

**Chapter XXI**

A Case Study of One-to-One Video-Conferencing Education over the Internet

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In a traditional classroom, students learn from the physical delivery of classes, which to a great extent depends on the teaching techniques employed by the instructor. In a virtual classroom, the physical delivery of classes depends not only on the teaching techniques chosen but also very much on the technologies used to deliver the teaching materials (Cyrus, 1994). With the increasing use of virtual classrooms, technologies have become a critical component affecting teaching and learning effectiveness (Alavi, 1994). Advances in information and communication technologies have significantly changed the ways students learn, the ways instructors teach and the means with which both parties access information (Leidner and Jarvenpaa, 1993).

Virtual classrooms have been investigated in the context of tele-learning (e.g., Alavi et al., 1995; Wheeler et al., 1995) and video-conferencing (e.g., Kydd and Ferry, 1994; Webster, 1998). While such technologies have allowed an instructor to deliver formal classes to students from another geographical location, these classes can be supplemented by informal computer-mediated interaction among the instructor and students through electronic mail or bulletin boards (Leidner and Jarvenpaa, 1995). Advances in internet technologies have opened up new ways for interaction among the instructor and students. For example, the instructor can now place the course materials on the World Wide Web for students to access.

A more significant way with which the Internet has changed the dynamics of teaching and learning is to make possible direct personal tutoring over long distances. In this mode of learning, an instructor gives personal instruction and attention to a student at any point in time through the Internet. Although video-conferencing facilities can be used for this purpose of direct personal tutoring, the costs of doing so is prohibitive because instructors and students need to invest in the same set of specialized hardware and software. This situation has changed drastically with latest developments on Internet video-conferencing

capabilities. With such capabilities, an instructor and a student located in different parts of the world can engage in a video-conferencing class using standard personal computers and very affordable off-the-shelf software (Alavi et al., 1995). Furthermore, instead of exorbitant international phone charges, the instructor and student will need to incur only minimal local phone charges.

Changes in the economics of direct personal tutoring over long distances (via Internet video-conferencing capabilities) can potentially lead to a proliferation of its use. Students are no longer subjected to the constraints of geographical barriers in their quest for knowledge. Instructors are no longer restricted by physical distances in their attempt to give personal attention to students. And since such technologies may fundamentally alter the mode of teaching and learning in the future, it is important that research be carried out to identify factors that may facilitate or hinder teaching and learning via Internet video-conferencing capabilities.

This chapter investigates the use of Internet video-conferencing for one-to-one distance education. Through in-depth observations of and interviews with two instructors and three students in Singapore, this chapter examines the impact of four critical factors (system characteristics, mode characteristics, social presence and media richness) on the effectiveness of teaching and learning in such a context. By focusing on one-to-one teaching and learning episodes involving the latest Internet technologies, this chapter has helped to fill a gap in knowledge that arises because current studies tend to concentrate on big virtual classroom settings (e.g., Alavi, 1994; Alavi et al., 1995).

BACKGROUND

Earlier studies on the use of information technology for education have focused almost exclusively on computer-aided instruction, where the students interact with educational software, either on personal computers or through the Internet (e.g., Schloss et al., 1988). For example, Leidner and Jarvenpaa (1993) examined the use of information technology in a traditional classroom setting where instructors had access to presentation software and students had access to spreadsheet and statistics packages. Alavi (1994) studied how a group decision support system could enhance group process gains and reduce group process losses (Nunamaker et al., 1991), thereby helping teams of students to learn from each other. Sanker et al. (1997) investigated two other instructional situations. In one situation, the instructor used a video-conferencing facility to deliver lectures from his office to students in a classroom. In the other session, students watched the instructor and a colleague solved a spreadsheet problem through a video-conferencing facility. In both cases, students did not get to interact with instructors. A common characteristic of these and other related studies is that information technology was not used to accomplish two-way communication between instructors and students.

Desktop video-conferencing facilities are a convergence of video-conferencing, audio-conferencing, software support tools and Internet tools, all packaged into the familiar and affordable personal computer (Alavi et al., 1995). Among many possible uses (Kydd and Ferry, 1994; Rosen, 1996), a useful application of desktop video-conferencing facilities is in education. With desktop video-conferencing facilities, an instructor and a student located at separate places can engage in a one-to-one instructional session on any subject matter. Unlike the settings studied in prior research, such a mode of instruction involves

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