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COMPUTER SUPPORTED COLLABORATIVE LEARNING REQUIRING IMMEDIATE PRESENCE (CSCLIP): INTRODUCTION AND RESEARCH OPPORTUNITIES

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Introduction

The objective of this panel is to describe and further explore the research opportunities in extending the current generation of distance learning to include laboratory learning. We will create a forum for the discussion of both the technical and educational components necessary to develop a virtual telecommunications laboratory (lab) course. An interdisciplinary team at Oklahoma State University (OSU) has been working on such a facility for use in its Master of Science in Telecommunications Management (MSTM) program. Our research project aims to employ the growing bandwidth in a research-driven, theory-building, technology development and assessment program to enable Computer Supported Collaborative Learning requiring Immediate Presence (CSCLIP). Immediate presence is characterized in two ways. First, it allows same time-different place (STDP) interaction among students, instructor and the technology. Second, it implies immediate presence that is typical in the lab environment. We believe that the right mix of learning theory, group dynamics, technology, and high bandwidth will usher in a new level of interactivity to support CSCLIP. Our specific development domain is a telecommunications lab course that requires students to travel as much as 1500 miles. Virtual Interactive Telecom Advanced Lab (VITAL) developed under this project will enable many more students to benefit from the lab courses. The technologies and learning theories explored by this project will build CSCLIP as a major extension to computer supported collaborative learning.

Panel members will discuss a wide range of topics in both the technical and educational areas. Technical topics include creation and development of a user-friendly interface, Virtual Reality development, and implementation of audio/video systems. Other non-technical areas for discussion include technological, learning, and group theories. Measurement of process and outcome variables will be presented and areas for future research will be explored.

Panel Participants

Ramesh Sharda will introduce the panel members and begin with a discussion about OSU's Telecommunications MSTM program. He will then continue with an overview and the need for CSCLIP. The dramatic increase in the number of people enrolled in

higher education through distance learning is likely to continue. These educational opportunities clearly have major social and economic ramifications. However, we need to realize that the currently available technologies are insufficient for educational modules that typically require hands-on experience with equipment. Lab coursework will become a limiting factor in growth of distance education opportunities. What is needed is a new initiative to explore the potential combination of high bandwidth, hardware, software, and human-computer interaction principles in making virtual simulations of lab modules realistic learning experiences. We assert that the right mix of learning theory, group dynamics, technology, and high bandwidth will usher in a new level of interactivity to support CSCLIP.

Nicholas Romano will talk about his recent work in CSCLIP theory development. The growth of Information Technology (IT) in general, and the Web in particular, has spawned exciting developments in Technology-Supported Learning (TSL). However, these applications and corresponding theory development have not focused on educational segments typically requiring immediate co-location of the instructor and students. Learning modules that include interaction with lab equipment typically require the students and instructor to be present in the lab i.e., same time-same-place (STSP). The purpose of our research stream is to design, develop, and assess theories that would make it possible to take a lab course without actually having to be in the physical lab. An initial review of the literature on learning theory in general, and for technology-supported learning specifically, illustrates that there is no one theory that adequately explains how people learn, how an instructional system should be designed, how social interaction affects learning, or how people and technologies function best together (Koschmann, 1994). He will explain a variety of theories that can be classified into three major categories: i) technological theory, ii) group theory, and iii) learning theory. In addition, he will discuss an area that has been seldom explored: situated, experiential learning that involves immediate presence and collaboration in the psychomotor domain. This will be examined with respect to behavioral learning objectives based on Bloom's (1956) definition, which includes the domains of cognitive, affective and psychomotor.

George Scheets will explain the current state of the laboratory and the ongoing technical activities. Regardless of their location, students should be able to utilize the equipment, interact with the instructors, and interact with other students. If executed properly, this type of lab should capture the essence of and offer essentially the same learning experience as a STSP classroom environment. Furthermore, because the subject of our curriculum is telecommunications, extending the system to the remote sites provides additional learning components. This methodology currently appears to be very rare, perhaps non-existent.

The telecommunication lab includes experiments in voice, data, and video. For example, the groups connect their individual office local area networks (LAN) via a backbone packet or ATM network, and connect the resulting network to the rest of the world. They conduct experiments to better understand the intricacies of Internet Protocol- based networking, client-server networking, Web-server hosting, and circuit- and packet-switched voice and video. They also investigate carrier-type, wide area network issues using simulation software. Some of these experiments have been developed for delivery through distance learning.

Key components used to date include the following:

- Microsoft's NetMeeting® (Microsoft, 2001), which enables such applications as video and audio conferencing, white boarding, application sharing, and desktop sharing over the Internet.
- Stand-alone camera packages based on Polycom's View Station® (Polycom, 2001) consist of a camera, a monitor, and an audio device, and are wall-mounted in selected rooms. Remote students connect with the camera via the Internet and see and talk with people in the vicinity. Video from the remote student is displayed on a local monitor allowing local students to see who is virtually in the room. These camera packages are always on and serve as key components, enabling remote students to see what is going on in the actual lab, and communicate with local students as well as instructors. Proper placement of cameras and ease of access insures remote students a successful virtual presence in the lab.
- Quick Time Virtual Reality®, which allows the generation of 360 degree, high-fidelity images (QT, 2001), is used to generate interactive videos for pre-lab study, as well as a virtual walk-through of the lab.
- Final Cut Pro®, a MacIntosh-based software package, is used to edit and produce video segments suitable for streaming over the Internet.

Dr. Scheets will also discuss future plans for the lab and some of the latest state-of-the-art systems currently under development at other institutions.

Joyce Lucca will provide a discussion on a number of categories of variables that can impact the learning process as well as learning outcomes. These categories include learning objectives, instructor variables, group variables, tasks, technology, and processes. Outcome variables discussed will include both achievement and non-achievement. She will conclude with a discussion on measurement of both processes and outcomes, and pose research questions for future investigation.

Format of Interaction

The AMCIS panel session will be the beginning of a discussion of an STDP collaborative lab environment. The panel chair (Sharda) will start by introducing the panelists and will describe the challenges in the development of this type of system. As described in the previous section, panelists will then give an overview of the research in their domain. A question and answer session with the audience and the panel will follow.

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