Interactive Multimedia Technologies for Distance Education Systems

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INTRODUCTION

Information is typically stored, manipulated, delivered and retrieved using a plethora of existing and emerging technologies. Businesses and organizations must adopt these emerging technologies to remain competitive. However, the evolution and progress of the technology (object orientation, high-speed networking, Internet, etc.) has been so rapid that organizations are constantly facing new challenges in end-user training programs. These new technologies are impacting the whole organization, creating a paradigm shift that in turn enables them to do business in ways never possible before (Chatterjee & Jin, 1997).

Information systems based on hypertext can be extended to include a wide range of data types, resulting in hypermedia, providing a new approach to information access with data storage devices such as magnetic media, video disk and compact disc (CD). Along with alphanumeric data, today's computer systems can handle text, graphics and images, thus bringing audio and video into everyday use.

The Distance Education Task Force (DETF) Report (2000) refers that technology can be classified into non-interactive and time-delayed interactive systems, and interactive distance learning systems. Non-interactive and time-delayed interactive systems include printed materials, correspondence, one-way radio and television broadcasting. Different types of telecommunications technology are available for the delivery of educational programs to single and multiple sites throughout disunited areas and locations.

However, delivering content via the World Wide Web (WWW) has been tormented by unreliability and inconsistency of information transfer, resulting in unacceptable delays and the inability to effectively deliver complex multimedia elements including audio, video and graphics. A CD/Web hybrid, a Web site on a CD, combining the strengths of the CD-ROM and the WWW, can facilitate the delivery of multimedia elements by preserving connectivity, even at constricted bandwidth. Compressing a Web site onto a CD-ROM can reduce the amount of time that students spend interacting with a given technology, and can increase the amount of time they spend learning.

University teaching and learning experiences are being replicated independently of time and place via appropriate technology-mediated learning processes, like the Internet, the Web, CD-ROM and so forth, to increase the educational gains possible by using the Internet while continuing to optimize the integration of other learning media and resources through interactive multimedia communications. Among other conventional interactive teaching methods, Interactive Multimedia Methods (IMMs) seem to be adopted as another mainstream in the path of the distance learning system.

BACKGROUND

F. Hofstetter in his book (*Multimedia Instruction Literacy*) defined "Multimedia Instruction" as "the use of a computer to present and combine text, graphics, audio and video, with links and tools that let the user navigate, interact, create and communicate."

Interactive Multimedia enables the exchange of ideas and thoughts via most appropriate presentation and transmission media. The goal is to provide an empowering environment where multimedia may be used anytime, anywhere, at moderate cost and in a user-friendly manner. Yet the technologies employed must remain apparently transparent to the end user. Interactive distance learning systems can be termed as "live interactive" or "stored interactive," and range from satellite and compressed

videoconferencing to stand-alone computer-assisted instruction with two or more participants linked together, but situated in locations that are separated by time and/or place.

Interactive multimedia provides a unique avenue for the communication of engineering concepts. Although most engineering materials today are paper based, more and more educators are examining ways to implement publisher-generated materials or custom, self-developed digital utilities into their curricula (Mohler, 2001). Mohler (2001) also referred that it is vital for engineering educators to continue integrating digital tools into their classrooms, because they provide unique avenues for activating students in learning opportunities and describe engineering content in such a way that is not possible with traditional methods.

The recent media of learning constitutes a new form of virtual learning-communication. It very probably demands an interacting subject that is changed in its self-image. The problem of translation causes a shift of meaning for the contents of knowledge. Questions must be asked: Who and what is communicating there? In which way? And about which specific contents of knowledge? The connection between communication and interaction finally raises the philosophical question of the nature of social relationships of Internet communities, especially with reference to user groups of learning technologies in distance education, generally to the medium in its whole range (Cornet, 2001).

Many people, including educators and learners, enquire among themselves whether distant learners learn as much as those receiving traditional face-to-face instruction. Research indicates that teaching and studying at a distance can be as effective as traditional instruction when the method and technologies used are appropriate to the instructional tasks with intensive learner-to-learner interactions, instructor-to-learner interactions and instructor-to-instructor interactions (Rahman, 2003a). With the convergence of high-speed computing, broadband networking and integrated telecommunication techniques, this new form of interactive multimedia technology has broadened the horizon of distance education systems through diversified innovative methodologies.

MAIN FOCUS

Innovations in the sector of information technology has led educators, scientists, researchers and technocrats to work together for betterment of the communities through effective utilization of available benefits. By far, the learners and educators are among the best beneficiaries at the frontiers of adoptive technologies. Education is no longer a time-bound, schedule-bound or domain-bound learning process. A learner can learn at prolonged pace with enough flexibility in the learning processes, and at the same time, an educator can provide services to the learners through much more flexible media, open to multiple choices.

Using diversified media (local-area network, wide-area network, fiber optics backbone, ISDN, T1, radio link and conventional telephone link), education has been able to reach remotely located learners at faster speed and lesser effort. At the very leading edge of the boomlet in mobile wireless data applications are those that involve sending multimedia data—images, and eventually video—over cellular networks (Blackwell, 2004).

Technology-integrated learning systems can interact with learners both in the mode similar to the conventional instructors and in new modes of information technology through simulations of logical and physical sequences. With fast networks and multimedia instruction-based workstations in distributed classrooms and distributed laboratories, with support from information dense storage media like write-able discs/CDs, structured interactions with multimedia instruction presentations can be delivered across both time and distance.

Several technologies exist within the realm of distance learning and the WWW that can facilitate self-directed, practice-centered learning and meet the challenges of educational delivery to the learner. Several forms of synchronous (real-time) and asynchronous (delayed-time) technology can provide communication between educator and learner that is stimulating and meets the needs of the learner.

The Web is 24 hours a day. Substantial benefits are obtained from using the Web as part of the service strategy (RightNow, 2003). Using the Web format, an essentially infinite number of hyperlinks