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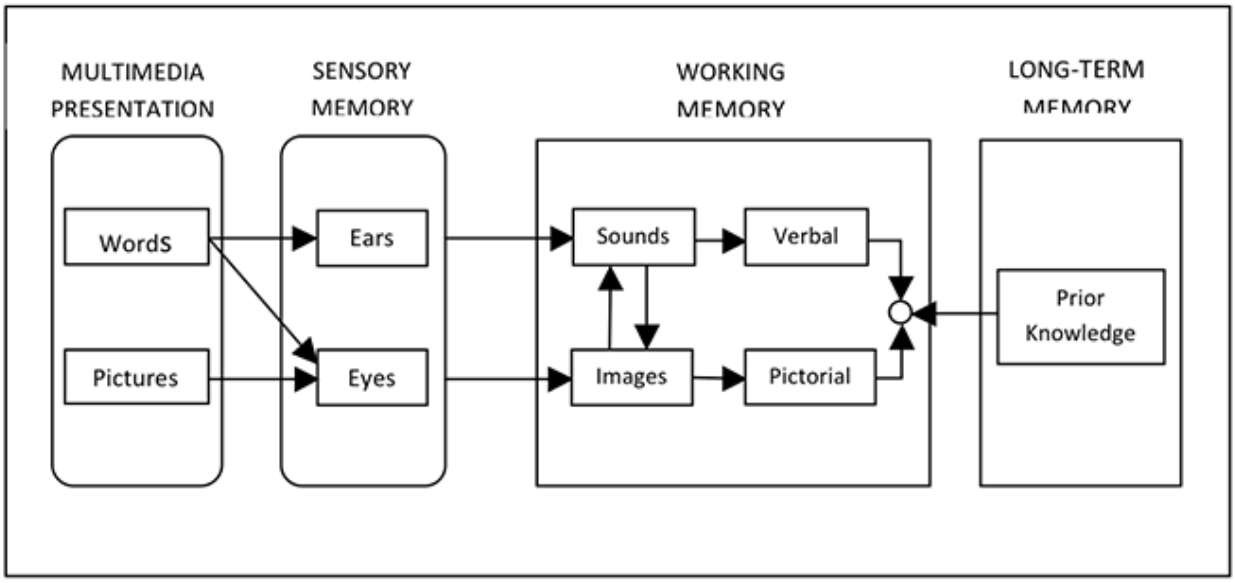
Learning Theory Paper
EDTECH 504
Fall - 2014

In a 1922, Thomas Edison declared that books would become obsolete in schools and that scholars would be taught through the use of motion pictures. (Cuban, 1986) While Edison's assertion has not come to fruition in the ensuing hundred years, advancements in computer technology have allowed educators to combine effective graphics with the spoken word. This combination of words and images forms the cornerstone of the Cognitive Theory of Multimedia Learning, which takes a dual pronged approach into the mind of the learner.

**Overview**

An offshoot of Cognitivism, Multimedia Learning purports that learners are more apt to retain information which is presented as words combined with appropriate pictures.




By combining the two methods of presentation, Multimedia Learning engages two different receptors for each learner. Each receptor triggers a separate pathway to the brain thereby doubling the chances of the learner making connections and filing the information away in long term

memory. Like all cognitive theories of learning, Multimedia theorists believe the brain processes information much like a computer in that the receptors receive input and the brain makes various connections and files the information in the appropriate folder. This folder type response of the brain is essential because, by categorizing the information before storage, retrieval then becomes of matter of recalling the category and extracting the information.

Because of their belief in the brain's filing system, Multimedia Learning theorists also believe that complicated information should be broken down into easily digestible subsets of the whole. This *chunking* of information allows the learner to absorb a single factoid and process it before moving on to next piece of the puzzle. Upon completion of the lesson, the learner mentally synthesizes the individual bits of information to form a working knowledge of the entire concept. The multimedia approach is particularly useful for novice learners who have not yet developed a mental model of the topic being presented. (Mayer & Gallini, 1990) The visual presentation jump starts the modeling process, which allows the learner to concentrate on the material rather than formulating a series of files in which to store that material.

