# Preparing Current and Future Teachers to Teach With Technology: An Examination of School-University Collaborations

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### Abstract

*Recent research as well as local, state, and national mandates promote an increased role of technology in teaching and learning. In response to this call, K–12 institutions and colleges of education are faced with preparing current and future teachers to teach with technology. The current models of inservice and preservice teacher preparation with technology, although sometimes effective in developing technology skills, often fail to address numerous other issues related to integrating technology into the curriculum. One solution to these issues is for schools and universities to collaborate and improve teacher preparation simultaneously. This paper discusses issues with current technology and teacher preparation models, reasons for school-university collaborations, various models of school-university collaborations, and the positive results of these collaborations. This paper also provides a much needed categorization system that enables teacher educators to explore matters related to various types of school-university collaborations as well as acts as a catalyst for conversation and a tool for developing collaboration models that work in a local context.*


The emergence of computers and technology into numerous facets of everyday life has greatly contributed to the need for technology to play a significant instructional role in the educational system. The demand for the improvement of education and the integration of technology into the classroom has fostered an analysis of the manner in which preservice and inservice teachers are being prepared with technology and for its implementation into the classroom. With these demands, the development of effective methods to prepare both preservice and inservice teachers to use technology are needed.

With a growing population of students and a decreasing population of teachers, the educational system must hire more than two million new teachers in the next decade (Milken, 1999). Many of these teachers will be the products of numerous colleges of education and often will have had limited experience with technology and its integration into the classroom (Milken, 1999). This idea is very unsettling because of the fact that recent research has shown that the effective use of technology in the classroom can provide motivation, relevance, and a deeper understanding of information for students (Johnston & Cooley, 2001; Jonassen, 1996). Various local, state, and national mandates and initiatives (e.g., the National Council for Accreditation of Teacher Education [NCATE], No Child Left Behind, Preparing Tomorrow's Teachers to Use Technology [PT$^3$], the International Society for Technology in Education [ISTE]'s National Educational Technology Standards [NETS], and so on) have aimed to address the issue of preparing teachers to use technology and have been fueled by research that suggests a number of ways in which computers and other technologies can be used to improve teaching and learning (Davis, 1994; Dwyer, 2002; Glendinning, 2002; Jonassen, 1996; Rice, 2001).

With this incorporation of computers and instructional technologies into the classroom (NCES, 2002), many K–12 teachers find themselves ill-equipped to teach with these new tools. Teacher education faculty members also find themselves without the necessary skills to teach preservice teacher education students the skills and methods of integrating technology into the classroom. In turn, preservice teachers often receive little instruction with technology, and as a result, have little knowledge of effective educational uses of technology (Willis & Mehlinger, 1996). Also, preservice teachers find themselves as inservice teachers with little ability to meet national or state technology integration mandates. A crucial concern for educators and researchers is determining how we address the aforementioned barriers while effectively educating inservice teachers, preservice teachers, and teacher educators.

This paper originated as an investigation of current models of integrating technology into both preservice and inservice teacher education. Upon examination of the various models of preservice and inservice teacher preparation with technology, one type—the school-university collaboration—emerged as a greater facilitator of the process of preparing teachers to use technology in the learning environment. After exploring numerous examples of school-university collaborations, it was evident that many had very different goals, participants, facilitating factors, benefits, drawbacks, and constraints. Also, although there is a great deal of literature related to school-university collaborations with technology, there were no categorization schemes in which teacher educators could consult. One goal of this paper was to develop a categorization scheme to allow teacher educators to examine different types of school-university collaborations, resources and participants involved in the different types of school-university collaborations, and the goals, facilitating factors, benefits, drawbacks, and constraints of the different types of school-university collaborations. The examples of each of the models of school-university collaboration chosen were selected for two main reasons. First, they exemplified the characteristics of the specific model and were easily distinguishable from the other types of school-university collaborations. Second, they had clearly stated goals, resources, participants, benefits, facilitating factors, drawbacks, and constraints. These reasons enable teacher educators to explore issues related to their particular teacher education model. This categorization scheme can as act as a catalyst for conversation and a tool for developing collaboration models that work in a local context. Teacher educators could use the information presented to develop school-university collaborations by integrating various aspects of different types of collaborations, depending on their needs, goals, and resources.

