Student Perceptions on the Use of Interactive Video Conferencing in Biomedical Engineering Technology Education

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ABSTRACT

To increase the breadth of exposure of students pursuing an Associates Degree in Biomedical Engineering Technology at the Penn State University, Wilkes-Campus, they were exposed to a series of *Guest Lectures Program* delivered via Interactive Video Conference (PicTel™). The lectures originated at the New Kenginston Campus of the Penn State University. This paper evaluates the benefits and drawbacks of the use of Interactive Videoconferencing in the classroom through the student's analysis and perceptions of such tool, especially at the remote location. The paper also identifies the characteristics of the lectures and speakers that are best perceived by the students at the remote location and consequently increase their attention on the subject. Although these conclusions have been extracted through Biomedical Engineering Technology, they are valid for any other technical subject with minor modifications.

INTRODUCTION

Education in Engineering Technology is aimed at training future professionals in the arts of maintenance, repair, acquisition and management of technical equipment. However, it is widely recognized that Technology is today undergoing major changes. The training of these future professionals needs to be reviewed and updated. The traditional educational approach consisted of theoretical lectures complemented by hands-on experiences in the laboratory. However, at the present time, students will have to compete in a career that demands not only that they be well-trained professionals, but also that they possess a broad vision of the profession (Buchal, 1997).

To provide the breadth of perspective and in-depth discussion of all the current issues that affect the profession, it is essential that students in any branch of Engineering Technology know what happens in industry. This exposure will complement the faculty points of view, experience and expertise in the field, being a dual approach to the training in a very specialized area.

However, it is not always possible to bring these professionals to the Campus grounds according to the academic needs. Problems such as schedule coordination, last-minute calls and travel costs limit the possibility of bringing these guests to the Campus. The technological advances,

developments and cost reduction of Video Conferencing Tools makes them a very attractive alternative to the physical presence of speakers. Large and medium size corporations have used these tools successfully for several years to reduce the cost, both economic and in time associated with traveling, but few efforts have been made to introduce them into academia in their Engineering Technology fields.

This paper evaluates how Biomedical Engineering Technology students perceive the use of Interactive Videoconferencing Tools in their training. It also examines the characteristics of the speeches and speakers that the students perceive more positively. Some of the benefits and problems associated with Video Conferencing have been extensively analyzed, focusing on the technology itself (Sprey, 1997), and the way the communication is established (Heines, 1997). The major problems associated with Interactive Video Conference can be summarized as:

- The degradation of image quality due to the video compression that is used to reduce transmission bandwidth and consequently to reduce the cost of the conference that is especially noticeable in motion actions

- The audio delay between the transmitting and receiving ends, that even small in its nature is heavily noticed by the users and,

- The almost unavoidable losses of communication that are particularly pernicious when they happen at the times when the speaker is engaged in lecturing rather than in interactive discussion.

MATERIALS AND METHODS

The students enrolled in their sophomore year of the Associates Degree in Biomedical Engineering Technology at the Penn State University, Wilkes-Barre Campus participated in a remote and highly interactive *Guest Lecture Program*. The *Guest Lectures* were delivered once a week, being treated as course material in the BET 204W course. After the lectures finished the author engaged the students in discussion about the content of the lecture and its repercussions on their future professional careers. The lectures were delivered by experts in fields other that academia, at the Penn State University, New Kensington Campus under the direction of the Biomedical Engineering Technology Program Chair, Scott Segalowitz. The students at the New Kensington Campus (*near site)* received the live lectures, while the students at the Wilkes-Barre Campus (*remote site*) received the lectures via PicTel™, a Two-Way Video Conferencing System. Although the information given to the students at both campuses was the same, the transmission channel was absolutely different, originating substantial differences in how the information is assimilated and retained by the two groups of students.

The purpose of the program was to expose the Biomedical Engineering Technology students to a broad variety of subjects related to the Clinical Engineering field. The regular academic sessions give the students the basic knowledge of engineering and other related disciplines to develop their technical skills and expands their critical thinking. The input from industry and other related

professionals gives them the breadth of perspective that is needed to become well-rounded and resourceful professionals in today's global and competitive markets (Arne, 1996).

The *Guest Lecture Program* contained two types of lectures:

- Technically-oriented lectures that describe in depth the technical and functional aspects of different medical equipment whose basic working principles have been previously explained in the classroom

- Lectures that focused on aspects that have been traditionally forgotten by academia but will have a high impact in the students professional careers, such as regulatory issues, aspects of technical writing, ethics, and interactions with other professionals among others (Elder et al. 1996).

At the end of the *Guest Lecture Program* the students at the Wilkes-Barre Campus were asked to anonymously respond to a survey regarding the program and the videoconferencing media that was used to transmit the lectures with their responses analyzed in this paper.

