CHAPTER

11

Professional Development for Change

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FOCUS QUESTIONS

1. What technology and integrative capabilities do educators need and what kinds of professional experiences will lead to the acquisition of these capabilities?
2. What policies ensure that all students have equitable access to technology and to teachers who know how to integrate appropriate technologies in a meaningful way?
3. How can engagement with digital age tools narrow the gap between the "haves" and "have-nots"?
4. When developing professional development programs, what strategies should be included to address the needs of diverse groups?

This chapter explores professional development as a critical component in the complex puzzle of educational reform. While a technological revolution has fundamentally transformed society, many students and teachers continue to be left behind. Minority and rural students continue to be the "have-nots" in this emerging digital world, enlarging an already significant learning divide. New models of sustained professional development for teachers and administrators can serve as powerful forces to bridge this learning divide. Skilled educators who are well prepared to use available technologies as part of an engaging curriculum can ensure that all learners, regardless of circumstances, have the opportunity to develop essential competencies, fulfill their potentials, and ultimately, secure and maintain productive employment in the twenty-first century.

As has been pointed out in previous chapters, surveys tracking the growth of computer connections in homes and schools have provided a picture of what the U.S. Department of Commerce calls a growing trend for digital inclusion (Mineta, 2000). Consequently, the digital divide may appear to be closing. However, not all teachers and students have access to
the same equipment and network connections. In addition, many educators lack the technological skills that would allow them to use these digital tools to their fullest potential. Because the classroom remains the sole access point to technology for many learners, a well-conceived professional development model that addresses these issues is critical to achieving our nation’s educational goals.

The literature suggests that sustained, lasting change in teaching performance is most likely to occur when teachers participate in a support network with partners. Building communities of learners that allow educators to share ideas and resources with their peers can open the isolated classroom and support new models of teaching (Fullan, 1993, 1999; Means & Olson, 1995). In this chapter, we will examine the impact of school reform and professional development experiences on the ability of teachers to incorporate new technologies that change teaching and learning. We will also share our interpretations of why these changes are important in addressing the learning divide and how best to sustain them. In addition, we will discuss policy issues, funded initiatives, and quality professional development opportunities that focus on ensuring equity. Finally, we will provide examples of exemplary practice in the areas of professional development and technology that explicitly address equity issues.

**Technical and Human Infrastructure**

"History does not suggest that equitable access to and use of the newest technologies will happen automatically or even easily" (Neuman, 1990)

As had been pointed out in previous chapters, surveys tracking the growth of computer connections in homes and schools have provided a picture of what the U.S. Department of Commerce calls a growing trend for digital inclusion (Mineta, 2000). However, these statistics continue to suggest that minority groups and the poor still lack adequate access to information and communications technologies. Blacks (23.5 percent) and Hispanics (23.6 percent) lag behind their White (46.1 percent) counterparts, and 12.7 percent of households earning less than $15,000, as compared to 86.3 percent of households with an annual income of at least $75,000, are connected. In the fall of 1999, 95 percent of U.S. public schools reported connectivity to the Internet, up from 35 percent in 1994. However, in schools with high levels of poverty, only 39 percent of instructional rooms had Internet access, compared to 62–74 percent of instructional rooms in schools with lower levels of poverty. In addition, statistics continue to show that the nation’s poorest schools are least likely to report use of the Internet by both educators and students. These numbers point out the continuing inequity for a significant number of students and sound an alarm for schools that remain the only access point for many students.

While we have seen considerable changes to the technical infrastructure in schools, we have not seen analogous changes to the human infrastructure. In a 1995 comprehensive nationwide study, the U.S. Office of Technology Assessment (OTA) indicated that teachers, who are perhaps the most valuable part of the education equation, are often overlooked during the acquisition of school technology (OTA, 1995). On average, districts devoted no more than 15 percent of technology budgets to professional development. The OTA report suggested that this figure should be closer to 30 percent. Yet, in many schools and districts across the nation, the figure spent on professional development is only 3 percent (Carvin,
2000b). Employing technology to best effect in the classroom requires that educators understand and use these tools themselves. Thus, not only must the funding for the technology infrastructure be in place, but also for the human infrastructure.