## Current Models of Integrating Technology in Teacher Education

### *The Standalone Technology Course and the Workshop*

As with a specific content or methods course, the learning of technology skills are often taught in standalone technology courses for preservice teachers (Brush et al., 2001) and in the popular and traditional "workshop"

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for inservice teachers. The stand-alone course—educational technology for teachers—may take the form of a single course, or in some programs, two courses (generally one prior to entering the program and one after being accepted). Some of these courses are taught outside of the department or college, and many are not taught by teacher educators.

The workshop is essentially a training session performed outside of the classroom, and often outside of normal school hours. The technology workshop typically involves a particular "expert" guiding the participants through the basic skills necessary to use a particular technological application (Loucks-Horsley, Hewson, Love, & Stiles, 1998). Workshop formats vary and can be single- or multiple-day events; most are performed on-site and focus on a limited audience such as inservice teachers or school administrators.

Although the most common methods of preparing inservice and preservice teachers with technology differ in many ways, the barriers that inhibit teacher preparation with technology and the means of addressing these barriers are closely related. Both the technology workshop and the standalone technology course can be effective in the development of technological skills, but can be ineffective in a number of other ways.

***Problem 1: Lack of development of pedagogical methods.*** The integration of technology requires that the teacher implement new pedagogical methods. Thus, teachers must develop these new methods of instruction. Developing these new pedagogical methods requires teachers to investigate their role in the classroom, how technology can be integrated into the classroom, the integration of technology into the content, the student's role in the classroom, and student access to technology (Grabe & Grabe, 2001). These issues are often not sufficiently addressed in technology workshops and standalone technology courses, generally due to issues of time and expertise.

***Problem 2: Lack of time.*** Current models of preservice and inservice teacher preparation with technology are also ineffective at providing "sufficient time, activities, and content necessary for increasing teacher's knowledge and fostering meaningful changes in their classroom practice" (Garet, Porter, Desimone, Birman, & Yoon, 2001, p. 920) These methods often make the common mistake of focusing on the tool, and not the curriculum (Cooper & Bull, 1997), which does not allow time for the participant to appropriately address integrating technology into their classroom.

***Problem 3: Failure to address the current body of research.*** Another problem with the current models of teacher preparation with technology is that they do not build on prior and current research. Inservice training programs that foster new pedagogical methods have a number of common characteristics. The first characteristic is collaboration between teachers, which allows for opportunities to discuss the effectiveness of previously attempted methods, as well as discussions of new ideas. The second characteristic is a common goal: to improve student achievement. Inservice professional development and preservice teacher education that addresses methods of improving student learning and performance allow teachers to visualize the effectiveness of a particular pedagogical tool. The third characteristic involves opportunities to address student needs, the curriculum, and methods of teaching. Investigating these crucial elements aids preservice and inservice teachers in appropriately implementing new pedagogical methods. The final characteristic involves opportunities to examine and investigate new ideas and instructional methods and to reflect on their effectiveness (Heibert, 1999). Many of these characteristics, which foster effective teacher preparation with technology, are not typically present in the technology workshop or preservice education technology course (Corcoran, 1995).

***Problem 4: Failure to address extraneous issues related to integrating technology into the classroom.*** Other instructional issues related to technology and teacher preparation include collaboration between faculty and students, technology access, technology support, lack of faculty expertise, and time (NCATE, 1997). Each of these issues is extremely important to successful preservice and inservice teacher preparation with technology and is often not addressed in current models.

Much progress has been made toward addressing these barriers and improving the integration of technology in teacher education (for examples see ISTE's Distinguished Achievement Awards, the American Association of Colleges of Teacher Education [AACTE]'s Innovative Use of Technology Awards, and PT$^3$'s collection of resources, strategies, tools and examples of integration strategies). One of the most promising strategies for preparing both inservice and preservice teachers rests in the development of school-university collaborations. In this article we provide a brief overview of school-university collaborations and a categorization framework that will enable others to conceptualize how they might develop such partnerships and which designs might best meet their local contexts.

## Addressing the Barriers Through School-University Collaborations

In order to make the integration of technology into the classroom more meaningful, there need to be experiences that focus on this integration (Thompson, 2000). This can be done a number of ways; however, John Goodlad notes that the most effective manner to accomplish this is through the simultaneous renewal of both K–12 schools and teacher education programs. Goodlad (1994) summarizes this potential school-university relationship:

> What comes first, good schools or good teacher education programs? The answer is that both must come together. There are not now the thousands of good schools needed for the internships of tens of thousands of future teachers. The long-term solution -unfortunately, there is no quick one- is to renew the two together. There must be a continuous process of educational renewal in which colleges and universities, the traditional producers of teachers, join schools, the recipients of the products, as equal partners in the simultaneous renewal of school and the education of educators. (p. 2)

