VIDEOCONFERENCING IN HIGHER EDUCATION

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Abstract: The on-line education is becoming more and more dominant in our world today and in many countries it gained accredited status. This new teaching method still remains in the text based (mostly HTML) web surfaces in the United States and it has failed to take advantages of the opportunities provided by the new, high-speed Internet. In this publication the author would like to highlight the potential of videoconferencing in higher education.

Keywords: Videoconferencing, modern education, on-line education, communication, multi-media

Introduction

On the doorstep of the third millennium, we are experiencing an unbelievable development of new technologies and improvements of current systems. This technology boom is much emphasized in our everyday use and dependence on computers and different aspects of communication. Around 20% of the entire world population has access to the Internet. More than 70% of the population of North America, more than 50% of Australia/Oceania, and more than 40% of Europe has Internet access. The total Internet usage around the globe has grown 265% from the year 2000 to 2007, and it increased by almost ten fold (920% and 882% respectively) in the Middle East and Asia [1].

According to the latest estimates there were more than 1.3 billion Internet users around the world – almost 1.1 billion users in Asia, Europe, and North America together - in late 2007, and this number is rapidly growing [1]. In our public schools in the United States only 35% had Internet access in 1994, while in the year 2000 this number reached 98% [2].

In our personal and business life, we cannot avoid having to use computers for different purposes. Most of us use mobile telephones, text messaging, e-mail, and even Voice over Internet Protocol for affordable international calls almost daily. We have got used to the interruptions of phone calls during dinner, or the loud commercials inserted into a nice, soft, romantic movie. We are used to the “on-the-minute” information from news, to stocks, to world events. We use our computers as entertainment sources for gaming, on-line interaction – chat-rooms, instant messaging – and movie updates, previews, show times, weather, etc.

Some of us discovered a new way of learning as well: the on-line education. Most higher-educational institutions have some on-line courses to help their students with their course scheduling. The list of available schools is ever expanding [3].

Definitions

Videoconference: Videoconferencing is not a technology in itself; it is rather a term fast becoming defined in America as any use of television

<table>
<thead>
<tr>
<th>Connection type</th>
<th>Transmission Speeds (MB/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fist telephone modem (dial-up)</td>
<td>0.0074</td>
</tr>
<tr>
<td>Typical telephone modem</td>
<td>0.1280</td>
</tr>
<tr>
<td>Digital Subscriber Line (1999)</td>
<td>0.8400</td>
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<tr>
<td>Digital Subscriber Line (2008)</td>
<td>2.0000</td>
</tr>
<tr>
<td>Cable connection (1999)</td>
<td>1.1000</td>
</tr>
<tr>
<td>DS-1 (Tier 1)</td>
<td>1.5440</td>
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<tr>
<td>E-1</td>
<td>2.0480</td>
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<tr>
<td>OC-3072</td>
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</tr>
</tbody>
</table>

Figure 1 - Transmission standards and speeds (in Mega-bit per second)
(picture and sound) to join people in some form of live interaction. This could be applied to a large variety of situations from any point-to-point communication to live video lecturing to large audiences via methods of computer-to-computer and/or other “interactive television” devices.

There are many different methods to categorize this type of communication. One possible way is into large-scale and small-scale. Large-scale communication, by definition is a broadcast from, usually, one central location to a multiple of locations potentially worldwide using satellite-based transmission. Small-scale could be a lecture to a limited audience (class room) or a personal one-on-one video-chat between family, colleagues, and friends.

Just a few years ago, the technology requirements to make videoconferencing possible were very costly, the leasing or renting of communication channels was also expensive. Today, any high speed Internet connection with most desktop and/or laptop computers – with a basic web camera and microphone - is capable of handling the processing and transmission needs of an acceptable quality videoconference even with more then two participants. With better equipment, larger processing power and/or bandwidth we can achieve better quality.

The quality of our videoconference - as I mentioned earlier – depends on the following factors: bandwidth, resolution, and compression (processing power). Without going into the technical details, I would like to mention some useful information.

**Bandwidth:** It refers to the amount of information (bits) which can be transmitted along a carrier every second. Different type of connection can transmit at different speeds. (Figure 1.) The original telephone modem was designed to transmit at 3600 baud (bit/s), and over several years the Internet Service Providers (ISP) developed new technologies to increase speed. Today, even with a standard telephone modem we can achieve communication at 128 kbit/s. That is still a pretty impressive increase in transmission speeds. Over time, new technologies were introduced and higher speeds were achieved (Figure 1).

