Situated Professional Development and Technology Integration: The CATIE Mentoring Program

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Abstract

This paper explores the theoretical basis for a mentoring model of professional development concerned with the integration of computing technologies into classroom teaching and learning. It describes seven factors that affect professional development for technology integration and tells how the Capital Area Technology and Inquiry in Education (CATIE) Program's mentoring approach can be characterized according to each of these. Grounded in situative theories of knowledge and learning, the CATIE model places educational technology experts in schools and classrooms to work directly with teachers. Together mentors and teachers create and implement technology supported lessons that meet the teachers’ instructional needs. The CATIE model thus aims to integrate technology into classroom activities at a grass roots level and situate teacher learning about technology in authentic classroom practice.

Background

Recent large scale studies of computer usage in schools (Becker, 1994; Panel on Educational Technology, 1997; Educational Testing Service, 1998) have precipitated public debate concerning the efficacy of using computers to support instruction, and have highlighted the need for professional development in this area. While emphasizing the need for professional development and pointing to the relationship between it and more sophisticated uses of technology in schools, these and other studies suggest that our understanding of what sorts of professional development programs impact technology integration at school and classroom levels needs to be improved. What we do know is that the teacher training, “expert model” of professional development (Sparks, 1994) does not work, especially when it comes to learning about educational technologies and their integration across the curriculum.

Indeed, teacher lore suggests that traditional inservice teacher education has little impact on teaching practices in general. Smylie (1989), for example, found that teachers ranked inservice training last out of fourteen possible opportunities for learning. What teachers ranked as most important was direct classroom experience. Other researchers report similar findings (Little, 1994). Even exemplary professional development programs find it difficult to maintain support for teachers (Carey & Frechtling, 1997), to encourage sustained discourse among participating teachers (Schlager & Schank, 1997), to “scale up” through the inclusions of all teachers, and to develop, test, and disseminate new teaching and learning ideas (Corcoran, 1995). Researchers agree that new models of professional development are needed, and that such models must include a focus on the development of local cultures of interest if they are to be sustainable.

Situated Professional Development

Several scholars in the field have developed lists of the features common to effective staff development activities (Little, 1988; Abdal-Haqq, 1995; Ball, 1996; Wilson & Berne, 1999). Putnam and Borko (1997), for example, reduce the essential features of effective teacher education to four:

- Teachers should be treated as active learners who construct their own understanding.
• Teachers should be empowered and treated as professionals.
• Teacher education should be situated in classroom practice.
• Teacher educators should treat teachers as they expect teachers to treat students.

In a more recent article, Putnam and Borko (2000) relate recent trends in research on professional development to new understandings of the nature of learning and knowing that collectively have been labeled “situative” (Greeno, 1997). They identify three conceptual themes central to situative perspectives – that cognition is situated in particular physical and social contexts, that it is social in nature, and that knowing is distributed across the individual, others, and tools (p. 4) – which they believe have important implications for professional development. Putnam and Borko argue that how teachers learn new methods of teaching is no different from any learning. If knowledge and learning are indeed situative, then the most effective inservice education will be constructive in focus and situated in authentic classroom practice. The situative perspective thus gives a theoretical rationale for the various lists of the essential features of effective professional development. It also explains previous findings concerning the seemingly ubiquitous ineffectiveness of professional development activities aimed at technology integration -- they have not been situated in authentic practice.

To our knowledge, such perspective has not been used to frame either the development of, or research on, professional development programs aimed at technology integration, although a situative perspective is widespread in the research and development of technology-based educational programs. Indeed, the Report to the President on the Use of Technology to Strengthen K-12 Education in the United States (Panel on Educational Technology, 1997) consciously grounds its recommendations concerning technology integration, professional development, and educational technology research within a constructivist and situative theoretical framework. The Panel’s argument for these later approaches is analogous to Putnam and Borko’s (1997) finding that teacher educators should treat teachers as they expect teachers to treat students -- it only makes sense to model best technology integration practices when attempting to get teachers to use them.

It only makes sense, and yet most professional development programs aimed at technology integration are instructionist, application-driven workshops or summer “institutes” well removed from classroom practice. Some have argued that while not optimal, such approaches are often the only practical solutions to meeting large-scale professional development needs with limited resources (Wilson & Berne, 1999). There has been little investigation of the effects of these traditional professional development activities, however, on technology integration at the classroom level. In fact, what little research there is suggests such activities have little impact on the day-to-day integration of computing technologies into classroom teaching and learning (Becker, 1994; Panel on Educational Technology, 1997; Educational Testing Service, 1998).

