

PRODUCING PERSONAL MULTIMEDIA PRESENTATIONS TO ENHANCE ENGINEERING EDUCATION

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ABSTRACT

Universities have started to equip their classrooms and seminar rooms with multimedia equipment such as televisions, video players, computers and multimedia projectors. Multimedia presentations stored in VHS tapes, CDs, or DVDs, are available commercially, but they are expensive and usually not designed for a specific engineering subject. To maximize the use of this technology in the teaching and learning process, multimedia presentations about engineering must be developed. This paper presents the experience of the author in producing photo slide shows and video presentations using a digital video editing software. These multimedia presentations, if designed properly, can be integrated in the curriculum to enhance the delivery of information and knowledge in engineering schools.

KEYWORDS

Multimedia, Video, Photo Slide Show, Software, Engineering Education

1. INTRODUCTION

The trend toward the use of multimedia technology in instruction has increased dramatically. Universities, recognizing the important role that multimedia can play in the teaching-learning process, have started to equip classrooms and seminar rooms with multimedia equipment such as televisions, video players, computers and multimedia projectors. University libraries have also started to purchase video materials (CD-Rom, VHS, VCD and DVD formats) to maximize the use of multimedia technology. The library collections on multimedia presentations in engineering, however, are scarce. Multimedia presentations or software are available commercially, but they are expensive and usually are not designed for a specific engineering subject. The price of DVDs about engineering marketed by *Insight Media* (<http://www.insight-media.com>), for example, ranges between US\$ 119 to US\$289 for a program running for about 20 min. New multimedia equipment, specifically the multimedia projector and computer, have been used by the faculty on a limited way, usually when presenting their lectures using *Microsoft Powerpoint*. However, there are other modes of using multimedia in the classroom. Multimedia as a tool for teaching and learning has not been fully utilized.

To effectively and efficiently use multimedia in the classroom, there is a need to develop multimedia presentations. The author explored the use of digital video editing software to create multimedia presentations stored in CD and DVD discs. This paper presents the author's experience in creating and producing multimedia presentations such as photo slide shows and video presentations. The production of a multimedia presentation in disc or file format requires the creativity, imagination, technical know-how

and mastery of engineering courses of the faculty. Producing personal video or movie is relatively cheap than purchasing commercially available materials. If multimedia presentations like photo slide shows or video are developed on various topics in engineering and are properly designed to specific engineering subjects, multimedia technology can enhance instruction and training in engineering schools.

2. DEFINITION OF MULTIMEDIA

The term “multimedia” is sometimes defined as content presentation using a combination of media - sound, audio, text and images (static, moving, animated, video). Although the delivery of multimedia can be done using various equipment such as a video player, the present trend in multimedia instruction is delivery by computer and through the internet. A more definite definition of multimedia is proposed by some authors [1]: “A computer system or computer system product that incorporates text, sound, pictures or graphics, and/or audio.”

Multimedia is multi-sensory and it engages the senses of the students. The varying characteristics of different presentation media and modes, and their implications for learning, have direct implications for the design of multimedia strategies and materials. **Table 1** describes the different elements in a multimedia presentation and their attributes [2].

Table 1. General Guidelines for Choosing the Right Media

Media	Type	Attributes
Text	Text	Written words are descriptive, detailed, and direct. Careful use of words is critical – they are easily misinterpreted.
Narration or Voice-over	Audio	Listening to narration supplements visual information and can be used to attract attention, arouse and hold interest, provide cues and feedback.
Sound effects	Audio	Add audible texture to visuals. Provide audible cues. Emphasize points. Add entertainment value. Reach audience on a mostly subconscious level.
Music	Audio	Sets mood and tone of the presentation. Evokes feelings in the audience. Highly expressive, engrossing, and entertaining. The most subtextual of all media.
Graphics and illustrations	Image	Designs, drawings, paintings and clip arts can be use thematically, literally, or symbolically. Graphics can be explanatory, conceptual, or suggestive. Use color, style, and design to create mood or atmosphere. The graphic design connects the disparate elements of the presentation.
Still photographs	Image	Visually rich, detailed, and attention-getting, stills can convey realistic images and information. They can be highly suggestive, even symbolic. Artistic photography will grab attention. Dramatic subject matter makes both a literal and subtextual impact.
Charts and graphs	Image	Ideal for data visualization and comparative studies. 3-D and creative thematic elements can alert the audience.
Video	Video	Highly realistic and descriptive, they can also be highly entertaining. Use video to communicate time-based information in a time-based manner. Motion grabs attention and has a wide artistic range.
Animation	Video	Computer animation can be literally descriptive and suggestive and works well for explaining or clarifying complexities.

