

Impact of multimedia in education: A modern approach

Ramdev Singh and Sherjung, Al-Falah School of Engg. & Tech.
Pooja Rani, YMCA University of Science and Tech.

Abstract- Multimedia offers exciting possibilities for meeting the needs of 21st century learners. The sophistication of multimedia technologies now a days gives a great challenge to educators in order to continuously play significant roles in the borderless globalization of information era. This challenge should not be regarded as a threat but should be accepted as a great reward to education world, which is able to produce an amazing result if the tools are used correctly and wisely. Thus, the main purpose of this paper is to discuss the use of multimedia in teaching and learning process. The nature of multimedia interactions in distance education discussions has been approached from many different perspectives. This article attempts to synthesize approaches based on distance education theory, cognition research and multimedia development. As a result a composite framework for discussion of multimedia and multimodal interactions in distance education context is proposed, which is based on interactions between the instructor, students and content. This framework should be useful for establishing clearer relationships among the existing interaction literature, for classifying interactions in education instructional design, and as a basis for further research.

Keywords- Multimedia, video, Learning, education, Teaching, Technology, Memory.

I. INTRODUCTION

Educators continually search for more effective ways to engage their students during learning as well as to increase student learning outcomes. Various technologies have been touted as being able to provide the ultimate delivery mechanism to achieve these laudable goals.

However, while the technologies purporting to provide solutions are changing at an exponential pace, the true effect of these technologies on learning outcomes remains unclear. The multitude of student (individual) variables plus the myriad of content and situational variables interact with the delivery mechanisms in such a way as to confound the

applicability of many of the research results.

This paper provides an updated overview of research on the use of multimedia for educational purposes in order to highlight under-researched areas, and offers suggestions for future research projects that will help clarify the appropriate use of multimedia by educators. The paper begins with a review of what educators and researchers consider multimedia and its

importance to the learning process. It then provides a representative though not exhaustive review of research findings to date, and concludes with areas of additional research to guide educators wishing to utilize multimedia tools.

BACKGROUND

Humans receive data through multiple channels, i.e. media, including audio and visual channels as well as touch, taste and smell. Multimedia is most commonly defined as the use of at least two of these elements: sound (audio), and text, still graphics, and motion graphics (visual). To date, the majority of the educational research projects do not include the other media of touch, taste and smell. The importance of multiple channels for delivery of educational content can be found in the theory of multi-channel communication which confirms that when information is presented by more than one channel, there will be addition reinforcement, resulting in greater retention and improved learning.

HOW PEOPLE PROCESS INFORMATION

Our ability to process information is a multi-step process that involves the perception, attention, selection, organization and integration of information. At the center of this process is long term memory. As the name implies, our long term memory stores our accumulated knowledge. Our accumulated

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knowledge is organized into —chunks of information in what are known as schema. Schemas allow us to organize information in meaningful ways and help us integrate and organize new information. In short, our long term memory is where what we know is stored and where we integrate new information. If information does not find its way into long term memory, it is lost. Learning can be thought of as change in our long term memory.

THE LIMITATIONS OF WORKING MEMORY

Before information can be integrated into long term memory it must be received and processed by our working memory. Working memory is very limited; it can only handle small amounts of information before it has to be integrated into our long term memory or lost. In his landmark article on this subject, George Miller suggested that we can only process about seven pieces of information at one time. And, we must do so quickly, as working memory can only keep information for about 20 seconds.

BRAIN PROCESSING AND MULTIMEDIA LEARNING

1. Effective multimedia recognizes that working memory has a limited capacity to process information.

2. Effective multimedia presentations take advantage of both the auditory and visual channels in working memory to deliver content. Using multiple channels increases the overall amount of information the brain can process.

3. Effective multimedia understands that text may be particularly challenging to process, with involvement from both the visual and auditory channels required.

4. Effective multimedia presentations recognize that long-term memory organizes information into meaningful chunks called schema. Presenting information in a way that makes use of existing organizing structures (schema) or that helps students organize the information can greatly assist the learner in incorporating information into Long Term memory.

Good multimedia instruction is driven by an understanding of how the brain processes information. The most effective multimedia applications take advantage of this knowledge.

WHY MULTIMEDIA IS MORE EFFECTIVE?

Words and pictures are better than words alone. Words include written and spoken text, and pictures include static graphic images, animation and video. That using both words and pictures is more effective than words alone should not be surprising in light of what we know about how the brain processes information. Research tells us that the use of both words and pictures lets the brain process more information in working memory.

Extending this basic principle, Mayer and his colleagues tell us that narration and video is much more effective than narration and text. Similarly, narration and video appear to be more effective than narration, video and text. Narration and text rely on the same channel to process information (Baddelley, 1999). It seems that text heavy multimedia presentations may be less effective than those that rely on narration.

