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## **Chapter XI**

# **Cognitive Skill Capabilities in Web-Based Educational Systems**

Elsbeth McKay, RMIT University, Australia

## **Abstract**

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*This chapter represents a discussion on the interactivity of how people think and react to instructional materials in general, in the light of how this interaction may be affected by multimedia. Grounded in instructional design, where first principles take a fine grained approach to identify the learning/instructional context; this chapter provides an explanation of the differing terminology used by people when referring to multimedia instruction. A Meta-Knowledge Processing Model is proposed as a courseware designing tool. Several controversial issues that surround learning with multimedia are exposed. More work is needed to unlock the mysteries that surround multimodal instructional strategy development.*

## Introduction

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Can Web-based educational systems (WBESs) really facilitate cognitive skill development? It would appear from the common rhetoric that learning occurs as a somewhat automatic process through interactive multimedia. Moreover, it is taken for granted that a collaborative approach to lifelong learning and knowledge transfer is a guaranteed WBES outcome. An examination of current multimedia courseware reveals that the opposite is true. This is where effective learning management systems (LMS) can make all the difference. To this end, there have been a number of developments toward identifying the management of collaborative instructional environments (Bhattacharya, 2000). However, if we want to sustain the momentum toward achieving positive outcomes from interactive multimedia in a shared knowledge/experiential learning network (Sims, 2000), we must first understand more about how to manage an individual's capacity to access information through human-computer interaction (HCI) (Preece, 1994). Once we understand more about the HCI phenomenon and learn how to manage the so-called *e-learning* environment successfully, we may be in a position to claim that interactive-context-mediated learning has arrived (von Wodtke, 1993).

This chapter discusses the interactivity of how people think and react to instructional materials in general, and how this interaction may be affected by multimedia. Written from the perspective of instructional design, where first principles take a fine-grained approach to identify the learning/instructional context, this chapter first provides a brief explanation of the terminology used by people when referring to multimedia instruction. To assist with this, a Meta-Knowledge Processing Model (see Figure 1) is proposed as a courseware design tool that identifies each complex variable involved in an interactive multimedia learning environment. Because multimodal instructional materials tap into an individual's spatial ability, several controversial issues, relating to cognitive skill acquisition within a WBES, will be exposed. In closing, this chapter will show how current progress points toward the future, revealing that much more work is needed to unlock the mysteries that surround multimodal instructional strategy development.

## Dealing with the Terminology

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What exactly is meant by HCI? The global leaders in this field at the Open University, in the United Kingdom, have defined HCI as comprising elements of computer science, cognitive psychology, social and organization psychology,

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