Technology and Pedagogical Renewal
Mesut Duran a, Paul R. Fossum b, Gail R. Luera b

a School of Education, The University of Michigan-Dearborn, Dearborn, MI, USA
b School of Education, University of Michigan-Dearborn, Dearborn, MI, USA

To link to this Article: DOI: 10.1300/J025v23n03_03
URL: http://dx.doi.org/10.1300/J025v23n03_03

PLEASE SCROLL DOWN FOR ARTICLE
SUMMARY. Research indicates that, if future teachers are to effectively use technology, their pre-service preparation should employ multiple components. These components include core course work in educational technology, faculty modeling, and clinical experiences. This paper describes and analyzes one model for drawing these three...

MESUT DURAN is Assistant Professor of Educational Technology, The University of Michigan-Dearborn, School of Education, Dearborn, MI 48129-1491 (E-mail: mduran@umich.edu).
PAUL R. FOSSUM is Assistant Professor of Education Foundations, School of Education, University of Michigan-Dearborn, Dearborn, MI 48129-1491 (E-mail: pfossum@umich.edu).
GAIL R. LUERA is Assistant Professor of Technologies and Science Education, School of Education, University of Michigan-Dearborn, Dearborn, MI 48129-1491 (E-mail: grl@umd.umich.edu).
The research reported in this article was based on a project funded by the U.S. Department of Education through Preparing Tomorrow’s Teachers to use Technology (PT3) Grant# P342A010073. The views and conclusions expressed are those of the authors, and no endorsement by the U.S. Department of Education should be inferred.

Available online at http://cits.haworthpress.com
© 2006 by The Haworth Press, Inc. All rights reserved.
doi:10.1300/J025v23n03_03
components coherently together in a teacher preparation program. The paper further reports on a research project that applies this model at a major Midwest research university. In the conclusion section the paper identifies and discusses ways in which the model presented responds effectively to the need for a comprehensive program for preparing a technology-proficient teaching force. doi:10.1300/J025v23n03_03 [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress.com> © 2006 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. Teacher education, professional development, university/school collaboration, learning communities, educational change, education renewal, educational standards, instructional technology, technology integration, computers in education

A considerable amount of research on educational technology suggests that preparing technologically proficient educators relies on multiple components. Basic instruction in an educational computing course—preferably near the beginning of the professional sequence of classes—plays an important role in introducing pre-service teachers to fundamental technology concepts and skills (Kim & Peterson, 1992). Yet such course work is not sufficient in creating technology-proficient teachers (Hunt, 1994; Moursund & Bielefeldt, 1999; Wetzel, 1993). An additional important element in the preparation of a technology-proficient teacher is the opportunity to observe technology-proficient faculty, modeling effective use of technology in methods and content courses (O’Bannon, Matthew, & Thomas, 1998; Moursund & Bielefeldt, 1999; Strudler & Wetzel, 1999). Scholarship in the field of educational technology has also indicated that effective preparation of technology-proficient teachers calls for the meaningful integration of advanced technology into the pre-service teacher’s field experiences (Gunn, 1991; Novak & Berger, 1991; Wetzel & McLean, 1997; Wepner & Mobley, 1998).

These three elements, then, contribute to the comprehensive preparation of technology-proficient educators—core course work, effective faculty modeling of instructional technology, and technology-enriched field experiences (Duran 2000; Instructional Technology Resource Center [ITRC], 1998; Moursund & Bielefeldt, 1999; National Council
for Accreditation of Teacher Education [NCATE], 1997). Yet while a large and growing proportion of the nation’s postsecondary teacher preparation institutions require core course work in educational technology (Vagle, 1995), the typical teacher education program does not include sustained faculty modeling nor does it provide field experiences that meaningfully integrate educational technology (Duran 2000; Moursund & Bielefeldt, 1999).

There is a pressing need for models that address all of these three components, and that foster progress toward the end goal of producing a technology-proficient teaching force. This paper first describes and analyzes one model for change called the Michigan Teachers’ Technology Education Network or “MITTEN.” The model envisions a three-year process aimed at aligning and strengthening the three vital elements identified above—core coursework, faculty modeling, and technology-enriched field experiences—thus helping to encourage the sound use of advanced technology tools in the region’s schools. The discussion in this section links the model with the literature on instructional technology in particular. Further, because Wilburg (1997) has maintained that “efforts to integrate technology with teaching must consider the research on change” (p. 174), the discussion also includes considerable reference to theoretical and conceptual literature on educational change in general. Second, the paper reports on the MITTEN project’s findings from the first three cohort groups who participated in the study from September 1, 2001 through April 30, 2003. Third, in a concluding section, the paper describes ways in which the model presented responds to the need for a comprehensive program for preparing technology-proficient future teachers.