One method of implementing the concept of simultaneous renewal is through school-university collaborations. The school-university collaboration not only acts as a form of preservice teacher preparation, but also as a method of inservice professional development and teacher educator training, as well as a catalyst for systemic reform. These collaborations can be particularly effective and are rooted in the fact that many of the challenges that face teacher education faculty (and colleges of education) regarding the integration of technology are similar to those that are encountered by the K–12 instructor (Thompson, 2000). The school-university collaboration can address a number of the issues that impede the effectiveness of current preservice teacher training and inservice professional development with technology. These collaborative efforts allow for both the preservice and inservice teachers to develop a vision of the relevance of the integration of technology into their classroom, while affording teacher educators firsthand knowledge of the implementation process.

A number of benefits result from school-university partnerships. These benefits include multiple levels of collaborations, potentially extensive durations of collaborations, multiple faculty participants from the same institutions, and opportunities to assess pedagogical strategies in an authentic context.

The first benefit is that it can involve multiple collaborations. In a typical partnership, collaborations between the college of education faculty member, the educational technology faculty member, the K–12 instructor, and the preservice teacher are possible. These partnerships and collaborations are important in determining mutual goals and providing support throughout

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the collaborative experience. They also provide participants with varying fields of expertise to gather and share ideas and information.

The second benefit of the school-university partnership is its duration. The individual collaborations are similar to intern experiences, in that they often last the duration of the college term or semester. Duration is an extremely important factor in effective preservice teacher training and inservice professional development, as research has shown that the greater the duration of a professional development experience, the more likely it is that the teacher will change his or her method of instruction (Heibert, 1999). As opposed to the technology workshop and standalone course mentioned previously, the duration of school-university collaborations allow for more opportunities for discussions of content, ideas, and pedagogical methods and strategies, more time to implement numerous practices, and opportunities to observe the effectiveness of technology integration (Garet et al., 2001).

The third benefit of the school-university collaboration is that it will typically involve numerous faculty members from the same school, and numerous preservice teachers from the same university. A number of other benefits can result from this. First, the K–12 instructors and the preservice teachers, each being from the same school, are more likely to be involved in discourse about a number of factors related to their experiences (Garet et al., 2001). These include new ideas, effectiveness of strategies, content, misconceptions, and others. They are also more likely to share information, including curriculum materials, assessment information, and student needs. Finally, these arrangements promote professional development situations that can sustain beyond the timeframe of the collaboration (Ball, 1996).

Finally, the school-university partnership provides an opportunity to assess pedagogical strategies in an authentic context. When integrating technology into the curriculum, a number of issues must be addressed. These include classroom management, accessibility, copyright, the roles of the student and the teacher, and specific content issues. In the school-university collaboration, these issues can be addressed through experiences in the real classroom. Preservice and inservice teachers are provided opportunities to see the relevance of numerous issues related to technology in the classroom environment, and not simply be discussing them in coursework or a workshop.

## School-University Collaboration Models: Examples, Benefits, and Constraints

Although there are many more benefits that can result from school-university collaborations, they are often specific to the design of the collaboration. A number of design-specific drawbacks, facilitating factors, and constraints also exist. In this section, we examine the benefits, drawbacks, facilitators, constraints, and future recommendations related to specific examples of school-university collaborations, each presenting a different model. The categories that will be examined are content-specific technology integration collaborations, tool-specific technology integration collaborations, school-university-outside agency collaborations, professional development schools, and methods-based technology integration collaborations. (See Table 1 for summary information.)

### *Content-Specific Technology Integration Collaboration*

There are a number of models of the content-specific technology integration collaboration. This type of partnership typically involves a single university and a single school system, but may also involve multiple universities and school systems, or even community centers. The distinguishing characteristic of this type of partnership is that the use of technology is driven by the individual teachers' curriculum rather than by a particular tool or subject area. These types of collaborations provide both preservice and inservice teacher preparation with technology and promote a positive relationship between the university and school system involved. Typically, preservice teachers from the university collaborate with inservice teachers from the school system. Faculty and administrators from participating institutions are also involved in many facets of the partnership.

One example of a content-specific technology integration school-university collaboration is the Technology Infusion Project (TIP). This is a joint effort between the Curry School of Education at the University of Virginia and Albemarle County Public Schools and was recognized by NCATE (1997) as an exemplary school-university collaboration. In this project, a preservice teacher education student collaborates with an inservice teacher in an effort to provide both with mutually beneficial experiences using instructional technologies and to foster a positive relationship between the Albemarle County Public Schools and the University of Virginia (Dawson & Nonis, 2000).

