

IMPACT OF MULTIMEDIA IN TEACHING AND LEARNING

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ABSTRACT

The use of multimedia in teaching and learning presents challenges to institutions of higher learning. Multimedia refers to any computer-mediated software or interactive application that integrates text, color, graphical images, animation, audio sound, and full motion video in a single application. Multimedia learning systems consist of animation and narration, which offer a potentially venue for improving student understanding (Mayer & Moreno, 2000).

This paper briefly discusses the impact of multimedia in teaching and learning. Teaching and learning are two complementary aspects of education. Within learning, there are two key elements: content, which forms the “what” of learning; and skills, which describe the application of content to specific tasks, or the “how.” These two elements are mirrored in teaching by the curriculum and syllabus (the “what”) and the teaching methodology (the “how”). Multimedia technology affects both aspects of teaching and learning. It does this in three ways: in how it presents information; in how students interact both with the medium and through the medium with the teacher and other learners; and in how knowledge is structured within multimedia.

Introduction

Due to advances in computers and electronic media, the potential for quality education has been elevated with the appearance of innovative instructional methods employing multimedia equipment and resources. E-learning materials have been developed for a variety of disciplines. Developments in the Internet, particularly the World Wide Web, and in Multimedia technologies are resulting new approaches to designing and developing teaching and learning in higher education. Some of the characteristics of such developments can be described as follows:

8 An increased flexibility and access to learning, resulting in new markets being reached, particularly the lifelong-learner market.

8 The enhancement, through multimedia technologies, of psychomotor and intellectual skills, including problem-solving and decision-making skills.

8 The ability, through Internet technologies, to sharpen knowledge management and collaborative learning skills and to design global, multicultural courses and programs.

Using multimedia in teaching and training process has become standard in a technology-oriented society, especially as far as young generations are concerned. Rarely it occurs that during a professional, school and even informal training, devices such as computer or television do not appear as a supporting form of traditional lecture or assignment. Moreover, Internet and computer based trainings have lately gained on importance, frequently taking over a role of personal educational process and somehow partially substituted classroom teaching. It is even assumed that blended learning or e-learning is what defines the future of education.

What is multimedia?

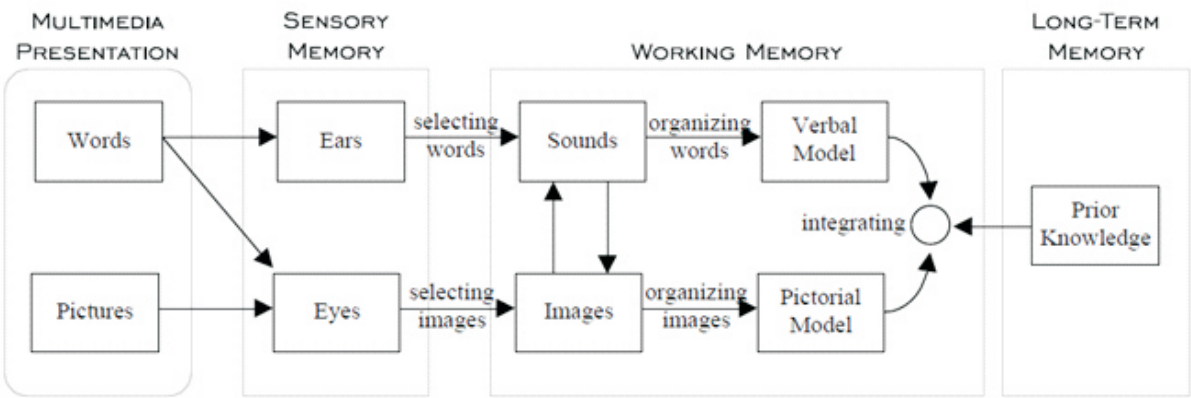
To answer questions above, the issue of multimedia needs to be defined. According to Richard Mayer, professor

of psychology at the University of California “multimedia is a as presentation of content that relies on both text and graphics”, which may seem quite general, as it does not show the technological background of the matter in question. If we follow the idea presented by Mao Neo and Ken T. K. Neo, faculty at Multimedia University in Malaysia, who claim that “the combination of various digital media types, such as text, images, sound, and video, into an integrated multisensory interactive application or presentation to convey a message or information to an audience” we receive a broader perspective. What is most crucial in defining multimedia is to emphasize the duplicity of knowledge transmission channels, as it takes advantage of various senses: either of sight and ear, as well as it engages the whole variety of neurological processes, absent during the traditional training. Additionally, it supports participant's activity and makes the training more absorbing. The most important advantage of multimedia usage, is an opportunity to reach participants who differ from each other as far as knowledge acquisition is concerned, while being efficient in case of visual – , hearing -, or reading oriented student.

The term multimedia is formed by the combination of two words multi and media, multi refers many, i.e. at least two medium can be referred to storage, transmission communication representation, presentation, input interaction and perception meaning that it can refer to different levels of abstraction. It also refers to basic information like text, graphic, image, video and audio (Kumaresan, 2002).

has improved the design of computing

Mayer bases his *cognitive theory of multimedia learning* on the following model.



