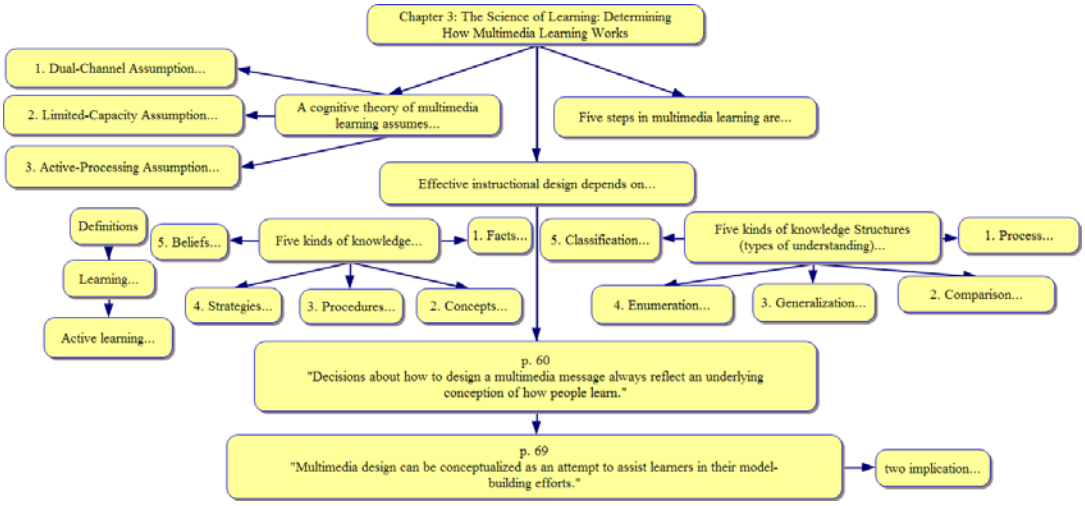

Chapter 3: The Science of Learning: Determining How Multimedia Learning Works

I. A cognitive theory of multimedia learning assumes...

p. 57

"A cognitive theory of multimedia learning assumes that the human information-processing system includes dual channels for visual/pictorial and auditory/verbal processing, each channel has limited capacity for processing, and active learning entails carrying out appropriate cognitive processing during learning."

A. 1. Dual-Channel Assumption...

p. 64

"The dual-channel assumption is that humans posses separate information-processing channels for visually represented material and auditorily represented material."

B. 2. Limited-Capacity Assumption...

p. 66

"The second assumption is that humans are limited in the amount of information that can be processed in each channel at one time."

C. 3. Active-Processing Assumption...

p. 67

"The third assumption is that humans actively engage in cognitive processing in order to construct a coherent mental representation of their experiences. These active cognitive processes include paying attention, organizing incoming information, and integrating incoming information with other knowledge."

II. Five steps in multimedia learning are...

p. 57

1. "...selecting relevant words from the presented text or narration,"
2. "...selecting relevant images from the presented illustrations,"
3. "...organizing the selected words in a coherent verbal representation,"
4. "...organizing the selected images into a coherent visual representation, and"
5. "...integrating the visual and verbal representations and prior knowledge."

p. 71

table 3.3

"Three Processes for Active Learning"

reorganization of the above

p. 75

"Each of these five steps in multimedia learning is likely to occur many times throughout a multimedia presentation."

III. **Effective instructional design depends on...**

p. 57

"Effective instructional design depends on techniques for reducing extraneous processing, managing essential processing, and fostering generative processing."

IV. **p. 60**

"Decisions about how to design a multimedia message always reflect an underlying conception of how people learn."

V. **p. 69**

"Multimedia design can be conceptualized as an attempt to assist learners in their model-building efforts."

A. **two implication...**

p. 69

"...two important implications for multimedia design: (a) the presented material should have a coherent structure, and (b) the message should provide guidance for the learner on how to build the structure."

Definitions

I. **Learning...**

p. 59

"Learning is a change in knowledge attributable to experience."

II. **Active learning...**

p. 68

"Active learning occurs when a learner applies cognitive processes

to incoming material - processes that are intended to help the learner make sense of the material. The outcome of active cognitive processing is the construction of a coherent mental representation, so active learning can be viewed as a process of model building. A mental model (or knowledge structure) represents the key parts of the presented material and their relations."

Five kinds of knowledge...

p. 60

Anderson et al, 2001; Mayer & Wittrock, 2006)

I. **1. Facts...**

P. 60

facts - "knowledge about characteristics of things or events, such as 'Sacramento is the capital of California,"

II. **2. Concepts...**

p. 60

concepts - "knowledge of categories, principles, or models such as knowing what a dog is or how a pulley system works,"

III. **3. Procedures...**

p. 60

procedures - "knowledge of specific step-by-step processes, such as how to enter data into a spreadsheet,"

IV. **4. Strategies...**

p. 60

strategies - "knowledge of general methods for orchestrating one's

knowledge to achieve a goal, such as knowing how to break a problem into subparts, and"

V. **5. Beliefs...**

p. 60

beliefs - "cognitions about oneself or about how one's learning works, such as the belief that 'I am not good at math."

Five kinds of knowledge Structures (types of understanding)...

p. 69

table 3.2

I. **1. Process...**

p. 68

1. "Process structures can be represented as cause-and-effect chains and consist of explanations of how some system works." (e.g., how a oven works)

II. **2. Comparison...**

p. 68

2. "Comparison structures can be represented as matrices and consist of comparisons among two or more elements along several dimensions." (e.g., comparative work or a teacher vs. a student)

III. **3. Generalization...**

p. 98

3. "Generalization structures can be represented as a branching tree and consists of a main ideas with subordinate supporting details."

e.g., the outline of a chapter

IV. **4. Enumeration...**

p. 68

4. "Enumeration structures can be represented as list and consist of a collection of items." e.g., a grocery list

V. **5. Classification...**

p. 68

5. "Classification structure can be represented as hierarchies and consists of sets and subsets." e.g., types of birds and their major characteristics