A MODEL IN THEORETICAL PERSPECTIVE

Various parties are involved in the work of preparing future teachers, and these include, most obviously, postsecondary schools of education. Commonly, such teacher education units maintain tight links with K-12 schools in their regions to serve as sites within which future teachers pursue coordinated clinical experiences. In addition to the schools of education and their K-12 partners, colleges of arts and sciences have vital roles: Within these units in particular, future teachers shape their expertise in various fields of emphasis. The task of integrating the components discussed above—core course work in educational
technology, faculty modeling, and clinical experience—warrants the co-operative engagement of all of these entities.

MITTEN and the Educational Change Context: Descriptive and Analytic Overview

In responding to PT3’s (Preparing Tomorrows’ Teachers to Use Technology) call for sustained and meaningful linkages between the P-12 and the postsecondary sectors, the MITTEN project discussed here has adopted a model similar to John Goodlad’s (1994) “centers of pedagogy” (see Figure 1). Like the Holmes Group (1995) vision of professional development schools as venues for sustained discourse around the young teacher’s practice, Goodlad’s centers of pedagogy call for new and stronger relationships between P-12 and postsecondary institutions. The MITTEN project, based in the University of Michigan Dearborn’s School of Education, involves UM-D’s College of Arts, Sciences, and Letters and nearby Henry Ford Community College as additional higher education collaborators that are engaged in the work of teacher preparation. Several local P-12 institutions, which sponsor UM-D’s pre-service teachers for their clinical experiences, are also engaged in the project.

As Figure 1 illustrates, Goodlad’s contention is that effective interaction regarding teaching improvement calls for engagement among three entities: schools of education, school districts, and colleges of arts and sciences. Certainly, while each of these three participants has its own

functions and other business to attend to, Goodlad (1994) has stressed that each is an essential and equal player in a healthy teacher preparation “ecosystem” (p. 9). More than just a setting, then, the center of pedagogy “brings together simultaneously and integratively the commonly scattered pieces of the teacher education enterprise and embeds them in reflective attention to the art and science of teaching” (Goodlad, 1994, p. 10). In sum, centers of pedagogy constitute a means of addressing the shortcomings of the status quo in teacher education, comprised, as it normally is, of an “undergraduate curriculum of general and special studies interspersed with essentially required courses in education and student teaching” (p. 10).

A feature of the MITTEN project called the Networked Learning Circle (NLC) parallels in small scale Goodlad’s center of pedagogy idea. Project participants’ work within one of five NLCs constitutes the core activity of the project. Additional events are designed to prepare participants for productive engagement within their respective NLCs and to provide venues for sharing the fruits of the NLC’s collaborative efforts. This sequence of experiences is described in fuller detail, together with some rationale for these events.

**Technology and Pedagogical Renewal: MITTEN’s Conceptual Mooring**

Remarkably, the typical student teaching or clinical experience has tended to foster—and at a most critical juncture in the pre-service teacher’s preparation—distance rather than interaction between the pre-service teachers and their college and university-based faculty members. Certifying future teachers, having concluded all or nearly all of their course work, are “released” by their academic instructors into the hands of their hosting teachers. Also, regularly a supervising teacher who the student teacher’s college or university appoints has an important role in supporting the pre-service teacher and, to varying degrees, in helping synthesize the student teacher’s experiences with content and pedagogical knowledge already learned. Yet, like the student teachers themselves, these supervisors rarely have sustained contact during the clinical experience with members of the faculty mainstream. This structured separation has negative consequences of at least two sorts. First, the pre-service teacher is unable to benefit from meaningful continuing contact with content and pedagogical expertise. Second and perhaps even more limiting, the faculty members themselves are unable under most prevailing models to reconnect with the P-12 world in ways that
might inform and rejuvenate their own instruction. Smith and Kaltenbaugh (1996) have noted the desirability of establishing the meaningful input of “academicians, master teachers, and master practitioners” to overcome the tendency for each of these vital participants in teacher education to stand as an “autonomous unit” (p. 96). Venues that can foster genuine dialogue between and among pre-service teachers and members of these three groups are necessary elements of programs aimed at spurring structural change. Goodlad’s model provides a basis for pursuing this kind of cooperative engagement.