The use of multimedia in instruction and training can be implemented in various modes. In the present “information age”, the most advanced mode is through the internet. This approach which is quite costly requires the development of web-based learning materials and this is ideal for on-line or distance education.

The traditional method of delivery of instruction using multimedia requires equipment that is not very expensive. The most common method is the use of the overhead projector (OHP) and OHP slides. Another approach is the use of video players and video discs (VCD and DVD formats) which are usually purchased commercially. With the introduction of the multimedia projector, presentations with the aid of the computer have started to become popular. The most common way of delivery of lectures in the classroom using the computer and a projector is through *Powerpoint* presentations, animations and software demonstrations. Another mode, which is proposed in this paper, is through multimedia presentations like short photo slide shows and video presentations. The authoring software used in developing multimedia presentations is digital video editing software. Digital video editing software belongs to the group of authoring tools called as “*dedicated media integration tools*” (**Figure 1**). These tools cannot develop graphics, text, or audio within the application; instead they are used to import multimedia elements and arrange the events and elements in the timing sequence desired. The presentations created using digital video editing software can be presented using a video player or multimedia projector and computer. No interaction between the computer and the audience is incorporated in this type of application yet. The interaction or exchange of ideas takes place only between the presenter and the audience.

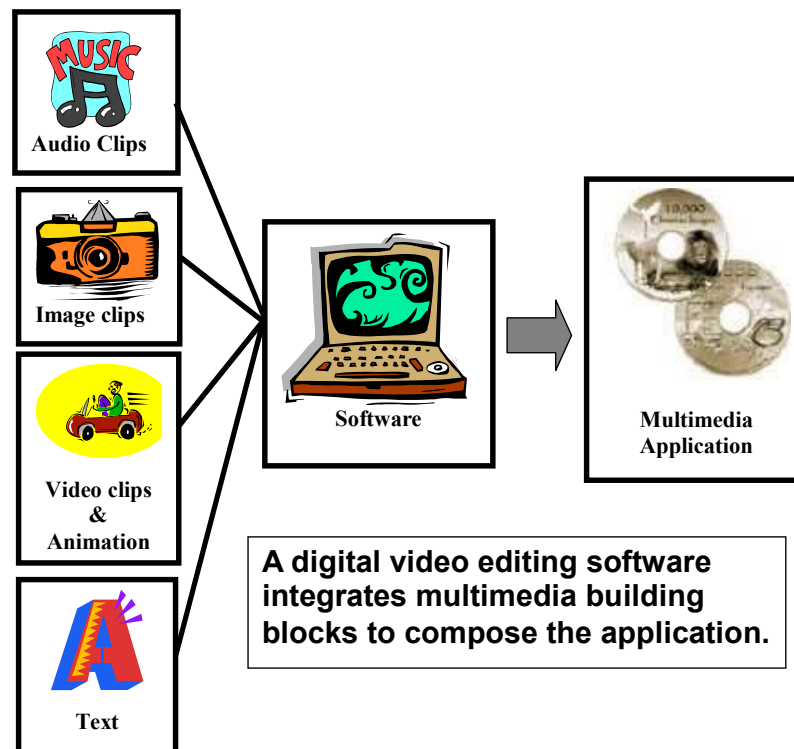


Figure 1. Integrating various types of media using a software

3. OVERVIEW OF DIGITAL VIDEO EDITING

Digital video editing is an exciting activity that challenges creativity and imagination. One will perform various tasks in the production of his own multimedial presentation. Among the roles that one has to play are:

- (a) Content specialist – prepares the content such as data, graphics and facts
- (b) Script writer – tells the story by planning the visual flow of the presentation
- (c) Artists – are responsible for the graphic elements of the presentation such as backgrounds, text, color, 3-D objects, animation, renderings, graphs, charts etc.