**Technology Integration**

Few would argue that the goal of technology-based professional development is technology integration, but a common definition of technology integration is hard to find. Until recently technology integration was equated with computing equipment in schools, and even today many school districts seem to be of a similar mind. However, the rapid escalation of technological advances, most especially the growth of the World Wide Web, has led educators to expand conventional notions of literacy to include "being able to use an array of technologies to gather information and communicate with others." (National Council of Teachers of English / International Reading Association, 1996), and to call for technology integration across the curriculum.

The first two recommendations for K-12 education by the President's Panel on Educational Technology (1997), for example, are

• Focus on learning with technology, not about technology, and
• Emphasize content and pedagogy, and not just hardware.
They write that “. . . it is important to distinguish between technology as a subject area and the use of technology to facilitate learning about any subject area.” (Panel on Educational Technology, 1997, p. 128)

The Panel distinguishes between isolated computer education courses, which teach students about computers and computer related basic skills, and the integration of meaningful and creative uses of computer technology throughout K-12 education. “The greatest promise of educational technology,” they write, “lies in the possibility of utilizing computers and networks as an integral part of virtually all aspects of the curriculum.” (Panel on Educational Technology, 1997, p. 116). Indeed, national standards for educational technology (International Society for Technology in Education, 1998), information literacy (American Association of School Librarians, 1998), and electronic literacy (Swan, in press) take similar stands.

It seems safe to say, then, that technology integration in schools refers to the use of electronic technologies in the day-to-day activities of teaching and learning, and that professional development for technology integration should have a similar focus. It could even be argued that professional development programs aimed at technology integration should be similarly assessed. However, as previously noted, traditional technology-based professional development has been little investigated on such basis and the few studies that have done so suggest that it has had little impact on the day-to-day integration of computing technologies into classroom teaching and learning (Becker, 1994; Panel on Educational Technology, 1997; Educational Testing Service, 1998).

**The CATIE Program**

It is hard to see how approaches that consistently have had little or no effect on classroom-based technology integration can be deemed “practical,” (Wilson & Berne, 1999) thus we decided to try an “impractical” approach. The Capital Area Technology and Inquiry in Education (CATIE) program was established through the Center for Initiatives in Pre-College Education (CIPCE) at Rensselaer Polytechnic Institute as an innovative means for addressing technology-based, constructivist-oriented staff development in elementary schools in the greater Troy (NY) region. This unique program places technology experts in school buildings where they serve as mentors to teachers interested in integrating the use of technology into their day-to-day classroom activities. The school-based mentors provide training to teachers on technology utilization, but, more importantly, the mentors work with teachers to jointly design computer-supported lessons that incorporate technology into existing classroom curricula. Teacher learning about technology integration is thus situated in authentic technology integration activities.

Typically, the mentors first meet with teachers, both individually and in groups, to discuss how technology might be used to enhance learning in planned units on particular topics. Mentors try to avoid planning that is either artificial or focused on specific software applications. They then work with teachers to design computer-supported lessons that are integral parts of larger, classroom-based learning units. They encourage inquiry-based, student-centered, constructivist uses of computing technologies, but they do not insist on them. Often, mentors model best practices in computer-based teaching and learning by taking the lead in implementing jointly created lessons. They then guide teachers in designing and implementing their own computer-based lessons, gradually fading their support as teachers become more confident in the use of electronic technologies.

Mentor support, however, does not just disappear. Each mentor structures his or her schedule according to their school and participating teachers’ individual needs. Generally, the mentor is available two days each week for a period of two years or more to work with teachers and students on a continuing, as-needed basis. Many teachers, having mastered a particular technology tool, return to their mentor for help in utilizing other applications in their teaching. Some teachers just come to share with their mentors the ways in which they are using technology on their own, and some mentors meet regularly with groups of teachers to discuss technology integration. As mentors become a part of the culture of the school, formal and informal conversations of this sort become more common and ongoing, and a discourse community grows up around technology integration.

