The MITTEN project created a networked learning community involving preservice teachers, inservice teachers, and education faculty. The model combined core coursework, faculty modeling, and technology-enriched field experiences in a program of teacher preparation and professional development. The model responded to the need for a comprehensive program for preparing technology-proficient educators.
Introduction

Theory met practice during a 3-year project known as MITTEN (Michigan Teachers’ Technology Education Network). MITTEN tied into preservice teacher preparation all three components of technology integration: core coursework, effective faculty modeling of instructional technology, and technology-enriched field experiences.

The defining feature of the MITTEN project was its creation of a networked learning community among PK–16 educators that called preservice teachers, inservice teachers, and education faculty to engage, interact, and collaborate in a self-sustaining development network.

Conceptual Framework: Center of Pedagogy

Goodlad (1994), in discussing what he calls the “center of pedagogy,” has proposed pursuing cooperative engagement among K–12 schools, colleges of arts and sciences, and schools of education by bringing together “simultaneously and integratively the commonly scattered pieces of the teacher education enterprise and embed[ding] them in reflective attention to the art and science of teaching” (p. 10).

As Figure 1 illustrates, Goodlad’s contention is that effective interaction regarding teaching improvement calls for engagement among the three entities—schools of education, school districts, and colleges of arts and sciences—stressing that each is an essential and equal player in a healthy teacher preparation “ecosystem” (p. 9).
The center of pedagogy idea constitutes a means of addressing the shortcomings of the status quo in teacher education, which is normally typified by an “undergraduate curriculum of general and special studies interspersed with essentially required courses in education and student teaching” (p. 10).

Goodlad’s center of pedagogy lends itself to adaptation in smaller scale by means of “Networked Learning Circles” (NLCs) involving educators at all levels, PK–16 (see Figure 2). As the figure suggests, each NLC engages participants of four types:

1. student teachers
2. content area faculty of the arts and sciences specializing in student teachers’ major fields of study
3. education faculty specializing in educational technology and methods
4. practitioner experts: student teachers’ school-based mentoring teachers and their university-based field supervisors

The involvement of these groups in the focal activity of the NLC model is intended to enable the development of shared meaning, which Fullan (2001) has identified as key in reaching outcomes related to educational change.

At the heart of the NLC is the focus on the progress of preservice teachers, a focus that has certain strengths. An emphasis on student teachers’ development is foremost among these strengths. It addresses the tendency toward separation between the postsecondary and the K–12 educational worlds.
Most often, having concluded all or nearly all of their coursework, students entering the teaching force are released by their academic instructors into the hands of their supervising, or host, teachers. A supervising teacher appointed by the student teacher’s college or university has an important role in synthesizing the student teacher’s teaching experiences with the content and pedagogical knowledge already learned. Yet, like the student teachers themselves, during this clinical experience these supervisors rarely have sustained contact with members of the faculty mainstream. Therefore, the typical student teaching experience has tended to foster—at a most critical juncture in the preservice teacher’s preparation—distance between the preservice teachers and their college- and university-based faculty members, rather than important and needed interaction.

Such patterns of structured separation have been typical of the teacher preparation enterprise in the United States and have had negative consequences of at least two sorts:

1. The preservice teacher has been unable to benefit from meaningful continuing contact with content and pedagogical expertise.

2. Perhaps even more limiting, the faculty members themselves have been unable, under most prevailing models, to reconnect with the PK–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 preservice teachers and members of these three groups are necessary elements of programs aimed at spurring structural change. The NLC model provides a basis for pursuing this kind of cooperative engagement. MITTEN confronted and dismantled this structured detachment in significant ways.

**Implementing the NLC Model**

While the NLC adaptation of Goodlad’s model has strengths in theory, such as those noted above, its application required testing. The following section discusses our experiences putting this theory into practice in the MITTEN project, first describing the project, then reporting on the findings during a period of about 3 years of operation.