The collaborative efforts begin with individual preservice teachers being paired with local inservice teachers for a single semester. During the first portion of the semester, preservice teachers focus on developing a variety of technological skills to share with their inservice partner. The latter part of the semester involves each pair of preservice and inservice teachers collaborating in an effort to identify, develop, and implement assorted methods of integrating technology into the content areas of participating inservice teachers. As with many other school-university collaborations, TIP is funded by both the Curry School and the Albemarle School District. This further contributes to the idea that both participating bodies will benefit equally from the collaboration, a common theme of school-university collaborations (Dawson & Nonis, 2000).

Some major benefits that have emerged from this collaboration are positive attitudes toward the integration of technology into the classroom, increased skills and knowledge of educational technologies, increased skills regarding instruction with educational technologies, confidence in technological abilities, visualizing the relevance of the value of technology in the classroom and instruction, content-specific uses of technology, and classroom management issues related to educational technology (Dawson & Nonis, 2000).

In this collaboration, there are also a number of facilitating and constraining factors. Factors that facilitate experiences in the project are flexibility of instruction, curricular and technical support, a collegial environment, and the low number of students per instructor. Two major factors that hinder the collaborations are time and access to various technologies (Dawson & Nonis, 2000). From this experience, a number of recommendations have been developed to improve future school-university collaborations. Recommendations included: (1) creating a plan that is beneficial to both the K–12 school and the university, (2) thoroughly planning the partnership, (3) promoting a supportive and sharing environment, (4) choosing college faculty with sufficient expertise in both curriculum and instructional technologies, (5) focusing on the integration of technology into the content, (6) not waiting for perfect conditions, and (7) focusing on appropriate timing of the field experiences within the preservice education coursework (Dawson & Nonis, 2000). This model has been used as the basis for numerous school-university collaborations, including the Technology-Based Field Experiences between the University of Florida and the School District of Alachua County.

### *Tool-Specific Technology Integration Collaboration*

The tool-specific technology integration collaboration is similar to the content-specific technology integration collaboration in a number of ways. Both collaborations involve similar partnerships and focus of the appropriate integration of technology into the curriculum. Both collaborations serve as preservice and inservice teacher preparation with technology and to promote a positive relationship between the university and school system involved. Also, preservice teachers from the university collaborate with inservice teachers from the school system, faculty, and administrators. The major difference involves the breadth of the partnership. Although con-

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tent-specific technology integration collaborations focus on the integration of various technologies into the curriculum, the tool-specific technology integration collaboration is much narrower in scope, and focuses on the integration of a single technology into the curriculum.

The Interactive University Project (UCB, 1999) is an example of a tool-specific collaboration between the University of California at Berkeley, San Francisco and Oakland Area schools, and community centers such as museums and libraries. The initial purpose of the Interactive University Project was to investigate, through a school-university collaboration, how the Internet could be used to support both schools and families. The first phase of the Interactive University Project involved developing the framework for the partnerships, producing resources, and developing evaluation measures for the project. From these investigations, changes were implemented in Phase 2. The project focuses on the following: Internet learning community projects, technology centers, research for future amendments to the current model, collaborative training of teachers and campus partners with educational technologies, and developing new areas for large-scale collaborations.

Unlike the Technology Infusion Project, which includes a number of paired partnerships, the Interactive University Project involves a series of projects consisting of multiple participants at both UC Berkeley and the Oakland area schools, as well as other colleges and community centers. For example, one project titled "Arts, Education, and the Internet" consisted of six participants from the College of Education at UC Berkeley, the History of Art department, a Berkeley art museum, and five K–12 schools from San Francisco and Oakland. Overall, more than 40 campus departments, 27 area schools, an adult center, a charter school, and a number of community colleges were involved in the first phase of Interactive University Project.

To facilitate the various collaborations involved in the project, it was necessary to develop a strong infrastructure. Components of this support system include the following: a steering committee, which works with non-educational entities to maximize the benefits the both UC Berkeley and the participating K–12 schools; project liaisons, consisting of two full-time teachers acting as vehicles and facilitators of communication between the University of California at Berkeley and participating school districts; a strategic planning group, which meets and discusses the effectiveness of projects as well as other evaluative issues; district leaders, which meet to address other decisions to be made. A number of key steps in the initial planning process for the Interactive University Project included "a planning retreat for pilot project participants, and several project-wide events on campus that combined technology demonstrations with general project orientation, technology training and planning time" (UC Berkeley Interactive University Project, 1999, p. 14). Other conditions necessary for the success of such a large-scale school-university collaboration include adequate funding, strong project coordination, undergraduate and mentoring participants, readily accessible technology and technology infrastructure, and a liaison between participating institutions.