The major goals of the CATIE program are to foster individual teacher and student development of technological skills, to assist teachers with the infusion of technology into existing curricula, to broaden the
use of computing technologies within the elementary school setting, and to foster constructivist teaching and learning around electronic technologies. It is an ongoing program that has grown from a single mentor in one school to more than ten mentors working in fourteen elementary schools in four school districts. Indeed, the model is currently being institutionalized in at least one of these districts as the preferred means of technology training.

Factors Affecting the Efficacy of Professional Development Programs

Researchers at the University at Albany have been developing a metaphor to help them examine differing models of professional development aimed at technology integration in terms of factors characterizing and affecting their evolution (Swan, Bowman, Holmes, Vargas & Richardson, 2000). Professional development for technology integration is conceptualized as a tree (Figure 1). The tree grows to maturity as the knowledge, skills, and attitudes of the teachers involved grow through the six stages of development outlined in Norris and Soloway's (1999) "Snapshot Survey" -- awareness, learning, understanding and application, familiarity and confidence, adaptation, and creative application to new contexts. The tree is rooted in seven factors that have been shown to influence both the character and the success or failure of educational technology training programs. These are: technology planning, local access to equipment and software, teacher attitudes and beliefs, program focus, program situation, local culture, and local support for technology integration. Each is of these discussed below:

![Figure 1](image.png)

**Figure 1**

Factors Affecting Professional Development for Technology Integration

**Technology Planning**

Planning for the integration of the use of technology in the everyday life of a school is not easy. Not only are computing technologies themselves constantly changing, but so are what we think of as best practices for their educational use. Schools, moreover, are by nature conservative. Unfortunately, this can lead them to embrace technological innovations just as they become outdated. In many schools, planning cycles are longer than cycles of innovation, making certain kinds of technology plans obsolete before they can be
implemented. In addition, most schools do not budget adequately for technology and technology training. Technology planning is thus contingent on the acquisition of outside funding which almost always imposes its own requirements and restrictions. Professional development for technology integration, for example, was almost non-existent before Presidential initiatives made money available for that purpose (Executive Office of the President, 1996; Panel on Educational Technology, 1997).

Planning for professional development should be an integral part of technology planning, and professional development for technology integration should be linked to technology plans (Putnam and Borko, 1997; Norum, Gabringer & Duffield, 1999; Catching & MacGregor, 2000). For all of the above reasons and more, it often isn't. Even when professional development is an integral part of technology planning, if teachers are not included in the planning process, it may not meet their needs. There are a wide range of good options for the use of computers in teaching and learning. Some of the best of these require important changes in teaching practice that not all teachers are willing to make. At very least, teachers are more willing to make such changes when they have some input into their institution (Catching & MacGregor, 2000). Some very well-conceived professional development experiences we know of have been sabotaged by hostility from teachers upset at having technology and technology training imposed on them.

**Local Access to Equipment and Software**

Of course, even the best professional development programs cannot make up for a lack of access to computers and relevant software at the school and classroom level (Norum, Gabringer & Duffield, 1999; Adamy, 2000; Catching & MacGregor, 2000). In a qualitative study of the technology integration practices of four math educators, Adamy (2000), for example, found that the technology resources and support services available to teachers directly affected the extent to which they integrated technology in their teaching practices. He writes, "Limited technology resources directly affect the ability of faculty to use technology in their practice." (p. 3)

The above sounds like a trivial truth, yet almost anyone who has ever been involved in technology-centered professional development has found themselves training teachers to use applications or machines they do not have in their classrooms. Currently, for example, many schools and school districts are sending teachers for training in the use of the Internet even though they have little or no local access. It is clear that such trainings cannot result in technology integration. Similarly, the more applications and machines used in professional development activities differ from those teachers have local access to, the less likely it is that technology integration will occur. Catching and Macgregor (2000), for example, in a study of exemplary technology-based professional development programs found that all the programs they studied conducted trainings onsite. They write, "professional development using school equipment and software available to teachers was found to be a more effective approach to teacher training than inservice conducted outside the school." (p. 2)

Trainings given as off-site workshops cannot match local equipment and often do not match local applications. Compatibility issues between different versions of the same software only compound this problem. Other access factors that may influence technology integration include training in computer labs for use of classroom based computers, access to peripherals such as color printers, scanners, digital cameras, and projection systems, the local use of complex networks with differing levels of access, and, as previously mentioned, access to the Internet.

