Interactive Videoconferencing

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INTRODUCTION

The convergence of once disparate voice, video, and data telecommunication technologies and the increasing adoption and cost effective availability of high bandwidth network services among educational institutions, businesses, and home users has rapidly altered the landscape of technology-mediated communications (TMC) in instructional settings. In combination with the use of distance learning technologies, such as Web-based chat and threaded discussion boards that facilitate both synchronous and asynchronous collaboration, many instructional environments are increasingly adopting a blended approach to instruction that includes video communications. One of the evolving and dynamic technology tools that schools and institutions are increasingly utilizing or planning for in learning environments is videoconferencing because of its ability to offer media rich interactive learning opportunities (NCES, 2001; USDOE, 2004). The extent to which the adoption of TMCs and the closely related subject of information communication technologies (ICT) has transformed education is an ongoing debate that continues to be the focus of a variety of academic and industry research studies. One subset of both TMC and ICT that continues to substantially alter classroom pedagogical practices and the perceived viability of distance education is two-way interactive video communications also known as interactive videoconferencing (IVC). The use of videoconferencing in education has rapidly grown over the past several decades. As technology rich learning spaces continue to be constructed, videoconferencing has the ability to substantially alter both face-to-face and online learning. Through numerous authentic learning opportunities, social interactions, virtual field trips and experiences, global communications, and increased personalized contact, videoconferencing facilitates diverse instructional strategies in support of multiple learning styles and cognitive development. To fully and effectively utilize this tool, it is essential that educators are continuously trained on and informed of the evolving teaching and learning methods, styles, and strategies enabled through the dynamic advances in videoconferencing and related instructional technologies. With these changing pedagogical practices and the increasing use of blended learning, new ways of measuring interaction and evaluating instruction need to be developed and teachers will need to be trained on its use and best practices. This and the institutional sustainability of these endeavors are critical aspects of this author's ongoing research as well as that of several others (Caspi & Gorsky, 2005; Cox & Webb, 2004; Kozma, 2003; Lim, Pek, & Chai, 2005; Lou, Bernard & Abrami, 2006).

BACKGROUND

As educators and administrators in K-20 learning environments work to blend videoconferencing technologies into the instructional process in order to expand and facilitate student learning and interaction in face-to-face and distance education settings, a number of factors that impact its sustainability as a viable instructional tool must be examined. While the acquisition and deployment of the technology itself is a concern for administrators, as is the training and preparation of in-service and preservice teachers, teachers and researchers themselves have varying viewpoints on the efficacy of videoconferencing for learning, design of instruction, and the best approach to acquiring the skills to use it (Byrne & Staehr, 2002; Greenberg, 2004; Schiffman, 1986). One aspect of the necessary teacher preparation with regard to the use of two-way videoconferencing involves implementing pedagogical strategies that provide an engaging and interactive instructional experience for both face-to-face and distant students. Critical to this experience is the design, development, and delivery of instructional content and mastery of the interconnected system of technology tools used in this environment.

The design of instruction with respect to videoconferencing can take on a number of different focal points. Looking at the early uses of technology and media in

the classroom, instructional design processes tended to take on a media view approach to lesson development (Schiffman, 1986), that is, the technology was center stage and the designer planned the instruction around it and its limitations. Some of these limitations include aspects of physical classroom design such as seating arrangement, viewing angles and distances, temperature, environmental and mechanical noise, lighting, and acoustical transmission, to technical limitations such as noise in audio telecommunications, which reduce the ability to ensure quality dialogue in an atmosphere conducive to learning. The effects of noise in communication and the distance between instructor and learners have been investigated through varying perspectives. Shannon and Weaver's early investigation into the effects of noise in information processing is demonstrative of how dialogue can be disrupted and misinterpreted between its original source and final destination (Griffin, 1997). Related to this aspect of communications over a distance, the theory of transactional distance introduced by Michael G. Moore, in 1989, examined the success of distance education as a factor of structure and dialogue with dialogue being significantly impacted by the selection of the communications media and structure being impacted by the design of the course and delivery of content and materials through the chosen media (Moore, 1989). While focusing on distance learning, Moore points out that transactional distance theory is applicable to multiple learning environments including classrooms where the distance is relatively insignificant to large lecture halls where students in the back tend to be impacted by the increased distance (Moore, 1991).

In looking at the development of a framework to further examine the transactional distance and classroom discourse while keeping the adoption of new technologies and learning modalities in mind, varying modes of interaction have emerged as a theoretical basis for analysis. Moore and Kearsley (2005) investigated the concept of interaction by describing three modes of interaction, Learner-Content, Learner-Instructor, and Learner-Learner. In a similar vain, Terry Anderson (2004) described three additional types of interaction: teacher-teacher, teacher-content, and content-content. Anderson (2004) goes on to define the relationships of all six types of interaction with each other and to illustrate their influences relevant to the type of educational media (face-to-face, videoconferencing, teleconferencing, computer conferencing, radio, Web-based learning, etc.) being employed.

Six Core Types of Interaction

- **Learner-content:** This is the interaction between the learner/student and the instructional materials, which can range from passive interaction with paper handouts or Web pages, to active immersion in virtual environments. Critical to the success of this interaction is the design and delivery of the content, as it facilitates the learner's ability to retain the information and construct new knowledge (Anderson, 2004; Moore & Kearsley, 2005).
- **Learner-instructor:** This second interaction involves the communications with the instructor as well as the instructor's interest, motivation, and rapport. Dialogue is an essential component of the instructor-student communication and can occur synchronously through video, audio, or text media, as well as asynchronously through the same media (Anderson, 2004; Moore & Kearsley, 2005).
- **Learner-learner:** This third type of interaction is characterized by peer discussions and group collaboration. Learner-Learner interaction can lead to the development of communities of learners, interpersonal skills, and social development. This interaction can be facilitated in face-to-face or videoconference-based groups or within virtual groups online (Anderson, 2004; Moore & Kearsley, 2005).
- **Teacher-teacher:** The fourth type of interaction can be found within professional development activities and communities of learners, as well as mentoring programs and, in many cases, in team taught instruction with subject matter experts that may or not be present face-to-face. Teacher-Teacher interaction is also found in the design and development of shared curriculum (Anderson, 2004).
- **Teacher-content:** Teacher-content interaction, as its name implies, pertains to the development, selection, and design of the actual content. The process through which teachers continuously monitor and update curriculum and instructional materials can also be included in this interaction (Anderson, 2004).