2000

Enhancing the Teaching Business Telecommunications and e-Commerce using SMIL and Videostreaming

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Abstract

Few topics have received as much attention in the information technology field as the Internet/world wide web (Web). Internet/Web aided instruction is one of the most important research topics in the business field, especially business telecommunications and e-commerce. This paper discusses the results of using videostreaming technology and synchronized multimedia integration language (SMIL) as an instructional tool in the domain of business telecommunications and e-commerce. These experimental findings (e.g., experiences on effects of the SMIL and videostreaming technology) are presented.

Introduction

Telecommunication is the key to all interconnection and information system and services; voice communications and data communications links computers and people, while computer telephony integration binds people, telephones, and computers. Video communications support information broadcasting, and conferences via people to people. Internet communications provides a full range of connectivity services. Over the past several decades, numerous applications in the field of business telecommunications have been presented.

Internet/World Wide Web (Web) aided instruction, one of the most important research topics in the business field today, has received increasing attention from information systems professionals. While the distance learning education has received considerable attention in the field of business, virtually all the studies on the topic of information systems have neglected or given cursory attention to the subject of business telecommunications and electronic commerce (e-commerce) using synchronized multimedia integration language (SMIL) and videostreaming technology. Consequently, the author has attempted to show that the SMIL and videostreaming technology is an essential element in the subject of business telecommunication and e-commerce.

The primary purpose of this paper is to present the results of using the SMIL and videostreaming technology as an instructional tool in the domain of business telecommunications and e-commerce. Secondly, it discusses how SMIL and videostreaming technology-based instruction can be useful in teaching this subject.

Video streaming and Synchronized Multimedia Integration Language (SMIL)

Video streaming technology provides a constant stream of video that is displayed in a window on the user's desktop. This differs from the traditional FTP method in that the video is viewed as it is sent rather than being downloaded to the user's PC and viewed later. Streaming video effectively brings audio and video together into one affordable technology. Due to its affordability, companies are using this technology to make their websites more interactive and, consequently, more appealing. Streaming media allows companies to better fulfill the needs of their employees, customers, and business partners. Some examples of the way companies are using video streamlining to promote and enhance e-commerce are provided: 1) live video broadcasting, 2) live multimedia conferencing, 3) live distance education and training, 4) live monitoring and security, and 5) live customer and sales support. A list of requirements for video streaming is shown in Table 1.

Creating a streaming video can be done with a digital video camcorder, a PC, and software such as Real Producer. The software captures the video from the source via Firewire (IEEE 1394), encodes the video in streaming format and saves the file with the resolution and bit rate (e.g., 12000) specified. There are several compression techniques being used in video streaming today. Two of the most widely known are RealNetworks' RealSystem G2 and Windows Media. Windows Media uses MPEG 4 codec. This technology is dynamically scalable for varying bandwidths and can accurately estimate motion changes between frames [Senna, 2000]. RealSystem G2 discrete cosine transform (DCT). DCT transforms data about the spatial arrangement of color in an image into data based on the frequency of occurrence of a given color arrangement. Once the media is ready for use, it can be uploaded to a media server such as RealServer or Microsoft Media Server. The advantages of RealServer are versatility and compatibility with many operating systems including Unix, Windows NT, and Linux. Table 1 shows a list of hardware (video capture card) and software (RealProducer and RealServer).

Table 1. A List of Video Capture Card and RealProducer /Server

Hardware: Video Capture Card			
Producer	Model	Features	System Requirements
ViewCast	Osprey – 100	NTSC and PAL format, up to 30 fps uncompressed, Real time encoding for live broadcast, no audio input	Win 9x , NT4.0 or Win2000, Pentium processor (200Mhz and up), 16 Mb RAM, PCI slot, Sound card
ViewCast	Osprey – 200	NTSC and PAL format, up to 30 fps uncompressed, Real time encoding for live broadcast, with audio input	Win 9x , NT4.0 or Win2000, Pentium processor (200Mhz and up), 16 Mb RAM, PCI slot, 16 bit depth graphics card supporting Direct Draw
Winnov	Videum VO PCI	NTSC and PAL format, up to 30 fps 640 x 480 pixels,TWAIN drivers, support all V. conferencing protocols	Win 3.x, Win 9x & NT4.0, Pentium processor (120 Mhz and up), 16 Mb RAM, PCI slot, Sound card, CD-ROM drive
Winnov	Videum AV PCI	NTSC and PAL format, up to 30 fps 640 x 480 pixels,TWAIN drivers, with audio input	Win 3.x, Win 9x & NT4.0, Pentium processor (120 Mhz and up), 16 Mb RAM, PCI slot, CD-ROM drive
Software: RealProducer and RealServer			
RealProducer Plus (Windows, MacIntosh, Linux, Compaq True 64 / DEC Alpha) RealServer Plus (Windows NT Server, Linux, Solaris)			

