

Chapter 5

Creating Supportive Multimedia Learning Environments

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ABSTRACT

A strategy for developing effective multimedia instruction should be based on evidence presented by cognitive science and backed by research. Unless guided by instructional design principles, multimedia learning products run the risk of being unusual and entertaining but not effective. An effective design strategy at a minimum should embrace; recognizing learner differences, creating good multimedia messages, managing cognitive load, providing opportunities for active cognition, and monitoring learner engagement, intentions and progress. Activity theory, when integrated into multimedia instruction can support the creation of constructivist learning environments. Activities are ways that learners interact with the outside world and cognition is part of the interaction. Using multimedia to develop opportunities for learners to participate in active cognition can enhance the learning environment Active cognitive engagement should include active, interactive and reflective e-learning. The challenge for instructional designers is to position multimedia in an environment that supports the realization of meaningful learning.

INTRODUCTION

This chapter presents a strategy for developing effective multimedia instruction based on evidence presented by cognitive science. The strategy is based on research and may guide instructional designers in creating supportive multimedia e-learning environ-

ments. The underlying assumptions of this chapter are that learners have individual styles of learning, construct their own meaning and that the learner is at the center of the learning process. Though learning differences exist, environments can be created that provide the learner with effective, functional and appealing places to learn.

The end of the twentieth century has produced changes in technologies and new ways of thinking

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about how people learn. The new paradigm supports a constructivist view that learners create their own meaning. Learning is seen as an active, intentional and constructive practice. Learners in constructivism are actively engaged in the learning and responsible for creating knowledge. This is a vast departure from traditional didactic pedagogy where the teacher is seen as the purveyor of knowledge. In constructivism, community and environment are relevant aspects of the learning experience. Learning environments must provide authentic activities or ways for learners to interact with the objective world, which support their intention of meeting learning goals. The challenge for instructional designers is to create environments rich with crucial learning attributes that support a cognitive, constructivist paradigm.

Creating effective multimedia instruction means creating environments that adhere to cognitive learning theory, utilize the results of high quality research and apply these to a learning situation. By creating multimedia messages that are grounded in how the human mind works, managing cognitive load, fostering active cognition, and creating learner engagement, instructional designers can create supportive and effective constructivist learning environments.

Chapter Objectives

The reader will be able to:

- Understand how constructivist theory and cognitive science can aid in the creation of effective instruction for multimedia e-learning.
- Appreciate the importance of creating a supportive learning environment when using multimedia.
- Evaluate several influences on learner centered design when using multimedia in learning environments.
- Identify three different strategies for creating active cognitive engagement.

BACKGROUND

Understanding the human brain and the complexity of the processes involved in learning is a division of the cognitive science field. The field is relatively young, very dynamic, and expanding. Advances in technologies and computers give scientists the ability to create expert systems, robots, and artificial intelligence. These advances have also given scientists a better picture of how the mind works. Cognitive science is the study of how the mind works (Boring, 2003).

The establishment of this area of study began in the 1940's and 1950 with developments by computer pioneers like Alan Turing. Turing realized that computers could be programmed to understand language, solve math problems and play chess. This established the theory that the human mind operated much like a computer with inputs and outputs. The theory that minds were programmable and ran on brains with capacities was a shift in paradigms. Other advances in the fields of linguistics and neurophysiology contributed to the knowledge base of how the human brain processes information. Continuing research in the areas of cognitive psychology and cognitive neuroscience are creating images of the human brain and mapping out the processes. Along with learning about the brain, scientists are learning about how we learn (University of California Berkley, 2005).

Instructional design and development professionals are concerned with the process of recognizing learning needs and goals. Instructional designers must also determine which delivery methods meet these needs. E-learning is a viable and economical alternative for delivering learning materials and creating a learning environment. There are many varieties of e-learning including those targeted at higher education, K-12 education, corporate training and the military. These varieties can be delivered in as many forms including WBT (Web-based learning), CBT (computer based training), learning management systems, virtual

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