Interactive Multimedia

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INTRODUCTION

Media is a Latin word used to describe ways to convey information. Media can be related to newspapers, magazines, radio, television, audio-video programmes, computers, and others. Many prefixes are used with the word media such as multimedia, electronic media, and interactive media. The most common reference used in education is multimedia, which is the integration of text, audio, video, graphics, and animation into a single medium. Instructional multimedia is the integration of various forms of media in the instructional process. It is the technology that combines print, radio, television, animation, photographs, and other forms of illustration (Usha, 2003). Interactive refers to the way the user engages in the integration of different media (text, audio, video, graphics, and animation) to enhance the user's learning process. The use of multimedia as an educational medium is becoming increasingly popular in various fields of study including medicine, science, engineering, and arts. Interactive multimedia courseware (software used by students in their learning) in particular, developed on a CD-ROM, is adding a new and interesting dimension to both teaching and learning. This new approach can effectively complement the conventional methods of teaching and learning. The multisensory input of this media provides possibilities for higher performance ratings and higher retention (Usha, 2003). With effective feedback, this method makes learning and teaching more meaningful. Students with different learning abilities can work at their own place, time and pace; and with interactively and self-assessment it can make learning a highly personalized, independent, and a rewarding experience. Today, new media and technologies for learning technical courses have influenced education in higher learning institutions. This trend has posed an immense challenge to academicians who wish to employ multimedia in their teaching activities.

BACKGROUND

Interactive multimedia systems for learning came into existence in the early 90s (Robert, 1994). Cairncross and Mannion (1999) state that interactive multimedia systems have the potential to create high quality learning environments that actively engage the learner. For example, they can combine explanations with illustrative examples, online assessment with feedback, and provide opportunities to practice and experiment. Additionally, Cairncross (2002) points out that the key elements of multiple media, user control over delivery of information and interactivity, could be used to enhance the learning process.

Present multimedia courseware has been designed to incorporate multimedia to allow learners to perform multiple tasks simultaneously during a tutoring session. For example, a learner can read text and be narrated by displaying a video clip to explain certain concepts of the subject matter. Information is presented in a predetermined sequence, regardless of how knowledgeable the student is at the beginning of the learning activity, or how quickly or slowly the learner absorbs and understands the course material (Rickel, 1989). The incorporation of multimedia in courseware, on the other hand, provides the learner with the opportunity of exploring information in various media formats in addition to conventional text and graphics which focus on presenting information in a way that maximizes the student's learning process. In addition multimedia can be programmable, that is, it gives the possibility of engaging the learner in activities, that is, reacting, or responding, to selections made by the learners (Cairncross, 2002).

This article addresses the use of interactive multimedia in the field of engineering. The study of motion has always played an important role in the education of science and engineering. In view of this, efforts to incorporate multimedia technology into courseware to facilitate teaching and learning have been initi-

ated. This article further describes the path taken to achieve this goal and discusses pertinent development issues on how interactive multimedia can be used as a supplement to aid the learning process. In addition, key features of multimedia are explained and its potential benefits and pitfalls are discussed from an educational perspective.

The purpose of this present work is to explore the issues surrounding the role and benefit of interactive multimedia courseware. The results can provide a useful framework to help educators, instructional and multimedia designers in particular, to appreciate and understand the use of such multimedia technology to enhance engineering education.

ATTRIBUTES OF MULTIMEDIA

Multiple Media

Multimedia enables courseware developers the freedom to select from a variety of media elements to express a particular message in the form of text or motion to represent a process. The key attributes of multimedia are shown in Figure 1.

In addition, a given piece of information can be delivered using one or more media element (Cairncross & Mannion, 2001). For example, an image can be used to illustrate a text-based description. The information originally presented on screen can be supplemented by the use of audio, video, and pop-up boxes. Audio is useful as text can be minimized on the screen. Multimedia can thus support multiple representations of the same piece of information in a variety of formats.

Delivery Control

Every multimedia tool demands some kind of user navigation. The nonlinearity offered by many multimedia learning applications provides a learner greater navigational and freedom (Cairncross & Mannion, 1999). Users may go onto any section in a multimedia tutorial they wish and in any order. Dynamic media such as video and audio can be controlled, that is, by pausing, playing, and repeating clips. Thus users can skip sections they are familiar with.

Interactivity

"Interaction" refers to the reciprocal action of two phenomena and has both a physical connotation (one entity operating on another) and a psychological connotation (two entities influencing each other's behavior). In human context, interaction can be people-to-people or people-to-objects. Multimedia itself is not inherently interactive. It can be made interactive through authoring software. In interactive multimedia, it is the user's interaction with the program that is explored. Researchers into learning styles show that students learn better through specific modalities such as visual, oral, and kinetic. The goal of interactive multimedia is to provide the student with the choice of these modalities in learning environments. Rhodes and Azbell (1985) have identified four levels of interactivity:

- **Reactive:** Refers to relatively simple responses by learners such as pressing the space bar to advance the program or simple menu choices which generally do not require hypothesis generation or a deeper understanding of the material to be learned.

Figure 1. Key attributes of Multimedia
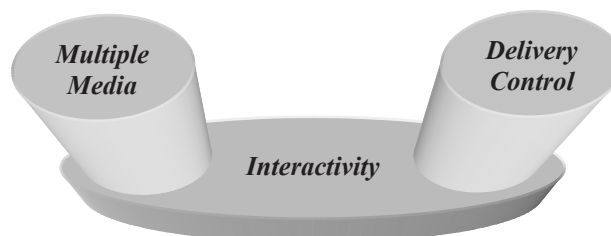
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