Thus, while the infusion of educational technology is MITTEN’s end in view, the student teacher and the student teaching experience lie at the heart of MITTEN’s plan for reaching this goal. Figure 2 (an adaptation of Figure 1 based on Goodlad) depicts the composition of MITTEN’s NLCs and reflects the project’s emphasis on the pre-service teacher’s student teaching experience and his/her development of technology-enhanced lessons. The NLC idea calls for engaging four types of participants (as Figure 2 further illustrates): the student teachers themselves; practitioner experts comprised of the student teachers’ school-based mentoring teacher and their university-based field supervisors; content area faculty of the arts and sciences, specializing in the student teachers’ major fields of study; and education faculty specializing in educational technology and methods. This diversity of groups engaged in the focal activity of the grant seeks to enable the development of shared meaning, which Fullan (2001b) has identified as key in reaching outcomes related to educational change.

FIGURE 2. The “Networked Learning Circle”: a structure for collaboration on technology integration, adapted from Goodlad (1994).
The project’s prevailing attention to the student teacher and the student teaching experience has certain strengths. Foremost among these, it helps MITTEN address the insularized nature of the student teaching experience. As mentioned, the clinical experience has most often tended to feature detachment between the postsecondary and the P-12 educational worlds rather than engagement, interaction, and collaboration on the pre-service teacher’s behalf. A further important intention of this element of the design is that it leverages and reshapes existing relationships, practices, and energies rather than seeking to replace or to duplicate them. For example, the student teaching appointment has, as a state-mandated part of the certification experience, been a long-standing fixture of the college’s teacher preparation programs. As such, the college has a well-seasoned field placement office. This office plays an important role in securing the interest and participation of student teachers, their hosting teachers, and their university-based supervisors.

Another prominent element of the project’s design is that each of the NLCs stresses a distinct content area, corresponding to the instructional majors of the participating student teachers in each group. Accordingly, at the heart of the MITTEN project is a learning circle in each of the five following areas: early childhood/educational psychology, mathematics, social studies, language arts, and science. This cluster of five learning circles is depicted in Figure 3. A common criticism of teacher preparation programs that this element of the MITTEN model addresses is that often pedagogical concerns are detached from the world of subject area learning, undermining the adequate blending of the two to facilitate the development of what Shulman (1986) has described as pedagogical content knowledge. A further strength of this element of the project design is that it allows for some diversity of participants in terms of their instructional levels, since the focus is on the subject area rather than the grade level. The NLC experience therefore augments the more typical focus on grade level concerns, giving participating teachers early exposure to topics such as optimizing learning across age and grade levels, gaining insights into methods for accommodating diverse abilities among their P-12 students, and so forth.

Cycles of Progress: Project Events and Sequence

MITTEN’s primary goal is to prepare a cadre of future educators with improved knowledge, skills, and confidence regarding the integration of information technology into the teaching and learning process in meaningful ways. MITTEN pursues its goal by offering three types of
interrelated professional development activities to pre-service teachers, in-service teachers, and education faculty: a series of capacity-building workshops, a sequence of meetings of the NLCs themselves, and a pair of seminar activities designed for the whole-group engagement of all participants. Figure 4 shows the sequence of these events within a single cycle of the project. To stress again, the meetings of the NLCs and the work undertaken within them are of primary importance to the project. The other sorts of activities, however, constitute important supports to that work.