**Teacher Attitudes and Beliefs**

Nespor (1987) characterizes beliefs as existential, affective, evaluative, and loosely bounded, and maintains that they are "very important determinants of how individuals organize the world into task environments and define tasks and problems." (p. 322) Teacher attitudes and beliefs strongly affect both professional development and technology integration. Some attitudes and beliefs that have been shown to affect technology-based professional development include teacher self-efficacy (Tschannen-Moran, Hoy & Hoy, 1998, Albion, 1999), especially technology self-efficacy (Ross, Hogaboam-Gray & Hannay, 1999), teacher epistemology and pedagogical beliefs (Pajares, 1992), and teaching styles (Canfield & Canfield, 1988). Teachers' subject specific beliefs (Pajares, 1992), in particular their beliefs about educational technology
and technology integration (Ross, Hogaboam-Gray & Hannay, 1999), are obviously also critical. Ross, Hogaboam-Gray and Hannay (1999), for example, in an extensive, two-year study of 263 Canadian teachers, found that teachers’ confidence in their ability to use computers was the strongest indicator of technology use at the classroom level.

Norum, Grabinger and Duffield (1999) studied the "thoughts, perceptions, beliefs, experiences, knowledge, and growth" (p. 187) of practicing teachers studying and attempting to integrate the use of computers in their classrooms. The overarching theme they found running throughout this research was teachers' strong assertion that they needed to change personally and take on new roles if technology was to be effectively integrated into their classrooms. Most of the teachers involved in this study saw themselves as the place where change efforts needed to begin.

Experiences with technology planning highlight the well-documented observation that teacher attitudes toward technology and technology integration seriously impact the success of professional development programs (Albion, 1999; Ross, Hogaboam-Gray & Hannay, 1999). They thus need to be seriously considered. Positive attitudes toward technology integration enhance learning to use technologies in teaching and learning; negative attitudes constrain it. This does not necessarily mean that only teachers with positive attitudes should be included in technology training activities. It does mean that negative attitudes among participants need to be valued and addressed, and that positive attitudes should be encouraged and developed.

**Program Focus**

Program focus is concerned with the major emphasis in professional development programs; what program participants are being taught and how that learning is conceptually organized. Common foci of technology-based professional development programs are hardware, software, curricula, teachers (learners), classes, and schools.

It is our belief that teachers tend to teach as they have been taught. Putnam and Borko’s (1997), for example, maintain that teacher educators should treat teachers as they expect teachers to treat students. Thus the focus of technology training is important because teachers will most likely maintain it in their own practice. Training that focuses on hardware and/or software issues will most likely result in the teaching of technology as a separate subject or skill. On the other hand, programs that focus on curriculum, teachers, classes, or schools are more likely to result in technology integration. Similarly, learner-centered programs encourage learner-centered teaching.

Garner and Gillingham (1996), for example, have found that expert users of technology in education do not focus on the technology at all, but view it rather as a means to a curricular ends. Meskill, Mossup, DiAngelo and Pasquale (2000) likewise have found that that expert technology using teachers focus on learners and learning rather than the technology.

**Program Situation**

Program situation refers to the surroundings in which teachers learn about technology and technology integration. This can range from college classes to summer workshops to inservice trainings in schools to learning based in teachers’ own classrooms. In learning about technology, program situation must also take into account the hardware and software available to program participants and its correspondence to the hardware and software available to participants in their schools and classrooms. As previously noted, the greater the difference between these, the less likely it is that technology integration will result. It is also important to note that the further removed professional development is from students the more removed it must be from teaching practice.

Putnam and Borko (1997, 2000) maintain that all teacher education should be situated in classroom practice. They argue that how teachers learn new methods of teaching is no different from any learning, and contend that the most effective professional development programs are situated in authentic classroom
practice. Indeed, Catching and MacGregor (2000) found that exemplary technology integration programs were grounded in strong, ongoing, and school-based professional development programs conducted using the equipment and software available to the teachers involved.

The most common technology training programs, however, have been removed in space and time from the classroom. These range from summer institutes that take place in university computer labs or commercial training sites to workshops given in school computer labs on professional days. Although it is clear that the closer trainings come to the space and time of the classroom, the more likely they are to result in technology integration; it is also seems clear that any training so removed encourages teachers to think of technology as also removed. Professional development that takes place outside the classroom also does little to model technology integration.