Despite having increased access to technology in schools, a substantial number of teachers report that they do not use computers and other technologies regularly for instruction (Smerdon et al., 2000), with usage being lowest in minority schools. In the same study, the authors confirmed earlier findings that teachers in high-minority and/or high-poverty schools were less likely to use computers and the Internet than their counterparts in low-minority and/or low-poverty schools. For example, in schools with 50 percent or more minority enrollments, only 41 percent of teachers used computers or the Internet for research, compared with 57 percent in schools with less than 6 percent minority enrollments.

Studies on learning technologies have typically focused on access in schools, with much less research available on technology use in the classroom. The research that does exist suggests that as availability has grown, so has the number of teachers and students using technology (Levin, Stephens, Kirshstein, & Birman, 1998). However, even with the availability of computers and the Internet in schools, teaching and learning has not changed dramatically. Chris Dede (1998) suggested, “As educators, our task is to prepare our children to function in a future civilization created by the biggest leap in technology since the Industrial Revolution two centuries ago” (p. vi). To successfully achieve this goal, we need a sustained professional development initiative that prepares educators to integrate twenty-first century tools into their classrooms.

**Professional Development: Building Learning Communities**

“What teachers really need is in-depth, sustained assistance as they work to integrate computer use into the curriculum and confront the tension between traditional methods of instruction and new pedagogic methods that make extensive use of technology”

(CEO Forum, 1999)

**Background—Reform Efforts**

Traditionally, the role of education has been to impart information to students to enable them to obtain gainful employment. Teaching, based on behaviorism and the scientific management ideas of Frederick Taylor, viewed the student as an empty vessel to be filled with knowledge. Teachers were viewed as technicians who delivered a pre-developed curriculum with little deviation from the plan. During the last 50 years researchers such as Piaget, Dewey, and Vygotsky have tried to steer us from the notion of teaching as merely imparting information to a more inclusive pedagogy that views learning as an active process.

The realization that our educational system needed to change drastically came about with reports such as A Nation at Risk (National Commission, 1983). As a result, educators and policymakers rallied around the notion of school reform and the economic and social implications of the report’s findings. Increasing emphasis on accountability and restructuring of schools continues to focus on improving student achievement. However, growing evidence suggests that the single most important factor in increasing student achievement is the quality of the teacher in the classroom (Archer, 2000; Darling-Hammond, 1999a;
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Sparks, 2000; Sullivan, 1999). While schools and students have changed, teachers are still the driving force of instruction, and we must provide teachers with ongoing opportunities to reflect on and adapt their practice to an increasingly diverse student population.

In 1994, the Information Infrastructure Task Force concluded that American methods of teaching, learning, transmitting, and accessing information had remained largely unchanged from a century ago. The task force found the following conditions in American education, which persist today:

- The textbook is the basic unit of instruction. Absorption of its contents tends to be the educational goal.
- Instructors use “chalk and talk” to convey information. Students are often recipients of instruction rather than active participants in learning.
- Teachers work largely in isolation from their peers. They interact with colleagues for only a few moments each day. Most other professionals collaborate, exchange information, and develop new skills on a daily basis.
- While computers are a frequent sight in America’s classrooms and training sites, they are usually used as electronic workbooks. Interactive, high-performance uses of technology, such as networked teams collaborating to solve real-world problems, retrieving information from electronic libraries, and performing scientific experiments in simulated environments, are all too uncommon.
- The U.S. education system is a conservative institution that slowly adopts new practices and technologies. Highly regulated and financed from a limited revenue base, schools are subject to local consent and serve many educational and social purposes.
- Computer technology, with its demands on physical space, teacher professional development, instructional time, and the budget, has slowly found a place in classroom practice and school organization.

Halley and Valli (1999) found that “an almost unprecedented consensus is emerging among researchers, professional development specialists, and key policymakers on ways to increase the knowledge and skills of educators substantially” (p. 127). There is agreement that meaningful reform will not occur until teachers are recognized as full partners in leading, defining, and implementing school improvement efforts (Boe & Gilford, 1992; Darling-Hammond, 1998; Fessler & Ungaretti, 1994). However, Mary Howard Futrell (1994), a former president of the National Education Association, found evidence that most reform initiatives have excluded professional educators from the development process, and instead have been developed by policymakers with little or no educational experience.