**Resolution:** Similarly to graphic pictures, visible video quality is determined by resolution: the number of pixels (or picture points) in each column and row of our image. Standard television images with the NTSC standard are set to 720 x 480 pixels (horizontal & vertical resolution) in the US, and the PAL standard at 720 x 576 pixels elsewhere. NTSC uses an analog system of 486 pixels split into two interlaced fields of 243 lines, while PAL uses 576 split into two interlaced fields of 288 lines. (Figure 2.)
HDTV 720 is defined at 1280 x 720 HDMAC scanning, HD 1080 at 1920 x 1080, and today’s computers (30” Apple Cinema HD Display) are capable of WQXGA at 2560 x 1600 pixels resolution [4].

Compression, Video Codec: Video compression refers to the method of reducing the quantity of data used to represent video images. Some forms of data compression are lossless, but most reduces the actual quality of our video as well. Video codec in our everyday life refers to a software application (in some cases it is a hardware device) that enables video compression and/or decompression [5].

Videoconferencing in higher education
Most educational institutions use the Internet to provide information to their students in text form, audio or even streaming video. Some educators use the resources of the high-speed Internet to their advantage and hold seminars, classes, and tutoring over videoconference. I personally believe it is time for a dramatic change. It is time, to take advantages of these new technologies in a very different way.
I have attended on-line broadcasts of live events, participated in live video-interviews via the Internet, and held several seminars using this technology. It is very feasible with our computers today to participate in one-on-one, and in multi-videoconferences between any points around the globe. Other than the time difference, there are truly no limits to our capabilities. I have held seminars in multi-videoconference between the United States, Great Britain, Hungary, Romania, Taiwan and Japan. The technology exists; the resources are available, affordable, and easy to master (Figure 3).

I am currently participating in an international research effort to make videoconferencing a usable tool for students to attend classes worldwide in a “traditional” higher educational institute without leaving their home. The language barrier is simply not there anymore, since most students outside the United States learn at least one other language in their high school years, and the most popular choice is English. College students in most parts of the world are required to pass a mid-level language exam as their secondary language choice to earn their Bachelor’s degree. For Master’s and Doctorate level it is not uncommon to require one mid-level test and one professional-level exam in two different languages in addition to their native language.
To me - it seems like - our little globe is shrinking. Borders still do exist, but international travel is becoming a common practice for scholars, businessmen and women, and vacationers. I think we should try to use the available technology for the benefit of all. We should make these educational institutions understand the potential of videoconferencing, explain all the benefits and the disadvantages, and then ask them to make a decision based on facts.

A Personal Experience
I had enrolled – prior to Capella University – into a traditional course with a Hungarian Institution, and was accepted as a “virtual student”. I received special permission from the President of the University to attend
regularly scheduled classes via videoconferencing. I was able to start the first semester, when I received my termination notice. One of the educators who were teaching a “hands-on” class was not satisfied of my “virtual” presence, and submitted my termination notice.

I contacted the President of the University, and had a two hour videoconference with him on the situation. He explained to me that Hungary is part of the European Union now and they did some research into laws and regulations not implemented in Hungary yet but would be enforced within the next six months. Based on that information they claimed that, if a student is physically not present in the classroom, he or she is considered missing. If someone misses more than 20% of the classes the attendance of the student should be terminated.

I argued that I was “virtually” present in the classroom, but they did not accept my argument. I was not able to continue my studies, and was forced to look for other options. I would have been the first “virtual” student in the world. I have no knowledge of anyone ever trying to become a part-time student in a traditional environment via a “virtual” presence using videoconferencing.

Current Educational Use of Videoconferencing

In my research work, I was fortunate to meet and work with some of the world’s leading educators who use videoconferencing in their everyday life on the private and professional level as well. Many of them rely on Apple based computers, but some are testing other types of computers with other Operating Systems.