**The MITTEN Project**

The MITTEN project involved the School of Education and the College of Arts, Sciences, and Letters at the University of Michigan–Dearborn (UM–D), as well as nearby Henry Ford Community College. These were the three higher education teacher preparation collaborators engaged in the project. Several local PK–12 institutions that sponsor UM–D’s preservice teachers for clinical student teaching experiences were also project participants, as was a local private technology consulting company, RWD Technologies.
The project’s goal was to prepare future educators with improved knowledge, skills, and confidence regarding the meaningful integration of information technology into the teaching and learning process. The project supported the redesign of computing, methods and content courses, field experiences, and student teaching to ensure that students met National Educational Technology Standards for Teachers (NETS•T) throughout their programs.

MITTEN pursued its goal by offering to the project participants three types of interrelated professional development activities:

- a series of capacity-building activities
- a sequence of meetings of the NLCs
- a pair of seminar activities designed for whole-group engagement of all participants.

Figure 3 shows the sequence of these events within a single cycle of the project. The meetings of the NLCs and the work undertaken within them were of primary importance to the project, while the other activities constituted vital sources of support for that work.

To address the needs of the project’s cooperating master teachers, field supervisors, and faculty of education and arts and sciences, MITTEN offered a set of capacity-building activities. These consisted of whole-group workshops, working lunch sessions, and one-on-one mentoring opportunities designed to enhance the technology proficiency of the participants so that their familiarity with the tools and method of instructional technology better matched the student teachers’ proficiency in these areas.

The general scope of these sessions encompassed three needs areas—telecommunication tools, productivity tools, and educational multimedia—while specific emphases corresponded to the needs that participants identified on assessment surveys. By improving the technology readiness of the participants and bringing their skills more in line with those of the participating student teachers, the entire cohort was prepared to undertake the work of designing and implementing technology-enhanced instruction, work that occurred during the subsequent collaborating semester.

Meetings of the five content-focused NLCs during the course of the collaborating semester comprised 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 had a common interest in improving instruction pertaining to a discrete content area. Each of the five circles met a minimum of three times during the course of the term to design, revise, and implement technology-enriched instruction for use in their educational practices.

As Figure 3 reflects, the first circle meeting (NLC I) provided inspiration and guidelines to encourage technology integration ideas among project participants. Typically, examples of best practices in technology integration were demonstrated. The first NLC meeting readied the participants to consider their instructional practices and how they might be improved through technology integration.
At each circle’s NLC II session, circle members presented their own ideas for integrating technology into lessons in their classrooms. During and after these presentations, other members of the circles raised questions and made suggestions pertinent to content, technology, and pedagogy. The presentation and discussion activities featured during the NLC II meeting geared circle members for the classroom implementation phase that was to follow NLC II sessions.

FIGURE 3
One Round of the MITTEN Events
NLC III generally occurred after the completion of most of the implementation phase and provided time for each participant to report on successes and challenges encountered during implementation. Because discussion across members of the circle was encouraged, the participants usually learned from the experiences of circle colleagues but also considered how specific uses of technology might be adapted to their own instructional settings and circumstances.

The seminar activities served two different but complementary purposes. First, they built awareness of broader social and cultural issues related to instructional technology, with attention to topics such as the digital divide, assistive technology, and plagiarism and copyright. For the school-based master teachers in particular, these opportunities augmented their home schools’ efforts to contribute to teachers’ continuous learning (Darling-Hammond, 1998).

A second purpose of the seminar activities was to build and maintain the investment and commitment of those involved by showcasing current products and works in progress, consistent with Fullan’s (2001) observation that knowledge exchange is both a motivator and an integral attribute of the competent professional.

In collaborative interaction with members of their respective NLC, each MITTEN participant created an electronic portfolio documenting the development and implementation of technology-enhanced lessons. Production of portfolios and lessons allowed project participants to share, with parents and the community, the technology-learning resources at their PK–16 buildings. The MITTEN project’s Web site (www.umd.umich.edu/mitten/eportfolios2.htm) contains increasing numbers of such learning resources and constitutes an important venue for the sharing of experiences of project members with broader audiences in the education community.

**Lessons Learned**

During the project’s nearly 3 years, 90 student teachers, 90 cooperating teachers, 30 university-level faculty, and 8 student teaching supervisors participated in the study. Quantitative and qualitative data reported here came from a variety of sources, including pre- and post-surveys, journal entries, technology projects, and reflections within electronic portfolios.