In response to ongoing concerns about education, Americans have attempted to reform the public schools many times. In fact, as Fullan (1993) noted, “the greatest problem faced by school districts and schools is not resistance to innovation, but the fragmentation, overload, and incoherence resulting from the uncritical acceptance of too many different innovations” (p. 197). Complicating the issue further are the politics of accountability, one of the major components of any reform initiative, which is often driven by factors outside the realm of education (Ginsberg & Berry, 1997). If teaching and learning existed as strictly technical, skill-driven tasks, easily regulated through bureaucratized policies and simple prescriptions, quick-fix practices would have resolved the many pressing challenges confronting the
American educational system. However, quick fixes and simple solutions that have attempted to circumvent the classroom teacher as the essential unit of change for school improvement have led to disappointing results (Berliner & Biddle, 1995).

As fundamental changes occur in the characteristics, conditions, and learning needs of students, knowledge about teaching and learning is also expanding dramatically. Thus, schools will continue to face ongoing pressures for accountability and reform (Berliner & Biddle, 1995; Smylie & Conyers, 1991). This rapidly shifting landscape of education has created an unprecedented need for the development of teachers' knowledge and skills. "It is critical that [learning organizations] develop appropriate curricula and instructional approaches to deal with student differences" (Knapp & Glenn, 1996, p. 215), systemic inequities, and the effect of technology in the classroom. Nonetheless, teachers are often cast into a system of "one-shot" professional development seminars, with no thought given to continuity between workshops, follow-up, or to whether this system meets the needs of either teachers or students (Bullough & Baughman, 1997; Kennedy, 1992; Little, 1993; Sparks & Hirsch, 1997). Loosely defined goals and traditional methods of implementation have often left teachers to return to classrooms without the capacity to apply new tools to change classroom practice.

The Potential of Technology

"Technology builds a bridge between our individual potentials and our ability to act on and influence our world" (Norton & Wiburg, 1998, p. 2), and can provide a path for American educational reform to close the learning divide. This reform continues to gain momentum, as teachers, school administrators, and policymakers abandon old paradigms and develop greater understanding of the inherent power of technology to radically transform teaching and learning.

However, the transformation processes without an accompanying focus on changing traditional attitudes about teaching and learning through quality professional development may never be realized. The President's Committee of Advisors on Science and Technology (1997), in its Report to the President on the Use of Technology to Strengthen K–12 Education in the United States, recommended that technology be used to support the current pedagogical shift in education toward a constructivist paradigm. While constructivism was a prominent methodology used by educators in the 1930s and 1940s (Rice & Wilson, 1999), renewed interest in this instructional practice may have grown due to the fact that sophisticated technological capabilities have caused educators to reconceptualize the teaching and learning process.

The move away from traditional methods of instruction is based on the premise that one can learn with, not from or about, technology, allowing computer-based technologies to become important tools in a constructivist learning environment (Boethel & Dimock, 1999). Classroom environments that support constructivist ideals require that learners have access to a wealth of materials, experts, and peers outside of the classroom walls. Educational technologies offer powerful ways to access these resources and engage the learner in authentic inquiry, thereby, promoting acquisition of higher-order thinking and problem-solving skills. In order to create such environments for students, according to Boethel and Dimock (1999), teachers need to experience learning in constructivist environments. As a result, teachers will learn new skills, will be able to apply confidently a new pedagogy to the teaching and learning process, and will recognize the limitations inherent in accepted practice.
Learning in the twenty-first century is a critical survival skill for all students. While mastering the basics of reading, writing, and arithmetic is still important, educational success can no longer be measured in isolation of essential information age competencies. Literacy must not be narrowly defined, but rather understood as a complex process where all learners emerge as:

- Information seekers, analyzers, and evaluators
- Problem solvers and decision makers
- Productive and creative users of technology tools
- Communicators, collaborators, publishers, and producers
- Informed, responsible, and involved citizens (New Mexico Department of Education, 1999).

