Tips for Creating Media-Rich Training Materials and Supporting Training with Online Resource Materials

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This presentation will review:

- What media and multimedia is, how it has been used historically, and how it fits into the training development process.
- The duel coding theory and its impact on how we think about training and use multimedia in training.
- A concept of training that encompasses training, support tools, and resources.
What is Media and Multimedia?

- A medium is a way of conveying information. There are many kinds of unique media.
  - Speech
  - Text
  - Paintings, illustrations, graphs
  - Moving images, animation

- Multimedia is the use of more than one type of medium at the same time to convey a message or information.
Thomas Edison
In 1922 Thomas Edison Predicted:

- The motion picture would replace textbooks (and perhaps teachers) in the classroom.

- However film was successfully used in WWII for training troops in everything from personal hygiene to weapons maintenance.
In 1947 the U.S. Army conducted research to demonstrate that instruction delivered by film resulted in better learning outcomes than traditional classroom or paper-based versions.

- Reading a micrometer
- What was the result?

There were no differences in learning among the three groups (film, classroom, or paper document).
Why didn’t the media have an affect on learning outcomes?

- Although each new wave of instructional delivery technology (starting with film) spawned optimistic predictions of massive improvements of learning...

- We have learned it is the instructional design that affects learning... not the media.
Critical Steps in Designing Effective Training

- Needs Assessment
- Establish Training Objectives
- Specify Training Content and Media
- Account for Individual Differences
- Specify Learning Activities
- Evaluate Training
- Revise Training
So Why is Multimedia Important?

- Multimedia can create a rich interactive experience.
- Multimedia, appropriately used, can allow learning to occur with less effort.
- Misused, multimedia can actually inhibit learning.
- Multimedia can not fix an inherently bad learning design.
How do we acquire information during training?

- From our senses
  - Hearing
  - Sight
  - Touch
  - Smell
  - Taste
How do we process information during training?

Duel Coding Theory
How do we improve the chances new information will be assimilated?

- Organize and present what you teach in a way that makes sense to learners.
  - Organize information into logical sequences in quantities that can be processed by working memory.
  - Structure the information so that it is easily integrated into existing mental models.
  - Use both auditory and visual sensory information
Guiding Principles for Incorporating Multimedia into Training

- Multimedia principle
- Contiguity Principle
- Modality Principle
- Redundancy Principle
- Coherency Principle
- Personalization Principle
Types of Media Used in Training

- Text
- Audio (sounds, music, narration)
- Graphics (photographs, drawings or illustrations, paintings, 3D objects)
- Video
- Animation (sequences of drawings)
- Virtual Worlds (3D scenes that learners move through and interact with)
Guiding Principles for Incorporating Multimedia into Training

- **Multimedia principle** - use both words (text and audio) and graphics (drawings, charts, graphs, maps, photos, animation or video).

- **Rationale** – People are more likely to understand material when engage in active learning. Multimedia encourages learners to engage in active learning by making connections between verbal and pictorial representations.
Multimedia principle - Example

Operate fire extinguisher using the P.A.S.S. technique:

- **PULL...** Pull the pin. This will also break the tamper seal.

- **AIM...** Aim low, pointing the extinguisher nozzle (or its horn or hose) at the base of the fire.

- **SQUEEZE...** Squeeze the handle to release the extinguishing agent.

- **SWEEP...** Sweep from side to side at the base of the fire until it appears to be out. Watch the area. If the fire re-ignites, repeat steps 2 - 4.
Guiding Principles for Incorporating Multimedia into Training

- **Contiguity principle** - place corresponding words and graphics near each other.

- **Rationale** – When separated on the screen, people must use their scarce cognitive resources just to match them up. This leaves less to mentally organize and integrate the material.
Contiguity principle - Example

When moving furniture, bend at the knees placing one foot in front of the other. Lift smoothly using your legs and keeping your back straight.
Guiding Principles for Incorporating Multimedia into Training

• **Modality principle** – present words as audio narration rather than onscreen text whenever the graphic is the focus of the words and both are displayed simultaneously.

