Models of Technology Diffusion at Three Public Universities: Campus Perspectives on a PT3 Grant

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A consortium of three rural, public universities with large teacher preparation programs in Western Pennsylvania report on strategies used to infuse appropriate technology throughout their teacher preparation programs. They are the recipients of a $1.7 million PT3 grant (Preparing Tomorrow’s Teachers to use Technology) from the U.S. Department of Education. The strategies include 1) classroom mentoring, 2) minigrants and stipends, 3) variety in training formats, 4) K-16 modeling and collaboration, 5) tie-ins with standards and accreditation requirements, and 6) other strategies particular to each university. The reasons why these strategies are successful in their particular educational environment are discussed.
**Background and Problem Statement:** “Preparing Teachers for the Digital Age: Implementing a Dynamic Model of Pedagogical Change” is a project funded by a $1.7 million PT3 grant (Preparing Tomorrow’s Teachers to use Technology) from the U.S. Department of Education. The proposal for this project was written by the ADEPTT Consortium (Advancing the Development of Educators in Pennsylvania through Technology Training), composed of three public universities in rural areas of Western Pennsylvania. In this paper, Indiana, Clarion, and Edinboro Universities of Pennsylvania will give their perspectives on methods of technology diffusion and curriculum change that are working in our educational environment.

The overall goal of our PT3 grant (Preparing Teachers for the Digital Age: Implementing a Dynamic Model of Pedagogical Change) is to infuse technology into the pre-service teachers’ core curriculum and several teacher education programs. Technology infusion at these institutions will have a significant impact. With their founding as normal schools, these universities have a tradition of teacher preparation. Together the members of the ADEPTT Consortium graduate some 1500 future teachers per year placed throughout the U.S. and 7 foreign countries. The universities provide excellent faculty-student ratios but have limited support staff and budgets. Both faculty and non-managerial staff are unionized.

Three of the major objectives of the project are: 1) Instructional Technology will be moved from the periphery to the core of our curriculum. 2) Future teachers will apply and integrate Instructional Technology into the teaching/learning process. 3) Additional faculty, instructional designers, and technical support staff will assist with the transition. We aim to help faculty to recognize instructional objectives that can be more readily achieved using technology, to learn enough technical skills to model appropriate uses of technology in teaching, to assign and assess student work that incorporates technology use, and to consolidate these innovations into their syllabi. We wish to sustain the impact of PT3 well beyond the life of the grant, empowering faculty to continue to use and explore new technology in teaching after the grant-funded personnel are gone.

In large teacher preparation programs, these goals seem daunting at first. We had three years to make fundamental changes in the way teacher preparation courses are taught at our institutions, which includes training faculty and helping them to apply the training in their courses and change their syllabi, thus integrating technology in a more permanent way into the curriculum. There are many reasons why some college faculty members have been slow to integrate technology into their teaching. Some are exhilarated by the change brought about by integrating technology in their teaching, while others are concerned about how technology impacts their authority, control of students, and the teacher’s role (Cuban, 1999). Other reasons include: lack of suitable training, the time it takes to master the required skills (exacerbated by the need for teacher preparation faculty to spend time on the road supervising student teachers in widely scattered rural schools), lack of technical support, lack of incentives, and the lack of hard evidence that technology can make their work move effective (Albaugh, 1997, Freberg, 1995, Olcott, 1999, Oppenheimer, 1997, OTA, 1995, Spotts, 1999). It is clear that getting faculty to use technology remains a challenge (Olsen, 1999). Even when institutions begin to offer support, the use of technology in teaching necessitates fundamental changes in the way faculty are trained and rewarded, as it is not something that can be easily done as a sideline to the primary functions of research and teaching (Bates, 1999).
Activities and Outcomes: So how could we try to achieve these goals? Now in our final year of this three-year project, we have tried a variety of approaches and identified what works best at this stage in our educational environment. Among the successful strategies we have been using are 1) classroom mentoring, 2) mini-grants and stipends, 3) variety and innovation in training formats, 4) K-16 modeling and collaboration, 5) tie-ins with standards and accreditation requirements, and 6) other strategies particular to each university. Many of our findings bear out the results of a best practice report by the American Productivity and Quality Center (Bates, 1999).