- (d) Photo specialist – responsible for taking the pictures and editing digital photos
- (e) Audio specialist – responsible for recording and editing narration or voice-over; selecting, recording or editing sound effects; recording and editing background music.
- (f) Video specialist – responsible for video capturing, editing and digitizing.
- (g) Director – decides on how to use the images, video clips, audio clips, colors and text effectively to convey the message.
- (h) Educator – applies the learning and pedagogical principles of multimedia to effectively use the presentation in instruction.

3.1 Hardware and Software Requirements

To create personal multimedia presentation, the following are needed:

- (a) A computer with at least 20 GB free disk space to run the video editing software. Most video editing software requires a *Windows XP* operating system.
- (b) A CD-Rewritable or DVD-Rewritable drive for producing video in discs.
- (c) Blank rewritable discs (CD-R or DVD-R)
- (d) A digital camera (optional). This is necessary if one wants to take his own digital pictures and short video clips..
- (e) A digital camcorder (optional). This is use for shooting one’s own video footages.
- (f) A microphone is required for recording voice-overs
- (g) A digital video editing software. Among the commercially available software are:
 1. *Cyberlink PowerDirector 5* – This is the software used by the author
 2. *Microsoft Windows Movie Maker* - This comes free with *Windows XP* software.
 3. *Pinnacle Studio Plus*
 4. *Ulead PictureShow*

To run the files and discs on the computer, a computer with speakers and a software such as *Windows Media Player* is needed. The discs can also be palyed using a VCD or DVD player.

3.2 Media

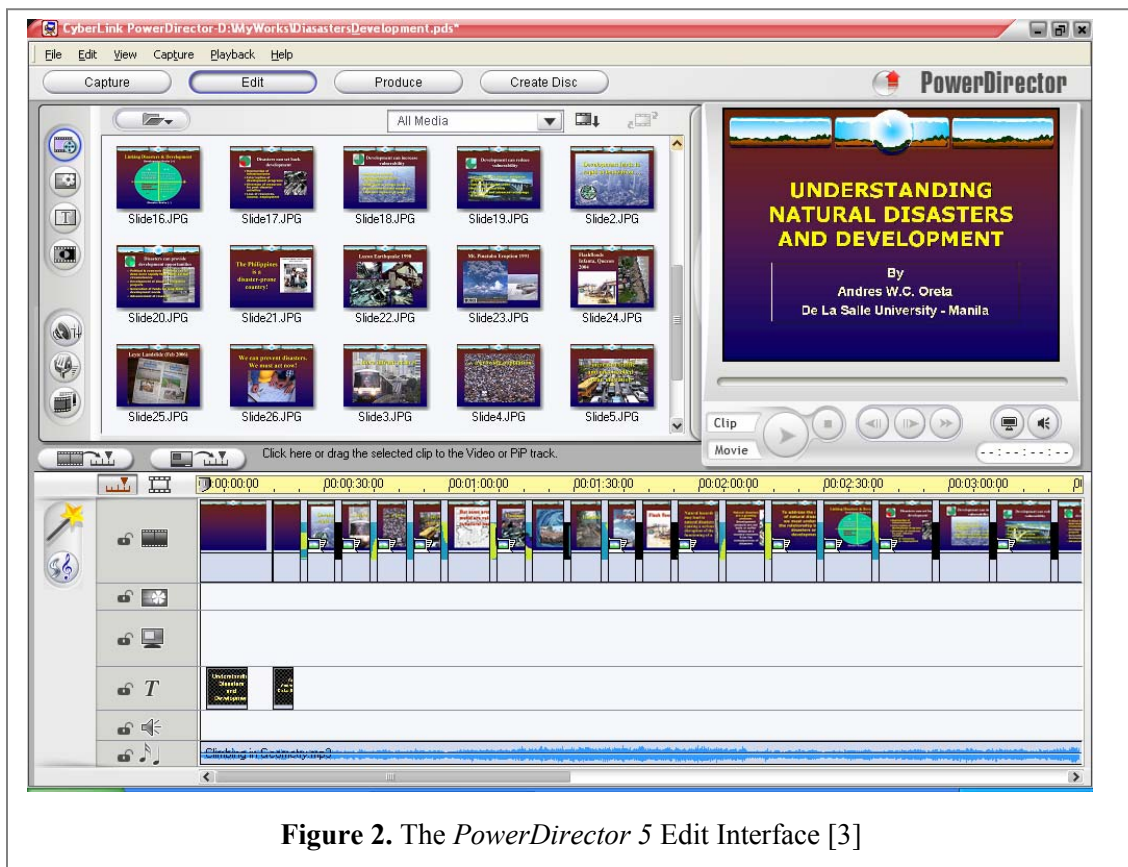
To produce personal multimedia presentation using a digital video editor, the following media are imported to the software::