As is now true of the majority of the U.S. postsecondary teacher preparation programs (Vagale, 1995), UM-D certification students are required to have completed a core course in educational technology prior to their clinical phase. The MITTEN leadership is therefore familiar with the technological capacities of the student teachers who agree to participate in the project. In order to address the needs of the project’s
cooperating master teachers, field supervisors, methods and arts and sciences faculty members, however, MITTEN offers a set of capacity-building activities such as whole group workshops, working lunch sessions, and one-on-one mentoring designed to enhance the technology proficiency of these participants. The general scope of these sessions encompasses three needs areas—telecommunications tools, productivity tools, and educational multimedia—while specific emphases correspond to the needs that participants identify on needs assessments surveys. Thus, the capacity-building activities address technology-related professional development and training imperatives that various scholars (e.g., Willis & Mehlinger, 1996; Flaba, Strudler, & Bean, 1999; Strudler, 1993) have identified as crucial. Referring again to Figure 4, the capacity-building activities are part of a preparatory semester which is geared toward enhancing the productivity of the NLCs when they meet in the collaborating semester that follows.
In addition to the project’s capacity-building events and to a set of whole group events that include seminar activities and exposition events, meetings of the five content-focused Networked Learning Circles during the course of the collaborating semester comprise perhaps the most vital set of activities within the MITTEN project. With each NLC focused on one of five areas of specialty (language arts, social studies, science, math, or early childhood), the memberships of each circle bear a common interest in improving instruction pertaining to a discrete content area. Each of the five circles meets at minimum three times during the course of the term in order to design, revise, and implement technology-enriched instruction for use in educational practices (e.g., course or unit redesign in P-12, syllabi revision at the university level). Two key assumptions form a basis for the interaction and exchange of ideas within the NLC. First is the notion that all members of the group are primarily present as learners. Thus, although each circle’s profile includes educators at different “levels,” all have a stake in developing their own familiarity with technology applications and uses and in doing so by observing other members’ progress on their own experiments with and uses of instructional technology. Technology requires continuing openness to learning, even among those who are closest to technological innovation. The second assumption that exemplifies the conceptual mooring of a successful NLC is that co-learning supports the learning of all the members of the NLC. The critical eyes of other members of a circle help develop capacities in each member to self-monitor and to critique one’s self with an eye on improvement.

The seminar activities serve two different but complementary purposes. First, they build awareness of broader social issues related to instructional technology, with attention to topics such as the digital divide, technologically enhanced participation in learning communities (Levin, 1996), and the effects of the technology revolution upon the formation and uses of knowledge (Scott, Cole, & Engel, 1992; see also Maddux, Johnson, & Willis, 2001, for additional descriptions of critical perspectives and of other value-laden implications of technology use). Special and emerging uses of technology in special learning contexts are other possibilities for seminar sessions revolving around issues such as uses of technology with certain age groups (e.g., Wetzel & McLean, 1997) or confronting challenges associated with special types of learners (e.g., Willetts, 1992). For the school-based master teachers in particular, these opportunities augment their home schools’ efforts to contribute to teachers’ continuous learning (Darling-Hammond, 1998). A second purpose of seminar activities is to build and maintain the in-
vestment and commitment of those involved by showcasing current products and works in progress, consistent with Fullan’s (2001a) observation that knowledge exchange is both a motivator and an integral attribute of the competent professional.

To integrate all the elements of the MITTEN activities, each participant creates an electronic portfolio documenting the development and implementation of technology-enhanced lessons and projects (leading to course or unit redesign in P-12 and syllabi revision at the university level) to demonstrate the extent and quality of personal growth.

THE MITTEN EXPERIENCE

The following sections of this paper describe the project participants, the data collection and analysis, and findings from the first three cohort groups who were involved in the study from September 1, 2001, to April 30, 2003.

During the project’s first three cohorts, 50 UM-D student teachers participated in the study, 18 in the first group, 15 in the second group, and 17 in the third group. Each student teacher participant was a member of one of five NLCs. All first-, second-, and third-round participants completed MITTEN expectations (coursework; capacity-building workshops; at least three circle meetings; required activities including implementation of technology-rich lessons, maintaining journals, and developing electronic portfolios; whole group activities including a kickoff event, a technology seminar focusing on a featured social issue, and a final exhibition showcasing project products).

Each student teacher’s P-12 mentor teacher (called cooperating teachers) was a NLC participant. Eighteen (18) in round one, 15 in round two, and 17 in round three participated in the study. Cooperating teachers were partners in the project with the student teachers. They participated in all seminar, capacity-building, and NLC activities; they reflected on learning in journals and demonstrated achievements in integrating technology into lessons and projects through their electronic portfolios.

Each NLC consisted of one educational technology faculty, one methods faculty, one or two content faculty, and one student teaching supervisor from the participating schools and colleges. The MITTEN program targeted 18 university-level faculty and 5 student teaching supervisors to participate for a full year cycle (four semesters in two different cohort groups) in the project, while the student teachers and their
mentors were involved for two semesters in one cohort group. This was perhaps to provide more experiences to higher education faculty. Fifteen (15) faculty started in the first year, with 13 finishing. Five (5) supervisors started in the first year, with four (4) completing the project. These faculty and field supervisors have been full participants in seminars, capacity-building activities, the NLC activities, journaling, and preparing the electronic portfolios that demonstrate the development and implementation of advanced technology lessons and projects in their teaching. Thirteen (13) new faculty and four (4) new supervisors started in the second-year cycle.