By classroom mentoring, we mean a multi-step process in which a technology mentor (colleague, student assistant, or technology specialist) first teaches a class while the teacher assists. Then, the teacher teaches while the mentor assists. Finally, the co-pilot departs, and the teacher can teach the new or revised unit without assistance. This training model was based on the work of Donald Schoen in *The Reflective Practitioner: How Professionals Think in Action* (1984) and *Educating the Reflective Practitioner* (1990). Studies of best practice institutions also point to the efficacy of a team approach and mentors in reducing “technology overload” and disseminating technology use (Bates, 1999).

Classroom mentoring has been used successfully in both the university and the K-12 contexts. For example, at Indiana University of PA and Clarion University of PA, grant faculty, graduate assistants and technology specialists have taught one or more classes within a course, designing them with varying degrees of collaboration from the responsible faculty member. Faculty members have gained a chance to learn or review a technology in the context of their specific discipline and courses, empowering them to teach it themselves later. At Clarion, after technology specialists taught hands-on classes, faculty members were obliged to follow up with an assignment requiring students to use the same software. By the third year, IUP faculty had begun to present portions of each assisted course themselves. By beginning to teach it themselves, they were moving up the Learning Pyramid to full mastery of the technology. The main challenge in classroom mentoring is to make sure that faculty do indeed reach the last stage of the model, where they present all or most of the lesson themselves.

At the IUP University School, a laboratory school, grant faculty have taught units integrating technology into the school curriculum. Here the lab school teachers, who also have faculty status at IUP, as well as student teachers, observers, and pupils, all have the opportunity to learn and apply technology as an integral part of the school curriculum. One faculty member recently invited the school children to present projects they completed using technology to college courses, thus completing the circle. In this way, classroom mentoring has enabled us to address multiple audiences and use multiple technology models at the same time. In addition, we have found examples of this exact same approach being used successfully within the nearby Indiana Area School District, PA, where the technology resource specialist serves as the mentor to teachers in her district.

Best of all, classroom mentoring saves a great deal of time both from the faculty perspective and from the perspective of implementing technology diffusion. From the point of view of busy faculty, technology is incorporated into their classes with less need for them to attend training
beforehand and with less preparation time. From the perspective of technology diffusion, classroom mentoring makes it possible to address multiple stages of training and diffusion almost simultaneously, telescoping stages and saving time. The various parts of technology training, application and diffusion were conceived in the proposal as separate and sequential and, therefore, were expected to require a long time frame: Faculty would be trained, faculty would model the use of technology in courses, faculty would train their students, faculty would devise assignments that require technology use, and finally, faculty would change their syllabus to incorporate technology enhanced assignments. In the classroom mentoring model, however, basic technology training, application of technology, and integration into the curriculum can all be addressed at once. When learning spreadsheets or WebQuests, for example, the audience has a clear idea of the objectives and sees an immediate purpose to learning the technical skills. Since the instructors and audience could be faculty, inservice teachers, preservice teachers, several parts of the training, modeling and diffusion process can combined: faculty training, modeling to preservice teachers, preservice teachers observing inservice teachers, inservice teacher training, and/or preservice teachers using technology in their field experience.

It is an understatement to say that education faculty members at our institutions are extremely busy. Student teacher supervising, professional activities, teaching loads of four courses per semester, heavy advising loads, and service leave little time for professional development, not to mention for revamping one’s entire approach to teaching. How can we motivate faculty members to learn and attempt to use technology in their courses? How can we make good use of the very limited time they have available for training?

At Indiana, Edinboro, and Clarion Universities of Pennsylvania, the PT3 grant has enabled us to sweeten the pot with incentives. No single incentive works for all faculty members, so we have offered a variety. Mini-grants are offered for individual and team projects using technology. Stipends are provided for workshops, with part of the stipend paid for attendance and the remainder paid for demonstrating changes in syllabi and teaching. Prizes are given for completing mini-workshops. Lunch helps!

For example, Clarion has given stipends to groups of two or three individuals who teach different sections of the same course when they create a joint website using online course software. Positive side-effects of putting the syllabus online are that it has all but eliminated copy machine jams on the first day of class, it has saved many trees, and best of all, students can no longer use the excuse that they "never got a syllabus." Other mini-grants at Clarion have enabled faculty to purchase such items as PDAs, software that can be used as mindtools, digital cameras, AirPort base stations, and online training. Many IUP faculty also used their stipends for small technology items, such as cameras, scanners, color printers, software, or registration and travel to conferences and workshops related to technology.