Data analysis was an ongoing process, with the project leadership reviewing data as they were collected. Multiple data sources, together with frequent incidence of data collection activities and methods, helped triangulate the research: data sources included pre- and post-survey results, participant journal entries, and summary reflections within electronic portfolios.

The project objectives drove the data collection and analysis. The analysis yielded discussion, below, of “what happened” in the program and “why it happened.”

**What Happened**

A technology survey designed in two parts by the project’s external evaluator was used to evaluate participants’ technology confidence (comfort level) and competence (frequency of use). It is available at www.umd.umich.edu/mitten/survey.doc.
Part I is made up of two scales: 9 items measuring participants’ confidence and competence related to technology literacy. Part II is also made up of two scales: 13 items measuring participants’ confidence and competence related to integration of technology into teaching and learning. The technology survey, administered twice (in a pretest and posttest design), employed 5-point Likert-type scales to measure participants’ confidence (1 = very anxious or even afraid of; 5 = eager) and competence (1 = never; 5 = daily) in both technology literacy and the integration of technology into teaching and learning.

A paired-samples t test was conducted to compare means for the same variable measured at two time points (pretest and posttest) on the same set of subjects. To treat the missing data the researchers excluded cases analysis by analysis, and they used all cases that had valid data for two variables in a pair in the test for that pair. The test results indicated a significant increase (at the .05 level) in scores from pretest to posttest for each item tested on the survey (available at www.umd.umich.edu/mitten/MITTEN-Results.htm). The survey data suggest that over the course of the program the project participants significantly improved their confidence and competence in technology literacy, as well as integration of information technology into the teaching and learning process.

Document analysis of technology projects and electronic portfolios (conducted by the project director using MITTEN electronic portfolio guidelines and checklist) confirmed the findings of the survey results. Most project participants developed and implemented technology-integrated projects (leading to changes ranging from unit revision to course and syllabus revision) and included them in their electronic portfolios. Projects created by preservice teachers and inservice teachers included reflections related to their development and effectiveness that were directly related to National Educational Technology Standards for Students (NETS•S) and the state’s curriculum standards.

One indicator of the quality of participants’ portfolios was the increasing rate at which project participants received a statewide recognition from the Consortium of Outstanding Achievement in Teaching with Technology (COATT, www.coatt.org). As of this writing, 23 participating student teachers have received this award, owing largely to their participation in MITTEN. To place this rate of recognition in context, UM–D’s 23 recipients constitute around 40% of all COATT’s preservice teacher award recipients statewide (that is, across all 26 collaborating teacher preparation institutions).

Faculty members’ portfolios containing models for technology applications in university classrooms and for supervising student teachers’ field experiences are also now available. The MITTEN Web page (www.umd.umich.edu/mitten) contains an increasing number of electronic portfolios and content-specific technology projects in language arts, social studies, science, math, and early childhood in different K–16 grade levels.

**Why It Happened**

Analysis of the formal and informal interviews with project participants, of their journal entries, and of observations of participants in NLC discussions provided data useful for understanding some of the factors that facilitated project participants’ professional growth in technology.
Building Confidence. Interviews with project participants and analysis of their journal entries revealed that capacity-building activities increased their confidence as well as their competence with technology tools. The flexible format of the activities (group workshops, small-group work sessions, and one-on-one mentoring) helped address individual needs.

All the participants—student teachers, mentoring teachers, faculty, and supervising teachers—responded to a needs assessment that gauged participants’ readiness to use technology in the classroom and identified specific areas they needed to improve. This formative data enabled the development of appropriate capacity-building activities. The primary participants in these activities were content and methods faculty, cooperating teachers, and supervisory teachers. Most student teachers also took advantage of workshops, even though they had met the prerequisite for participation in the MITTEN project during their preservice educational technology course.

