Chapter X

Theoretical and Practical Considerations in the Design of Web-Based Instruction

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INTRODUCTION

The intended audiences for this chapter are (a) individuals who design and develop Web-based instruction in any setting (i.e., university faculty, instructional developers in medical, business and government settings), and (b) graduate students in the fields of instructional design, educational technology, and educational psychology.

The purposes of this chapter are to:

• describe three unique features of the Web environment relevant to instruction: structure, media, and communication capabilities;
• explore the role of epistemology in the design of instruction: relationships of epistemology to cognitive learning theories, Web technologies and practice;
• examine five factors that influence the design of Web-based instruction: theoretical orientation, learning goals, content, learner characteristics, and technological capabilities;
• recommend ten issues for Web course developers to consider as they design Web-based instruction;
• discuss four factors that will affect the future of Web-based instruction: efficacy studies, technological advances, pressures of competition and cost containment, and professional responses to market influences.

UNIQUE INSTRUCTIONAL FEATURES OF THE WORLD WIDE WEB

Web-based instruction uses hyperlinking and communication capabilities that are time and place independent (Jonassen, Davidson, Collins, Campbell, & Haag, 1995). These characteristics apply to on-line courses in both education and corporate settings. Designing instruction for on-line delivery requires consideration of this complex learning environment. The associative, nonlinear, and hierarchical structure of the Web, enhanced media capabilities, and a variety of synchronous and asynchronous communication opportunities are unique features of the Web that influence instruction (Ayersman, 1995b; Jonassen, 1991, 1993; McGuire, 1996; Yang, 1996). Although discussed separately below, these features are interrelated. For example, constructivists view the web’s nonlinear and associative structure as a way for students to express and reflect understanding of a topic as they collaboratively build knowledge. In turn, collaboration requires sophisticated and supportive communication and performance tools (i.e., Computer Supported Communication Work tools as noted in Jonassen, et al., 1995; Mayes, 1999).

Structure

There is unanimous agreement that the hypermedia structure of the Web is associative, nonlinear, and hierarchical with unrestricted hyperlinking capabilities (e.g., Ayersman, 1995b; Jonassen, 1991, 1993; McGuire, 1996; Wilson & Jonassen, 1989; Yang, 1996). This structure can be thought of as “mimicking” the associative, nonlinear, hierarchical structure of memory (Jonassen, 1991).

The semantic network model of memory proposes a representation system constructed of nodes (i.e., propositions or concepts) that are meaningfully connected or linked (Jonassen, 1991, 1993; Lanza, 1991; McGuire, 1996; Vrasidas, 1996). Concepts relate to other concepts in a nonlinear and hierarchical fashion forming a net-like organization of memory (Jonassen, 1991; Lanza, 1991). This structure is reflected in the net-like organization of the Web where nodes are linked in an associative, nonlinear, and hierarchical fashion. Larger configurations of associations can be assembled that reflect a schematic model of memory. A schema consists of associative connections that represent a larger body of knowledge, that is, what one knows about “something.” Schemata interrelate to form the structure of memory and learning involves the reorganization of these cognitive structures (Jonassen, 1991; McGuire, 1996). Although consensus exists on the correspondence between cognitive models of memory and the structure of the Web, differences have emerged in the application of this similarity to the design of instruction.

Media

Use of the term “hypermedia” instead of “hypertext” in describing the structure of the Web reflects the “multimedia” nature of information that is available (Yang, 1996). The Web structure is not comprised solely of links among text documents or parts of text documents (Jonassen, 1991; Vrasidas, 1996), but of a range of media such as illustrations, pictures, animation, video, and sound. The “media” component of hypermedia enables representations of real-world contexts that produce authentic learning situations. Technological advances (e.g., second generation hypertext systems and browsers, alternate link types, distributed architecture, audio and video streaming technologies, [see Hill, 1996])
Using Concept Maps to Assess Individuals and Teams in Collaborative Learning Environments


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