During the first phases of the Interactive University Project, the school-university collaborations included a number of projects that focused on using the Internet in teaching and learning, and fostering positive attitudes toward technology. A number of results were evident in this project. First, the perceived value of the Internet for teaching and learning increased. Effects that teachers reported experiencing included increased motivation and participation among varied students. Academic performance improved and student performance increased. Secondly, through the project, inservice teachers had access to university resources. This access promoted collaborations between inservice teachers, K–12 administration, project coordinators, and university faculty. As a result of these collaborations, there was an increase in teacher efficacy, related to the integration of technology into the curriculum. The creation of Teacher Networks (http://www.laep.org/about/teachernetworks.html) by the project also had a number of benefits. These support systems promoted a collegial atmosphere, similar to the Technology Infusion Project recommendation, and served to improve the relationship between the schools and the university. As a result, inservice teachers' views of the university improved. Also, with access to university resources, inservice teachers saw how these various resources could be integrated into the classroom. Another component of the project was professional development with technology. During various on-campus events and technology training workshops presented throughout the school year, inservice teachers experienced assistance with a variety of technology applications. Many of these workshops focused on the content-specific applications of instructional technologies. Contrary to the typical technology workshop, these professional development opportunities were infused into the Interactive University Project, and were not standalone technology workshops.

Although the benefits to inservice teachers are important, there have also been a number of benefits to the San Francisco and Oakland Area school districts. First, there has been an improved relationship between the school districts and UC Berkeley. This relationship has made it easier to increase teacher participation in the program. As there has been an increase in the relationship between the school districts and the university, there has also been an improved relationship between the San Francisco and Oakland school districts themselves. They have collaborated on a number of grants—which has increased their funding—and aided in the ability to address problems that are similar between the districts. Much as teachers from the same school learn from discourse with each other, so have these school districts.

There have also been a number of benefits for the university. First, the project involved a number of different participants in an outreach effort. Graduate students gained experiences in educational research and project coordination. Undergraduates worked with K–12 students and, in the process, promoted interest in the teaching profession. College faculty members were exposed to a number of educational issues, along with developing improved relationships with school district personnel. They also experienced firsthand the level of experience that teachers have with regards to technology. The University of California at Berkeley campus is now a place in which the value of collaboration and partnering is appreciated. Varying groups that would not have collaborated previously are now forging strong partnerships. Through this experience, the Interactive University has developed a large-scale model of a school-university collaboration (UCB, 1999).

### *School-University-Outside Agency Collaboration*

Similar to both the content-specific and tool-specific collaboration is the school-university-outside agency collaboration. The major difference between this partnership and the two previous types is the professional development of individuals other than school system or university participants. There is also much more of a focus on developing responsible learning environments, in which the entire community is involved in the promotion of meaningful learning environments (Jonassen, 1995). Finally, with more institutions involved in the collaboration, the construction of goals, as well as the potential benefits to each institution involved, can potentially become strained.

One example of a collaboration that includes less traditional educational institutions is the eCOMET project. The eCOMET project, a collaboration between Iowa State University, the North Polk School District, and the Heartland Area Education Agency, is designed to provide inservice and preservice teachers with training and professional development in appropriately implementing technology into the K–6 classroom. The eComet project is a cohort-based professional development that focuses on skill, acquisition, and integrative teacher training as well as providing a system of ongoing support for participants. Another major goal of this project is to develop a community of learners in which opportunities for participants to share their expertise with each other are facilitated.

After the initial year of planning the roles, responsibilities, and expected benefits of all partners in the collaboration, a needs assessment

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was administered to participating teachers from the North Polk School District. This was done to determine various technological needs relating to both their personal and professional situations. The results of the needs assessment led to the creation of specific professional development opportunities to address deficiencies. During these professional development activities, K–12 teachers collaborated with other participants, such as university faculty or Heartland Area Education Agency consultants, to either develop a technology project for their classroom or to model instructional strategies that integrate educational technology into the classroom (Thompson, Schmidt, & Bentley, 2001).