It is essential that educational communities recognize the need to transform professional development opportunities for teachers, and especially those in high-minority and low-income schools. Guided by sound learning theory and clear program goals, professional development experiences can expand the capacity of teachers to translate theory into practice. Extensive training for teachers and administrators will have a direct impact on the educational lives of their students. Educators who are helped and encouraged to understand the medium will use its currency and authenticity to their advantage (Adams & Burns, 1999; McKenzie, 1999) and the advantage of those in their classrooms.

Thus, there must be a vital connection between technology and the professional preparation and continued development of teachers and educational leaders. In addition, it is essential to establish a robust technological infrastructure that allows the learner, both teacher and student, to transcend the traditional barriers of most classrooms so learning is not confined by location or circumstance. Norton and Wiburg (1998) noted that “designing learning opportunities that meet today’s technological challenges while simultaneously using technology, as part of the solution, is one of today’s most pressing demands” (p. 13). It is also one of our most important opportunities.

**Engaging a Community of Learners**

Is professional development a catalyst for change in classroom practice? It is, according to a U.S. Department of Education study, *Does Professional Development Change Teaching Practice?* This three-year study examined professional development programs developed to educate teachers to use specific instructional strategies. The report stated that those who participated in such programs increased their usage of modeled strategies in their own classrooms (Porter, Garet, Desimone, Yoon, & Burman, 2000). By exposing teachers to effective methods for the integration of technology, and by giving them time to learn and adapt those strategies, professional development experiences impact classroom practices. Teachers begin to use what they learn in the workshops, adapt it to their specific needs, and change their instructional procedures to better facilitate student learning. They then create similar settings for their students, such as collaborative work and student-initiated activity, as those experienced in the workshops (Becker & Reil, 2000). In addition, U.S. Department of Education reported that there is “a substantial benefit when teachers from the same
school, department, or grade level participate together in technology-related professional development” (Porter et al., 2000).

It is time for education leaders and policymakers to focus not only on the technology divide, but also on emerging social and learning divides. There are no easy ways to eliminate social disparities, but without question, technology could do far more to help. New technologies, applied in targeted ways by knowledgeable educators, could make efforts to narrow the learning divide much more effective than they currently are. However, this will come only with substantial cost. Money spent on technology without investments in organizational change and professional development is essentially wasted (Morino Institute, 2001).

The Policy Arena

States and public school districts are beginning to recognize the need to transform the professional development experience for teachers and administrators. A series of national and state reports, written between 1993 and 1995, agreed that what teachers are expected to know and do has increased in amount and complexity (Abdal-Haqq, 1996). Additionally, “reform efforts place demands on teachers to improve their subject-matter knowledge and pedagogical skills; understand cultural and psychological facts that affect student learning; and assume greater responsibilities for curriculum, assessment, outreach, governance, and interagency collaboration” (Corcoran, as quoted in Abdal-Haqq, p. 1). In this context, teacher professional development practice extends beyond mere acquisition of new skills or knowledge; it also requires that teachers reflect critically on their practices, and fashion new knowledge and beliefs about content, pedagogy, and learning.

A State Perspective

A review of recent New Mexico educational initiatives provides a rich case study of the evolution of state supported or mandated professional development plans. Between 1985 and 1989, the New Mexico State Department of Education (NM SDE) and the New Mexico State Board of Education (NM SBE) developed both a Leadership Initiative and an Educator Support Plan. Their goals were to enhance the skills of teachers and administrators and to provide support and assistance to both experienced and new educators. Between 1991 and 1992, the Legislature became involved, enacting three initiatives relevant to professional development and systemic reform. The first of these, the Teacher’s Opportunity Study, concluded that while effective professional development is crucial to their professional growth, teachers received far too few professional development opportunities, most of which were inappropriate to their work. Thereafter, the NM SBE organized the Systemic Change in Education Advisory Committee (SCEAC) task force to examine professional development.

