

# Chapter 11

## Key Factors and New Directions of Multimedia Learning Design

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### ABSTRACT

*This chapter explores specific topics, issues and directions associated with multimedia and hypermedia learning environments. A key aim is to inform researchers, designers, and developers of multimedia learning systems as well as educators who wish to engage students in learning activities rooted in multimedia learning research and design of the critical factors that have had an impact on maximizing learning through multimedia. Strengths and pitfalls of multimedia learning design are discussed through the review of the important conclusions that two generations of multimedia research have contributed to multimedia design. Finally, emerging factors, which are currently formulating a third generation of multimedia design and learning research are presented.*

### INTRODUCTION

In today's new digital age traditional classroom education or training does not always satisfy all the needs of the new world of flexible, personalized and lifelong learning. A shift is being made toward e-Learning (also known as online training, distributed learning, CBT, and multimedia courses)

where the medium of instruction is through computer technology, particularly involving digital technologies. E-Learning affords a lot of opportunities. It is claimed to have the potential to dramatically change the way teachers teach or learners learn, offering learning-on-demand opportunities and reducing learning cost. As e-Learning continues to evolve, it is important to remember how people learn. Developers must consider and understand instructional design and its integration into build-

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ing e-Learning courses. The quality and value of e-Learning applications is dependent on the use of available technology and the design and development of applications (Huffaker, 2004). A variety of enabling technologies such as multimedia technologies can facilitate the design and implementation of e-Learning systems.

The term multimedia has existed in the educational technology field for some time and refers to the use of different media to convey information; text together with audio, graphics and animation, often packaged on CD-ROM or provided through the Internet combining interactivity. Multimedia finds its application in various areas including advertising, art, education, entertainment, engineering, medicine, and business. In the academic sphere, empirical research regarding the impact of multimedia on learning can be traced back several decades before the large-scale invasion of multimedia learning resources (like CD-ROM titles and Internet applications) into the educational field and originated from areas outside the scholastic community. Although the results are not decisive, the existing multimedia research has contributed to establishing factors that influence effective multimedia design.

This chapter aims to provide a theoretical framework associated with multimedia learning research and design. It will provide insight on specific topics, issues and directions associated with multimedia and hypermedia learning environments. In particular, the chapter aims to provide a comprehensive study of the prevalent ideas and the main directions which have made an impact on multimedia research and design until now.

More specifically, the chapter will provide a review of the important conclusions that two generations of multimedia research have contributed to multimedia design, specifying their key theoretical issues and research directions as well as the weaknesses associated with each one of them. Emerging factors, which are currently formulating a third generation of multimedia design and learning research will be discussed.

## **BACKGROUND**

As has been the case in the past with every innovative form of educational technology, such as motion pictures, radio, educational television and computers (Cuban, 1986), the emergence of multimedia educational technology has been accompanied by contradictory views and attitudes. On the one hand there have been high hopes in support of multimedia, which have been based on a range of claims, such as that multimedia systems have the ability to cut down the time of learning while at the same time they increase learning effectiveness. On the other hand, contrary positions have maintained a state of skepticism and disbelief regarding the use of multimedia in education.

Multimedia learning research and in general educational technology research has been characterized by inconsistency until now, failing to draw explicit conclusions with relation to the impact that multimedia and technology have on the learning process or to provide a comprehensive framework of design principles at the micro-level for the optimal integration of multimedia elements within a multimedia learning system (Koumi, 2003). Over three decades of research have not managed to resolve the problem satisfactorily. The literature does not lack studies with statistically significant results in favor of multimedia use from which a collection of factors that influence effective multimedia design may be drawn (Najjar, 1998, 2001). However, at the same time it includes a large body of studies that do not provide strong evidence to warrant for the use of multimedia as an effective alternative to learning (Hede, 2002).

Up until the late 1980s, before the large-scale invasion of multimedia into the educational field, a number of attempts, (viewed in this chapter as the first generation of multimedia research) had been made to comprehend the ways that learners integrate and capitalize on information that is presented to them verbally and visually (Samuels, 1967; Levie & Lentz, 1982). When, in the follow-

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