For this paper, I have contacted a few of my colleagues, and asked them the following questions:

- When did you start using videoconferencing?
- How often do you use videoconferencing in your professional life?
- How do you use videoconferencing in your current education?
- Can you give me more details about how you teach your class using videoconferencing?
- Can you describe some of the benefits of using this technology?
- Have you experienced any disadvantage using videoconferencing vs. traditional classroom education?
- Have you had any student(s) participate in a traditional classroom activity via videoconference? (If not, would you consider allowing one of the students to participate in a traditional class “virtually”?)
- How would you summarize your experiences (personal and professional) with videoconferencing?
- Do you have any future plans to introduce new technologies, new methods with this technology? (like iChat’s presentation slides, video background etc.)
- Would you have any suggestions for using videoconferencing in higher education?

I would like to summarize their answers below:

Mr. Istvan Gulyas; Educational Director of Apple Macintosh of Hungary

“I have been using videoconferencing for over 10 years now, on my Apple based systems. I could not imagine doing my job without it. I have held countless lectures, seminars, classes, business meetings, and personal conversations via this technology. I am currently using videoconference to teach a class at the College of Dunaujvaros, in Hungary, in the subject of Virtual Reality. It is an interesting correlation to teach virtual reality via a virtual presence.

My students are very much involved in the education. They participate in my virtual class just as if I was present in the classroom. I do not require any assistance other than setting up a laptop computer on the teacher’s desk, and powering it up. The rest is done via remote access, and I set-up my own videoconference. I could not even start describing the many benefits of this technology. I use it daily to eliminate my travel time. I use it to keep in contact with colleagues and to hold seminars around the world without leaving my office.
The only disadvantage I can think of, and this will be resolved over time, is that I cannot give exams to my students via videoconferencing yet. I have to be physically present for all tests and exams. I have never heard of a student participating in a traditional class via videoconference.

I am currently experimenting with the presentation aspect of the iChat software. This will allow me to display pictures and video in the background of my video-image. I can use this tool to show data, graphs, and pictures to my students. I think I can be confident enough to say that any educator should give this technology a chance, and experiment with it, to see the potential and limitless possibilities of videoconferencing.

Dr. Dezso Benedek, Ph.D; Professor of Comparative Literature at the University of Georgia, USA

“I have been using videoconferencing for over a decade; and will continue to use it on a daily basis. I teach here in the University of Georgia full time. But I also hold seminars, lectures, and two different classes at the University of Taiwan and at the University of Romania in Europe.

I have realized the advantages of this technology early on. My students have experience in setting up videoconferences on Mac based computers, so it is easy for us to connect at the beginning of each class. I have rarely experienced technical difficulties, and in my 12 year career in “virtual” education, I have missed less than 10 lectures due to technical problems. I am always 15 minutes early for class, and that gives us time to work out any glitch in the system. Sometimes I have to use Skype, a VOIP program to get in touch with my class, and set-up the video properly, but it almost never fails. I have no knowledge of any student attending regular classes via videoconference. I am currently using the presentation slides with iChat, and I am very successful with showing linguistic problems, cultural images, and other slides to my classes.

Without videoconferencing, a lot of the professional challenges that I enjoy would not be possible, and I would simply not be able to give lectures this often overseas.”

Prof. Janos Kertesz; Director of the Institute of Physics at the Budapest University of Economics, Hungary, EU.

“I have been an educator for over 25 years now, and I am new to this technology. I have limited computer experience, and I would not call myself professional in any aspects of computing. I started using videoconference 4 months ago, when I met you on a seminar. In my personal and professional opinion, this technology is worth more time experimenting with. Since then I have attended another seminar where one of the speakers was present via videoconference, but I have never seen anything like what you did with quad-video, between USA, Taiwan, Oslo and Hungary. For me, this was an eye opener into the field.”

Prof. Tung Shen, Ph.D; Dean of the Office of International Affairs at the National Taiwan University, Taiwan.

“I am very interested in our research into the potential of videoconferencing in higher education. We have been introducing new study materials, especially, for our international students. We are researching methods of live-translation software for spoken languages to eliminate international differences. I think all educators and students will benefit from these new tendencies in technology and research.”

Conclusion

From all areas of my research I have received mostly positive feedback on the use and potential of this technology. It is becoming more and more an everyday occurrence to use videoconferencing for some of our communication needs. It is much better than a telephone call, since we can interpret and visually inspect the other party’s (or parties’) facial movements. We can observe students in the classroom almost as well as if we were present in the room with them. We can interact between two or more participants with no concern of distances, borders, or nations.

Businesses, families, college buddies can keep in touch regardless of the physical location of their members.
References