- (a) **Image clips or Pictures:** These includes still pictures or images that are obtained with a digital camera. Photos and images can also be scanned to convert them in digital form. Images in the internet under the “public domain” can also be downloaded and used freely provided proper acknowledgment is done. *Powerpoint* slides can also be converted to jpeg files. Graphics, clip art, charts can be created using appropriate software. Files for pictures usually have the following extensions, .bmp, .gif, .jpg, .jpeg, .tif and .tiff.
- (b) **Video clips:** These are video captured using a digital camera or camcorder. Video clips include the audio originally shot with the video. Files for video clips usually have the following extensions, .avi, .mp2, .mpg, .mpeg and .wmv.
- (c) **Audio clips:** These are audio files which include sound effects, music and voice-over. Files for audio clips usually have the following extensions, .mp2, .mp3, .mpa, .wav and .wma.

3.3 Producing the multimedia presentation

When the video editing software is first opened like *PowerDirector 5*, the edit interface similar to **Figure 2** appears. Using this interface, a photo slide show or movie can be created. The digital video editing process can be summarized by the following steps:

- (a) Collect all digital pictures, image clips, video clips, audio clips and music files before editing...
- (b) Plan the visual flow of the presentation to tell the story.
- (c) Run the video editing software and the edit interface (**Figure 2**) will appear.
- (d) Import all image clips (digital photos and graphics) and video clips into the library. The library is the storeroom in which all the media clips used in the project are kept.
- (e) Following the story line, drag the image and video clips in the proper order into the time line of the edit interface.
- (f) Trim the video clips to remove unwanted portions at the beginning, between scenes, or at the end.
- (g) Set the duration for the display time for each image clip.
- (h) Import the audio clips (music and voice) into the library and drag them to the workspace to add background music or narrative voice over to the movie. The audio clip (background music) can also be trimmed to fit the duration of the presentation. Transition effects such as fade-in or fade-out can also be applied to the audio clips.



- (i) Apply transition effects between clips. Transitions are visual effects used to make the flow from clip to clip smooth. **Figure 3** shows some of the transitions available in *PowerDirector 5*.
- (j) Add title effects on selected clips.
- (k) Add voice over, if necessary.
- (l) Add other effects on clips, such as zoom and pan, if necessary.
- (m) Preview the movie to make sure all the clips and effects are working to create the movie desired. Edit if necessary.
- (n) When satisfied with the preview, produce the movie as a file in formats such as .avi, .mpeg1, .mpeg2 or create a disc (VCD or DVD format).
- (o) Run the file in the computer using the *Windows Media Player*. The disc can be played using either a video player or the computer.

