A Proposed Cohesive Use of Online Discussion Board from the Aspects of Instructional and Social Interactions in Engineering Education

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ABSTRACT

This article uses instructional and social interactions in the current era of networked learning as a conceptual metaphor to guide the design of engineering learning practice. Because of students' digital literacy and their customary means of acquiring information and peer-to-peer interaction, researchers have also explored the potentials of implementing social networks for student learning. This article values these two trends and explores how both mechanisms can be implemented in an engineering course. The topics delivered to students should be based on the needs of daily life. In addition, students in online discussion board-related learning are introduced to discussing their works. A learning activity design is proposed with the aim of providing a richer understanding of the interactional relationship between instructional and social interactions regarding the use of online discussion boards. The main findings reveal the importance of re-designing the online discussion board to bridge students’ study between in-class and out-of-class discussion.

KEYWORDS

Engineering Education, Instructional Interactions, Learning Interactions, Online Discussion Board, Social Interactions

INTRODUCTION

Students of today are digital natives, and as native speakers of technology, they are fluent in the digital language of computers and the web (Prensky, 2005). Digital literacy is the ability to use digital technology, communication tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function effectively in a knowledge society (ICT Literacy Panel, 2002). The ability of digital natives to embrace Information and Communication Technology (ICT) means that they possess a higher level of digital literacy (Ng, 2012). Digital natives are often more adept at using ICT tools than their teachers. Moreover, digital natives’ patterns of thinking and communication, notions of learning, needs for control, and even their personal and social values have also been shaped by ICT (Gu et al., 2013). Because of these students’ unique patterns of thinking and communication on the Internet, they may work well in a higher cognitive order of discussion as well as with a social constructivist’s learning and collaboration. In addition, because their work eventually goes online

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and will probably be read by others, students are more likely to feel motivated to do their best (Chang & Chang, 2014).

Online learning has become more popular in recent years because it provides students with greater access to information and learning resources and thus exposes them to more ideas and issues (Thompson & Ku, 2005). However, pedagogical changes in online learning have been slow (So & Bonk, 2010). Little attention has been paid to the selection of appropriate modes of interaction and activity design which are based on robust learning theories (So & Bonk, 2010). Simply having students participate in online learning formats in and/or after classroom discussions does not necessarily provide them with opportunities to acquire knowledge. It is important to have deep understandings of how people learn as well as what the online discussion board can provide to support the successful design of web learning environments.

For example, Piaget provided the foundations for an understanding of the four-cognitive development of children from infants to adulthood: sensorimotor, pre-operational, concrete operational, and formal operational (Piaget & Inhelder, 1969). In the first two stages, intelligence is roughly indicated by motor activity and then by language and symbol manipulation respectively. Stage three is the concrete operational stage about grasping conservation of matter and classifying concrete objects. Stage four is to use symbols related to abstract concepts and to think abstractly, systematically, and hypothetically (Kramer, 2007). Furthermore, the nature of human learning - the dual channel assumption, the limited capacity assumption, and the active learning assumption (Mayer, 2003) related to human sensory, short-term, and long-term memory also provide strong foundations helping teachers understand how people learn. Theory of cognitive load help teachers be aware of how much information is to be delivered at each moment of teaching. The traditional way to measure people’s cognitive capacity is to give a memory span test, and the average memory span is approximately five to seven chunks (Simon, 1974). According to these theoretical frameworks, teachers can tailor their curriculum to make their learning content more accessible to students.

The online discussion among students carries the characteristics of peer learning and peer tutoring. In the process of learning, because of similar age and background, students’ arguments made in online discussion could lead to rethinking. Sometime, the discussion also could provide emotional support and positive incentives to help improve the efficiency of learning. When there are students with less learning capability, peer groups may act as mentors to help them.

In an online discussion board (DB), discussions are grouped in threads that contain a main posting and all related replies (Ajayi, 2009). For example, when a student posts a question, it appears in the main thread and subsequent responses will be indented under the thread. Typically, each posting may have multiple indented threads as responses to the original question. Students can post questions and responses any time. Allowing more time for students to discuss may provide opportunities for students to demonstrate more diverse and deeper thinking (Scherling, 2011). Pena-Shaff and Nicholls (2004) even claimed that DB provides students with the opportunity to reflect on and articulate their thoughts at their own pace, consult the readings and other materials, and reflect on other students’ ideas. In this sense, the DB environment establishes a forum for transactional learning (Vygotsky, 1967) because students need to create meaning in a way that others could understand (Pena-Shaff & Nicholls, 2004).

Discussion boards provide an open forum where students can initiate their own discussions or contribute to discussions initiated by others. Students can navigate the postings in a nonlinear order (Mabrito, 2006). Because of the web technologies, students can incorporate more outside material and experiences in their posts (Newman et al., 1995). Much of the messages posted by students in a DB goes beyond the standard curriculum (Kay, 2006). Hence, a DB may replace the single view of the instructor with the diversity of views from different students (Bliss & Lawrence, 2009; Greenlaw, & DeLoach, 2003). DB instruction seems to allow students to deliberate, reflect, and simultaneously utilize web resources, thus promoting active and critical learning (Ajayi, 2009; Schellens & Valcke, 2006; Biesenbach-Lucas, 2004).

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