Preservice teachers also play an integral role in the eComet project. Many Iowa State preservice teachers participate in technology-based field teaching experiences in the North Polk School District. These technology-based field-teaching experiences are conducted weekly and consist of preservice and inservice teachers collaborating on the design, development, and implementation of lessons that appropriately integrate technology into the curriculum (Thompson et al., 2001).

Throughout the project, a number of benefits for all parties involved have been observed. Teachers in the North Polk School District have increased their knowledge of technology and how to integrate it into the classroom, have experienced increased access to resources and to models of teaching and learning with technology, and more professional development opportunities (Thompson et al., 2001). The Heartland Area Education Agency has experienced the creation of innovative models of professional development, the development of new methods to share technology and expertise, and others. The Iowa State University Teacher Education Program has also experienced a number of benefits. These include extensive learning opportunities for preservice education students related to technology integration into the classroom, research opportunities, and the development of preservice and inservice teacher relationships (Thompson et al., 2001).

The eComet project is different from many school-university collaborations in the fact that it offers numerous types of professional development opportunities. These many formats for teaching effective methods of integrating technology into the classroom include single or multiple day workshops (large group instruction), one-on-one mentoring, small group planning, and modeling of techniques in the classroom. In addition to these experiences, the inservice teacher and the preservice teacher education student have an additional experience. In an effort to provide the preservice teacher with appropriate technology-based field-teaching experiences, each student works collaboratively with an inservice teacher in the school district to design, develop, and implement instructional lessons that effectively integrate technology into the classroom (Thompson et al., 2001).

There have been a number of findings that have already emerged from this project. First, the role of the teacher is changing. In these experiences, teachers are acting more as the facilitator of learning than simply an information source. Lessons involve more collaborative efforts between collaboration participants' students and an increase in the motivation of participants' students when learning with technology. Second, the technology skills of the teachers have increased. As a result of this, they are also integrating more advanced applications of technology into their teaching, and teachers are attempting new methods of instruction and activities involving technology that they may not have tried in the past. This is also a result of increased comfort with technology (Thompson et al., 2001).

### *Professional Development School (PDS)*

Another model of the school-university collaboration is the Professional Development School. The Holmes Group (1995), in describing the goals of the Professional Development School, states that they will:

> serve as setting for teaching professionals to test different instructional arrangements, for novice teachers and researchers to work under the guidance of gifted practitioners, for the exchange of professional knowledge between university faculty and practitioners, and for the development of new structures designed around the demand of a new profession. (p. vi)

The PDS model erupted from the need to provide practical, real classroom experiences for students of the teacher education program (Darling-Hammond, 1994). They differ from the previously mentioned school-university collaborations in a number of ways. First, the structure of the model of preservice teacher training and inservice professional development differ. Second, the breadth of the experience is greater than that of other school-university partnerships, and finally, the Professional Development School traditionally addresses local needs, rather than large-scale issues.

One Professional Development School was developed when Charles R. Drew Science Magnet School formed a partnership with Buffalo State College. The primary goal of this project was to address the key issue of providing preservice teachers with the appropriate skills to enter the field and integrate technology into their classroom. Although many states have added technology requirements to teacher education programs (Novak & Berger, 1991), these experiences are often not provided to preservice teachers (Davis, 1994). Four other goals of this project included improving computer literacy of preservice teachers, improving preservice teachers' ability to integrate technology into the curriculum, to prepare students with the necessary skills to effectively instruct in an advanced technology laboratory, to improve current and future teachers' skills with educational technology, and to enhance the educational experience for students of Drew Magnet School by providing enriching learning environments with technology (Johnson-Gentile, Lonberger, Parana, & West, 2000).

Due to the fact that the school is equipped with state-of-the-art technology, Drew Magnet School provided the ideal setting for the collaboration. School administrators and faculty collaborated to design the goals and objectives for the project and the manner in which they would be accomplished. They decided that technology would be a tool with which the curriculum would be enhanced (Johnson-Gentile et al., 2000). Using technology as a resource and knowledge-construction device, rather than a drill-and-practice aide, was the focus.