Synchronized multimedia integration language (SMIL) has been recommended by the World Wide Web Consortium (W3C) to allow integration of a set of independent multimedia objects into a synchronized multimedia presentation. It includes streaming audio, streaming video, images, and text. The language is similar to that of HTML. The Real Networks had made beta SMIL implementation (G2) available in July 1998. In the Real Player, SMIL is tailored to Real Audio, Real Video, Real Pix (graphics), Real Text, and Real Flash. These media types are integrated through SMIL and are streamed for playback in the Real Player. SMIL allows a person to put additional graphics on the screen with the video. Using traditional video, a person can only view the video. SMIL file allows the placement of different images PowerPoint file on different portions of the screen. This allows the user to view both the video and the PowerPoint presentation at the same time.

Videostreaming and SMIL for Business Telecommunications and E-commerce

The concept of learning has changed little since the time of Aristotle. However, the methods that help people to learn have changed. Technological developments have improved the delivery of information and interaction between the learner and the learning process. Several studies [Belton, 1994; Callahan, Shim, and Oakley, 2000; Rubin, 1993] indicate that the greater the interactive component in the learning process, the more material the student retains. Traditional lectures have proven to be one of the least effective methods of teaching. Integrating computing technologies with the educational process provides students an exciting environment in which to learn.

Traditionally, when teaching the subject of business telecommunication and e-commerce, the instructor has had to either follow textbook guidelines concerning the introduction of the business telecommunications along with its theory and applications or develop his or her own guidelines. Some instructors supplement the class requirement with a few relevant library projects. The author felt the need to give the business telecommunications students greater flexibility through SMIL and video streaming technology aided instruction than what the traditional teaching method offers. This method combines traditional lectures, SMIL and video streaming aided instruction, and other instructional materials (e.g., case study, independent projects). Table 2 shows a list of real media (video streaming) files and SMIL files for business telecommunications, i.e., data communications/network, voice telecommunications, video telecommunications, and several telecommunications files (captured and encoded).