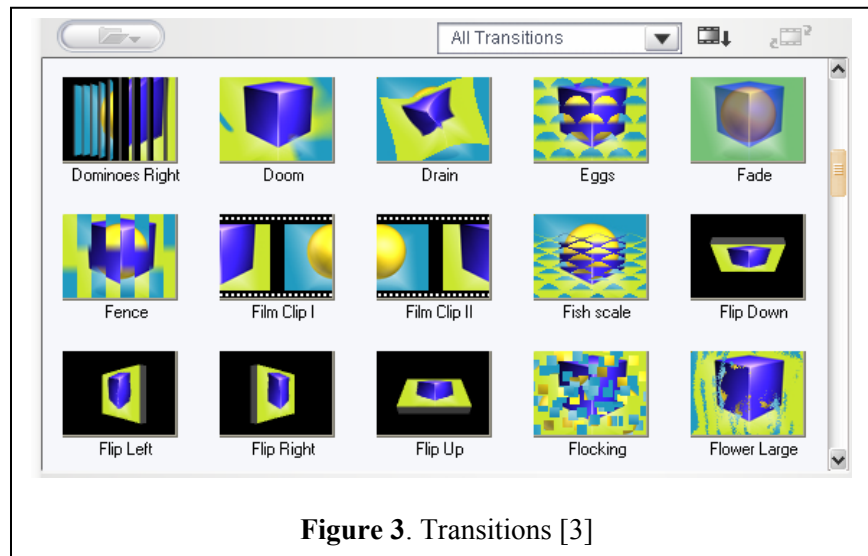


Figure 3. Transitions [3]

3.4 Examples of multimedia presentations

The author has edited and produced several multimedia presentations. Most of them are photo slide show presentations where only images or pictures with background music are used and there is no voice-over. Presentations that combine images, video and voice-over or narration can also be developed. Summarized below are some of the presentations created by the author:

(a) “*Understanding Natural Disasters and Development*” in **Figure 4** is a photo slide show presentation focusing on how natural disasters and development are linked. Natural disasters, have a negative and positive effect in the development of a country. On the other hand, development also contributes to both the occurrence and mitigation of natural disasters. This presentation is about five minutes.

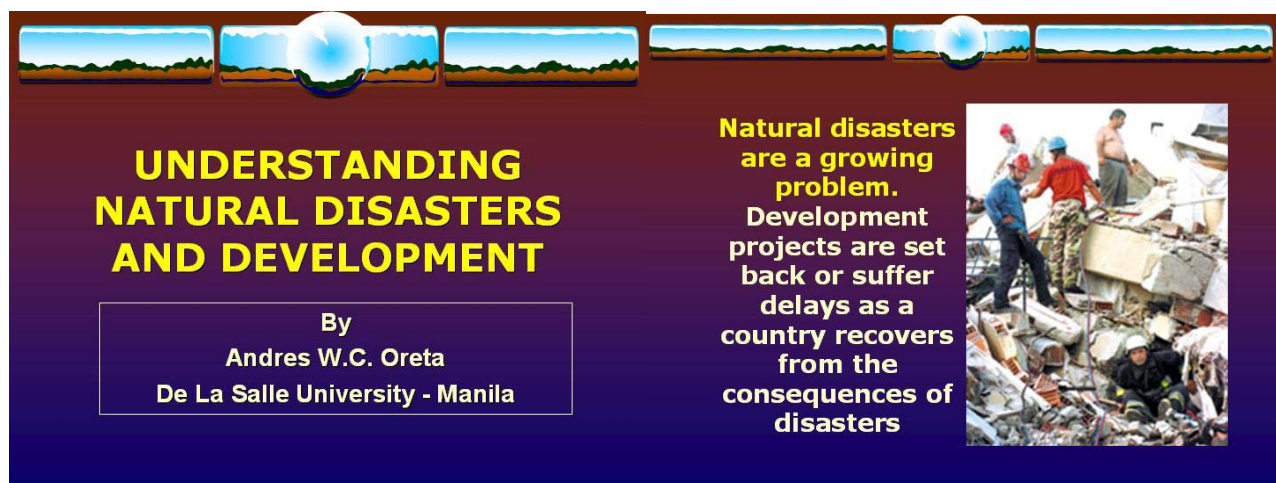


Figure 4. Photo Slide Show Presentation on “Understanding Natural Disasters and Development”

(b) “*Impact of Natural Disasters on Infrastructures and the Environment*” in **Figure 5** was created by the author under the Japan Society for the Promotion of Science (JSPS) Core University Program on Environmental Engineering [4]. To increase awareness about the impact of natural disasters on built infrastructures and the impact of structural and geotechnical failures on the environment, a photo archive and slide show video presentation was developed. Highlights of the photo archive and video presentation are some important natural disasters like earthquakes, landslides, tsunamis and volcanic eruptions and their effects on built structures. Through these photos, lessons on the cause of the damage or collapse of structures may be learned and corresponding response can be done to reduce the impact of natural hazards.