The qualitative data that contribute to the interpretive findings reported here came from a variety of sources. These include journal entries, technology projects, and reflections within electronic portfolios. Data collection and analysis were conducted on a continuous basis throughout the study. The cycle, that is, began with data collection, continued through reflection and analysis, and then looped back through additional data collection. The number of data sources and the frequency of the data collection effort helped to triangulate the data. The project objectives drove the data collection and analysis.

Findings suggest that the professional development activities taken place within the MITTEN program have been effective. Capacity-building activities increased participants’ confidence and competence with technology tools. NLCs provided critical support for teaching with technology. Each of the NLCs fostered the development of technology-enhanced lessons while retaining both a content-specific mooring and pedagogical integrity. Within the NLCs, participant growth was evident in the exchange of ideas, increased communication and connection, and the emergence of a notable sense of community. Participants were engaged in seminar topics and these events successfully built awareness of pressing social issues. The following narrative illustrates the major findings in detail.

**Technology-Proficient New Teachers**

A major component of the MITTEN program was to prepare a new generation of P-12 teachers who are able to creatively and critically use technology to enhance student learning. Data suggest that MITTEN has definitely been a rewarding experience for pre-service teachers. The project provided the experiences needed for pre-service teachers to use advanced technology tools in their future practice.
Participants have fulfilled MITTEN expectations; namely, coursework, capacity-building workshops, and three circle meetings. Participants engaged in all required activities including implementation of technology-rich lessons, maintaining journals, and developing electronic portfolios. They also participated in seminar activities, including a kickoff event, a technology seminar focusing on digital divide (cohort #1), assistive technology (cohort #2), or on plagiarism and copyright issues in the digital age (cohort #3), and a final exhibition showcasing project products.

All pre-service teachers were required to take an educational technology course prior to the MITTEN program. Therefore, most student teachers were confident and competent with advanced technology tools. However, the needs assessment survey administered to them at the beginning of the MITTEN program revealed that most of the participating student teachers were at low to moderate skill levels in using advanced technology tools in the classroom. One student teacher put it best, “It is one thing to learn and use a program or tool, but it’s another thing to teach it to a room full of six year olds.”

Most student teachers took advantage of capacity-building workshops, even though they met the prerequisite for participation in the MITTEN project in their pre-service educational technology course. This was a good opportunity for them to remember what they learned in their educational technology course and/or to learn to use some advanced technology tools that were not introduced to them in such courses.

Observations in NLC discussions and the analysis of the journal entries indicated that NLCs provided critical support for teaching with technology. Within NLCs each student teacher planned and implemented an instructional unit consisting of at least five technology-integrated lessons. The NLCs provided student teachers with forums to present their units and receive feedback from the circle members. One student teacher’s comments illustrate this point:

My first impression of the group is that we are all open to sharing what we know about the project and any ideas. I feel like a team in this, which is much easier than doing it alone. . . . The ratio of faculty to students in our circle greatly benefits me. I am aware of the support given to me by the teachers, and plan to take advantage of their thoughts and ideas throughout this project.

There were wide disparities in both equipment and technical support among the participating schools districts. Student teachers collaborat-
ing with their classroom mentor teachers conducted site assessments using School Technology & Readiness (STaR) Charts (The CEO Forum on Education and Technology, 2003), then developed their projects and lessons to fit the limited resources at their disposal. The NLCs and the National Educational Technology Standards for Students (International Society for Technology in Education, 2000) within the limitations of their teaching environments.

Most student teachers indicated that the MITTEN program demonstrated the importance of the technology integration in the classroom and provided them the confidence and the competence to continue using technology in their future classrooms. One student teacher explained:

The MITTEN project has demonstrated the importance of integrating technology into the classroom. I have learned a great amount about technology and the various educational software programs there are for students. I feel that technology helps students to become better learners and provides a more effective way of teaching. Using technology for our unit has given the students the motivation to learn and the feeling of accomplishment for their work. I am very proud of the work they have completed and in the future I will continue to use technology in my own classroom.

Another student teacher expressed similar feelings:

I am very happy that I decided to participate in the MITTEN project during student teaching. This experience will help me feel comfortable using technology in my future classroom. I have learned how to successfully create and integrate technology-based lessons into any existing curriculum. I feel that by participating in this project I have become a technology-proficient educator.

