

Research Based Methods for Using PowerPoint, Animation, and Video for Instruction

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ABSTRACT

This paper is a literature review on practical techniques and guidelines using PowerPoint, animation, and video effectively for instruction. The motivation to collect research based guidelines for the creation and use of instructional media comes from Giordano and Trufant's observation that one of the common barriers that prevent faculty from successfully integrating technology into their teaching is a "lack of familiarity with best practices, knowledge, and research on the appropriate uses of technology in the classroom" [1]. This paper would be of interest to faculty and instructional technology staff who support faculty in the development of instructional media.

Categories and Subject Descriptors

H.5.1 [Multimedia Information Systems]

General Terms: Design, Human Factors.

Keywords: Literature Review, multi-media authoring, faculty training, animation, video, PowerPoint, pedagogy.

1. INTRODUCTION

There is a rich collection of research and knowledge about how to use media for instruction effectively. While some aspects of teaching with media seem to be governed by common sense, other aspects of using media in instruction are far more subtle and gained through experience and experimentation. "Visual literacy is an acquired competency in visual expression and communication that involves insights and skills no less disciplined than those required for proficiency in engineering and construction" [2].

As faculty explore educational technology and visual literacy in the classroom, it is prudent for instructional technology support staff to be aware of current research on using PowerPoint, animation, and video in an educational setting. As instructional technology support staff train faculty how to use various software applications, they can include information on how to use the software to its best effect and maximum efficiency.

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This is a short literature review on practical tips for using technology in the classroom gleaned from a wide variety of sources.

2. CHOOSING MEDIA

Some media formats show off particular types of content better than others. Making a thoughtful decision on which media type is most appropriate for the content is a good first step to using media successfully. Consider supplementing instruction with technology where a subject is widely taught, and widely acknowledged to present difficulties for students to get the best response for your efforts [3]. PowerPoint can be used to show low resolution color images, graphics, and video that cannot be reproduced in printed handouts [4]. Animation is appropriate when video may overburden with too much detail, or when users must focus on specific details [5]. Use video where the content requires movement to clearly illustrate a point [6]. Table 1 is useful in that it asks the question: what media formats should be considered for the various components of a lesson plan?

Table 1. Uppsala grid for choosing media [7].

		Lesson Components			
		Lecture	Discussion	Assignment	etc...
Media Format	Text				
	Graphic				
	CMS				
	PowerPoint				
	Animation				
	Audio				
	Video				
	Other				

3. GENERAL MEDIA USE SUGGESTIONS

The following tips apply to media formats including PowerPoint, animation, and video.

3.1 Color

- Use color in a meaningful way [5].
- Use a dark text color on a neutral unsaturated background [5].

- Use three to six colors per screen at most [5].
- Highlight important information with bright colors [5].
- Avoid hot colors and color schemes such as blue/orange, red/green, and violet/yellow [5].
- Use color to organize information and provide contrast between screen objects [5].
- Avoid distinctions based only on color cues [6].

3.2 Getting Attention

Direct the attention of students by using arrows, labels, narration, colors, shapes, highlighting, bordering, underlining, mixed type sizes and fonts, but use too many and you will annoy your audience [6].

3.3 Design

3.3.1 Unity and Harmony

Elements of a design should look as though they belong together through a visual connection. Make the visual image coherent and readable [2].

3.3.2 Cohesion

Seek organization so that the whole dominates the parts. The viewer perceives the entire design prior to observing the individual elements [2].

3.3.3 Focal Point

Attract the viewers attention by using contrast or isolation between elements [2].

3.3.4 Balance

Imagine a vertical axis and look for equal weight on each side. Use symmetry or asymmetry. In asymmetry, place the larger object lower in the composition [2].

3.4 Fonts

The large print giveth and the small print taketh away [8].

Use a sans serif screen display font like **Verdana**, **Georgia**, and **Geneva** are also acceptable. Use novelty fonts sparingly, if at all [9].