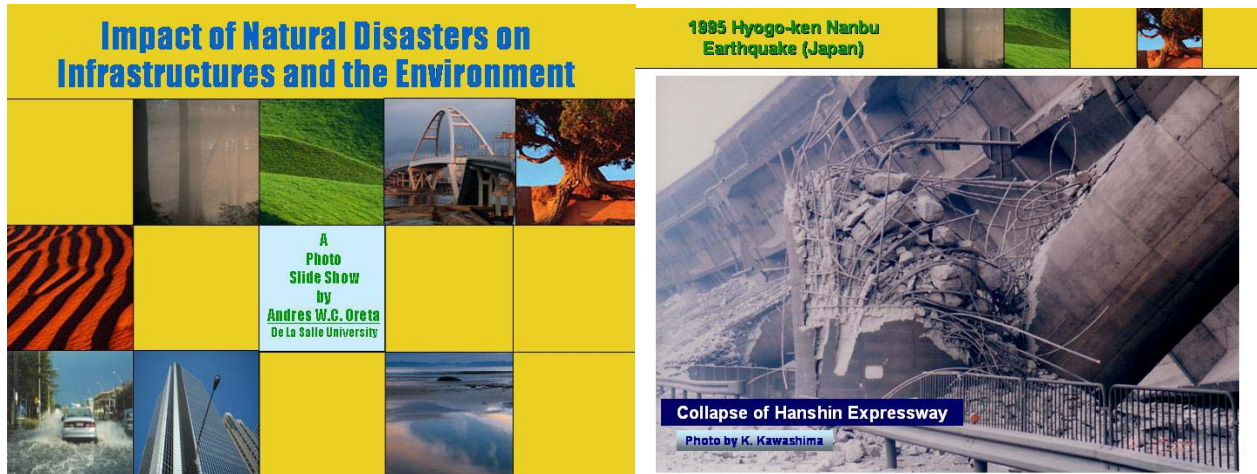


Figure 5. Photo Slide Show Presentation on “The Impact of Natural Disasters and on Infrastructures and the Environment”

(c) During the orientation of incoming civil engineering students at De La Salle University, the photo slide show presentation, “*Civil Engineering at DLSU-Manila: It’s the Right Choice*” was presented (**Figure 6**). The presentation has two parts. The first part highlights the “Top Ten Reasons Why Students Enroll at DLSU-Manila.” The second part presents what the students expect to learn about civil engineering at DLSU-Manila. Multimedia presentations, like this, are ideal in promoting engineering programs in various fora.



Figure 6. A Photo Slide Show Presentation Promoting Civil Engineering at DLSU-Manila

(d) During the PAASCU accreditation survey, a presentation about “SERVECom”, the service and community outreach committee of DLSU College of Engineering was presented (**Figure 7**). The presentation has two parts. The first part presented the different community outreach projects and values development oriented activities organized through SERVECom. These activities include the “Adopt-an-ENG School” project,” Night College, Ethics bowl and assistance to NGOs. The second part presents “Powering Up ABRA”, the Micro Hydro Project of the college at Malibcong, Abra.



