Preparing Tomorrow's Teachers to Use Technology Grant:
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The Virtual Professional Development School (PDS) at the University of Kentucky: A Networked Learning Community for Teacher Preparation and Collaborative Problem Solving

Abstract

The purpose of this grant is to re-design substantial components of the teacher preparation program at the University of Kentucky’s College of Education through the strategic use of networking, distance learning, and virtual learning environments. The department of Curriculum & Instruction has spent a decade reshaping its programs at all levels to be a) centered on content area expertise, b) field-based in professional development schools and c) collaborative in approach in order to meet the demands of preparing teachers as change. Now, our goal is to tackle how these programs can be enhanced and their impact extended through the use of technology. By linking our pre-service teachers, university faculty, school students and the teachers and administrators at our partnering professional development schools to form a “virtual PDS” environment, partners can benefit mutually—sharing resources and collaborating on specific learning problems. To achieve this goal, we will implement a a “clicks and mortar” integrative strategy. This will entail the development of on-site and on-line tools and resources, which support classroom technology integration and collaboration. By deploying a cadre of teamed technology-teachers-in-residence and technologists in the schools and department, faculty will work together to infuse technology and design curriculum.

Distributed, interactive technologies that are crafted to meet the needs of students and teachers will be designed and used routinely in all aspects of teacher preparation. Our partners on this project include technology-rich professional development schools in four school districts located in urban, urban-adjacent, and rural counties. In addition, the regional educational cooperatives, regional services centers, the Kentucky Department of Education, and the KY Professional Standards Board will provide support services. Our technology partners are Bellsouth, Dell Computer (still negotiating) and Kentucky Educational Television. Our graduates work in the context of systemic reform in Kentucky and various other states engaged in national efforts of school improvement and change.

The Kentucky Context

Kentucky teachers face unique challenges. After a decade of implementation, the mandates of the Kentucky Education Reform Act of 1990 (KERA) which required comprehensive reform in governance, finance, and curriculum has coalesced into a regimen of on-going school improvement. While the mandates of the reform have had impact on the schooling finance, curriculum and development, teacher training at all
levels has lagged behind. It is now clear that training teachers in collaborative settings will be key to upgrading the quality of teachers. This legislative session, governor Patton has announced that teacher training is the top educational priority in the state (Louisville Courier Journal, 2000). Attention has been focused on the professional preparation of teachers who must be prepared to work in the state’s context of on-going change. Due to the extensive commitment to education technology resulting from the KERA legislation, all forms of technology are viewed as essential to the task of preparing teachers.

The initial reform act contained provisions for an extensive technology initiative for the public schools, the Kentucky Educational Technology System. One of the proposed benefits of implementing a statewide network was to improve instruction and support teacher development through the use of telecommunications and online resources (Kentucky Master Plan for Technology, 1992). Kentucky schools are required to provide high-end desktop computers and network capacity at a ratio of 1 computer to every 6 students. Since 1992, Kentucky school districts have spent 467 million on technology and this has provided a workstation for every teacher and one computer for every 8 students in classroom or lab settings. An integrated wide-area network connects all the states school districts, colleges and universities, and governmental agencies. Internet access is available in 63% of classrooms, and this number is growing steadily. This extensive network in a largely rural state is intended, in part, to support the professional needs of all teachers including pre-service candidates -- who are expected to engage in new types of teaching (e.g., interdisciplinary instruction and distance education) and problem-solving activities. For novice teachers, performance is now assessed through portfolios in which they demonstrate what they know and are able to do consistent with state adopted performance standards. In January 2000 the state’s Professional Standards Board added a separate technology standards to the existing New Teacher Standards.

The KETS has been augmented with several other statewide initiatives. The Kentucky Educational Television Star Channels network has a satellite dish on every school in Kentucky (1500) which is used for distance learning and teacher professional development. The Kentucky Telelinking Network (KTLN) is an integrated 2-way compressed video network that connects all the state’s regional colleges and the University of Kentucky and the University of Louisville as well as 70 public school sites throughout the state. The Kentucky Department of Education supports the Student Technology Leadership Program (STLP) which offers technology enrichment and training activities to students throughout the Commonwealth. A Technology Leadership Program is also in place which designates teachers who are highly skilled integrators of technology into curriculum. The Department also supports the Tapped-In professional development site, which is a MOO environment designed to accommodate collaborative work for in-service teachers. In January, the Kentucky Virtual High School was launched. The Kentucky Commonwealth Virtual Library is available to every citizen in the state through schools, colleges and universities, and public libraries. In this highly sophisticated environment of technological tools, the only thing that seems wanting are teachers who

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1 It is critical to note post-secondary schools were never included in the KERA mandate.
are fully trained, and confident in the integration of technology -- teachers who are reflective decision makers and can take full advantage of the myriad resources available in Kentucky schools to facilitate collaboration and scaffold students’ learning.

