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ABSTRACT
                  Views of learning and teaching have a direct relationship to
the treatment of subject matter in online instruction. Two instructional
theories, Elaboration Theory and Cognitive Flexibility Theory, are discussed
in the context of online learning. Elaboration Theory (C. Reigeluth) is
primarily concerned with the organization of course materials. The theory
prescribes sequencing conceptual, procedural, and theoretical content from
the most basic to the more complex. Cognitive Flexibility Theory is a
case-based theory of instruction intended for use with complex and
ill-structured knowledge domains. A central assertion is that advanced
learning involves the development of flexible representations of knowledge
that will help promote deep conceptual understanding and the ability to use
knowledge adaptively. The theory was intended to support interactive
technology, including hypertext and Web-based instruction. Research has
demonstrated the usefulness of these two approaches. (Contains 16
references.) (SLD)

Web-based Instruction: Theoretical Differences in Treatment of Subject Matter

Symposium: Comparison of Theoretical Perspectives in

Designing Web-based Courses

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Web-based Instruction: Theoretical Differences in Treatment of Subject Matter

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Views of learning and teaching have a direct relationship to the treatment of subject matter in online instruction (Miller & Miller, 2000). Two instructional theories, Elaboration Theory and Cognitive Flexibility Theory, associated with the objectivist and constructivist paradigms will be introduced. Time permits only a brief outline of each.

An overview of Elaboration Theory

Online courses based on information processing theory employ the web's associative and non-linear structure as a vehicle for representing the instructor's conceptualization of the subject matter. Content is presented in a pre-arranged sequence. However, since mere representation of content does not guarantee knowledge acquisition (Locatis, Letourneau, & Banvard, 1989), instruction also includes prescriptive strategies designed to facilitate the learner's accurate acquisition of content. Wilson (1985-86) suggested that content structure be taught directly. Strategies such as text organization, diagrams, and graphic organizers can be employed to this end (Locatis, et al., 1989; Wilson, 1985-86; Wilson & Jonassen, 1989).

Reigeluth's Elaboration Theory is primarily concerned with the organization of course materials. Elaboration theory prescribes sequencing conceptual, procedural and theoretical content and can be readily applied to the field of psychology. Classifying subject matter as conceptual, procedural, or theoretical depends on the nature of the content as well as the instructor's perspective. For example, a course on developmental theories could be organized as conceptual or theoretical content, a clinical skills course as a procedural or theoretical content, and a statistics course as procedural or conceptual content (e.g., House & Miller, 1998).

According to this theory, the most basic content should be introduced first, followed by increasing levels of complex content. As more complex content is introduced, the learner should be encouraged to integrate the new information with what they have already learned (Reigeluth, 1983). The first lesson, referred to as an Epitome, typically introduces a single type of content (conceptual, procedural, or theoretical) to be learned in its most simplistic form at an applied level. The next level of instruction (Level 1) elaborates upon the original context by providing more detail and complexity. Then,

ideas from Level 1 are elaborated even further at Level 2 of instruction, and this process continues until the full complexity of the content has been introduced. Throughout the learning process each level includes summarizers and synthesizers that encourage the learner to integrate and relate new information with what they have already learned. Summarizers should include condensed statements of each idea, a memorable example, and practice items. Synthesizers should include an explanation, examples that demonstrate the relationships among the concepts, and practice items that integrate ideas (Reigeluth, 1983, 1999; House & Miller, 1998).

The simple to complex sequencing of content, summarizers, and synthesizers are three main components of Elaboration Theory. Additional strategy components include application of prior knowledge, use of analogies to connect new ideas to prior knowledge and learning prerequisites, and cognitive strategies (Reigeluth, 1983).

An overview of Cognitive Flexibility Theory

Constructivism suggests that the associative nonlinear features of the web are ideal for development of learners' constructions of knowledge. Typically, information is presented in the form of a case study or realistic problem (Wilson & Jonassen, 1989) which serves as a context for learning. Content is not presented in a pre-arranged sequence, rather sequencing emerges as learners explore and develop their understanding of the subject matter (McGuire, 1996). This instructional characteristic is one that differentiates constructivism as an instructional approach. However, empirical evidence confirms that unrestricted learner control is problematic (Weller, Repman, Lan & Rooze, 1995; Wilson & Jonassen, 1989). Cognitive Flexibility Theory may provide an ideal solution. Course structure involves the ability for learners to "criss-cross" the instructional landscape in order to access content from different perspectives (Spiro, Feltovich, Jacobson, Coulson, 1995).

CFT is a case-based theory of instruction intended for use with complex and ill-structured knowledge domains. "A central assertion of this theory is that advanced learning involves the development of flexible representations of knowledge that will help promote deep conceptual understanding and the ability to adaptively use knowledge in new situations" (Jacobson, 1994, p. 146). This theory was intended to support interactive technology including hypertext, and web-based instruction. It has been used to develop instruction in the areas of literary comprehension, history, biology, and medicine (Kearsley, 2000).

The seven major elements of CFT most relevant to web-based instruction are as follows: (a) employ rich cases and examples; (b) use multiple forms of knowledge representation; (c) link abstract concepts to case examples; (d) demonstrate conceptual complexities and irregularities; (e) stress the interrelated and web-like nature of knowledge; (f) encourage knowledge assembly from different conceptual and case sources; and (g) promote active learning of complex knowledge at an advanced stage of learning and to enhance the ability of students to transfer their knowledge to new situations (Jacobson, 1994). Previous research by Jacobson and Spiro (1995) has shown that hypertext learning environments based on CFT promote superior knowledge transfer. Their findings also indicate that presenting content using a the criss-crossed landscape prepares students to apply what they have learned in different ways and in a variety of situations (Jacobson & Spiro, 1995).

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