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ABSTRACT

This research project examined an innovative technology integration model that includes the design, development, implementation, and assessment of the use and integration of technology by inservice and preservice teachers. Personnel from a school district, an area education agency, and a college of education work collaboratively to provide the support and resources that are necessary to facilitate the exemplary use and integration of technology in elementary classrooms. The proposed three-year model provides a framework that will establish mentoring relationships between preservice and inservice teachers and will create classroom opportunities for them to infuse technology with best teaching practices. This paper describes the purpose of the project and discusses various activities that have occurred during the first year of the project. A literature-based rationale for the need to support inservice and preservice teachers in their use and integration of instructional technology is also provided; areas reviewed include technology integration models, technology support for inservice teachers, and technology in teacher education. (Author/MES)

Collaborative Research Partners: Technology Integration Model that Supports Learning Communities

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Abstract: This research project examines an innovative technology integration model that includes the design, development, implementation and assessment of the use and integration of technology by inservice and preservice teachers. Personnel from a school district, an area education agency, and a college of education work collaboratively to provide the support and resources that are necessary to facilitate the exemplary use and integration of technology in elementary classrooms. The proposed three-year model provides a framework that will establish mentoring relationships between preservice and inservice teachers and will create classroom opportunities for them to infuse technology with best teaching practices. This paper will describe the purpose of the project and will discuss various activities that have occurred during the first year of the project.

Introduction

"....what teachers actually need is in-depth, sustained assistance as they work to integrate computer use into the curriculum and confront the tension between traditional methods of instruction and new pedagogic methods that make extensive use of technology" (Panel on Educational Technology, 1997, p. 49).

For years, schools have purchased large amounts of technology in hopes that students and teachers a like would use these cognitive tools to help facilitate the teaching and learning processes. Despite this huge investment, few of the nation's teachers actually use technology in their teaching (Office of Technology Assessment, 1995). Although technology access has improved, teachers have been given little support in their efforts to use and integrate technology in their classrooms (Office of Technology Assessment, 1995; Panel on Educational Technology, 1997; Sheingold & Hadley, 1990). It is a difficult task for most teachers because not only do they have to learn how to use the technologies, but also they may have to change the way they teach. Still, helping teachers use technology may be the most important task for helping students use technology effectively for learning (Office of Technology Assessment, 1995). Inservice teachers are not the only educators who are not supported in technology use. Preservice teachers who graduate from teacher education programs must be prepared to use and integrate technology when they enter classrooms as well.

Several have suggested that colleges and universities must take a leadership role in preparing preservice teachers to use and integrate computer-related technology in schools (Espinoza & McKinzie, 1994; Office of Technology Assessment, 1995). Preservice teacher education programs can significantly impact future K-12 computer-related technology use by effectively preparing teachers who have the knowledge and the ability to use and integrate computer-related technology to enhance teaching and learning (Berney, 1991). Teacher education faculty, like their K-12 colleagues, face many of the same barriers such as limited access, little knowledge of technologies, and limited time. Before technology use and integration throughout teacher preparation programs can be realized, teacher education faculty and preservice teachers must receive substantial amounts of training and support in developing effective classroom strategies and applications of technology.

The potential use of instructional technology to improve teaching and learning in K-12 schools is great, yet it has been problematic because typically, inservice and preservice teachers have not been given the time nor the opportunity to learn how to use and integrate these technologies throughout the K-12 curriculum (Office of Technology Assessment, 1995). For this research project, a technology integration model is being developed that provides inservice and preservice teachers the on-site support they need to use technology to impact K-6 student learning. The strength of the model exists in the fact that it brings together the efforts of personnel from three educational institutions which are actively involved in providing support for the exemplary use of technology in Iowa schools: a school district, an area education agency, and a college of education.

Background

The following three sections provide a literature based rationale for the need to support inservice and preservice teachers in their use and integration of instructional technology. The three areas reviewed include: 1) technology integration models, 2) technology support for inservice teachers, and 3) technology in teacher education.

