Chapter 1.2
Technology's Role in Distance Education

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INTRODUCTION

Learning is enhanced by the physical and social technologies typically used in distance education. Students in distance programs typically have access to tools that allow them to repeat lectures and interact with their fellow students and faculty. Students in all classes, including face-to-face and blended courses, benefit from having similar tools and technologies available. This article will review common tools and technologies used in distance education, and demonstrate why they can facilitate learning and expand the educational opportunities for both distant and traditional students.

BACKGROUND

For many years technologies have been used to facilitate learning. In the early 1980s a group of researchers at the New Jersey Institute of Technology (NJIT) realized the enormous potential of the technology to enhance learning when they used a computer-mediated system to facilitate a regular face-to-face class. The system was introduced to students in a number of computer science and information system courses. Due to the amount of material covered in lectures, there was not much time for dialogue, and only a few students participated when there was a class discussion.

The instructors introduced asynchronous group communication technologies to communicate discussion questions and assigned grade point credits for student participation. One hundred percent of the students participated in these discussions outside of regular classroom hours. The extent and depth of the discussions changed the nature of the classes. Most importantly, student contributions were comprehensive, with more well-thought-out comments, because students had the time to reflect on the ongoing discussion before participating. Also very significant was that students, for whom English was a second language, became equal participants. They could reread the online discussion as many times as needed before replying. The computer-based activity monitoring and transcripts, electronic recordings of the discussions, showed that foreign students spent two to three times more time in a reading mode and reread many discussions, far more than the American students.

In addition, professors now have the ability to monitor activities and review the electronic transcripts of student involvement which gives the instructor insights into how students are learning. By reviewing the transcripts of the online discussions, it becomes obvious what and how students are learning. For courses with a high pragmatic content, such as upper-level and graduate courses in topics like the design and management of computer applications, students are required to utilize problem-solving approaches to evaluate the tradeoffs between conflicting objectives. In a traditional classroom environment, especially in large classes, it is very difficult to detect whether students are accurately incorporating the problem-solving mental models that the instructor is attempting to convey. When instructors review the transcripts of class discussions, they give insights into the approaches students are taking to master the material. Unfortunately, in the early 1980s few wanted to hear about a revolution in normal classroom teaching or were willing to expend the effort to dramatically improve classroom

education. It was only the rise of distance education that generated interest in learning about the educational potential of the technology.

Hiltz (1994) performed quasi-experimental studies that compared a population of NJIT students (only familiar with face-to-face classroom education) to a population of students taking the same courses in pure face-to-face sections, with pure distance sections using only CMC technology. The students in the matched sections had the same material, the same assignments, the same exams, and the same instructor. They found no significant difference in the amount of learning or the rate of student satisfaction. This finding is much more significant than a determination based on a study that included a population of distance learners already familiar with traditional correspondence classes.

Two critical underlying variables driving the success of this approach were identified by Hiltz (1994). First, the role the instructor needed to take was different from the traditional classroom role. The instructor acted more as an active and dedicated facilitator, as well as a consulting expert on the content of the course, rather than traditional teacher. Second, collaborative learning and student teamwork were the educational methodology (Hiltz, 1994) shown in later studies to be a key factor in making distance courses as good as or better than face-to-face courses (Hiltz & Wellman, 1997). These results show that distance courses can be as effective as face-to-face courses when using any of the traditional measures, such as exams and grades.

Creative, interactive software programs accompanied by background tutoring can effectively teach students to master the skills currently taught in many undergraduate courses. When these courses are automated, the costs incurred are far below typical college tuition. In the future, colleges and universities will not be able to continue to charge current tuition costs for introductory courses that are largely skill oriented. For example, there are many stand-alone and Web-based soft-

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