MITTEN therefore seems to meet a real need for student teachers to become confident and competent enough to use advanced technology tools in their future classrooms.

**Technology-Proficient Practicing Teachers**

Another major component of the MITTEN program was to increase in-service teachers’ ability to integrate information technology into their curriculum and to mentor student teachers in using technology in a technology-rich environment. All P-12 mentor teachers were partners in the
project with their student teachers. Data suggest that MITTEN has been a significant staff development initiative for classroom mentor teachers.

All mentor teachers responded to a needs assessment survey that identified their needs and readiness to use technology in the classroom. Based on the data appropriate capacity-building activities were developed and conducted. Formal and informal interviews with classroom mentor teachers and analysis of journal entries revealed that capacity-building activities increased their confidence and competence with technology tools. The flexible format of the activities (group workshops, small-group work sessions, and one-on-one mentoring) helped to address individual needs. A number of cooperating teachers were assisted in Web search strategies, multimedia creativity programs, and visual thinking tools. One cooperating teacher expressed the feeling of many others as she reflected on her experience in capacity-building activities:

I feel very comfortable learning this software in a step-by-step way. As I was in the session I noticed so many similarities between creating things in HyperStudio and working in PhotoAdobe and KidPix. I was confident in what I was doing because pieces of the program were familiar to me. I am finding that as I use these tools I am more confident in my abilities. Earlier this week I was able to send a photo, taken at school, to a parent through an attachment on e-mail. It was very exciting!

As was the intent of the capacity-building activities, participant growth was fairly common for those attending the sessions.

Observations in NLC discussions and analysis of journal entries revealed that NLCs provided critical support for classroom mentor teachers to learn about integrating technology into their classroom practice. The NLC discussions have made it abundantly clear that cooperating classroom teachers needed to look at models, and talk to those who used technology in their teaching. The following statement from one cooperating teacher illustrates this point:

I enjoyed discussing the project ideas with our circle. One of the real benefits of this project is the opportunity to share ideas with the other teachers and professors.

Another cooperating teacher shared similar feelings:
My student teacher] and I worked out the details of our first three projects, and decided upon our final two before the meeting. We may even try to incorporate a few extra if there is time. I sincerely appreciate the spirit of collegiality we have as a group. Suggestions were offered about how we might better enhance our projects, and we plan on making some modifications. Teaching can be an isolating profession if you allow it. You see your colleagues during hall duty and for 20 minutes at lunch if you’re lucky. This certainly doesn’t allow time to share knowledge and exchange ideas. This NLC was worth my time.

These reflections indicate that NLCs were meeting a real need for cooperating classroom teachers to discuss their challenges and successes in a sustained fashion.

Most UM-D student teachers were more advanced in integrating technology than were their cooperating classroom teachers; consequently, the student teachers served in mentoring roles themselves with regard to using instructional technology. In return, cooperating school teachers assisted student teachers in accessing technology tools and (in some cases) the expertise of building technologists; they have helped student teachers link content standards with technology standards in carrying out projects and lessons with advanced teaching and learning techniques. One cooperating teacher’s comment illustrates the feelings of many others:

I am enthusiastic about learning more and that is why this project appeals to me! It’s designed to assist veteran teachers by educating them about technology in a supportive environment. I have the classroom expertise as a master teacher while my student teacher has more experience using computers. We will absolutely learn from each other!

As it was the case for student teachers, the MITTEN program provided the experiences needed for classroom mentor teachers to learn about the effective use of advanced technology tools in the classroom.

Technology-Proficient Faculty

The MITTEN program was also aimed at increasing current teacher educators’ ability to use technology to better prepare tomorrow’s teachers and to model meaningful uses of technology in their professional
practice. Data suggest that, at the beginning of the MITTEN program, most faculty were at low to moderate skill levels in using technology with students to meet their course objectives, as well as in using advanced technologies to enhance their personal and professional productivity. Their participation in capacity-building workshops, the NLC activities, and technology seminars increased the development and implementation of advanced technology lessons and projects in their teaching. Faculty electronic portfolios demonstrated that most participating faculty increased their instructional use of technology. This includes using Web pages, listserves, and discussion boards as a means of communicating with students; using software application tools in their classroom activities; and developing technology-related assessment tools. For example, an early childhood methods professor assigned her students to create children’s portfolios using PowerPoint. This type of assessment is a crucial component to all early childhood programs. The portfolio is a record of the child’s process of learning: what the child has learned and how s/he has gone about learning; how s/he thinks, questions, analyzes, synthesizes, produces, creates; and how s/he interacts intellectually, emotionally, and socially with others. The portfolios contain pictures, children’s work samples, descriptions, children’s voices, and an evaluation of the child. Students had to apply many technology skills to create such portfolios. The professor reflected on her experience in this project:

I was so excited to figure out the Power Point program can be used to create children’s developmental portfolios. The students [pre-service teachers] produced high quality developmental portfolios while using this tool. The electronic developmental portfolios can easily be shared with the parents in the classroom. Also each child’s developmental portfolio can be archived and shared with future students. It makes perfect sense that technology integration activities must be connected to course content and assignments.

Some faculty who supervise student teachers have increased their instructional use of technology such as e-mail, listserves, and discussion boards as communication devices with student teachers and have become familiar with tools available to and used by P-12 teachers. One supervisor of student teachers described her experience:
Prior to participation in the MITTEN project, my computer technology skills consisted basically of use of MS Word for simple word-processing and a bit of e-mailing. During the past year, my skill proficiency has increased considerably as I now make use of many more Word capabilities, do Internet research, communicate and send files via e-mail, and use an online discussion board. In addition, my understanding and awareness of computer capabilities have increased enormously, so that I will continue to learn and use more in the future.

Despite their increased use of technology in their daily practice, some faculty have needed considerable time and professional development for moving beyond their traditional practice. One faculty member noted:

My participation has been a rich, rewarding experience, since I have greatly increased my knowledge of the technology issues in education and am currently implementing my enhanced skills in my upcoming courses, but I do have miles to go, as a famous poet once said.

It was evident from the faculty reflections and from the project exhibited on their electronic portfolios that most faculty appreciated the opportunities provided through MITTEN to master the tools to enhance their professional practice.

**Technology Learning Resources**

In addition to the preparation of technology-proficient P-16 educators, MITTEN also focused on developing a series of technology learning resources (including software tools, Web-based curriculum materials, hypermedia, and digital video best practice cases) that model effective uses of information technology for future teachers, practicing teachers, and teacher educators. Data suggest that most MITTEN participants developed and implemented exemplary technology-integrated projects (leading to course or unit redesign in P-12 and syllabi revision at the university level) and included them in their electronic portfolios. Projects created by the pre-service teachers and in-service teachers include reflections related to their development and effectiveness and directly related to National Educational Technology Standards for Students (NETS-S) and the state’s curriculum standards. Portfolios
from faculty members containing models for technology applications in university classrooms are also now available. The MITTEN Web page contains increasing numbers of such learning resources (http://www.umd.umich.edu/mitten).

Production of portfolios and lessons was certainly an anticipated outcome. Less anticipated, however, was the level of enthusiasm with which participants shared these technology resources. As one of many examples, a multi-age classroom teacher produced a “techno-book” (a PowerPoint slideshow exported to VHS format to be sent home) project with her students which inspired an early childhood teacher in a later cohort to create a similar project. More importantly, project participants have found more ways to share technology-learning resources including lesson plans and project ideas/examples at their P-16 buildings and with parents and the community. One example is that five MITTEN teams in different schools have presented their projects to the school community (inviting district administration and parents).

**P-16 Partnerships**

MITTEN envisioned forming a self-sustaining professional development network among future teachers, practicing teachers, and teacher educators to reach and use technology resources for further professional development. Data suggest that the communication and connections among project participants created a strong sense of community in most cases. Most project participants felt they had been working toward similar goals and had creative, supportive folks as partners on a common journey. They developed a shared vision about the use of technology for instruction.

In reviewing the structure of the teacher preparation experiences in place at UM-D prior to MITTEN, the project leadership discovered that, like most other institutions, many of the unit’s practices and structures fostered distance rather than interaction between and among pre-service teachers, college and university-based faculty members including student teaching supervisors, and P-12 cooperating teachers. For example, student teachers’ university-appointed “field supervisors” typically have little meaningful contact with full-time university faculty members. In short, structured separation of this sort has contributed to conditions in which a pre-service teacher and a P-12 cooperating teacher were unable to benefit from continuing contact with content and pedagogical experts at the university. In turn—and even more unsatisfactory—such structures of separation have prevented college and university faculty
members from connecting with the P-12 world in ways that might inform and rejuvenate their own instruction. None of the several parties involved in teacher preparation—whether at the college/university level or in P-12 classrooms—have been receiving sustained and meaningful support of the sort that might adequately address the development and implementation of technology-rich lessons and projects. And, importantly, the status quo at UM-D prior to MITTEN reflected patterns of structured separation that are typical of teacher preparation programs across the country.