Information Communication Technology (ICT) has become a vital component of the educational process and is giving educators new tools to transform learning and teaching. Multimedia learning ensures effective use of technology and compliance with users requirements; a coordinated plan must be developed that defines a common vision for the role of technology in instructional programs and operations. The gist of the above deliberation is to highlight the multimedia as a new platform for learning (Meleisea, 2005).

Presentation

Multimedia can represent knowledge in more ways than text or speech can. Multimedia combines text, audio, visual, graphic, and dynamic elements, such as animation and video. This presents learners and teachers with unique learning resources that can be used in a wide variety of ways to stimulate various forms of learning. The most significant feature of the multiple forms of media is that they allow for the presentation of knowledge in numerous ways. Thus students can learn about abstract principles through text and can see the application of those principles through an animation or a video example. This presents the opportunity for deeper levels of understanding, particularly if the presentational qualities are fully and deliberately exploited to achieve this purpose and are combined with the potential for learner interaction. Well-designed applications of multimedia then can do two things: they can enable learners to come to understandings more quickly than through more conventional classroom or textual media; and perhaps more significant, they can change how we come to know or to understand and hence what we know and understand.

Interaction

The first is the interaction of the learner with the machine. As the sophistication of multimedia design has increased, so have the types and forms of interaction, although so far they have been rarely exploited in an educational context. The most dominant physical form of learner-machine interaction today in education is a very old-fashioned operation that was developed in the nineteenth century and that requires a high level of prior learning and dexterity: typing. Another primitive but very dominant form of interaction, especially on the Web, is the use of a mouse to click on “active” buttons. Other forms of interaction possible with a computer include drawing, speaking (voice recognition), gesturing, and singing. It is surprising that these other forms of interaction are still so little developed, since they would be especially useful for computer applications in schools. Research over the years, however,

systems to take into account the way humans like to interact with a machine. A critical part of the design of educational multimedia is the interface. A well designed interface is intuitive for the learner, in that the learner can navigate easily and knows immediately what he or she is expected to do. The interface allows the learner to make responses that are appropriate to the learning context. Virtual reality offers much more profound changes in the way humans can interact with machines, but at this stage we cannot accurately identify the potential benefits (and dangers) that virtual reality holds for education. Human-machine interaction, though, is only the basement or foundation of interaction for learning. Virtual laboratories, computer simulations, and expert systems can demand from the learner much higher levels of interaction, such as analysis, problem solving, decision-making, and evaluation. Nevertheless, in many areas of education, learners still need to discuss and argue, to challenge and question, what they have learned. Humans still are much more able than machines to deal with uncertainty, with value-laden decision-making, and with complex problem-solving. Thus, for educational purposes, it is essential to combine human-machine interaction and human-human interaction. This too can be facilitated through computer and communications technology, such as the Internet.

Structure

Multimedia offers more complex and interesting ways to structure and access knowledge. For instance, the World Wide Web is based on hypertext, which links pages together. Different pages may rest on different servers around the world. Thus although a learner may start to work through the Web materials in a linear manner, at various points the learner can “take off” to other sites, explore these, and then return to the main or “home” site. In educational terms, the home site acts as a study guide, with links to many other sources of information. The learner retains more control over the links to follow up, and indeed, the teaching may be designed to encourage Web exploration, so that the teacher cannot predict where the learner will go. Multimedia materials can also be organized in an algorithmic or “tree” structure. Learners have to make a decision, and as a result of that decision the computer directs them to another area of the CD-ROM. This enables the teacher to control the sequence in which learner's access materials. This can be useful if dealing with a large and complex area of study that needs to be broken down into more manageable “chunks” to prevent the learner

from being overwhelmed by the large amount of detail to be covered. Furthermore, teachers can “share” this structuring of the content area by providing a “hot” index, or visual of the links between different sections of the CDROM. A learning object can be anything from a single graphic or log a single slide of a physiological cell up to a simulated laboratory experiment. As well as the object, a whole set of other data will be “tagged,” such as a verbal descriptor, a small fee for accessing the source, the copyright holder information, and financial transaction operations. For instance, a CD-ROM may be developed that contains a comprehensive collection of thousands of separate but computer-indexed examples of different insects. The same CD-ROM could then be combined with different Web sites and used for quite different purposes.

How are multimedia used in educations?

Multimedia can be treated as a supporting tool, which complements theoretical knowledge with practice. Usage of videos can illustrate a real action or behavior, Internet provides a variety of solutions, information and life-based examples with simultaneous reinforcement of search skills, and sound appeals to different brain areas than in case of read text.

Multimedia for Teaching and Learning

Audio-visual material can provide useful aids for learning when integrated into computer based teaching systems. However, a teaching system is only useful if the learner remains active and motivated. It is well-known that page turning or browsing does not ensure effective learning. To learn, students must want to learn and must be involved and active. They must be challenged to reason about the material presented. Flashy graphics and simulations are not enough; the experience must be authentic and relevant to the learner's life [Schank, 1994]. Active learning multimedia environments have been called for by other authors [Stevens, 1989; Schank, 1994].