The needs assessment survey revealed that most faculty and cooperating teachers were at low to moderate skill levels in using advanced technological tools in their daily practice. Some faculty were assisted in creating a digitized video presentation; others were assisted in the development of online courses. Some student teacher supervising faculty were assisted in using e-mail, sending and receiving attachments, creating Web pages, using e-mail lists, and composing electronic versions of lesson plans. A large number of cooperating teachers learned about Internet search skills, multimedia creativity programs, and visual thinking tools.

One cooperating teacher expressed not only her feelings but the feelings of many others when she wrote in her journal regarding her experience with capacity-building activities, revealing her frustration at the beginning of the program:

> It was reassuring to hear that there were other participants in the project that were just as “technologically illiterate” as I am. …At this point, I am feeling slightly frustrated and a little overwhelmed by how much training we have [received] in a short amount of time.

The participant communicated considerable self-consciousness, and the expressions of special need and self-doubt evident in this passage were relatively common to project participants. Also common, however, were participants’ expressions of enthusiasm after a period of participation in the project—indications of real progress, confidence, and agency—an enthusiasm that appeared in later journal entries made by the same participant:

> This was great!!! I felt very confident about what I was doing. …This [spreadsheet] is definitely something that I will use again with confidence. …I am feeling much more comfortable about these training sessions since Monday. …I am finding that as I use these tools I am more confident in my abilities.

As was the intent of the capacity-building activities, participant growth such as that shown above was fairly common across those attending the sessions. Qualitative evidence of this type confirmed gains identified through quantitative measurement.

Learning Communities. Observations during NLC discussions as well as analyses of the journal entries revealed that NLCs provided critical support for teaching with technology. Creative ideas were exchanged within the NLCs, and participants’ growth was evidenced by
the progress made between group sessions. Each of the five content-focused NLCs fostered the development of technology-enhanced lessons while retaining content-specific moorings and the pedagogical integrity of lessons taught.

NLC discussions reflected that the participants needed to look at models and talk to those who used technology in their teaching. The following quotes from one student teacher 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.*

One cooperating teacher expressed her feelings in a similar way:

*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.*

Another participant, a student teaching supervisor, reflected on her experience following the third meeting of her NLC group:

*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’s revitalizing all our teaching.*

These reflections indicate that NLCs were meeting a real need for teachers to discuss their challenges and successes in a sustained fashion. The revitalization to which the third example overtly refers carries a strong connotation that educational renewal occurs within the NLCs, and, therefore, reflects the sort of progress Goodlad (1994) has held as crucial. The NLCs and MITTEN educational technologists helped both cooperating teachers and student teachers strategize and find ways to meet NETS•S within the limitations of their teaching environments.

Most UM–D student teachers were more advanced in the integration of technology than were their mentoring teachers; consequently the student teachers served in mentoring roles themselves regarding the use of instructional technology. In turn, MITTEN has definitely been a significant staff development initiative for cooperating teachers. They helped student teachers access technology tools within their facilities, and in some cases they even activated the involvement of school technologists. Cooperating teachers also helped student teachers link content standards with technology standards in carrying out projects and lessons with advanced teaching and learning techniques. One cooperating teacher articulated a feeling that prevailed among 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!

Most faculty increased their personal and professional use of technology by using, as communication devices with students, Web pages, e-mail lists, and discussion boards. Some needed considerable time and professional development to help them move beyond their traditional practice. At times, project leadership observed that it was a challenge to help faculty give up the teacher role and become a learner, but the NLCs created nonthreatening environments. Seeing cooperating teachers often being mentored by student teachers in the implementation of technology was a model for university faculty.

**Long-Term Collaborative Growth.** It is apparent to most educators that a number of professional development working models exist for teachers. There is growing recognition that the one-shot inservice day, however, has notable limitations as a staff development strategy. This project illustrated considerable readiness for long-term collaborative training models that might produce lasting change in a school’s teaching and learning culture.

Observations in NLC discussions and the analyses of journal entries revealed that this long-term communication, as well as connections among project participants, often contributed to a sense of community. Numerous examples of communication and collaboration emerged among university faculty who had had little such connection prior to MITTEN—even though these people discovered that they often had the same goals, and in many cases the same students. Three faculty from Henry Ford Community College, for example, reported a substantial increase in their collaboration because of MITTEN.