Technology Integration Models

Potentially, technology has the ability to change the way teachers teach and students learn. New ways of teaching and learning have emerged as educators explore the many possibilities technology affords learners in classrooms. Several researchers have developed models that describe the stages educators progress through as they learn how to use and integrate technology (Dwyer, Ringstaff, Sandholtz & Apple Computer, Inc., 1990; Office of Technology Assessment, 1995).

Researchers involved with the Apple Classroom of Tomorrow (ACOT) program identified five stages of evolution for technology use in classrooms (Dwyer, Ringstaff, Sandholtz & Apple Computer, Inc., 1990). This research contributes to the growing body of evidence that "teachers' beliefs about instruction and schools is an important factor that underlies the institution's resistance to change" (Dwyer, Ringstaff, Sandholtz & Apple Computer, Inc., 1990, p.15).

The five stages that comprise the ACOT model of technology use include: Entry, Adoption, Adaptation, Appropriation, and Invention. The entry stage refers to the teachers' experience level with the

technology when they began the project. Once teachers accommodated the technology in their classroom to support their traditional methods and materials, they are at the adoption stage of technology use. During the adaptation stage teachers used various technologies as productivity tools in their classrooms and discovered students could use these cognitive tools for higher-order learning and problem solving. At the appropriation stage, teachers thoroughly understood technology as they began to emphasize project-base learning in a supportive, collaborative and interdisciplinary classroom. At the final stage, invention, teachers begin to invent new learning environments that use technologies as flexible learning tools. These learning environments become constructivist in nature as learners construct their own knowledge rather than receive it from someone else. This notable research helps other educators realize the time it takes for teachers to use and integrate technology successfully in classrooms and identifies various stages K-12 teachers progress through when using technology with students.

In the report, *Teachers & Technology: Making the Connection*, three levels of technology use in teacher education are identified: 1) discussion/demonstration, 2) technology practice, and 3) professional practice (Office of Technology Assessment, 1995). The order of these levels suggests a developmental model of technology use in teacher education; the progression through which preservice teachers are guided to acquire basic skills as well as sophisticated models of technology integration for classrooms. At the discussion/demonstration level, a professor might discuss how to use a database in an elementary classroom to an entire class of preservice teachers. The second level of technology use, technology practice, provides preservice teachers with hands-on technology practice. For example, preservice teachers in a reading methods course might spend time in a computer lab reviewing and examining several elementary word processing programs. Viewed as the most complex level of technology use in teacher education, the professional practice level focuses on integration of technology into K-12 classrooms. At this level, preservice teachers are either observing technology-based learning in K-12 classrooms, designing lesson plans that integrate technology, or teaching with technology in K-12 classrooms. Ultimately, preservice teachers design curriculum materials that infuse technology and practice teaching with technology in classrooms.

Technology Support for Inservice Teachers

There are not enough teachers in the K-12 schools who have acquired the necessary computer skills to utilize technology for classroom instruction (Office of Technology Assessment, 1995). Some reasons for the shortage of teachers who are capable of using instructional technology include the lack of technology courses offered in teacher training institutions, the inability of economically pressed school districts to hire new teachers with computer experience, and inadequate technology staff development programs (Office of Technology Assessment, 1988, 1995).

National surveys have been conducted to determine if computer inservice education and staff development programs are available for teachers. Data from the report, *Teachers and Technology: Making the Connection*, suggested that K-12 teachers still have very little training available for them to learn about technology and its education uses (Office of Technology Assessment, 1995). Less than half of the respondents reported having computer courses available for their teachers either at the district or local college level. Findings from this study indicated that more resources had been allocated to purchase hardware (55%) and software (30%) than were allocated to provide training and support (15%) for teachers. Respondents noted that most of the computer inservice training sessions for teachers focused on learning about computers, not on learning how to teach with the technology. This study indicated that teachers perceive the most effective staff development programs were ones that include follow-up support after the initial training.