**Needed: Kentucky Teachers Prepared for a Change with New Tools for Teaching & Learning**

Consistently, studies of the KERA implementation have stressed the need for more strategic new teacher preparation approaches (Robertson Associates, 1995). Teachers want more examples of new practices and ongoing support for incorporating new approaches (Mathews, 1995, Stallion & , 1995). Moreover, to be more effective in meeting the needs of teachers, technology should be integrated into flexible training and curriculum development and problem solving contexts. (Mazur, 1995). Surveys of new teachers point out specific areas where teachers felt best and least prepared (Wilkinson & Associates, 1996-7). In both years surveyed, 64% or more of new teachers reported they were extremely well or very prepared to meet new teacher standards of establishing positive classroom environments, communicating high expectations to students, applying different strategies to meet students’ needs, designing instruction that is developmentally appropriate and knowledge of core subject matter concepts. The lowest preparedness levels were using a variety of assessments including portfolios, open-ended questions, and performance events, identifying professional development options, planning a program of professional growth, and using technology as an integral part of instruction. The proposed project targets each of these lacks in strategic ways.

Kentucky is experiencing new teacher shortages in several content areas: Math, business, science, ESL, reading, foreign language, technology education, computer science and special education are areas of considerable shortage (2000 AAEE Job Search Handbook). Even in areas which report only some shortages or balanced distributions of teacher supply, the need for quality teachers who can use new teaching methods (e.g. technology) and collaborative strategies are in high demand. As a result, the teacher preparation programs at the University of Kentucky are enrolling a variety of students who are starting second careers, entering from the military, business and industry or who those undergraduate degrees in content areas but who lack teaching credentials. For example, 20% of students enrolled in the Secondary Masters With Initial Certification Program (a 1 year intensive MAT) over the last 7 years have had a previous career. In addition, shortages of lacks in preparation occur due to changing state requirements or certifications. Four years ago Kentucky changed its foreign language certification to a P-12 credential. This means that there is a lack of cooperating teachers in this field with whom we may place our current student teachers. Specific methods courses available in flexible formats are needed to assist teachers in upgrading their credentials and increasing our pool of placement sites. In the 1999-2000 class, the MIC program had two students with PhDs enrolled. As our programs attract students from these

**Teacher Education Programs at the University of Kentucky**
The Department of Curriculum and Instruction is organized into several program areas that prepare new teachers. Programs in Elementary and Middle School offer undergraduate and graduate programs, the Secondary Program offers a 3 semester professional year MIC graduate program. The College of Education graduates (on average) from the Elementary program, from the Middle school program and 70 new teachers from the MIC annually. Each of these programs have extensive field-based components (4-5 week in the Elementary and Middle and full semester in the MIC) prior to actual student teaching.

Each program has professional development schools associated with the teacher preparation process. Squires Elementary (www.squires.fayette.k12.ky.us) and Winburn Middle School (www.fayette.k12.ky.us/pub/win) in Lexington are associated with the Elementary and Middle School Programs. There are four high schools urban Henry Clay [www.henryclay.fayette.k12.ky.us], urban-adjacent Woodford County H.S. (www.woodford.k12.ky.us/wchs/index.html) and rural Scott County (www.scott.k12.ky.us/schs/schs.html) and East Jessamine High Schools (www.jessamine.k12.ky.us/ejhs) which collaborate with the MIC secondary program. These sites are described in detail in the Partners and Resources section below.

Kentucky is unusual in that the first year of teaching is actually an extension of initial teacher preparation -- an “internship year” when the neophyte teacher is supervised by a team consisting of a resource teacher, a principal and a teacher educator. Four times throughout the year team members observe in their classroom, meet to discuss progress and assess the intern’s portfolio. Successful completion of the Kentucky Teacher Internship Program (KTIP) participation is required to achieve a provisional certificate. Many teachers who take practicum students and student teachers in the schools are also KTIP resource teachers, and KTIP interns often have contact with their university instructors as part of the program.

