Chapter 36
K–20 Learning along a Novice to Expert Continuum in Online Learning Environments

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ABSTRACT

Online learning environments are offered in many modalities for many subjects. Students enter the environment as a novice and hopefully exit as more of an expert. The environment could be designed under a technological pedagogical content knowledge paradigm that uses specific technologies to present specific information to the student. Problem solving activities are embedded in the learning to provide experiences for the student to assimilate and accommodate the knowledge and to use it to solve authentic problems. As the problems increase in complexity, one can measure the growth of knowledge along a novice to expert continuum.

INTRODUCTION

Malcolm Knowles discussed similarities and differences between the learning strategies of children and adults (1979). While the age differences are apparent, children and adults are accustomed to teacher-centered learning. The learners receive and act upon direct instruction for most of their learning needs. In face to face classrooms, students listen to the teacher and some of them write notes based on the teacher's statements. Engaging dialogue is the goal of many teachers. Kindergarten teachers often ask the students what they did over vacation breaks, while middle school teachers engage the students in dialogue about fairness. High school teachers look for deeper meaning from the students based on their experiences, while college professors look for ways to link higher knowledge

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with students' past experiences. The teacher is engaging the student in meaningful discussion that bridges the gap between stages in the learning cycle. Knowles (1984) wrote about four characteristics of online learners. Firstly, they have a sense of self. They know who they are and what they want to learn. Secondly, their experience defines the new moment of learning. They want to fill a specific void in the learning schema. Thirdly, they are ready to learn. They adjust schedules to accommodate the learning. Fourthly, they have a perspective of time. They know how much time they can invest in their learning. While these writings were about face-to-face classrooms, it is thought that these same concepts apply to online learning. Online learning environments provide instruction in both asynchronous and synchronous modes of delivery. While asynchronous modes do not usually have a defined weekly time element, they usually publish a due date for assignments. This due date helps students define their perspective of time. Synchronous sessions specify a time to meet weekly and also define a time element. Adult learners are aware of their lack of knowledge and thus have a reason to learn. They know they travel along a novice to expert continuum and want to recognize their own growth. However, Feuer and Geber (1988) in Knowles, Holton, and Swanson (2011) speculated that Knowles overestimated the adult learner's readiness to be self-directing (p. 32). They contend that adults and children learn in the same way and this precludes the use of a different theory to unify adult learning strategies (p. 32). They also report that Knowles changed his position and wrote that children can be self-directing but that conventional classrooms often tell the student what to learn, when to learn it and how to study it.

These are important characteristics that designers and implementers of online learning need to consider as they construct online learning for adults and children. So, how does one measure the growth of student learning along a novice to expert continuum for K-20 students?

BACKGROUND

Kolb's (1976) cycle of experiential learning discusses the four major stages of Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation. While he wrote that not all people can master all four stages, he says that experiences propel a person from one stage to the next. Kamis and Kahn (2009) discussed the use of Kolb's Learning Cycle with Huber's Problem Solving concepts. They found that the instructor has to use very concrete problems to introduce the technical aspects of the problem. Scaffolding is added to the process with help from the instructors. Then, the scaffolding can be removed a little at a time to provide support to the students, yet to also allow them to be exposed in the problem solving tasks. Inhelder and Piaget (1958) also stated the importance of rich experiences provide the venue to assimilate and accommodate new knowledge and travel from pre-operational to concrete operational or abstract operational levels of thinking. Thus, the experience in which a person participates provides the learning environment to move from a lower level of thinking and learning to a higher one.

How can we determine the strategies to use with K-20 learners in online learning environments as they solve problems in their courses? A recent study by Antonenko, Toy, and Niederhauser (2012) discussed the mining of data from online learning environments and using cluster analysis to determine the structure of the problem-solving experiences. They relied on work by Ryan et al. (2007) to identify the cluster of behaviors of students that are high performers and low performers. Because problem-solving exists in many job categories, one wonders what holds the key to the differences between good problem solvers and poor problem-solvers. How are students prepared for problem solving tasks? Could the level of experience, regardless of age be related to performance of problem-solving tasks?