Designing a Distributed Learning Experience

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INTRODUCTION

With the availability of Internet and digital technologies, many universities are integrating new interactive media into course curricula, both to enhance conventional classroom-based learning and to enable remote students to overcome barriers of time and distance. Although the focus of computer-mediated communication in teaching and learning has traditionally been on distance education—delivering courses to students in remote locations—colleges are increasingly using interactive media to enhance on-campus courses, with positive outcomes. "Distributed learning" describes educational experiences that combine face-to-face teaching with synchronous and asynchronous mediated interaction (Dede, Brown-L'Bahy, Ketelhut, & Whitehouse, 2004). This instructional strategy distributes learning across a variety of geographic settings, across time, and across various interactive media. This study extends prior research findings on the design and educational outcomes of a Harvard Graduate School of Education course, *Learning Media that Bridge Distance and Time*, as a prototypical distributed learning experience.

BACKGROUND

In previous research, we found that a "hybrid" or distributed learning environment that integrates interactive media into the curriculum profoundly shapes students' learning experiences (Dede, Whitehouse, & Brown-L'Bahy, 2002). Our new findings build on previous scholarship about the use of multimedia in the classroom and challenge three decades of "no significant difference" findings in comparisons between traditional face-to-face instruction and teaching across distance (Twigg, 2001). This study extends our prior research with additional evidence supporting the dual assertion that no single medium (e.g., face-to-face instruction, asynchronous discussion, videoconferencing) can support the full range of student learning styles and that instructional models based on distributed learning using multiple media are superior to typical single-medium instructional approaches.

In the next section, we briefly describe our graduate course from which student participants were chosen, theoretical framework, research methods, and previous findings. We then present new findings from a case study of 20 students enrolled in the course *Learning Media That Bridge Distance and Time* at the Harvard Graduate School of Education in the fall, 2002 semester and add preliminary findings from the 2003 course.

Theoretical Framework

Our course curriculum is research based and shaped by guided social constructivist teaching and student-centered learning (Tessmer & Richey, 1997). The course design is structured on the concept that technology affordances should be aligned with the pedagogical foundations of the learning environment (Hannafin, Hannafin, Land, & Oliver, 1997). We

also believe that student-centered learning environments (SCLEs) should be guided by research on how people learn (Bransford, Brown, & Cocking, 2000). For example, Lave and Wenger (1991) argued that learning is an integral aspect of social practice and that situated learning theory helps us to understand learning within the social practice of a group. By inviting students to think about the cognitive, social, and affective dimensions of the learning experiences from both the perspective of the learner and the teacher, we build a conceptual bridge between cognitive practice and social practice.

"Learning styles," as described by Keefe (1987) and Sternberg and Li-fang (2001), are preferred ways in which learners interact with and process information in learning environments. Williams and Peters (1997) state that online environments offer "a better environment to accommodate flexibility in learning styles" (p.67). By combining face-to-face interaction with synchronous and asynchronous mediated communication, our course is designed to provide distributed learning environments that address a variety of learning styles within diverse student groups.

Distributed cognition is the "dispersal of intellectual functioning across physical, social and symbolic supports" (Perkins, 1992, p.167). Using groupware (Groove, for example; see http://www.groove.com) supports distributed cognition that scaffolds student collaboration in ways not possible in face-to-face meetings. Distributed learning experiences are based on a social constructivist model of learning in which students are active constructors of knowledge (Jonassen, Peck, & Wilson, 1999). Additionally, our course supports virtual communities of practice (Burnett, 2001; Wenger, 1998) that encourage students to develop a common language to build understandings of the strengths and limitations of various media and to devise problem-solving strategies for integrating distance learning into the educational environment.

Description of the Course

Learning Media that Bridge Distance and Time is an introductory graduate course open to master's and doctoral students at the Harvard Graduate School of Education. The purpose of the course is to introduce new theories in research and teaching practice that emphasize the cognitive, affective, and social dimensions of distributed learning environments. Its pedagogical framework assumes that students will have only cursory familiarity with the various interactive media presented. and extensive support is provided as students learn to use these methods of expression, communication, and collaboration.

The main objectives of the course are to: (1) describe current leading-edge work in distance education in K-12, higher education, business, and government settings, (2) to portray similarities and differences between face-to-face instruction and teaching across distance, and (3) to support students in gaining fluency in using the interactive media introduced in the course. These interactive media include asynchronous threaded discussions, multi-user virtual environments, groupware, interactive presentational media (e.g., videoconferencing), instructional authoring shells, wireless handheld devices, and e-learning applications (e.g., telementoring).

Students meet face-to-face for the first two weeks to establish working and social relationships. The classroom is a large, state-of-the-art amphitheater that features both Windows and Macintosh computers displayed on two large video screens with small supplemental screens. Videoconferencing from either ISDN or IP-based is available, along with a hook-up for a laptop, VCR, and computer white board. The speaker's podium controls all room functions, and a main control room regulates video- and audio-taping. The amphitheater-style seating for students features Ethernet connections, electrical outlets, and built-in microphones between each pair of seats to facilitate class discussion.

After the first two weeks, face-to-face meetings and meetings across distance are deliberately interwoven to support a range of student learning styles. Students use the interactive media for group and individual assignments so that they may experience how each medium shapes the cognitive, affective, and social dimensions of learning. The range of individual responses to each medium is made explicit through discussions, activities, and participation in our research process. In this way, students not only gain firsthand experience as learners using a full suite of interactive tools, they also acquire skills in evaluating the effectiveness of the various media. For more information on the course design and

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