Applying Instructional Design Principles to PowerPoint Presentations

Sunil Hazari, Ed.D
Associate Professor
Richards College of Business
State University of West Georgia
shazari@westga.edu
http://www.sunilhazari.com/education

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Agenda

n Why this research?
n Preliminary findings
n Presentation software
n Learning/Instruction design
n Applications of PowerPoint (ABED6128 & InfoSec course)
n Q&A
Why this research?

- To determine how traditional learning theories can be applied to computer/web based instructional design
- To fill gaps in technology-based instruction
- To determine if existing course material can be made more effective as a result of this research
- To assist with course development

ABED 6128
Instructional Strategies

- Active Learning Principles
- Case Studies
- Web Based Education
- International Issues/Current Events
- Keller’s ARCS theory (Motivation)
- Reigeluth’s Elaboration Theory
- Multimedia Use in Instruction
- Group Final Project (Interactive Web Module)
Information Security Course

"Security and Control of Information Systems"
Offered at Univ. of Maryland (1998-2003)
MBA Elective
Students from different backgrounds (programmers, finance, accounting, medicine, government)
Course focus more on Management and Business aspect of Information Security
Strategy, policy, planning, technology etc.

Preliminary Findings

Use templates
Use light text on a dark background
Use no more than 5 lines on a slide
Font should be legible
Use colors
Avoid visual garbage
Use five elements per page
Research Objectives

- A deeper level of understanding of the process of technology-assisted learning and use of instructional design principles to facilitate learning
- Which theories are most appropriate and how can they be used
- How can instructional design in PowerPoint be optimized to maximize learning and achievement
- Increase pedagogical understanding of presentation tools

Technology-assisted Presentation Software

- Example: PowerPoint
  - Easy to use
  - Feature rich
  - Industry standard
  - Easy to use
  - Message lost in medium
  - Follows 90 / 10 rule
Types of Presentations

1. Information only. No interaction
2. Self-paced presentation (kiosk)
3. Supplementary presentation based on previously distributed notes (class)
4. Presentation with audience interaction (Bruner’s Discovery learning)
5. Presentation + Assessment

Learning Theories

- **Behaviorist**
  Observes changes in behavior that can be measured. Stimulus-Response. *Aristotle, Pavlov, Thorndike, Skinner.*

- **Cognitivist**
  Focus on thought process behind behavior and what happens in learner’s mind. Use of schema (internal knowledge structure) as a result of examples, analogies, metaphors, tutorials. *Gagne, Gardner. Keller, Reigleuth.*

- **Constructivist**
  Students construct own perspective of world through experience, mental structure, and beliefs that are used to interpret objects and events. *Vygotsky, Piaget, Bruner, Jonasson.*
Motivating the learner, identifying what is to be learned, reminding learners of past knowledge, providing instructional material, requiring active involvement, providing guidance and feedback, testing comprehension, and providing enrichment are common elements of an interactive learning unit.

ID Principles

“Proper sequencing of instruction is important to learning” (Kemp, 1985)

“Students prefer to learn in an environment that reflects cognitive style they are most comfortable, and also when instructional method used matches the student’s learning style (Gordon, 1995)

Gagne’s sequencing of instruction (based on Information Processing Learning theory)
Bloom’s Taxonomy of Learning

Knowledge: Define the term ‘Firewall’

Comprehension: Explain how firewalls work at the Application layer of the 7-layer OSI model.

Application: Illustrate through examples, benefits of having a firewall outside versus inside network perimeter

Analysis: Compare/contrast features of two firewalls made by different vendors

Synthesis: Propose a firewall setup for an online bank

Evaluation: Compare results of intrusions between pre and post firewall periods

Elaboration Theory (Reigeluth, 1992)

Teaches sequences and cause-effect relationships

Builds on Ausubel’s use of Advanced Organizers

Instruction should be organized from simple to complex sequence to provide better retention and motivation in learners

Example: Use PowerPoint ‘builds’ to show hierarchy of access controls in databases

Broad context to focused application represents “cognitive zoom” for the learner to absorb information using cognitive strategy activators.
Constructivism & PowerPoint

- Group interaction, Shared workspace
- Embed learning in relevant context, encourage use of multiple modes of representation
- Include visual stimuli such as tables, charts, scanned images
- Use PowerPoint as a presentation platform for remote sites

Multimedia

- Based on Dual Coding Theory (Paivio, 1991)
- Memory has 2 separate codes for processing information: Verbal & Visual
- Interconnection allows dual coding of information
- 3 levels of processing
  - Representational Processing – activation of one type of code by stimulus
  - Referential Processing – cross activation between either system
  - Associative Processing – activation of additional information within either system
Router

- Router examines packet and looks for destination address
- Compares address to segment information in table and forwards packet
- Optimize Routing Path using routing algorithm
- Must be robust to perform critical operations
- Adapt quickly to network delays
- Switch packet to next hop for further transmission

What role does technology play in today’s organizations?
Carly Fiorina, CEO of HP
Other strategies...

- Use of ‘Question Slides’
- Use of Quizzes for feedback
- Hyperlinked elements
- Integration of external programs

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