A key lesson learned is that the incentives should be offered for the specific products and behaviors required for the success of the grant and technology diffusion. For example, stipends paid solely for attending workshops do not guarantee that the participants will actually use the technology in teaching or require it to be used in appropriate ways by their students. It is for this reason, then, that we have tied stipends to revising syllabi. IUP has also offered stipends for developing and carrying out personal technology plans, a type of learning contract. Minigrants,
revised syllabi and personal technology plans obligate the faculty to follow through – to learn, apply the technology in teaching, and integrate technology into the curriculum.

Stipends for revising syllabi and a variety of opportunities for earning incentives have probably been the most important aspects of our incentives program. As we near the end of the grant, it is both amusing and gratifying to see faculty carefully accumulating incentives so that they can put them toward an entire laptop or other large expense.

Once we capture the attention of faculty with incentives, we offer a variety of training formats to appeal to different schedules and needs. They range from individual consultation to short workshops, immersion workshops, technology sandboxes and smorgasbords (try out digital cameras, scanners, web cameras and the like) and progressive workshops. In the latter, workstations are set up in a small lab, and faculty members earn coupons for each activity they complete. Coupons are turned in afterward for increasingly attractive prizes. Training formats are adjusted to the time of year, with long workshops and immersion experiences offered during summers and breaks, mini-workshops and classroom mentoring during the semester, and individual consultation at any time. Naturally, materials are provided for all types of training, and faculty can save time by using these handouts for their own classes.

Workshop titles and descriptions are another important factor. Catchy titles that are clearly relevant to education capture attention, such as “Technology Sandbox” and “Technology Chalkboard.” Workshop publicity contains brief descriptions, clear objectives and easy registration procedures. Multiple email reminders help busy faculty remember to come once they register!

Although faculty and K-12 teachers do attend generic workshops on individual software programs such as PowerPoint and their application in teaching ("Dynamic Use of Digital Images"), education faculty show a particular interest in workshops that are project-based. For example, workshops on “Putting Technology in Your Syllabus,” WebQuests, and electronic portfolios are inherently related to teaching, place specific technical skills in a meaningful framework, and can be easily tied to NCATE, state or other professional standards. At Edinboro, PT3 support for online course development evoked a strong response from faculty. Nine of the 27 participating faculty in the Department of Elementary Education have used Blackboard or eCollege to enhance courses, one successfully developed a fully online reading course (READ 607), and the university is beginning its first completely online Masters program. Faculty members also gravitate toward projects that will also facilitate skill and subject integration for school children. As mentioned above, when IUP demonstrated a budget unit we adapted from the Chicago math curriculum for fifth grade, adding spreadsheets and electronic presentation software, we immediately received a request to have the children themselves demonstrate what they had learned to our preservice teachers.

Project-based workshops may require, however, that multiple skills be taught. Templates make such project-based workshops more feasible, saving a great deal of time. They have worked well at IUP workshops on WebQuests and electronic portfolios, for example. The skills that went into creating the templates can still be taught, but they do not have to be applied dozens of times,
as they would in such projects as portfolios. If the templates are fairly simple, they can be easily modified and personalized, letting the user master additional skills.

Some of these projects are compelling for still another reason. Two of our campuses were facing imminent NCATE accreditation reviews (National Council for Accreditation of Teacher Education), and portfolios are an important NCATE requirement. At IUP, the NCATE portfolio requirement has caught the attention of many teacher preparation faculty that were only moderately interested in technology at the outset of the grant. A summer 2001 portfolio workshop was well attended, and so far there have been more than a dozen invitations to visit classes to help introduce electronic portfolios. At Clarion, after an inspiring workshop on electronic portfolios by Helen Barrett, sponsored by the PT3 grant, Education Department faculty met for a full-day follow-up session to make decisions about a pilot project and requirements for student portfolios. Edinboro was notified in May of 2001 that it had successfully achieved NCATE accreditation. The activities of the PT3 grant were given recognition for elevating the level of technology infusion in the School of Education and the university in general. Dr. Scott Baldwin, Dean of Education, stated, "The PT3 grant virtually drives all of the technological initiatives in the School of Education!"

Several types of **modeling and collaboration** have been used in our PT3 grant. As mentioned above, **teams** of faculty have submitted proposals for mini-grants to introduce new technologies into their courses. Drawing on funds from a different grant, we have also awarded mini-grants to university faculty-K12 teacher teams for technology projects. Clarion in particular has had success in forming and nurturing such teams. Also at Clarion, a K-16 Council grant funded training for 30 public school teachers; ultimately they also received several types of mathematics software, such as Ice Cream Truck and Hot Dog Stand, for use in their own classes.

