Impediments to the Integrated Use of Computers in the Classroom

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ABSTRACT

Despite the belief that computer technology can enhance teaching and learning in our schools, the adaptation of technology enhanced instruction practices into classroom routines has been slow. This paper explores the reasons for the impeded incorporation of technology and suggests some possible solutions.

Keywords

Technology, technology enhanced instruction, professional development

INTRODUCTION

Educational technology is widely believed to have considerable potential for enhancing educational practice (1). Educational curriculum critics, governments, and the general public widely agree that increasing student access to computers is important (2).

Yet, few examples of technology integrated teaching models exist (1). Former US secretary of Education Terrel Bell states that: "The technological revolution that has greatly enhanced the efficiency of industry, business, and publishing has had little impact on the classrooms" (2).

Clearly, then, there must be impediments to the implementation of technology enhanced instruction (TEI) into educational practice. This paper includes a review of the impediments to the implementation of TEI and suggestions to improve the likelihood of successful TEI implementation.

THE IMPEDIMENTS

Budget constraint would seem to be an obvious limiting factor in the implementation of TEI. But the availability of computers in schools has increased substantially. In the United States, the number of computers entering schools annually went from 1 million in 1982 to 12.5 million in 1991 (3). These numbers indicate that an apparent gap exists between the supply of technological resources and their use in the classroom (3).

Although the technological resources may be present, factors exist that are preventing their curricular integration. One easily identified factor involves the perceived use of computers in the schools: 85% of computer use is restricted to computer science courses (4). While this use of technology may accommodate the goals of the computer science curricula, it ignores the potential benefits integrated technology may offer to other subject areas. In fact, the usual set up of a computer science lab, with one student per computer, may actually deprive these students of some benefit. Many of the reported benefits of technology use — including increased problem solving ability of the students and changing classroom roles of teachers and students — are interrelated with cooperative or collaborative student groupings. As a result, a major innovation in technology use has been described as placing at least one more chair at the computer station (5). A reorganization of the existing structure and a reallocation of the resources of existing computer labs could enhance computer science students' learning experiences, and provide additional resources to other teachers wishing to integrate technology.

However, even when adequate technology resources exist in a number of subject areas, some disturbing use patterns have been observed. For Example, a study conducted by Mathinos and Woodward (cited in 2) of an exemplary technology-laden school over a thirteen week period, discovered that 60% of the students never used a computer, and of the remaining students, half of them used a computer only once. The accountability for this type of technology avoidance falls on the teachers and their lack of training to implement technology integration in their classes.

Teachers, though, are not wholly to blame for the apparent failure of technological integration. There are a number of factors that are beyond the control of the teachers. For example, there is still little agreement on the optimal use of technology in schools (2). As a result, teachers may be confused by shifting policies or unsupported in their efforts for technology implementation. Another problem is that teachers tend to teach in the way they were taught (6). Since post secondary instruction and teacher training do not adequately address the use of technology (7), teachers may have little choice but to carry on teaching in the traditional way they themselves were taught.

It has also been suggested that teachers have been reluctant to accommodate the transfer of control and responsibility for learning, necessary in technology integrated classrooms, to their students (8). This may explain why many teachers who do use technology, tend to use it in an old-fashioned, teacher-centered way that does not facilitate its maximum potential (5). Adopting technology in this manner allows the teacher to use it without giving up control of the learning environment. Aggravating the problem, is the fact that few studies exist involving integrated technology use (2), and as a result few paradigms exist to guide teachers in their implementation efforts. Teachers may not be integrating technology simply because they have never been shown how (3).

The situation of the teachers is only worsened by governments and/or school districts who continue to invest in resources but ignore the need to allow teachers to learn to use it effectively (9). In addition, administrators often expect instant results from innovative projects and/or large capital expenditures; however, teacher competence in technology often develops slowly (10). Intensifying the accountability issue is the problem created by a potential decrease in student standardized test scores; because, the type of higher cognitive level learning facilitated by technology use is not usually assessed on these tests (9). The inability to deliver on administrative expectations, increases teacher anxiety regarding the use of technology.

The combination of some, or all, of the preceding factors affecting implementation helps to explain why teachers have avoided integrating technology into their teaching practice. Obviously the problem is complex and not one that can be easily overcome.

SUCCESSFUL TEI IMPLEMENTATION

Successful implementation of new teaching strategies, including TEI, must focus on the teacher (11). But, since not all teachers are interested in integrating technology into their classroom routines (Mathinos & Woodward, cited in 2), the first step towards the successful implementation of a TEI project is to identify teachers that are motivated to include technology as a teaching tool. These teachers must eventually be prepared to relinquish some of their classroom control to their students, and the teachers must be willing to allow the technology to assume their role as the information presenter.

The next step is to create a sustained program of professional development (12) including: mentoring of novice users of technology by experts, budget allowances for conference and workshop attendance, and support for teachers involved in innovative technology integration projects. This support should be in the form of additional preparation time, funding for resources and release time for mentoring activities.

The technology enhanced secondary science instruction (TESSI) project, a collaborative effort on the part of some British Columbia science teachers and Dr. Janice Woodrow from the University of British Columbia, is an example of a successful model of TEI (1). One reason for TESSI's success is that only teachers motivated to integrate technology into their classroom routine are recruited into the project. Once involved, these teachers receive the benefits of ongoing professional development including additional prep time, the attendance of educational conferences, and mentoring relationships with more experienced TESSI teachers (1).

CONCLUSION

Simply making computers available to teachers is not enough to facilitate TEI implementation. In addition to resources, teachers also require the motivation to change traditional teaching methods, the support of adequate and ongoing professional development activities, and advice and support from educators experienced in implementing TEI.

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