Under the direction of the President's Committee of Advisors on Science and Technology, the Panel on Educational Technology (1997) was given the task to provide the President with advise on the application of instructional technologies in K-12 schools in the United States. The panel reported that K-12 teachers receive little technical, pedagogic or administrative support for using technology in their classrooms as of 1997. This report indicates that only 15% of a school's typical technology budget is used for professional development, rather than the recommended 30% that is considered by most to be the minimum.

While K-12 schools and school districts continue to plan for technology use and integration, teacher education institutions typically have not done the same (Schrum, 1994). Little has been done by most teacher education institutions to help faculty use instructional technology or to prepare preservice teachers who are capable of using technology in classrooms.

Technology in Teacher Education

Several teacher education institutions identified the need to improve upon their efforts to promote the use and integration of instructional technology by teacher education faculty and students (Kortecamp & Croninger, 1994). Preservice teachers enter schools inadequately prepared to integrate technology effectively into their teaching repertoires (Davis, 1994). It is evident that many preservice teachers feel they lack the necessary skills and experiences to use technology for teaching and learning. In fact, not only must preservice teachers understand the potential of technology, they must understand how to use technology in the classroom with students (Barron & Goldman, 1994). To develop this vision, preservice teachers must have educational experiences that model how instructional technology can be used for instruction and as learning tools throughout their preparation program (Byrum & Cashman, 1993).

Many of the challenges that teacher education faculty members encounter in their attempts to use and integrate technology are similar to barriers K-12 teachers experience. Teacher education faculty stated they lack the necessary time to become more knowledgeable about instructional technology (Office of Technology Assessment, 1995). Teacher education faculty can be certain that learning how to use and integrate technology will take time, as it will probably be several years before they are comfortable using these technologies with students in their courses. As noted by Becker (1994) and Sheingold and Hadley (1990), if often takes K-12 teachers more than five years to become accomplished computer-using teachers.

Description and Implementation of the Project

As recommended by the Panel on Educational Technology there is a need to conduct "early-stage research aimed at developing innovative approaches to the application of technology in education...." (Panel on Educational Technology, 1997, p. 124). This research project examines an innovative approach to technology integration in a school district that includes representatives from a number of educational institutions involved in the systemic change process for school improvement. One goal of this project is to provide a framework that can be duplicated or modified by other school districts or teacher education institutions where educators work collaboratively to assist preservice and inservice teachers in their efforts to design compelling uses of technology that will facilitate meaningful learning in classrooms. This innovative model provides a means to which there is a shared responsibility of providing the necessary support and resources to increase the exemplary use of technology in schools.

The educational institutions involved with this collaborative project include a school district, an area education agency and a college of education. North Polk Community School District includes four small towns and the surrounding rural area and serves approximately 900 students. Heartland Area Education Agency (AEA) is a regional service center that serves 56 public school districts, 35 approved non-public districts, 120,531 students and 9,031 certified staff members in an eleven county area. An instructional technology team that consists of five members provides leadership and expertise in educational technology at the local, state and national level. The Department of Curriculum and Instruction in the College of Education at Iowa State University (ISU) prepares 1025 undergraduate elementary education majors and 500 undergraduate secondary education majors. The undergraduate and graduate instructional technology programs in the Department of Curriculum and Instruction have traditionally been known for preparing preservice and inservice teachers to use computer-related technology for learning and teaching.

Plans and preparations for this project began with meetings and discussions between key personnel from North Polk, AEA, and ISU in 1997, but the actual research project and related activities began in September of 1998. Project activities that have been implemented during the first year of the project include the selection of project participants, the collection and analysis of first year data, and the design and delivery of professional development activities.

Project Participants

Both inservice and preservice teachers volunteered to participate in this three-year research project. Inservice teachers from the North Polk school district expressed that they viewed this as an opportunity to

mentor preservice teachers on best teaching practices while receiving support in their use and integration of technology. Nineteen teachers representing various grade levels and specialty areas from two K-6 elementary buildings are participating in the project. In addition, ISU preservice teachers are excited to have the opportunity to share their working knowledge of information technology with an experienced teacher and to participate in a number of classroom-based learning experiences while completing their degree. Sixteen preservice teachers who are majoring in elementary education, secondary education or early childhood education are participating in the project. The majority of these preservice teachers will have completed the required introductory instructional technology course, will complete their freshman or sophomore year this spring and will pursue a minor in educational computing offered by the Department of Curriculum and Instruction at Iowa State University.