In 1994, the NM SDE conducted a random survey of 1,100 teachers, principals, superintendents, and directors of instruction to identify the most critical professional development needs in the state. As a result, a Blue Ribbon Panel released a planning guide to assist schools and districts in the design and implementation of their educational and professional development plans. Between 1995 and 1999, the Legislature introduced additional bills to fund professional development days for teachers, with a Professional Development Act finally passing in 1999. In that year, the Legislature appropriated an additional $3 million into the
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National Policy

On the national front, the Technology Innovation Challenge Grant program, the Technology Literacy Challenge Fund program, and the E-rate program have supplied states and school districts with federal moneys for both technical and human infrastructure. Each of these programs has given states an opportunity to provide school districts—especially those with high poverty rates—with funds to help meet their most important technology needs.

The Technology Innovation Challenge Grants provide five-year funding for school districts in partnership with business, institutions of higher education, community organizations, and educational researchers. Since its inception it has funded more than 100 programs, several of which are now self-sustaining. In 1998, the focus of the funded projects was professional development, especially for schools and/or states serving large numbers of underrepresented students, and students living in low-income communities. Twenty school district partnerships in seventeen states were awarded grants totaling $30 million, which provided them with the means to support and prepare new teachers to use technology effectively.

The Technology Literacy Challenge Fund (TLCF) and the E-rate program were both established in 1996. The former provided five years of funding to the states, with a focus on President Clinton’s four goals to ensure that every student in every school would become technologically literate in the twenty-first century. The E-rate program’s major objective was to make services, Internet access, and internal connections available to schools and libraries at discounted rates based on student income level and geographic location. As of February 28, 2001, $5.8 billion had been committed to E-rate applicants throughout the United States. Funds from these programs are disproportionately awarded to low-income and high-minority school districts; thus, they have helped to limit potential increases in social inequities caused by the digital divide (Puma, Chaplin, & Pape, 2000).

Model Programs

It has become clear that teachers do not need to be told what to do, but rather become active designers and participants in their professional development. Teachers need time to reflect on carefully researched models of good practice that support multiple strategies for integrating technology into the learning process. However, moving beyond the quick-fix mentality requires the implementers of any promising model to carefully examine the critical conditions that allow for the replication of a model under varying circumstances. Without this critical reflection, achieving similar results may not be possible if the capacity of the learning organization differs significantly from the local setting where the original model was successfully implemented.

This section highlights three professional development programs from three states: New Mexico (statewide model), Texas (district/university collaboration), and New Jersey (district model). Each of the initiatives serves communities that have high-minority and low-income populations.
Model Program—New Mexico

In New Mexico, a minority-majority state, the Regional Educational Technology (RETA) program, operational since 1995, has emerged as a powerful initiative. RETA provides "professional development opportunities for teachers and administrators to improve teaching performance, educational leadership, and student learning through increased understanding and use of learning technologies" (Gonzales, Pickett, Hupert, & Martin, 2001, p. 1). This project, a collaborative effort between local districts, the New Mexico Department of Education, and New Mexico State University, serves as a model for constructive engagement. It employs digital age tools to enhance the capacity of individual teachers to acquire the critical technology literacy competencies as outlined in New Mexico's Educational Technology Plan (New Mexico Dept. of Education, 1999). Since its inception, the RETA program has addressed the digital divide, making a concerted effort to reach those schools earmarked as in need of improvement or in rural and high-poverty districts.

The RETA program has five goals, but its main goal is the professional development of teachers, administrators, and higher education faculty in the meaningful use of technology to improve content learning. To accomplish this goal, the RETA project provides weekend workshops offered throughout the state to help educators meet the challenges of implementing technology within established classroom traditions. The workshops use the model of teachers teaching teachers. They have been designed to provide opportunities for educators to experience excellent models of technology integration and to think systematically about the translation of those models into their districts. Each workshop focuses on a specific curricular area, and while exploring this sphere, teachers experience both a technological and a pedagogical model that they can adapt to their own classrooms.