Local Culture

Contemporary theories of human development recognize that individual growth occurs within nested layers of cultural context that influence and shape it (Bronfenbrenner, 1978; Moen, Elder & Luscher, 1995). This is as true of the professional development of teachers as it is of the growth and development of a child. Teachers' commitment to learning about technology and technology integration is strongly influenced by how technology is perceived and integrated into the cultures of their schools, districts, and communities. It is also influenced by cultural factors having little to do with technology such as testing, bond issues, and district management. The professional development process itself may be influenced by such cultural factors as participating teachers try to make sense of what they are learning in relation to their personal practice.

Norum, Grabinger and Duffield (1999) found that a shared vision and support from the larger community were important to practicing teachers studying and attempting to integrate the use of computers in their classrooms. Adamy (2000), in his study of technology using teachers, reports that the ways in which the members of a community viewed technology and its use had a strong influence on teachers' professional development goals and their integration of technology into classroom activities. Ross, Hogaboam-Gray & Hannay (1999) found that, after large-scale technology infusion, one of the few factors affecting teachers' confidence in their ability to use computers in the classroom was a shared sense of purpose in their schools and larger communities. The only factor they found more significant was teacher attitudes and beliefs, a factor which is clearly influenced by local cultures.

Local Support for Technology Integration

It stands to reason that professional development programs that include ongoing support, especially support focused at the classroom and curricular level, are more likely to engender technology integration. Indeed, research indicates that teachers need not only strong inservice education, but long term, on-site support to integrate computers into the curriculum in meaningful ways (MacArthur & Pilato, 1995, Shiengold & Hadley, 1990; Goodson, 1991).

Indeed, one of the major reasons given for the failure of technology-based professional development to result in day to day technology integration is the lack of technology support in the daily life of schools (Panel on Educational Technology, 1997; Educational Testing Service, 1998). Adamy (2000), for example, found that technology support directly affected the extent to which technology integration took place.

Other studies indicate that another kind of support, administrative leadership, is also a critical factor in the success of technology integration programs (MacArthur & Pilato, 1995; Garcia, Johnson & Dallmarr, 1997, Catchings & MacGregor, 2000). Researchers particularly note the importance of principals and instructional facilitators in creating what Catchings & MacGregor (2000) term a “community of leadership.” Norum, Grabinger and Duffield (1999) found that four kinds of administrative support were useful -- financial support, opportunities for change, time for staff development, and, most especially, administrative vision. Ross, Hogaboam-Gray and Hannay (1999) report that, in one of the school districts they studied, teachers' confidence in their ability to integrate technology was negatively affected by a lack of district leadership.
Situated Professional Development and The CATIE Mentoring Model

In this section, the CATIE program is described in terms of the factors affecting the efficacy of professional development for technology integration. Figure 2 presents that model graphically.

![CATIE Mentoring Model](image)

**Figure 2**
The CATIE Mentoring Model of Professional Development for Technology Integration

**Teacher-Initiated Technology Planning**

Technology planning varied across the four school districts involved in the CATIE program, but in all cases was linked to grant-based funding. Thus, classroom teachers had little input into macro level planning. At one extreme, for example, the largest district involved in CATIE made digital cameras, scanners, color printers, and computers with Internet access available to all upper elementary classes. They also mandated that all fourth and fifth grade students produce electronic portfolios containing specific types of items. At the other extreme was a district that consisted of a single, K-12 school which obtained computers through a consortium initiative that asked very little in terms of curriculum, but also gave very little in terms of equipment. In between were schools in which principals urged teachers to involve themselves with technology in a variety of ways.

On the micro level, however, teachers in the CATIE program have absolute control over planning for both the integration of technology in their classrooms and for their own learning around technology integration. To begin with, although mentors approached and encouraged teachers to work with them, the decision to do so was always up to the individual teacher. In addition, mentors tried to meet not only teachers’ curricular needs, but their personal learning needs as well.

Many teachers asked for technology workshops, one-on-one tutoring, and/or handouts detailing the use of various software, so they could be more confident with the technology before working on lessons for the classroom. Others choose to begin by watching mentors model teaching with technology and learning...
along with their students. Some teachers came to mentors with upcoming units and asked for ideas for integrating the use of technology into them. Some came wanting to use a particular application. The CATIE mentors tried to meet all these varying needs with the only caveat being that planning be directed at producing lessons that teachers would participate in teaching to some degree or other.