How to make multimedia effective in educational process?

Whenever multimedia is well built in educational process they can accelerate learning, develop participant's activity, support application of knowledge and strengthen problem solving and decision making skills. However, to make the whole process work for user's benefit, there are four elements which have to be fulfilled:

- 1. Presentation of information
- 2. Guidance about how to proceed
- 3. Practice for fluency and retention
- 4. Assessment to determine need for remediation and next steps

Even though those four elements can appear in traditional training, multimedia can make them more effective. It happens, because the use of multimedia effectively employs verbal and visual processing channels to help learners integrate content with the knowledge. What is more, the use of single multimedia is less affective and only in combination of various forms the process is really effective.

The Internet: Interaction and Power

For many teachers, the most important element of the Internet is the ability to bring isolated learners and teachers together for discussion and analysis. Thus, interaction is not so much with a machine as through it, using the technology to link people together. This enables teachers to raise topics for discussion and allows students to work collaboratively online and to submit assignments and get

feedback from an individual tutor. In this context, technology does not change the nature of teaching or learning; it does, however, make learning available to those separated by time and place. In addition, the Internet can change the balance of power and control between teachers and learners. Teachers are no longer the gate keepers to knowledge. This shift is as profound as the impact of books on the Catholic Church. It moves the communication of learning from an authority figure informing those less powerful and informed to a context in which knowledge can be shared and reconstructed among equals. Individuals can interpret and apply knowledge to their own contexts and can share their experiences with others. The negative side of this is the challenge to authority and experience. Knowledge is not evenly distributed. The teacher will know more in some areas than each individual student and, in some circumstances, more than the sum of all students in the class.

Knowledge in the Future

The future, by definition, is uncertain. But there are three possible scenarios for the future of teaching and learning. First, the teacher will be in control. In this context, teachers and subject experts regain control. This is quite likely to happen as the Web moves from primarily a textual and graphic-based medium to a multimedia technology as bandwidth and computer power increase. Teachers can then start delivering lectures over the Internet. However, this is likely to be a short-lived triumph, since learners will be able to choose from alternative methods more suitable for distributed and lifelong learning. Second, the technology will be in control. This would be the final triumph of artificial intelligence. Computers will diagnose the learning problems of students, direct them to appropriate sources of information, select teaching methods, provide feedback, and assess the students' work. I think this is unlikely to happen because someone has to program the computer in the first place, and knowledge not only is expanding more rapidly but also is becoming more distributed, thus making it difficult for artificial intelligence to exert control. Third, the learner will be in control. This is perhaps the most likely scenario. Learners will take a constructivist approach to learning, seeking learning that meets their needs, in ways that are convenient, flexible, and cost-effective. In this scenario, teachers will remain important as counselors and guides, and perhaps as originators of some of the new learning materials, but they will become more like “hired hands.” There is a real danger in this scenario. Learners will effectively become consumers, with the risk that short-term gain will dominate long-term benefits. Perhaps more important, knowledge will become more subjective and value-laden (what people want to think) and less objective and rational- deductive. The ideal future will be a balanced future, one in which the roles of teacher, learner, and technology are all in balance and complement one another. Teachers and learners will become more concerned with the management of knowledge than with mastery of all areas. The teacher's role will combine guidance on appropriate areas of knowledge and subject matter with (especially but not exclusively in research universities) the generation of new knowledge. Above all, the teacher's role will be to challenge and stimulate the learner.

Conclusion

The aim of multimedia application in training is not only to make education more attractive, but also, or above all to make education more effective. Multimedia gives the participants the control over the educational process by

choosing the preferred channel of communication. It reduces frustration connected to adjustment to one and only learning model and creates friendly environment for knowledge acquisition, which finally leads to greater retention of the presented material. Nonetheless, multimedia cannot be treated as an obvious necessity and should appear only where it is actually useful. Therefore each training must be adjusted to the audience and their knowledge acquisition skills and preferences.

New technologies are fundamentally changing the nature of higher education. Nevertheless, we need to maintain a balance between face-to-face teaching and learning and technology-based teaching and learning. Many skills cannot or should not be taught solely through technology, although the range of knowledge and skills that can be taught effectively in this way is probably much greater than most teachers would credit. The trick is to understand, first, that there are many different clients, needs, or markets for education. For some of these markets, technology-based teaching and learning is perfectly appropriate; for others, it is not. We will need to be selective and sophisticated in our decisions as to how we want to use technologies to learn and teach. Second, the roles of both learners and teachers will change, in order to exploit the benefits of new technologies. This in turn will have a major impact on our educational institutions. Third, our move to representing knowledge in various ways through technology will change the nature of our understanding. This does not necessarily mean that our understanding will be better or worse-just different. (Tony Bates, 2000).

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