Chapter 1
Pedagogical Theories and Research: Re: Imagery in E-Learning

ABSTRACT
Some pedagogical theories and research have direct application to the use of digital imagery in electronic learning (e-learning). Applied perceptual research forms a foundational understanding of how humans see through their eyes. Cognitive theories address how the mind handles visual information. Pedagogical theories provide understandings of how individuals process information and learn effectively. These concepts lead to applied uses of digital imagery in e-learning contexts. These principles and practices will be introduced, analyzed, and evaluated in the context of the creation and use of digital imageries in e-learning. Then, strategies for how to apply theory to the selection, creation, and deployment of digital imagery in e-learning will be proposed.

CHAPTER OBJECTIVES

• Provide an overview of the relevant perceptual theories
• Present an overview of the relevant pedagogical theories
• Summarize the applied research and findings related to visual imagery in e-learning
• Identify some areas for further theory development and research

INTRODUCTION
This short chapter addresses the uses of digital imagery in electronic learning (e-learning). Digital imagery is multi-dimensional, information-rich and purposive. They are designed for particular aims in particular learning domains and contexts, and for defined learners.

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A foundational understanding of applied pedagogical theories may inform the planning, creation, development, handling, use, and storage of digital imageries. These theories focus on human perception at a foundational level; this is critical because imagery is sensory—and understanding the underlying sensory mechanisms will enhance strategies to develop visuals. The psycho-physical phenomena of how reflected frequencies translate into a meaningful visual image is not fully understood (“Electromagnetic spectrum,” Dec. 2008, n.p.), but what is known should be employed. Human cognition, particularly visual learning, visual working memory, and visual long-term memory, will enhance understandings of how the mind processes learning that involves visuals.

Various learning principles and conceptualizations that provide strategic direction for digital imagery creation follow. The diversity of these ideas results because of the juncture of visuals, e-learning, technologies, and the human learner in this topic. These include ideas of the importance of an imagistic learning context or environment, based on situated cognition, adult learning theory, and constructivism. From these concepts, there are spinoffs to applied uses of digital imagery in self-discovery learning, problem-based learning, case studies, and co-created emergent curriculums. This is not a comprehensive conceptualization, but rather an attempt to capture some of the most salient ideas in practice currently.

AN OVERVIEW OF RELEVANT PERCEPTIONAL AND PEDAGOGICAL THEORIES

A simple visualization of the approach in this chapter follows in “Applicable Pedagogical Theories and Research related to Digital Imagery in E-Learning.” The foundational structure is built on applied perceptual research, which draws from human perception, visual cognition, and visual memory. Built on the perception is cognition, or how the human behind handles information. Pedagogical theories comprise the next layer up, and at the top are the applied uses of digital imagery in e-learning contexts.

More pedagogical theories and research factors may be added, but Figure 1 is an early diagram to provide an approach to conceptualizing how theories and research relate to digital imagery in e-learning. Applied research with live learners has contributed further insights into professional uses of digital imagery in e-learning. These findings will also be addressed briefly.

This section will begin with the foundational level of the perceptual and pedagogical theories related to the use of digital imagery in e-learning and then progress to build further understandings of these concepts. The importance of starting out with visual perception is based on the fact that cognition relies on the senses for information: “As Hutchins (1995) so effectively pointed out, thinking is not something that goes on entirely, or even mostly, inside people’s heads. Little intellectual work is accomplished with our eyes and ears closed. Most cognition is done as a kind of interaction with cognitive tools, pencils and paper, calculators, and increasingly, computer-based intellectual supports and information systems” (Ware, 2004, p. 2).

Applied Perceptual Research

Human eyes are complex organs. This visual system senses electromagnetic radiation (photons) by photo-receptors, which capture this wave-and-particle information as light (Beckhaus & Kruijff, 2004). An image is focused on through the lens and is captured via the retina. (Figure 2)