Planning in the CATIE program, then, is at the lesson level, teacher-initiated, integrated with learning about technology, and contextualized in terms of classroom curriculum and real students. In short, planning in CATIE is very similar to the day-to-day planning that is a regular part of teachers' lives, helping situate learning about technology in teachers’ everyday practice.

School/Classroom Equipment and Software

The computing equipment and software available to teachers varied across schools participating in the CATIE program. All classrooms had some computers available except those in one open classroom school where computers are shared by classroom clusters. Schools in the larger school district and one of the smaller districts also had computer labs, and most schools additionally had computers available in the school libraries. Computing equipment also ranged in age and access to the Internet, and school based networks varied considerably. All of these factors clearly affected both teacher learning and technology integration, sometimes in unexpected ways.

For example, the large school district invested in an integrated learning system (ILS) for each of their elementary schools. In these schools, some teachers just dropped their students off at the lab to work on the ILS and did nothing to integrate technology into their classroom activities. Indeed, it generally seemed that the use of large computing labs led teachers, at least initially, to see technology as separate from regular teaching and learning. Teachers in smaller schools with only one or two older computers in their classrooms were thus first to embrace technology integration at the classroom level.

In any case, teachers participating in the CATIE program are learning to use the technology available to them in their schools and classrooms by using it in ways that are meaningful to their practice. It is clear that they not only know how to use the equipment they have access to, but that they know how to use it with their students, because that is how they learned to use it.

Professional Development Shaped By Teacher Attitudes and Beliefs

An important part of the work of the CATIE mentors involves getting to know the attitudes and beliefs of the teachers they work with so that the lessons they jointly create can be tailored to teachers’ particular pedagogical styles and epistemological beliefs, as well as to the specific content being explored in their classrooms. In some cases, this has been difficult for the mentors who as a group tend to favor practices that are more constructivist than the majority of the teachers with whom they work. In addition, part of CATIE’s mission has been to link technology and inquiry-based learning, but inquiry is not something that many participating teachers are comfortable with.

What mentors have learned is to be flexible and to take advantage of opportunities to model or suggest approaches that are more open. They treat teachers as professionals, one of the four essential features of effective teacher education identified by Putnam and Borko (1997). Over the course of the two years that the CATIE program has been operating, this approach has not only resulted in a great many teachers integrating technology use into their regular practice who might not have otherwise done so, it has also led to a slow change in individual teaching, at least teaching around technology.

Learner Focused

Another essential feature of effective teacher education identified by Putnam and Borko (1997) is that teachers should be treated as active learners who construct their own understandings. This notion is, of course, central to the CATIE program as mentors’ work focuses on individual teachers’ development of technology-based lessons. Professional development thus is centered on the particular needs of each
learner, and teachers learn ways to integrate technology into their classrooms that are meaningful to them. And they learn by doing. The mentoring model dictates that participating teachers involve themselves in the design and implementation of the lessons, and, as the teachers grow more confident in teaching with technology, that the mentors will gradually fade their support.

**Situated in Teaching Practice**

What is unique about the CATIE program is that it situates professional development for technology integration in authentic classroom practice. In the mentoring model, CATIE technology mentors work with classroom teachers to create lessons that integrate the use of technology into the teachers ongoing curriculum. Depending on participating teachers' experience and comfort with using particular software applications, mentors often first model the use of technology in teaching and learning by taking the lead in facilitating jointly designed lessons with the assistance of the teacher. Mentors then guide teachers in extensions of the lesson or new lessons they design together. Finally, mentors fade their support, but are available to assist teachers on an as-needed basis. Throughout this entire process, teacher learning about technology is situated in their actual practice.

Situated professional development has several advantages. It is in accordance not only with current learning theory (Putnam & Borko, 2000) but with what practicing teachers rate as their best opportunities for learning (Smylie, 1989). It links learning about technology with authentic practice, thus fosters the development of technology integration. Most importantly, perhaps, it provides intrinsic reinforcement for learning about technology in the form of successful lessons and enthusiastic students. And the successes of the first teachers to work with the mentors encourages the participation of others. Learning about technology in the CATIE program is indeed situated in the particular contexts of participating schools, social in nature, and distributed across teachers, students, mentors, and technology-based tools (Putnam & Borko, 2000)

**Mentors and School Culture**

Most technology-based professional development programs are situated outside the culture of schools. If they are not actually taught in other spaces at other times, they are facilitated by outsiders and separated from school culture as inservice trainings. Technology integration, however, is ultimately something that can only take place across the culture of an entire school. A major advantage of the CATIE program, then, is that it is itself situated in and across the cultures of participating schools.