Thanks to the presence of **lab schools** at two of our campuses, it is possible to have modeling and collaboration that involve both a K6 and faculty dimension. University faculty can model to preservice teachers, and lab school faculty, who are also inservice teachers, can model to both preservice teachers and university faculty. The laboratory school encourages not only observations but also collaborative projects between its teachers and education majors. In classroom mentoring, grant faculty, regular faculty, graduate assistants and technical support staff all act as models to preservice students and to faculty.

In addition, all three universities have started **teaching circles** where faculty, inservice teachers and preservice teachers learn from each other about infusing technology into curriculum. Success is being achieved particularly where the local intermediate unit is actively involved, and where the event has both a professional and social dimension (e.g., dinner). For example, ARIN intermediate unit (Armstrong and Indiana counties, PA) sponsors an Academic Alliance program for mentoring and collaboration among university and K12 faculty. It was only a short step from the existing program to creating a special Teaching with Technology Alliance that is also open to preservice teacher and is cosponsored by the IUP PT3 grant. Funding comes from several sources, including not only the grant but also districts, and student participants are charged a discounted rate. When associated with intermediate units, this kind of program can be expected to continue after the grant.
**Other Strategies**

At Edinboro University 16 courses in the School of Education have been identified as "T" courses (Technologically Enhanced). They appear in the university catalog with the T designation attached. Students are aware that the faculty teaching these courses will incorporate a high level of technological enhancement into the methodology. This approach has worked well for Edinboro, but the length of time to get approval for specially designated courses at the other universities discouraged them from pursuing it. At IUP, a traditional technology course required for all teacher preparation majors has been updated and shifted to the freshman level. The intention is for all majors to have a better technology foundation that will allow faculty to expect technology-enhanced assignments to be well done in later courses and reduce the amount of technology that instructors of higher-level courses will have to introduce themselves.

Edinboro has organized much of its grant activities around small cohorts – faculty teams; students proceeding through “T” courses; and mixed groups of faculty, students and teachers that function as teaching circles. These tightly knit groups develop close professional relationships that facilitate mentoring, peer mentoring, and collaboration.

All three universities promised infrastructure enhancements as part of their match to the grant, and these improvements have provided a dynamic context that facilitates faculty training, supports integration of technology into the curriculum, and accommodates technology change. For example, Edinboro University opened the Miller Educational Technology Center, which is the designated technology lab for the Department of Elementary Education. This center has 30 Macintosh workstations, scanners, printers, Internet access, CR-RW capabilities along with digital cameras and camcorders and is open to both faculty and students. The PT3 grant team, consisting of one graduate student and two undergraduate students on work-study, directs the maintenance of these services and equipment.

**Why do these techniques work best for us?** As stated, our teacher education faculty lack time, our institutions lack personnel, our departments lack funds, and our most successful strategies are all geared to addressing these obstacles. Classroom mentoring, appealing topics and demonstrations, incentives and prizes, materials and templates, and convenient training formats are helping us overcome the lack of time. Incentives are especially helpful because departments and colleges at these public universities have extremely limited budgets that make it difficult to acquire even small equipment like scanners and webcams or to travel for professional development. Our incentives help fulfill these needs. The grant has also helped to overcome the extremely limited number of support staff on these campuses, both by funding additional positions and by facilitating peer mentoring. This approach has resulted in increased technology integration in teacher education courses, as intended by the grant. Finally, classroom mentoring, technology-enhanced syllabi, providing templates and instructional materials, and the cohort/team approach will prolong the impact of PT3 at our universities after the grant because they empower faculty to continue to work with technology on their own.

**Importance:** Where else might these methods be useful? They can be expected to work at many institutions seeking to infuse the effective use of technology into curricula, but especially those with limited budgets and support staff to facilitate the process. Further, grant funds are a
blessing of limited duration. Any institution that receives a grant must consider how to continue its impact after the end of the grant. Giving faculty a framework by which to incorporate technology into the curriculum, not just specific technical skills; enabling successful classroom experiences using technology for teaching and learning; encouraging peer mentoring; and establishing teaching circles can all continue the impact of the grant beyond the last distribution of funds.
References


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