction and therefore decrease the likelihood of dropout (Hill, et al., 2004). Lee et al. (2004) support this idea when they write "developing a sense of community among students is one of the critical factors in ensuring the success of online learning" (p. 8).

On a micro level scaffolding can also be used to improve problem solving skills in learners. For example, students with lower and average meta-cognitive abilities should be supported by providing frequent, higher level question prompts when

problem solving within a principled based context. Whereas, learners with high levels of meta-cognitive skills will therefore require less frequent and lower levels of scaffolding during problem solving activities (Ge & Er, 2005, pp. 144-145).

Effective support systems are critical to the success of teachers and learners in education. Due to inherent geographical distances commonly found between learners, teachers and institutions in online learning, support systems become an increasingly vital facet to initiating interaction.

Interaction in learning can occur in many forms and at many levels. Although interaction alone does not necessarily improve teaching or learning directly, it is essential for community building, generating a sense of connectedness, creating knowledge, applying relevance to learning and elevating cognitive, affective and psychomotor skills in learners.

### *Significance*

The significance of this research project has been tremendous in relation to my personal growth as an educator and instructional designer. It is hoped that other educators, institutions of adult education and e-learning course design teams will also recognize the relevance of these findings. One can ascertain from this review of literature that the inclusion of interaction in learning does not equate to effective teaching or learning. However, what is found is that

regular and sustained interaction does equate to higher levels of student involvement which will have a positive effect on learning and satisfaction.

We have learned from Herrington and Oliver (2000) that "authentic context is valued by students as an element of a multimedia learning environment" (p. 14). We have also concluded that modelling, expert performances, scaffolding, ill-defined problems, multiple perspectives, collaboration, and reflection (Ge & Er, 2005) are all integral elements for engaging learners. "When learners are engaged in meaningful learning, they are defining the goals and/or context in which the learning will occur. Because they are creating it, they own it." (Hill, et al., 2004, p. 447).

### *Summary and Conclusions*

The purpose of this research paper is to present findings associated with the research question of how to incorporate interactivity into e-learning. It started by providing background information on what is already known about the topic of study. Next, underlying values and power issues that impact support, delivery, interaction, and student success were discussed at the micro and macro. Furthermore, the research findings were revealed and analysed in relation to four major themes; (a) constructivism (b) situated learning model (c) near and far transfer and (d) learner supports. Finally, it was

discussed how these findings may be of significance to learners, educators, instructional designers and institutions of higher learning. In the broader sense, the intended outcome of this research project was three fold; to fulfill Brock University course requirements, to deepen my personal knowledge related to adult education and expand my breadth of experience in research and literature review.

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