Collection and Analysis of Data

Since this research project is in the initial stages of implementation the data analysis and findings will not be reported in this paper. Data will be collected throughout this project to monitor the progress of participants in learning to use and integrate technology in classrooms. Several of the methods used to collect data include participant interviews and focus groups, direct observations and questionnaires.

Professional Development Activities

Participants involved in this three-year research project will be introduced to a framework that provides them with support and hands-on experiences using technology to enhance the instructional goals of their classrooms. Within this framework, various professional development activities will be introduced and implemented at various times each year. These activities will include technology and curriculum inservices, a preservice/inservice teacher mentoring program, courses, focus groups, and classroom support experiences. The project members who are responsible for the design and delivery of the professional development activities include two instructional technology consultants from the AEA and a professor and a graduate student from ISU. In addition, preservice and inservice teachers will be more involved in the delivery of the professional development activities as the project evolves over time.

The professional development activities that have taken place during this past fall semester were primarily designed for the teachers at North Polk. The majority of the teachers in this school district have had little experience using technology in the classroom, so the professional development team designed and scheduled activities that would provide support for the teachers in a variety of ways. During the first semester of the project the professional development opportunities have focused on introducing teachers to email and one-computer classroom approaches to using technology with students.

Although the North Polk teachers have had access to email in their schools, the electronic mail system they were using was not considered to be user-friendly by many. One of the AEA instructional technology consultants worked with both the district and elementary technology coordinators to set-up and install QuickMail for all elementary teachers. Then, the AEA technology consultant met with each teacher individually during the school day to provide him/her with the instructions on how to use the new email system. The AEA consultant continues to follow up this introductory session with weekly email messages to the teachers that provide them with additional instructions that help them use other features of the email system.

Since the focus of the project is to improve the use and integration of technology in classrooms, significant time has been spent designing professional development activities that will assist teachers in their use of technology in classrooms. To accommodate teachers' schedules, several approaches have been used to deliver these staff development activities. District administrators gave teachers the opportunity to participate in whole group inservices during district inservice days. This semester, the purpose of the whole group inservices was to introduce teachers to one-computer classroom software. Following these inservices, teachers could sign up to have one of the professional development team members come into their classroom to teach a lesson using one of the software programs introduced during the whole group inservices. To participate in this classroom activity, teachers had to verify that the software used and lesson created supported grade level curriculum initiatives. Then, a professional development team member went into the classroom and taught the lesson with assistance from the classroom teacher. In most cases, the teacher was then responsible to continue

or follow up the initial lesson with activities of their own. These classroom team-teaching activities were highly successful and will be continued throughout the project as more software programs are introduced.

As this project moves into its second semester of implementation the preservice teachers will play a major role in supporting the teachers as both discover ways to integrate technology into teaching and learning environments. To meet a university field experience requirement, each ISU preservice teacher will spend approximately 2-4 hours per week in a classroom with a North Polk teacher. Specific course activities are being planned for the preservice teachers as they participate in this field experience with teachers. Preservice teachers will also be encouraged to participate in the technology inservices that will be offered next semester.

Other professional development activities are being planned for spring semester and beyond. There will be a two-day workshop for participants (i.e., inservice & preservice teachers) this summer. Next fall, inservice and preservice teachers will be taking a three-credit university course in which they will learn and support each other as they continue to explore the possibilities of using technology in elementary classrooms.

Summary

This project is the result of collaborative planning efforts by administrators and teachers from a school district, instructional technology consultants from an area education agency, and faculty and preservice teachers from a university. The major goal of this technology integration model is to create a community of learners where all participants share their knowledge and expertise with each other to ultimately improve the learning process for elementary students.

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