Formal and informal interviews with project participants and their journal entries indicated that the MITTEN model addressed these shortcomings by providing a venue that fostered genuine dialogue among participating faculty, P-12 teachers, student teachers, and their university supervisors. In so doing, the program was overcoming the tendency for each of these vital participants in teacher education to stand as an autonomous unit. Engaging these diverse groups through NLCs enabled the development of shared meaning, important in reaching outcomes related to pedagogical renewal in technology education. One student teaching supervisor reflected on her experience:

3rd NLC Meeting. This is a wonderful group of people to work with. There is such good rapport and interaction among the members. . . . It’s marvelous to see all these educators sharing ideas and inspiring each other. It is revitalizing all our teaching.

One cooperating teacher similarly expressed her feelings:

I enjoyed discussing the project ideas with our circle. One of the real benefits of this project is the opportunity to share ideas with the other teachers and professors.

These reflections indicate that NLCs were meeting a real need for teachers to communicate and collaborate with their P-16 colleagues.

Numerous examples of communication and collaboration were observed of university faculty who had little such connection prior to MITTEN—even though these people have discovered that they often have the same goals and in many cases the same students. An example: a science-methods faculty member volunteered to visit the P-12 science team to provide assistance in their classroom. Yet another: Three faculty from Henry Ford Community College reported a “significant increase” in their collaboration because of MITTEN. The project provided opportunities to
address a concern, expressed in one journal entry, that “university and college faculty do not know what is happening in public schools; they are living in their own, isolated worlds.” Similarly P-12 teachers and pre-service teachers had opportunities to learn and appreciate the resources and perspectives the teacher educators brought to teaching and learning.

University faculty have expressed appreciation of the opportunity MITTEN affords them to collaborate and communicate with each other and to connect with P-12 teachers and student teachers in ways which inform and rejuvenate their own instruction.

MITTEN IN PERSPECTIVE

The question currently challenging the teacher education community is not whether technology should be included in teacher preparation, but what is the efficient way to integrate technology into the teacher education curriculum. Starting in 1999, the U.S. Department of Education’s PT3 initiative provided the educational technology community with the opportunity to explore and develop a variety of approaches for addressing technology integration into teacher preparation. The MITTEN model presented and discussed in this paper represents a strong theoretical grounding as a response to the PT3 call, highlighting the three critical components of technology integration into the teacher preparation programs—core course work, effective faculty modeling of instructional technology, and technology-enriched field experiences. John Goodlad’s discussion about “center of pedagogy” has provided a basis for pursuing the MITTEN model that fosters a structure for collaboration on technology integration. The work of the student teachers and student teaching lie at the heart of the NLC. The NLC model facilitates engagement, interaction, and collaboration among schools of education, school districts, and colleges of arts and sciences, on the pre-service teachers’ behalf, and it undoes the kind of detachment between the postsecondary and the K-12 educational worlds. This type of cooperative engagement among all of these entities warrants addressing all three critical elements of technology integration into a teacher preparation program.

Findings from the first three cohorts of the project indicate that the MITTEN model provides a venue that fosters genuine dialogue among academicians, P-12 teachers, and student teachers and their university supervisors. Engaging these diverse groups through NLCs enables the development of shared meaning, important in reaching outcomes related to
pedagogical renewal in technology education. In these ways, the MITTEN model enables an effective response to the need for a more comprehensive program for the preparation of a technology-proficient P-16 teaching force. Indicators of the MITTEN model’s effectiveness in enhancing technology proficiency include observed increases in the quality of participants’ portfolios. Further, the project has brought significant growth in the numbers of portfolios both submitted and accepted for formal state recognition. Capacity-building activities, meanwhile, have increased the participants’ confidence and competence with advanced technology tools. And, technology seminars built awareness of pressing social issues. The communication and connections among project participants has created a strong sense of community. The research reported here suggests that, in these ways, the present model enables an effective response to the need for a more comprehensive program for the preparation of a technology-proficient P-16 teaching force.

REFERENCES


doi:10.1300/J025v23n03_03