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Higher Education Culture and the Diffusion of Technology in Classroom Instruction

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INTRODUCTION

The diffusion of an innovation takes, on an average, 25 years in an educational setting. Many factors contribute to this slow acceptance rate. Rogers' (1995) theory on the diffusion of innovation and the influence of culture on such diffusion is used to shed light on the causes for this slow diffusion. While not a full explanation of this slow rate of change, this case study shows that the academic culture, within which faculty function, has a strong influence on the diffusion of the use of technology in classroom instruction. This case study provides a point of reference for further study of diffusion of technology in classroom instruction.

This case focuses on a Research I institution in the Midwest that has made a number of commitments to the integration of technology into the curriculum and has channeled many resources into this campaign. While the institution has invested large sums of money in the development of the infrastructure, the rate at which faculty have adopted the use of technology in their teaching has remained low. In order to determine the perceptions of faculty and develop some framework for understanding why the infusion of technology into classroom instruction was so low, faculty members on the campus were interviewed, focus groups were conducted, and meetings between faculty and administrators concerning technology issues were observed. Because additional issues exist with distance education, the scope of this case study research was limited to on-campus classroom instruction and support.

CASE QUESTIONS

- Do the values and beliefs of academic culture promote or discourage a pro-innovation social climate?
- What aspects of academic culture hinder or promote the diffusion of innovation, specifically, the process for adoption of the use of technology in higher education?
- How do disciplinary differences affect the adoption of technology?
- What roles do faculty play in the diffusion of technology in the classroom?
- What tools and support structures drive successful technology integration into the classroom?

CASE NARRATIVE

History of Technological Innovations in Higher Education

As an innovation, technology has been diffusing throughout institutions of higher education since 1946 (Heterick, 1993). Some of the earliest research in higher education resulted in the development of ENIAC at the University of Pennsylvania in 1946. By 1965, Thomas Merrill, Lawrence Roberts and Leonard Kleinrock had developed and implemented the first wide-area computer network, operating between Massachusetts and California (Leiner et al., 1998). By 1969, ARPANET was operational at the University of California-Los Angeles, Stanford Research Institute and the University of California-Santa Barbara, and was connected to the University College of London in England and the Royal Radar Establishment in Norway by 1973. In the 1980s, BITNET was connected between City University of New York and Yale University and the National Science Foundation established five super-computing centers, enabling connections for many universities.

During the 1950s and 1960s, funding from agencies such as the Ford Foundation, the Carnegie Foundation, and the Kettering Foundation enabled institutions of higher education, usually research institutions, to acquire large computers (Saettler, 1990). Many of these were used for administrative purposes and were not available to the general faculty or to students. With the passage of the National Defense Education Act and the Elementary and Secondary Education Act, the federal government became a primary source of funds for institutions of higher education desiring to integrate technology into education (Saettler, 1990). By the late 1960s, spurred by these federal research grants, more faculty were investing in technology (Knapper, 1988). Katz (1993) stated that by the 1970s most of the research institutions were using mainframe computers extensively for three major activities: "... numerically intensive research, ... instruction in computer science, and ...administration" (p. 15).

By the 1980s, desktop computers were available to individual faculty and students (Mason, 1996). Cartwright (1993) indicated that the first uses of technology in the classroom were demonstrations of how a computer could analyze data. However, faculty also began to develop interactive processes of using technology in teaching. One example was Patrick Suppes and Richard Atkinson's program of computer-assisted instruction in mathematics and reading, which was designed for "...individualized, instructional strategies that allowed the learner to correct his [the student's] responses through rapid feedback..." thereby allowing active participation by the student (Molnar, 1997, p. 3). By 1992 the World Wide Web made access to information around the world possible from desktop computers. Today in some classrooms, faculty are using multimedia, integration of text, video, audio, animation, or graphics, which are often interactive in design. They are also using technology for simulations, acquiring information, communicating with others in the classroom and outside the classroom, and transmitting assignments electronically. According to Ringle (1996), technology is now a part of the curriculum. Usage by faculty and students is found across a wide spectrum and includes:

> [...] access to literary and historic databases, simulations in the social sciences, digital imagery in art, theater and architecture, virtual laboratories in chemistry, biology, and physics, and many other things (p. 6).

Higher education institutions are undergoing some major changes as they incorporate