A number of individuals are involved in the project. First, preservice Elementary Education students attend methods courses at Drew. From this experience, preservice teachers can see the integration of technology into the classroom, as modeled by the teacher educators and faculty members, and the inservice teachers see new methods of integrating technology into the classroom, as presented by the preservice teachers. Preservice teachers, known as Junior Participants, attend a number of lab sessions conducted at Drew to extend their technological skills and familiarize themselves with the technological equipment at the school. Junior Participants also collaborate with inservice teachers to develop teaching units that appropriately integrate technology into the curriculum. They also mentor other inservice teachers at the school (Johnson-Gentile et al., 2000). Fourth year students are recruited to return to Drew to provide support to current inservice teachers and future preservice teachers (Johnson-Gentile et al., 2000). Their roles include supporting inservice teachers in the Drew computer labs for grades 2 through 6 with the goal of eventually taking over all computer lab teaching duties, collaborating with a science magnet teacher to design, develop, and implement a multi-week lesson plan that appropriately integrates technology into the learning environment, mentoring other second through sixth grade teachers with technological issues, and conducting instructional computer lab sessions for other students at Buffalo State College (Johnson-Gentile et al., 2000).

As a result of this collaboration, a number of formative observations were made. First, the value that students gave to technology, and the skills

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**Table 1: Collection of School-University Collaboration Types**

| Type of Collaboration | Brief Description of Collaboration | Focus of Collaboration Type | Example of Collaboration Type | Major Benefits of Example |
|---|---|---|---|---|
| Content-Specific Technology Integration Collaboration | Partnership between university and school system (sometimes multiple) with a focus on the integration of technology into the curriculum. | Appropriate Integration of technology into the curriculum.<br><br>Preservice and inservice teacher preparation with technology.<br><br>Promote positive relationship between partner university and school systems. | Technology Infusion Project (TIP) | Positive attitudes toward technology in the classroom.<br><br>Increased skills and knowledge of educational technologies and instruction with educational technologies.<br><br>Confidence in abilities, relevance of the value in the classroom and instruction, content-specific uses, and classroom management issues. |
| Tool-Specific Technology Integration Collaboration | Partnership between university and school system (sometimes multiple) with a focus on the integration of a particular technology into the classroom. | Appropriate integration of specific technology into the curriculum.<br><br>Preservice and inservice teacher preparation with technology.<br><br>Promote positive relationship between partner university and school systems. | Interactive University Project (IUP) | Increase in the perceived value of the Internet for teaching and learning.<br><br>Increased motivation and participation among varied students.<br><br>Academic performance improved.<br><br>Increase in the independence of students in the learning process.<br><br>Improved relationship between the school districts and the University of California at Berkeley. |

associated with using various technologies, increased. Secondly, confidence in the use of technology also increased for many of the students. Skills such as accessing the Internet, using content-based educational software, creating graphics, and the ability to demonstrate these skills to a novice all increased dramatically (Johnson-Gentile et al., 2000). With these observations in their formative stages, this collaboration plans to grow, and build on these accomplishments.

### *Methods-Based Technology Integration Collaboration*

Yet another model of the school-university collaboration is the methods-based technology integration collaboration. This partnership is similar to the content-specific technology integration collaboration and the tool-specific technology integration collaboration in structure, but places more of a focus on the development of methods of integrating technology into the classroom. In this partnership, there is more focus on developing pedagogical strategies.

One example of a methods-based technology integration collaboration is the Ed-U-Tech project. Ed-U-Tech is a PT$^3$ project at the University of Minnesota, designed to simultaneously improve preservice teacher proficiency with integrating technology into the classroom while increasing the use of technology in the classroom by inservice teachers. In the project, teacher education faculty members collaborate with technology integration specialists and other experienced classroom teachers to develop appropriate and effective methods of integrating technology into a variety of subject areas, such as consumer science, physical education, art education, and others. Participating teacher education faculty members are often provided with new skills and methods of integrating technology into the classroom. The faculty then share these practices with the preservice education students throughout the preservice methods courses. This is done by providing preservice teachers with opportunities to develop and utilize appropriate and effective methods of integrating technology into lessons. This is done in an effort to provide connections between the methods course content of different subject areas and varying technology skills.

Other key goals include improving the ability of university faculty members to train preservice and inservice teachers with technology, increasing the level of technology in both the foundations and methods courses, and increasing preservice and inservice opportunities to integrate technology into the classroom. Another goal is that individuals involved reflect on their experiences and issues related to the improvement of integrating technology into the classroom.