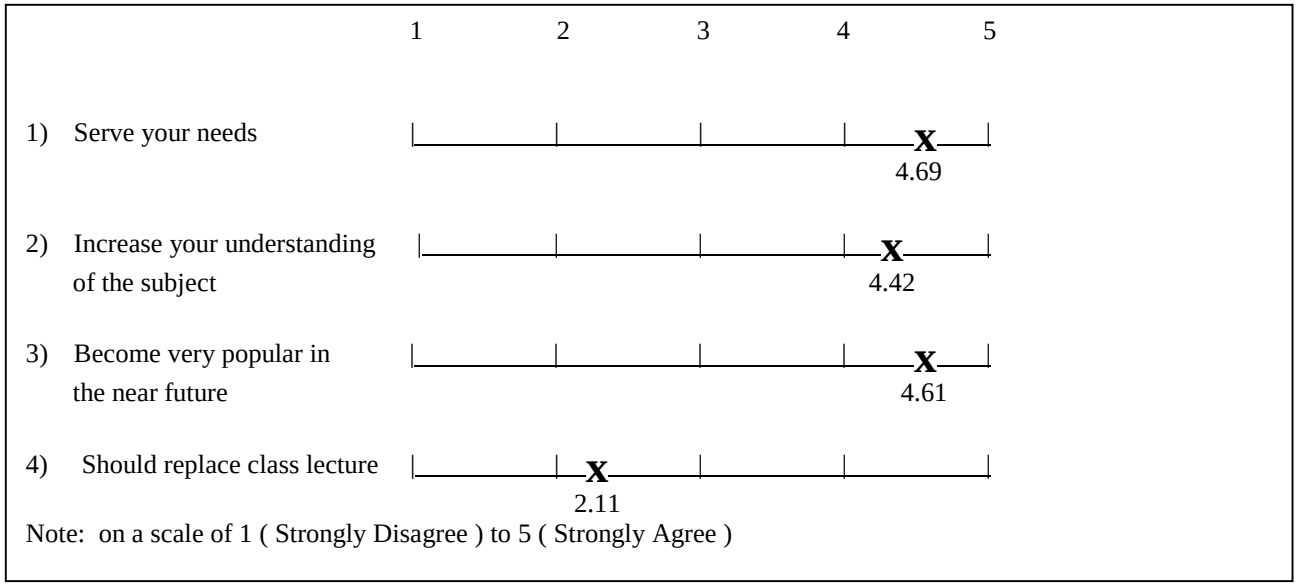
Experience

The experiment was conducted during the 1999-2000 spring semester in the course “Business

Table 2. A List of SMIL and Videostreaming Files

❖ **Telecomm Act of 1996**	❖ **Telecomm Industry Infrastructure**	
♦ **Data Comm/Network**	♦ **Voice Telecomm**	♦ **Video Telecomm**
• Intro to Data Comm	• Voice Application	• Video Streaming
• Groupware, e-commerce	• Voice Systems	• Video Conferencing
• TCP/IP Model	• Convergence	
• Physical Layer	• Voice over IP	
• Data Link Layer		
• Network Layer		
• LANs		
• High Speed LANs, BN		
• WAN, MAN		
• Network Design		
• Network Management		
• Network Security		
Several telecom tapes (captured & encoded)	Internet 2 (captured & encoded)	
Video_streaming aided Telecomm Term Project		

Figure 1.Effects of the SMIL and Video streaming



Telecommunications." It is a MS in Information Systems level. To determine how well the SMIL and Video streaming aided instruction was received by the students as an instructional tool, the author developed a questionnaire [on a scale of 5 (strongly agree) to 1 (strongly disagree)] and gave it to graduate students (n=26) in an experimental group who had completed the course during 2000 Spring semester. The author asked the students if they thought the technology aided instruction served their needs and increased their understanding of the subject. The survey showed positive and favorable responses (between 4.42 to 4.69) on the SMIL and video streaming aided instruction. The most favorable reactions to the technology in the near future were very positive (4.61). However, the students do not believe that the SMIL and video streaming technology should replace class lecture (2.11). Figure 1 shows effects of the SMIL and video streaming technology. Table 3 lists advantages and disadvantages of SMIL and video streaming technology perceived by students.

Table 3. Advantages and Disadvantages of SMIL and Videostreaming Technology

Disadvantages

1. No interaction with speaker (can't ask questions)
2. Lag
3. Can't print slides out
4. Server not completely reliable (may go down at times)
5. Some may not have computer(connections) capable of real/video
6. No classmates/groups
7. Poor quality (sometimes) because of slow connection

Advantages

1. Allows playback of lesson anytime
2. The notes will be on the Web more convenient
3. Able to view outside of class
4. Can watch if missed class
5. Concise, timely, and interesting
6. Access to new technology
7. Supplements difficult material

Conclusion

Over the last several decades numerous studies have pointed out the instructional benefits of the computer-aided visual interactive and multimedia-aided instruction approach [Shim, 1988]. In the past the author has also observed that the SMIL and video streamlining approach has made teaching information systems courses more stimulating and productive for both students and instructors; business telecommunications and e-commerce are no exception. By utilizing video streaming and SMIL, the instructors are able to familiarize their students with the use of Internet while presenting concepts and theories of business telecommunications and e-commerce. However, the author believes that SMIL and video streaming technology should not be used to replace basic classroom teaching of fundamental principles. Rather, it should supplement class materials so that concepts, theories, and its applications are better understood by students.

References

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Appendix


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……
</layout></head><body><par>
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……
</seq></par></body></smil>
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