Readability of Instructional Materials and Usability of Online Learning Environment: Their Relations to the Development of Authentic and Contingent Knowledge

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Abstract: This research project correlates authentic knowledge with the readability of instructional materials and contingent knowledge with usability of the online learning environment. Based on thematic analyses in above two areas, we propose a model that governs how adult learners develop authentic and contingent knowledge in an intertwined manner.

Context and the Research Problem

In online environment, adult learners often learn by reading in twofold. First, they read content materials to develop skills for the intended learning outcomes, and second, they read to following directions and navigate the learning environment. While reading content constitutes genuine skills and authentic knowledge transferable across contexts, reading for navigation and direction constitutes contingent knowledge, specific to the learning environment. To this end, learners often focus on learning behaviors toward contingent knowledge as opposed to authentic knowledge. This research study juxtaposes the accessibilities of authentic knowledge and contingent knowledge by examining readability of content materials and usability of the learning environment respectively. Using Edwards' integral learning as the theoretical underpinning, the research questions are: (1) How does readability of math texts influence student development of a math concept? (2) How does readability influence usability of course materials and/or environment? (3) How does usability benefit contingent knowledge and help learner navigate the learning environment? (4) And how do both readability of materials and usability of environment foster authentic over contingent learning in adults?

Readability in Learning Authentic Knowledge

This study defines authentic knowledge as content knowledge that can be transferred from one learning environment and another. A remedial (developmental) math topic will be chosen and several math text passages will be reviewed from various sources to assess the readability of these texts and from the learners' perspectives. The criterion of readability reviewed includes several established readability formulas and measures. The goal of this phase of the study is provide a content analysis of sample texts of a math topic and explore the impact of readability on learning engagement.

Usability in the Learning Contingent Knowledge

As Goto and Cotler (2002) and Nielson (1995) state, the usability of learning environment is defined as the way a user actually navigates, finds information, and interacts with the learning materials. Two simulated courses will be used to survey learners to examine how usability may

affect them navigating the learning environments. Usability is important as it lessens the 'cognitive load' of the student learner, minimizing frustration and to encourage students to participate in the course (Rubin, 1994). Thus, learners spend less time finding what they need in the mere operation of the LMS (contingent knowledge). The preliminary research regarding prior online course experience indicates less 'usable' courses demand more cognitive load and contingent knowledge. A more highly usable course allows a learner to move more quickly to more enduring, authentic learning.

Uniting Authentic and Contingent knowledge

The two portions of this study provide data and results to inform theoretical models. Adapting from Wilber's Integral Model (Wilber, 2000; Esbjörn-Hargens, 2006, 2009; Martin, 2008), Edwards (2005) proposed an integral learning model that cycles in four stages: (1) *Agentic* Learning, (2) *Abstract* Learning, (3) *Communal* Learning, and (4) *Concrete* Learning, with these stages corresponds to:

- What is happening? (From *agentic* to *abstract* through reflection)
- What does it mean? (From *abstract* to *communal* through interpreting/meaning)
- What have we learned? (From *communal* to *concrete* through testing)
- What do we do? (From *concrete* to *agentic* through acting)

In this case, Edwards' (2005) model characterizes the intertwining properties where readability for authentic knowledge development takes place in *acting* and *agentic* learning, and the usability, and the usability for contingent knowledge development takes place in *communal* and *concrete* learning. Learners need to activate not only metacognitive strategies (i.e. Cognitive load) for reading texts, but also for the self-regulation of using online instructional design, especially in their understanding of the macrostructure of the text and the content it presents (Lee & Wu, 2013). While this is a mid-term report, the study continues to undergo data collection and analyses, and a future report on the research could provide insights to practitioners on how to address those pre-conceived adult learner's assumptions, as well as better design learning activities for acquiring authentic knowledge. The Roundtable Session participants will be engaged in an interactive discussion of this topic.

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