3.5 Text

- Limit the number of lines per screen and use no more than two or three font types and sizes [5].
- Use highlighting to focus attention [5].
- Left justify text and mix upper and lower case letters, center headings and titles, do not hyphenate words at the end of a line. Reserve all uppercase letters for emphasis and titles [6].
- Keep in mind that people read text about 28% slower and with lower comprehension from a computer screen than from a print based media [5].
- Provide generous white space to separate blocks of information [6].
- Convert sentences containing several items to lists [6].

- Limit highlighting or boldface to 10 percent of the display. Used mixed type sizes or fonts to differentiate screen components [6].

3.6 Audio

- Limit audio to what is relevant and use the active voice. Use short sentences. Write the script for the ear [6].
- If the message is too long, break it into chunks [6].
- Watch out for acronyms, technical jargon, and unfamiliar terms [6].
- Avoid long pauses in visuals while waiting for extended narration to finish [6].
- Alternate male and female voices to provide variety [6].
- When possible provide a corresponding visual for the narration [5].

3.7 Graphics

Irrelevant graphics/clipart can harm learning [10].

To use graphics well, use text in your graphics. Mix in text frames with visual cues, graphics with an equal amount of text, and graphics with some text cues [11]. Keep the level of detail in a graphic appropriate to the learning objective [10].

4. POWERPOINT

4.1 Easy to Use Inappropriately

Elaborate PowerPoint presentations cause lower achievement on test scores [9]. What makes PowerPoint so potentially inappropriate for education? Edward Tufte does a good job of summing it up: foreshortening of evidence and thought, low spatial resolution, a deeply hierarchical single-path structure as the model for organizing every type of content, breaking up narrative and data into slides and minimal fragments, rapid temporal sequencing of thin information rather than focused spatial analysis, conspicuous decoration that is irrelevant to the content, a preoccupation with format not content, an attitude of commercialism that turns everything into a sales pitch [4]. Using PowerPoint well for education requires careful consideration of the content. Proceed with caution.

4.2 Using PowerPoint Well

- Include only images that teach [9].
- Avoid bells and whistles, animations, sound effects, graphic templates, irrelevant graphics, and other distractions from the content [9].
- Avoid printing out PowerPoint presentations as a report or for note taking [4].
- Avoid line-by-line slow reveal, and elaborate hierarchies of bulleted lists [4].
- Never read aloud from slides [4].
- Do not use font sizes below 24 points [12].
- prepare a handout (not a print out of your slides) for your audience [12].

- practice delivery of your presentation from the computer in the room in which you will be presenting [12].

5. ANIMATION

- The motion being illustrated should be meaningful to the learning objective [10].
- Carefully cue students to the information [10].
- Use object motion to control attention. Gradually reveal labels, symbols and objects to control viewing order. Reveal related elements in a sequence [13].
- Reveal objects and labels as they come up in the audio track. Speech information should reinforce images. If the speech information is complex or important, then present it concurrently in a caption [13].
- Chunk content into smaller units and provide opportunities for interaction. Ask a question after related content [6].
- Keep feedback on the same screen with the question and student response. Provide feedback immediately following a student response [6].

6. VIDEO

- Carefully balance the level of detail with the pace of the video [10].
- Present all information in three shot sequences, long, medium and closeup. Use close up shots to grab the student's attention and imply that something is important. Use long shots to establish frames of reference [6].
- When showing something new focus on the subject long enough for the audience to register what is being shown [6].
- Keep the main subject well lit and watch for possible background distractions [6].
- The eye focuses on lighted instead of dark areas and movement instead of static images [6].
- Use audio and video to reinforce each other [6].
- Present a series of visuals before or at the end of instruction to stimulate recall of prerequisites [6].
- Use still frames. Video has lower resolution than graphics. Use graphics to reduce irrelevant details and highlight key information.[6]
- Use a tripod. The movie will compress to a smaller file.
- Audio is half of video.
- Keep video to 3 to 5 minutes.

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