

Designing Instruction for Successful Online Learning

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INTRODUCTION

Teaching and training has been going on for decades; however, the design methods and delivery technology have changed over the years. The invention of the Internet and the computer, especially the microcomputer and the availability of computer software, has revolutionized the design and delivery of instruction using online methods. Studies and analyses (Kulik, Kulik, & Shwalb, 1986; Lawson, 1999; Wesley, Krockover, & Hicks, 1985) have concluded that online learning is as effective, and in some cases, more effective than traditional classroom instruction; however, some researchers claim that it is the extra amount of time spent on the design that makes online learning more effective than classroom instruction rather than the technology (Allen, 2003; Clark, 1983, 2001; Kozma, 2001). This claim supports the idea that good instructional design is important for online materials.

Before the design of online materials is explored further, it is important to examine the definition of online learning. Most definitions of online learning are based on the delivery of materials over the Internet rather than defining online learning from the learner's perspective. Carliner (1999) defines online learning as educational material that is presented on a computer. Khan (1997) defines online instruction as an innovative approach for delivering instruction to a remote audience, using the Web as the medium. Another definition is "online learning involves the learner's use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (Ally, 2004a). Key words in this definition are interaction and support. There must be interactive strategies to promote high-level learning using the Internet, and

there must be support for different learners. Proper instructional design must be conducted to make online learning effective to meet the needs of learners. Instructional design is a systematic approach that uses principles from learning theories to develop learning materials for delivery over the Internet.

LEARNING THEORIES FOR DESIGN OF ONLINE LEARNING MATERIALS

Behaviorists claim learning is a change in observable behavior caused by external stimuli in the environment and that it is the observable behavior that indicates whether or not the learner has learned something—not what is going on in the learner's head (Skinner, 1974). The early behaviorists influenced Pressley (1927) to develop the teaching machine, which moved the repetitiveness of teaching from the teachers to technology by using drill and practice as the instructional strategy.

The design of online learning material was also influenced by cognitive theory, which claims that learning involves the use of memory, motivation, metacognition, and thinking, and that reflection plays an important part in learning. Learning is considered to be an internal process, and the amount learned depends on the processing capacity of the learner, the amount of effort expended during the learning process, the depth of the processing (Craik & Lockhart, 1972), and the learner's existing knowledge structure (Ausubel, 1974). Cognitive psychology looks at learning from an information processing point of view, where the learner uses different types of memory during learning. Sensations are received through the senses into the sensory store before processing occurs. Effective online learning materials must use strategies to allow learners to attend to the learning materials so that the information can be transferred from the senses to the sensory store

and then to working memory. The amount of information transferred to working memory depends on the amount of attention that was paid to the incoming information and whether cognitive structures are in place to make sense of the information. Strategies that check whether learners have the appropriate existing cognitive structure to process the information must be used in online learning. If the relevant cognitive structure is not present, pre-instructional strategies, such as advance organizers, overviews, and concept maps, should be included as part of the learning process (Ally, 2004a; Ausubel, 1960).

The design of online materials should use a variety of learning strategies to accommodate individual differences. Different learners will perceive, interact with, and respond to the learning environment in different ways, based on their learning styles (Kolb, 1984). Online learning materials should include activities for the different styles, so that learners can select appropriate activities based on their preferred learning style. The computer can be used to determine a learner's existing level and style and prescribe the appropriate learning sequence and strategy based on that learner's level. Learners come to the learning process with their own metacognitive strategies that were obtained in previous learning situations. Online learning systems should encourage learners to use their existing metacognitive skills to help in the learning process (Sternberg, 1998). Self-check exercises with feedback throughout a lesson are good strategies to allow learners to check how they are doing, so that they can use their metacognitive skills to adjust the learning approach, if necessary.

According to the constructivist theory of learning, learners interpret information and the world according to their personal reality, and they learn by observation, processing, and interpretation, and then personalize the information into their own worldview (Cooper, 1993; Mezirow, 1991; Wilson, 1997). Learners learn best when they can contextualize what they learn for immediate application and to acquire personal meaning. According to constructivism, knowledge is not received from the outside or from someone else; rather, it is the learner's interpretation and processing of what is received through the senses that creates knowledge. The learner is at the center of the learning, with the faculty playing an advising and facilitating role. Learners should be

allowed to construct knowledge rather than being given knowledge through instruction (Duffy & Cunningham, 1996). Constructivists view learning as the result of mental construction where students learn by fitting new information together with what they already know. According to Ausubel (1974), it is important to determine where the learner is coming from and teach from there to make the learning more meaningful and personal. The challenge for instructional designers is how to design online learning systems to integrate the theoretical and the practical and then facilitate learners to contextualize and personalize the learning (Eichler, Goncalves, da Silva, Junges, & Pino, 2003).

Online learning strategies should give learners the opportunity to reflect on what they are learning and to internalize the information. Online learning should use embedded questions throughout the learning session to encourage learners to reflect on and process the information in a relevant and meaningful manner; or learners can be asked to generate a learning journal during the learning process to encourage reflection and processing. At the same time, learning should be interactive to promote higher-level learning and social presence, and to help develop personal meaning (Heinich, Molenda, Russell, & Smaldino, 2002). Interaction is also critical to creating a sense of presence and a sense of community for online learners and to promoting transformational learning.

CURRENT MODELS FOR DESIGNING ONLINE MATERIALS

There are many instructional design models for designing online learning materials. Dick, Carey, and Carey (2001) proposed a systematic nine-phase model to design, develop, implement, and evaluate instruction. Another widely used model is that of Gagné, Wager, and Rojas (1991), who claimed that strategies for online learning should be based on learning outcomes. The five main categories of learning outcomes are verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes. Once the learning outcomes are specified, the following instructional events are specified to promote learning (Gagné et al., 1991, p.215). These include: gain learners attention, inform the learner of

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