RETA has also enhanced the learning potential of teachers through the creation of an online professional community. This online community not only addresses the ongoing learning needs of its participants, but also combats the problem of rural isolation. Further, the creation of regional support centers in institutions of higher education throughout the state has provided direct support for school administrators and teachers ready to capitalize on the opportunities provided by the emerging technologies. Access to exemplary curriculum models is available at http://reta.nmsu.edu.

Many RETA participants have remarked that one of the most useful aspects of the program has been sharing with others; thereby, being introduced to new ideas and instructional resources. Teaching can often be an isolating profession. The RETA workshops offer teachers the chance to meet with other teachers who share their concerns about and interest in technology. They also have time to talk with other teachers, discuss lesson plans, make contacts, and establish a support network.

The creation of support networks is especially important for successful technology integration because a teacher’s ability to use these tools is often dependent upon numerous factors over which she has little or no control. These include her access to equipment, software, the Internet, and technology-enhanced curriculum that is appropriate for her grade level and subject matter; the support of her administration for experimenting with new teaching techniques; the expectations she is required to meet in terms of standards and content; the technical support available at her school, and her own technical abilities. Often, teachers need to work with other teachers who share similar challenges in order to get a practical sense of how to overcome these obstacles. One new RETA instructor noted that in
her workshops the participants shared what they did in their classes. One thing she remembered enjoying as a participant was having that time to share and collaborate with colleagues. They would plan and develop curriculum together; it was a cohesive factor.

Not only is the RETA project helping to educate New Mexico teachers in the use of technology, it is also helping to establish a cadre of technology leaders throughout the state. Teachers who participate in RETA become active in their school and district technology committees, help the districts make decisions about technology purchases, help write grant proposals to acquire equipment and networking services, and provide technology instruction to their colleagues, to administrators, and to parents. These efforts are especially valuable in schools and communities in remote areas of the state (serving large-minority and low-income students), where technical expertise and leadership are sorely lacking.

Model Program—Texas

The University of Texas and the Austin Independent School District (AISD) faculty collaborated on the development of a scalable model for technology-infused educational preparation of middle and high school mathematics and science teachers. Funded by the U.S. Department of Education’s Preparing Tomorrow’s Teachers to Use Technology (PT3) program, the initiative allows cooperating teachers to reexamine their own practice as they provide modeling and mentoring to preservice teachers and other teachers in their schools. The project has three goals:

- To intensify, extend, and enrich the use of technology as an institutional and collaborative tool in the early courses in the majors of mathematics and science
- To institutionalize and fully implement the integration of technology in the three mathematics and science education professional development courses and in the conduct of student teaching
- To establish an intensive collaborative Technology Leadership—Learning Community among all teacher—educators in the UTeach program, to plan for technology infusion, to establish an integrated program, and to share expertise.

The project supports the University’s UTeach Program for science and mathematics educators and facilitates collaboration between College of Education faculty, College of Natural Science faculty, and the cooperating teachers in the Austin Independent School District (AISD). Preservice teachers enrolled in this program receive a technology-rich experience, with technology integrated into their education methods courses, natural science content courses, and in the classrooms of their AISD cooperating teachers. Activities of this learning initiative include setting technology requirements and standards for the students’ portfolios, supervising graduate students who assist faculty with technology integration, and coordinating necessary professional development experiences for cooperating teachers in the use of technology.

Twenty-eight skilled mathematics and science teachers were chosen to be PT3 Fellows. These teachers serve as cooperating teachers for the UTeach student teachers during the 2001–2002 school year and act as technology mentors to other teachers in their schools. AISD has provided each Fellow with a Dell notebook computer, a Palm Pilot, and an LCD projector for the department, as well as unlimited technical support throughout the school.
year. Fellows are compensated for their successful completion of a four-day technology training seminar provided by UT faculty and students and AISD instructional technology experts. The project has a website that acts as the hub of the emerging cybercommunity and provides a space where members can share expertise and access relevant science, mathematics, and technology education news.