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**Table 1 con't**

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|---|---|---|---|---|
| **School-University-Outside Agency Collaboration** | **Similar to Content-Specific Technology Integration Collaboration.**<br><br>**More of a focus on the professional development of individuals other than school system or university participants.**<br><br>**Much more of a focus on developing responsible learning environments, in which the entire community is involved in the promotion of meaningful learning environments.** | **Preservice and inservice teacher preparation with technology.**<br><br>**Develop responsible learning community.** | **eComet** | **Increase in the inservice teachers' knowledge of technology and its integration into the classroom.**<br><br>**Increased in access to resources.**<br><br>**Increased access to models of teaching and learning with technology.**<br><br>**Extensive learning opportunities for preservice education students.**<br><br>**The development of preservice and inservice teacher relationships.**<br><br>**The development of new teacher preparation methods.** |
| **Professional Development Schools** | **Provides professional development setting for teaching professionals. Greater breadth than typical school-university collaboration and typically address local needs.** | **Provide practical, real classroom experiences for students of the teacher education program.**<br><br>**Appropriate integration of specific technology into the curriculum.** | **Charles R. Drew Science Magnet School** | **Perceived value of educational technologies increased.**<br><br>**Increased skills and knowledge of educational technologies and instruction with educational technologies.**<br><br>**Confidence in abilities and relevance of the value in the classroom and instruction increased.** |
| **Methods-Based Technology Integration Collaboration** | **Partnership between university and school system (sometimes multiple) with a focus on the development of pedagogical strategies of integrating technology into the classroom.** | **Development of pedagogical methods related to integrating technology into the classroom.**<br><br>**Preservice and inservice teacher preparation with technology.**<br><br>**Promote positive relationship between partner university and school systems.** | **Ed-U-Tech (University of Minnesota)** | **No results at this time.** |

## Conclusion

Meeting the growing demands of preparing preservice and inservice teachers to teach with technology is a complex process. School-university collaborations allow the deficiencies of the current models to be addressed simultaneously, and with greater flexibility. With multiple types of collaborations, schools can address many different aspects of preparing teachers to use technology, depending on their specific needs. These different models of school-university collaborations allow teacher educators to address different needs through a variety of methods. Each of the various models of collaborations have related—yet different—goals, results, facilitating

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factors, participants, required resources, and constraining factors. These differences allow for greater flexibility in preparing preservice and inservice teachers to use technology. Additionally, using the various models in tandem can allow for an even more varied approach to preparing current and future teachers to teach with technology.

As previously mentioned, this paper originated as an investigation of current models of integrating technology into both preservice and inservice teacher education. From this examination a categorization scheme for school-university collaborations emerged. The authors hope this categorization scheme will allow teacher educators to examine different types of school-university collaborations, the resources and participants involved in the different types, and the goals, facilitating factors, benefits, drawbacks, and constraints of these different models of school-university collaborations. Also, this categorization scheme can act as a catalyst for conversations regarding the development of new models of school-university collaborations that work in a local context and to improve the preparation of both preservice and inservice teachers to use technology in the learning environment.

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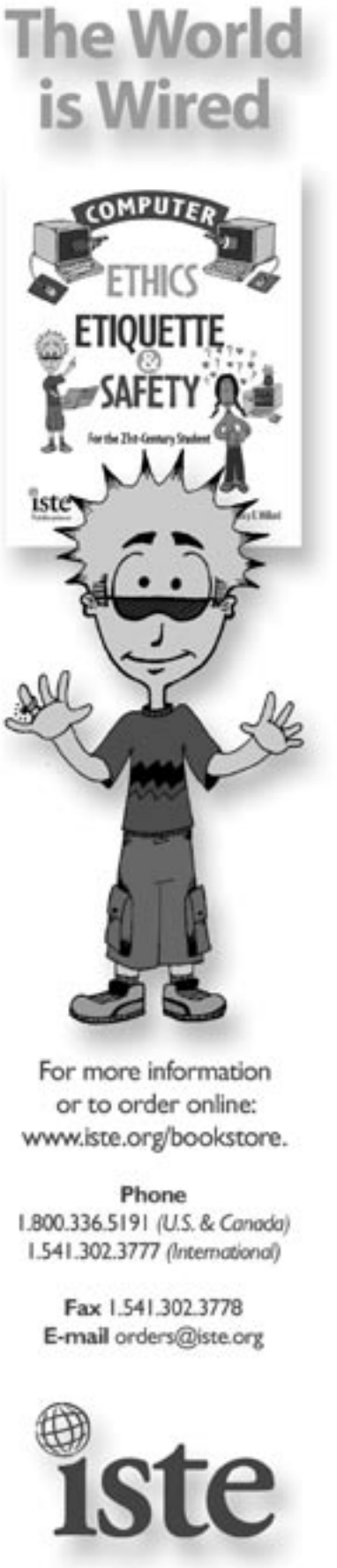


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