Figure 7. A Photo Slide Show Presentation about the Community Outreach Projects of DLSU College of Engineering

4. MULTIMEDIA AND LEARNING

The current use of multimedia technology in education has generated interest in integrating multimedia into the realm of cognition and instruction. Cognitive and pedagogical principles relevant to learning and instruction within multimedia environments have been developed by researchers. Mayer and his coworkers studied the impact of multimedia on learning, based on how the human mind works to process verbal and visual information [1]. The important insights about media and learning are:

1. Words and pictures, although qualitatively different, complement one another and promote learning, if learners are successful in mentally integrating visual and verbal representations.
2. True learning is more a process of knowledge construction than information acquisition.
3. Deep learning is evidenced by retention and transfer (lack of which indicates no learning, or merely superficial rote learning).

In Mayer’s model there are three assumptions underpinning a cognitive theory of multimedia learning[1]:

1. Humans have dual channels for processing input as part of learning, the visual and the auditory;
2. While the two channels exist in most people, humans are limited in the amount of information they can process in each channel at one time; and
3. Learners must actively process information and experience as part of learning, by a process that includes attending to relevant incoming information, organizing selected information into coherent mental representations and integrating mental representations with other knowledge.

Seven principles useful for guiding the design of multimedia instruction are summarized by Doolittle et al. [5]. Under these principles, students have been shown to achieve greater retention and transfer based on researches.

1. **Multimedia principle** – Students learn, retain and, and transfer information better when the instructional environment involves words and pictures rather than from words or pictures alone.
2. **Modality Principle** - Students learn, retain, and transfer information better from animation and narration than from animation and on-screen text. When on-screen text and animation are presented simultaneously, the visual channel may be overloaded. However, when the on-screen text is transformed into auditory narration, the cognitive load of the visual channel is reduced, and a balance between the auditory and visual channels is achieved.
3. **Redundancy Principle** – Students learn, retain, and transfer information better from animation and narration than from animation, narration and on-screen text. This principle is an extension of the multimedia and modality principle. Learners have limited capacity to process material visually and auditorily. When on-screen text and animation are present, the visual channel may be overloaded and this may impair the auditory channel. Eliminating the unneeded on-screen text reduces the cognitive load of the visual channel.
4. **Coherence Principle** – Students learn, retain, and transfer information better when the instructional environment is free of extraneous or irrelevant words, pictures and sounds. Multimedia instructional environments should be clear and concise, avoiding the duplication of information and the inclusion of extraneous, non-informative elements such as add-ons like moving texts or interesting sounds.
5. **Signaling Principle** - Students learn, retain, and transfer information better when cues or signals are used to guide the learner's attention and processing during a multimedia presentation. There are various forms of signals that can be used like change in intonation or pausing during narration or use of arrows, color emphasis, summary icons in pictures.
6. **Contiguity Principle** – Students learn, retain, and transfer information better when corresponding words and pictures are presented simultaneously or very close together rather than successively. Presenting words and pictures one after the other requires extra working memory and processing from the learner.
7. **Segmentation Principle** – Students learn and transfer information better if the narration and animation are presented in short, user-controlled segments, rather than as long continuous presentation.

Successful learning, according to Mayer, requires students to perform five actions, with direct implications for the design of effective multimedia instruction:

1. Select relevant words from presented text or narration
2. Select relevant images from the presented illustrations
3. Organize the selected words into a coherent verbal representations
4. Organize selected images into a coherent visual representations
5. Integrate the visual and verbal representations with prior knowledge

The cognitive and pedagogical principles of multimedia presented are useful in designing effective multimedia presentations. Educators who plan to create their own multimedia presentations should be guided by these principles.

5. CONCLUSION

Improving instruction has been a primary goal of education. To attain this goal, educators must explore ways of using new instructional technology such as multimedia in the classroom. To effectively and efficiently use multimedia, there is a need to develop multimedia presentations. The author explored the use of a digital video editing software to create and produce multimedia presentations such as photo slide shows and video. The production of a multimedia presentation in disc or file format requires the creativity, imagination, technical know-how and engineering knowledge of the faculty. Producing ones own video or software is relatively cheap than purchasing commercially available media. The cognitive and pedagogical principles of multimedia should be considered in designing multimedia presentations for instructional use. If multimedia presentations like photo slide shows or video are developed on various topics in engineering and are properly designed to specific engineering subjects, multimedia technology can enhance the teaching and learning process in engineering schools.

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