Model Program—New Jersey

In February of 1996, Union City, New Jersey, a predominately Latino, inner-city community, received national recognition when President Clinton and Vice President Gore acknowledged the extraordinary accomplishments of this urban/minority school district. The unique blending of comprehensive school reform, technological innovation, and corporate sponsorship was cited by the President as a national inspiration and a model for educational excellence. In 1990, the district implemented a five-year plan that included a variety of reform efforts to bring about substantive changes in their educational system. Three main objectives were central to the district’s plan: to create a print-rich environment; to recognize and promote reading and writing as integral to all content areas; and to encourage teachers and students to explore new ways of teaching and learning. One of their main goals was to create a curriculum that emphasized the development of thinking, reasoning, and collaborative skills throughout the content areas, rather than utilizing rote learning and whole-group/lecture modes of teaching. Teachers came together during the summer to develop the curriculum, which focused on students learning by doing. In 1995, they received NSF funding to continue their efforts with the Union City Online Project (Honey, Carrigg, & Hawkins, 1999).

In order to accomplish the needed reforms, they established effective professional development for integrating technology to support new models of teaching and learning. Honey, Carrigg, and Hawkins (1999) indicated that the professional development provided the teachers at Union City was a process, not an event, and focused on five stages:

- **Awareness**—broad and/or new concepts, such as whole language and cooperative learning techniques introduced in large groups
- **Practice**—a commonly used approach for technology integration
- **Sharing**—a time for teachers to discuss their experiences, both successful and less so, when integrating the new approaches (including technology)
- **Peer coaching**—experienced teachers open their classrooms to coach and team-teach with colleagues working with these new approaches
- **Mentoring**—a mentor is partnered with up to three protégés for a period of time

The district has implemented several successful teacher-to-teacher and teacher-to-student mentoring programs.

Common Elements of Model Programs

Some important aspects of these model programs can serve as a basis for others who are seeking to implement similar initiatives. These include:

- **Key parties working together:** Support from district leaders, administrators, and school boards enables teachers to engage in the program’s activities. Teachers, who
share with other teachers the challenges of integrating technology, often find support and knowledge that assists them in overcoming obstacles.

- **Respecting teachers as professionals:** In order to create a network of knowledgeable education professionals who are willing to assume leadership and advocacy responsibilities, a professional development program needs to treat the participating teachers like the professionals they are.

- **Responding to feedback:** Respecting teachers as professionals includes listening to feedback and making changes in the program in response to that feedback. In this way, the participants learn to see themselves as integral and respected members of the program community.

- **Tailoring instruction and adapting content to meet the needs of diverse groups:** Programs that seek to educate a diverse array of teachers must design professional development that is flexible enough for instruction and content to be adapted to the needs, interests, and experiences of the participants.

- **Close connections between curriculum and technology:** Successful professional development initiatives emphasize curriculum goals and integration over technological mechanics and mastery of software. In addition, teachers must engage in a re-examination of their own practices and how to change them.

### Conclusions and Recommendations

Educators who are provided with quality professional development are able to better integrate the ideas they have acquired into their schools and classrooms, affecting the teaching and learning of countless children and narrowing the digital divide. Well-planned initiatives encourage the development of networks of teachers who rely on one another in acquiring technological skills, and who are more likely to model this collaborative approach in the education of their students. “Research confirms that meaningful technology experiences often elude academically struggling students” (Manzo, 2001, p. 22). We must ensure that professional development models do not keep teachers captive to the same phenomenon or further contribute to the learning divide.

Effective and ongoing professional development programs must become the norm. Moving beyond the traditional quick fix will require the careful collection and analysis of relevant data to determine best practices. This will ensure that professional development focuses on important topics unique to the community of learners and challenges traditional beliefs that impede reform and equity. Such practices can serve as a realistic driver for sustainable reform. The role that technology plays in this critical endeavor is unquestionable.

If our schools are going to succeed in meeting the educational demands of the twenty-first century, policymakers and school administrators must understand the impact of technology on teaching and learning. However, inequities exist, not merely in access to computers and the Internet, but also in the way teachers use computers to educate children (Johnston, 2001). Therefore, we must reflect deeply about which professional development models can help educators to bridge the technology divide that currently exists in our schools and universities. The challenge will be for reformers to create programs that are equitable, affordable, sustainable, and scalable, and that capture the opportunities offered by emerging technologies.