The project also 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.” For example, a science-methods faculty member volunteered to visit the PK–12 science team to provide assistance in their classroom.

University faculty expressed appreciation for the opportunity MITTEN afforded them to connect with PK–12 teachers and student teachers in ways that informed and rejuvenated their instruction. Similarly PK–12 teachers and preservice teachers had opportunities to learn and appreciate the resources and perspectives the teacher educators bring to teaching and learning.

**Outcomes and Recommendations**

The PT³ initiative provided our educational technology community with the opportunity to explore and develop a variety of approaches for addressing technology integration into teacher preparation. The NLC model provided a strong theoretical grounding in response to the PT³ call. Goodlad’s (1994) discussion about “center of pedagogy” provided a basis for pursuing the NLC model that fostered a structure for collaboration regarding technology integration.

The work of student teachers lies at the heart of the NLC, yet the NLC model facilitated engagement, interaction, and collaboration among schools of education, school districts, and colleges of arts and sciences on the preservice teachers’ behalf. It therefore undid the detachment.
between the postsecondary and the K–12 educational worlds, a detachment that has limited the depth and quality of the teacher preparation enterprise. This type of cooperative engagement among all of these entities addressed the critical components of technology integration—core coursework, effective faculty modeling of instructional technology, and technology-enriched field experiences—within a teacher preparation program.

In reviewing the structure of the teacher preparation experiences in place at UM–D prior to MITTEN, the project leadership discovered that, like at most other institutions, many of the unit’s practices and structures fostered this distance between and among preservice teachers; college and university-based faculty members, including student teaching supervisors; and PK–12 cooperating teachers. Structured separation of this type had contributed to conditions in which a preservice teacher and a PK–12 cooperating teacher were unable to benefit from continuing contact with content and pedagogical experts at the university. Even more unsatisfactory, such structures of separation had limited college and university faculty members’ connection with the PK–12 world in ways that commensurately limited opportunities to inform and rejuvenate their instruction. None of the several parties involved in teacher preparation—whether at the college and university level or in PK–12 classrooms—had been receiving sustained and meaningful support of the kind that might adequately address the development and implementation of technology-rich lessons and projects.

Data from research on the MITTEN project suggests that Goodlad’s center of pedagogy idea as adapted in the form of MITTEN’s NLC model can indeed address these shortcomings by providing a venue that fosters genuine dialogue among academicians, PK–12 teachers, student teachers, and their university supervisors. The model thereby alleviates the tendency for each of these vital participants in teacher education to be autonomous. Engaging these diverse groups through NLCs has enabled the development of shared meaning—important in reaching outcomes related to pedagogical renewal in technology education.

Because this separation has been most pronounced with respect to field experiences, intensified focus on the student teaching experience (as has been characteristic of MITTEN) appears to be the key for reconnecting those engaged in teacher education. The NLC idea has put into place structures and processes that encourage networking, mutual learning, and sharing of strategies and resources. The research reported here suggests that, in these ways, the model presented can enable an effective response to the need for a more comprehensive program for the preparation of a technology-proficient PK–16 teaching force.

One remaining question revolves around the issue of sustainability: To what extent will MITTEN’s past participants continue to locate and use technology resources for their ongoing professional development? Answers to this question will emerge from ongoing research in the near term. However, anecdotal evidence already on hand suggests that participants’ growth as a result of MITTEN may survive over the longer term and that participant and project successes are spreading to educators and to institutions beyond MITTEN’s initial scope.

One example is an elementary school principal from one of our participating schools (which had three teachers involved in the program) who was so excited about the expertise MITTEN had brought into his building that he incorporated a structure to free up the time of his participating teachers so that their new expertise could be shared with other teachers in his building.
In another case, a superintendent from one of our participating school districts sought help in considering how MITTEN’s model and approaches might be adopted for districtwide application. As a result, the project team is exploring opportunities to implement the MITTEN idea at a district level.

Finally, and more generally, the UM–D School of Education and its individual faculty members are benefiting from relationships that have emerged from MITTEN.

A new network of colleagues has indeed been established.

References