RESULTS

All the students indicated a preference for the lectures that had a high technical content and concentrated in medical equipment rather than the lectures that focused on interpersonal and interprofessional skills. This outcome is not surprising as the students are pursuing a degree in a very specialized and strongly technical field. They valued the possibility of acquiring more in-depth technical information on medical equipment, followed by the possibility of interacting with professionals in the field, wither by being aware of the industry needs or talking to professionals currently employed, as it is shown in Figure 1. All the students also agreed that although they did not like the less technical lectures, the program was well balanced.
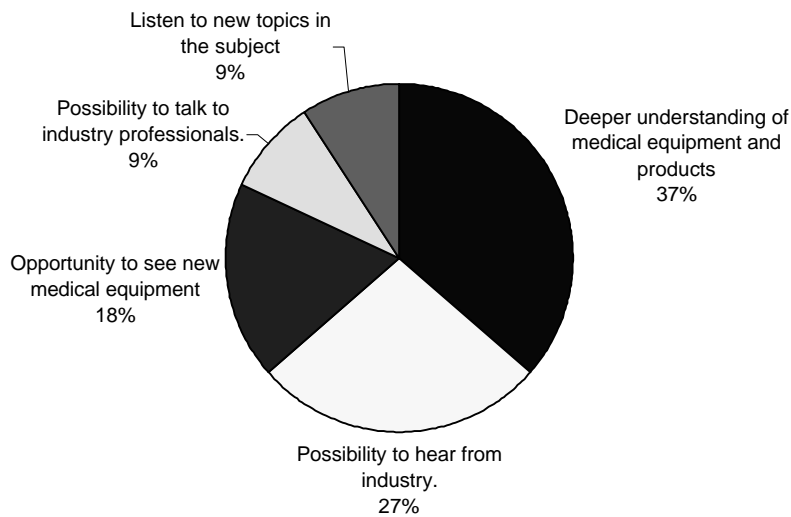
FIGURE 1: Summary of students' perceptions of benefits from Videoconferencing Lectures

Most of the drawbacks in the *Guest Lecture Program* that the students pointed out were due to the use of the interactive videoconferencing system. In particular, they unanimously recognized that the information delivered to them was positive, but it lacked the benefits from the human contact that the students at the near site had. It is in fact, harder for the students to concentrate on the message delivered when it is done using a videoconferencing tool as they don't have all the resources that are employed in a face to face communication. In this situation, they also realized and pointed out that the speaker's personality, as well as the correct use of audiovisual tools, becomes a critical issue to reach the audience at the remote site, and can overcome the problems associated to distance education delivery. They strongly value the speaker's personality, in particular their enthusiasm and interest in making their audience feel interested in the topic being discussed and their ability to create a relaxed atmosphere. The students also valued very positively the speakers talking loudly and clearly and the effective combination of audiovisual aids, resources that if used in the right way increase the effectiveness of the communication between professionals and the students.

The students showed lesser interest for the lectures with lower technical content. However, in this case, the students were not as unanimous in identifying the reasons for this low interest. Most of them did not have any interest in the topic being discussed. Other reasons for the lower interest were attributed to the way the speakers presented the information and facts and the effects of compressing a lot of information in a very short period of time.

CONCLUSION

All the Biomedical Engineering Technology students at the remote site appreciated the effort of the faculty at both campuses involved in the Program, in giving the students the opportunity to

interact with industry and related health-care professionals. The students perceived this interaction as the most important outcome from the *Guest Lecture Program*. Although this is a benefit that is common to the students at the near and remote sites, the students at the remote site were less enthusiastic about the overall result. They recognized that even though it is a promising way to deliver information when the personal contact is not possible, the use of interactive video conferencing cannot substitute for human contact. All the students also recognized that there is a need in their training to become successful professionals in the clinical field to address issues that are less technically oriented, but focused on their other human and interpersonal skills. However, all the students also showed less enthusiasm in these discussions compared to the ones focused on the technology of medical equipment. This dichotomy needs to be addressed by the educators by showing the students the importance of receiving a well rounded education, with a strong emphasis on their communication skills. Instructors should strongly emphasize that once in the Clinical field, the future professionals will need more than technical knowledge to advance in their careers. Educators in technical subjects, clinical managers contacted through field visits, and guest speakers invited to campus to deliver technical lectures should highlight the need for the students to acquire a breadth of exposure to different areas that will play a major role in the student's future career development (Kearney, 1996).

In this context, the personality of the external speakers invited to deliver lectures or share their experience with Engineering Technology students plays a major and decisive role in how the students will perceive them. The students clearly manifest a more positive attitude towards those speakers that use abundant examples extracted from personal experiences in the field, those lectures in which the speakers display a genuine enthusiasm, and those in which humor is wisely placed. All these aspects that are important when talking to a direct audience, become critical to assure the success of communication when the lecture is delivered by Video Conferencing.

The responses from the students clearly show that Interactive Video Conferencing is a new and promising tool in education in Biomedical or in general any Engineering Technology Program. Like any new tool, it requires further refinement by students and speakers exploring the best approaches to obtain the maximum benefit. In any case, the future of this and other similar tools is very promising as it allows Engineering Technology students to interact with professionals in their fields on a routine basis, without the costs or inconveniences derived from traveling to the Campus or industry grounds. The speakers invited to participate in an interactive videoconferencing speech or lecture have in their hands an excellent resource to reach audiences that are normally away from their range in order to increase their interest in their technological profession and contribute to the formation of highly qualified professionals at the service of the society.

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