MULTIMEDIA CONTENT SHOULD EXCLUDE EXTRANEIOUS AND REDUNDANT INFORMATION

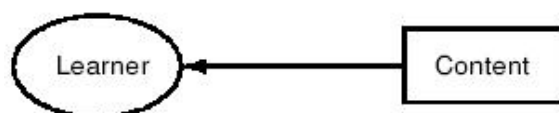
Students learned more when extraneous and redundant information was not included in a multimedia presentation. Learning is most effective when interesting and irrelevant information is eliminated because of the brain's limited information processing resources.

MODELS FOR MULTIMEDIA LEARNING

1. The Moore distance education interaction model

We shall begin with the model of distance education interactions proposed by Moore (1989; with Kearsley, 1996). He distinguished three main types of interactions in distance education. They are learner–content interaction, learner–instructor interaction and learner–learner interaction. He argued that articulating and defining these

interactions would help to dispel some of the misunderstandings that had arisen in the debates about educational media.



Learner-content interaction

2. Learner-content interaction

Learner-content interaction is without doubt one of the most fundamental interactions in any educational situations. The intellectual engagement of the learners with material which changes their understanding, attitudes, etc. is basic to all educational processes.

Importance of multimodal or multimedia presentations of learning-content to students in the distance education learner-content interactions if the material to be learned is complex. On the other hand, educational cognition research suggests that if the material is simple interactivity, then presenting it in multimedia form, especially if exactly the same information is presented both verbally and in text or graphics, may make learning more dif. cult due to the redundancy effect.

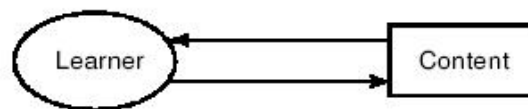
	Text	Graphics	Video	VR
Sound	Text + Sound	Graphics + Sound	Video + Sound	VR + Sound

Learner-content media interaction dimensions

3. 2-way learner-content interaction via interactive multimedia

In all of the above interactions between the learner and the content, the interaction is assumed to be one-way, i.e. the content is presented to the learners for their consumption, without the learners affecting the

content as they internalize it. However, the promise of interactive multimedia has always been an active engagement of the learner with the learning environment. We shall consider how this may be achieved from the perspective of an educational multimedia designer.

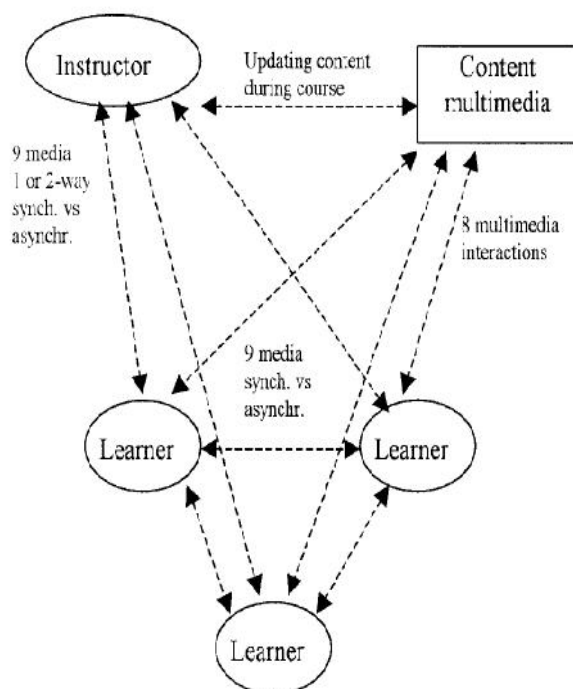


Two-way learner-content interaction

4. Total interaction model

This model suggests the following implications for instructional design in distance education:

1. In planning a distance education program all the four interaction aspects must be addressed. This model may form the basis of an instructional design checklist.
2. The means for interaction may include nine forms of media/technologies, which may be synchronous or asynchronous and 1- or 2-way in nature.
3. The more demanding and complex the content, the more beneficial the multimodal interaction in content presentation, instructor-student interaction and learner-learner interaction.
4. The learner interaction with multimedia content may be at eight different levels.
5. Optimal learning activities depend on the students' prior knowledge. For students with minimal background more structured learning activities are required.
6. Multimedia may be designed to incorporate learner-learner and/or instructor-learner interactions via internet using multiple modalities and either synchronous or asynchronous communications.



four interaction models

CONCLUSION

This paper has provided an overview of the status of research in and application of multimedia in a learning environment. The review provides us with the conclusion that pedagogy must drive educational technology usage, rather than the reverse. The first stage of a new technology is always accompanied by unrealistic expectations of its revolutionary advantages. Including multimedia as part of instruction can significantly enhance student learning. Research has contributed much to our understanding of how the brain processes information, and we know that multimedia that recognizes how the brain processes information is more effective than multimedia that doesn't. This paper highlights several principles that discriminate between effective and ineffective multimedia use for teaching and learning. While multimedia learning technology is not a panacea, it should occupy a prominent place in the 21st century instructional toolbox, as research has shown it to be a significant tool for student engagement and learning.

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