• **Rationale** – Learners may experience an overload of their visual channel (trying to read subtitles and watch a foreign film).
Modality principle - Example
Guiding Principles for Incorporating Multimedia into Training

- **Redundancy principle** – presenting words in both text and audio narration can hurt learning.

- **Rationale** – Learners may pay so much attention to the printed words that they pay less attention to the accompanying graphics due to an overloaded visual channel.
Leaving the laboratory hood sash up, illustrated by the hood on the left, reduces the face velocity of the hood and increases the chance for vapor spillage out of the hood. More effective control is maintained when the sash is positioned in the half-closed position. This is illustrated by the hood on the right.
Redundancy principle - Example

Sash open

Sash half-closed

Less effective control  More effective control

Airfoil sill

Yapors can spill over the sill and into the room air.
Guiding Principles for Incorporating Multimedia into Training

- **Coherence principle** – Adding interesting material, but not essential, can hurt learning.
  - Avoid extraneous sounds (background music)
  - Avoid extraneous pictures and graphics
  - Avoid extraneous words

- **Rationale** – Working memory is highly limited and unnecessary sounds, graphics or text can overload the cognitive system.
Coherence principle - Example

Design features of a BL3 laboratory
A HEPA filter will remove particles from the air using four filtration mechanisms.
Guiding Principles for Incorporating Multimedia into Training

• **Personalization principle** – Use a conversational style (first and second person constructions) and virtual coaches.

• **Rationale** – People work harder to understand material when they feel they are in conversation with a partner rather than simply receiving information. Virtual coaches provide hints, worked examples, demonstration, explanations, and stories.
Personalization principle - Example

Formal version

Eye protection must be worn in the laboratory at all times. The type of eye protection will depend on the hazards associated with the work conducted. Wear goggles to protect against a chemical splash to the eyes.

Personalized version

Hey man, don’t end up like me. Wear your eye protection when working in the lab and make sure it’s the right type. Wear your goggles if you could be splashed in the eyes by a chemical.
Thinking Differently About Training

• Don’t teach what you don’t have to and only teach at the appropriate moment.

  – Safety training programs often overwhelm workers with unnecessary information.
  – Information received in training may be used infrequently and long after training occurs.
  – People learn when they are ready, not when it is convenient to provide them with training. Training can not be force-fed.
Thinking Differently About Training

Components of a Training and Information Support System

- **Training** – instructing, transferring new skills and knowledge to user.
- **Support tools** – guide performance directly, assist in performance (or do it completely).
- **Resources** – inform, and manage/organize knowledge.
Thinking Differently About Training

**Training**
- Instruction in locking and tagging out equipment

**Support tool**
- Detailed checklist on locking and tagging out a particular piece of equipment

**Resources**
- Description of previous experience locking out or maintaining this piece of equipment
Graphics Tools

- **Software**
  - Fireworks & Freehand (Macromedia)
  - Photoshop & Illustrator (Adobe)
  - Visio (Microsoft)

- **Formats**
  - Vector graphic
  - Bitmap graphic

- **Price** $200 - $400
Graphics Tools
Graphics Tools
Creating Audio

- Using your sound card and microphone
- Portable audio recording devices
  - Price - $400 - $1600
  - Microphones - $35 - $300
- Format
  - WAV; MP3
Editing Audio

- Software
  - Cool Edit Pro (Syntrillium)
  - Sound Forge (Sonic Foundry)
  - Audition (Adobe)
- Price $200 - $400
Editing Audio
Video Editing

- **Software**
  - Avid Xpress (Avid)
  - Final Cut (Apple)
  - Vegas Video (Sonic Foundry)
  - Pinnacle Studio (Pinnacle Systems)
  - Premiere (Adobe)

- **Formats** – AVI; WMV; MPEG; MOV; RV

- **Price** $100 - $1700
Non-linear Editing