One of the first lessons learned in the CATIE program was how complex, unique and varied individual school cultures are. The second lesson was how strongly these unique cultures affect the process and progress of learning about technology. Although in many cases, it took as long as the first year of the program, mentors slowly became a part of the school communities in which they worked, and as they did, they became more effective as mentors.

**Ongoing Local Support**

Technical support varies greatly among schools and school districts. All of the schools with computer labs had computer coordinators but few of them were either technicians or certified teachers. The large district has a technology team that rotates among schools and maintains a large network with files for all students. The smallest district has had to hire outside contractors to install a new computer lab and rotates a librarian between that lab and the library.

Regardless of the level of onsite technical support, however, one of the most important features of the CATIE program seems to be the ongoing presence of the technology mentors in their schools. Participating teachers in all schools often state that they feel they can integrate the use of technology into their daily teaching because they know the mentors are there to help out if they get in trouble. What is unique to the CATIE program is that the mentors have a long term commitment to work with teachers and that they
provide instructional as well as technical support. Indeed, the obvious success of the program did not become clear until its second year of operation.

In turn, administrative support for CATIE, especially the support of principals, seemed to strongly affect mentors' successes in their schools, especially initially. For example, the mandating of electronic portfolios for all fourth and fifth graders in the large school district was not well received by many teachers, but teachers did work with students to create them because principals insisted on it. When principals and district level officials and even the mayor attended presentations of the portfolios at the end of the year, however, teachers became much more enthusiastic and committed to the project for the following year.

The obvious importance of administrative support has led to the creation of a document outlining actions that school administrators can take to insure the success of the CATIE program in their schools. CATIE has also initiated a three-day principals’ workshop to introduce principals to the program.

**Preliminary Findings**

Clearly, the CATIE program exhibits the features Putnam and Borko (1997) identify as essential to effective teacher education:

- Teachers involved in the CATIE program are treated as active learners who construct their own learning to meet their own specific professional needs. CATIE mentors serve as facilitators for that learning but follow and respect the directions it takes.
- Thus, teachers in the CATIE program are empowered to use technology in their teaching (through the on-site support of the mentors) and treated as the professionals they are.
- In the CATIE program, teacher learning about technology integration is situated in classroom practice.
- CATIE mentors model constructivist, student-centered teaching with technology in their work with both students and teachers. Mentors thus treat teachers the way they would have them treat students.

Mentors spend the majority of their time working with teachers and students in the computer labs of their participating schools, although they also assisted some classes within their own classrooms. The latter is the goal of the program and it is increasing. A related goal is to encourage teachers to look beyond their current uses of technology. This seems to be happening with the more technology-experienced participating teachers, and with teachers involved in their second year with the program. The CATIE program has also made significant gains in helping teachers less familiar with educational technology become comfortable in its use. To date, CATIE mentors have assisted approximately 175 teachers in fourteen schools in four school districts to create and implement lessons that integrate the use of technology into regular classroom activities.

Flexibility and adaptability were found to be central to best practices in mentoring. Mentors’ ability to work with variations in teacher learning styles, pedagogical approaches, and prior experiences, as well as with existing school technology resources were found to significantly influence technology integration in schools and classrooms.

Teacher perceptions of the CATIE program were overwhelmingly positive. Teachers uniformly reported increased knowledge of computing technologies, greater confidence in using them, and more creative teaching with computers. Positive outcomes for students, including greater independence, heightened self-efficacy, and increased motivation, were also noted by participating teachers. The CATIE program has been a positive experience for mentors as well, giving them the opportunity to become part of school communities while learning more about technology infusion therein.

**Educational Significance**
Although early on in its development, the CATIE program seems to be positively affecting technology integration in the schools in which it is operating. In this its second year of operation, its effects are becoming clearer. Perhaps the best measure of its success is that one of the CATIE districts is adopting mentoring as the preferred means of technology training. Common sense indicates that the CATIE program is successful because it is reaching out to teachers in the physical and social context of their practice, because it provides ongoing, long-term support for technology integration, and because of the personal relationships mentors are forging with participating teachers within the culture of the schools in which they work. Its success thus supports a situative perspective on teacher learning, especially teacher learning about technology and technology integration.

References