**Contributors**

Since the 1980s, Richard Mayer has been the major proponent of Multimedia Learning. Working out of the University of California, Mayer has written numerous papers and conducted a number of studies on Multimedia Learning Theory. His research and incites are indispensable for an Instructional Designer in the computer age. Not content to simply study the generic theories of Multimedia Learning, Mayer has fine-tuned the topic, developing a number of helpful suggestions for anyone seeking to provide a multifaceted approach for their learners. Mayer was also the editor and a contributor to The Cambridge Handbook of Multimedia Learning. As the world of e-learning

continues to grow, the work that Professor Mayer has done will be turned to with increasing frequency.

**Major Principles**

In his book Multimedia Learning (Cambridge Press, 2001), Mayer discusses twelve principles that should govern the design and organization of multimedia presentations. While these principles are directed toward educators, anyone who has endured a poorly constructed Power Point presentation knows that these principles are germane to corporate world as well. These principles ensure that a learner's interest is captured and that their ability to absorb the material is unimpeded by distractions. While all of the principles are important, only a few will be included and discussed.

**The Coherence Principle** – Learning is more effective when distractions are eliminated from a presentation. Extraneous movement, unrelated graphics and superfluous sounds should be avoided.

**The Redundancy Principle** – Written words should be avoided when combined with graphics and narration. The learner will be distracted by attempting to read the words and thus the lesson suffers a loss of effectiveness.

**The Temporal Contiguity Principle** – The graphics and the narration should be timed such that the graphic being displayed corresponds directly to the narration taking place.

**The Segmenting Principle** – Multimedia information should be presented in small chunks rather than a contiguous whole.

**The Modality Principle** – Learners are more likely to absorb material which is presented as graphics and narration rather than as text and animation.

**The Personalization Principle** – For effective learning to take place, conversational rather than formal language and tones should be used in a lesson.

**The Voice Principle** – A human, rather than a synthesized, voice should be used when presenting narration. The human voice is less distracting than a machine voice which allows learners to concentrate on the material being presented.

Finally, there is the Multimedia Principle, itself, which states that learners will learn better from a presentation of words and pictures rather than a presentation of words on their own. It is vital to heed these principles when developing a multimedia presentation. The goal in any learning environment should be knowledge transfer and knowledge retention. An effective multimedia presentation adhering to these principles facilitates this process.

**Application**

While adhering to the principles of Multimedia Learning Theory seems fairly straight forward, Instructional Designers and presenters often have difficulties when constructing a lesson. To be sure, computer software offers endless graphical options, but the key to any multimedia graphic is less how it looks and more about what the graphic says. Creating info-graphics is challenging, but when constructed effectively and combined with informative narration, the results are positive and encouraging.

When applying multimedia principles, it is important to remember that less is quite often more. Each chunk of information should be covered in one or two slides. When presenting, it is important to remember that each sub-topic should have an introduction followed by an explanation and end in a conclusion. Alluding back to the file analogy, the introduction provides the learner an opportunity to scan their internal filing system and choose a file in which to store the knowledge. The explanation presents the knowledge to the learner in a usable format, and the conclusion allows

the learner to file the knowledge and attach a tag in order to facilitate retrieval. The words used in the narration should communicate to the learner when a new topic is beginning. These words, combined with a new slide, communicate in a non-direct way that a new topic has begun. Phrases such as, "Moving on to…" or "Now let's look at…" are excellent ways to communicate to a learner that a new topic is beginning.

**Conclusion**

In 2001, Marc Prensky coined the term, "Digital Natives." These are individuals who have never lived without a personal computer, or for that matter, the internet. These Digital Natives are our present generation of learners and have forced a step change in the way information is presented and received. It is incumbent on educators to make this change. The principles put forward in Multimedia Learning Theory ensure that the current and future generations of students embrace learning and that the learning will be effective.

**References**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