Technology Integration and Teacher Training

The research literature, which focuses on preparing teachers to use technology exhibits various themes and detail barriers to integration, offer various models detailing stages of implementation, as well as a plethora of recipe-like formulas describing the do-s and don’t-s of skills development approaches. Barriers to integration include technological, administrative, personal and cultural blocks. Ryder and Wilson (1996) found that technological barriers were among the easiest to solve. Cultural, social, learning style and paradigms were more deeply rooted. But these researchers found that dialogue, reflection, and opportunities to discuss and transform perspectives were effective means to address these deeply seated barriers. Beginning with Rogers (1994) the issues associated with diffusion of innovation have consistently framed discussion of technology. Rogers states of adoption, knowledge, persuasion, decision, implementation and confirmation have stood the test of time. However, Rogers can be faulted on his analysis of why late adopters persist--his characterization as laggards is off-point. Most teachers have legitimate concerns about time and opportunity associated with learning new technologies --especially innovations that seem to change weekly. The change (Hall
and Hord, 1987) and the persistence literature offer a more thoughtful and counterpunctal discourse on the issue, and highlight the conflicting concerns of those who are considering change of any sort. Are any models effective? Recently (Sherry et. al, 2000) have offered a multi-dimensional approach. They define a cyclical process in which teachers evolve from learners (teacher-trainees) to adopters of technology to co-learners/co-explorers with their students in the classroom and lastly, to a reaffirmation/rejection decision. At each stage various strategies are appropriate. For example, in the teacher as learner phase, time for training and demonstrations of promising practices and on-going training by peers are useful.

This model offers more robust possibilities for teachers to experience technology integration from particular perspectives and for various purposes, individually and collaboratively, and finally to decide, in a self-efficacious way, for themselves whether the technology supports their pedagogy or instructional goals. Because the process is collaborative and cooperative, more opportunities for expression and growth will energize the process of learning to use new technologies. Also, this model seems to support teacher professionalism at all levels and because it utilizes resources (teachers, students, support personnel) at a school seems consonant with a community of learners approach.

Self assessment and self-efficacy are central to technology integration. The seven dimensions of progress developed by the Milken Foundation (1999) fit

Contextualized, Multi-faceted Teacher Preparation

Notions of effectiveness in the preparation of new teachers has changed markedly in the last two decades. Previously pre-service teachers were armed with an array of strategies and techniques for dispensing subject matter to students. Teacher preparation occurred in formal university settings and classes and real-world teaching experiences were the culminating work. But these approaches of teacher preparation did not develop reflective practitioners suited to changing school demographics, new roles for teachers and learners and collaborative, integrated approaches to teaching and learning. In order for preservice education to play the vital role it must in the early development of teachers they should focus on in-depth subject matter knowledge, knowledge of historical, philosophical, and socio-cultural foundations of education as well as knowledge of theories, research about teaching and learning, schools as organizations and change (Smylie, Bay & Tozer, 1999).

This complex task clearly cannot be accomplished within the walls of the isolated university classroom. Professional development schools, who partner with universities in the preparation of new teachers, enable pre-service programs to extend and contextualize the learning environment to provide new teachers with the vital experiences and connections needed to theory and research to truly professional practice (Whitford & Metcalf-Turner, 1999). Distinguished teacher preparation programs feature common clear visions of good teaching evident in coursework and clinical experiences, a core
The curriculum grounded in foundations and subject matter expertise and taught in the context of practice, extended practicum experiences (30+ weeks), well-defined performance standards, strong relationships and common knowledge among school-and university based faculty, and extensive use of case research, teacher research and performance and portfolio assessment. Such programs ensure the application of learning to real problems of practice (Darling-Hammond, 1999 p. 234).

We believe that the strategic, thoughtful use of technology can assist our programs in meeting the criteria for quality programs set forth by Darling-Hammond. Specifically, we see the need for development and use of a variety of on-line tools and resources which will support such efforts. Pea et. al (1999) note that technology must not be “transitory” and we interpret this to mean technology has to become infused and institutionalized into our programs so that we no longer notice we are using it -- we just are. These researchers group technologies into four thematic areas that particularly support active engagement through guided inquiry, exploration, challenge, reflection and communication. Visualization and Modeling, Technology and Assessment Models, Ubiquitous, low-cost computing, and Tools for Learning Communities are modes of extent and emerging technologies for which they see great promise. The active engagement strategies they detail are highly consistent with activities designed into program development. Thus, our Virtual PDS environment activities will be organized by the concepts of inquiry, interaction, integration, internationalism, and information. Brief explications of these concepts follow.

**Inquiry** - The development of a community of inquirers will be central to the project. As Pea and his colleagues note “technology can provide access to new collaborations, mentors, teachers; augmenting the range of inquiry with more powerful and intelligent tools (p. 22).” For example, we propose the use of digital video (streaming and conventional DV) enable preservice teachers to observe in public school classrooms without the disruptive aspects of “guests” in class as well as to provide video preservice anchors (Cognition and Technology Group, 1989) for situated learning and contextualized skill development.

**Interaction** - Communication via networking and mobile computing will be a key strategy to support interaction among teachers, pre-service teachers, and faculty. In addition, opportunities will be provided for partners in the Virtual PDS to enlarge their circle of professional conversation. Gore & Zeichner have expressed reservations about the limitations of reflective practice solely within a community of peers and argue for interactions with a “critical friend.” One unique facet of our interaction network will be the inclusion of retired or practicing teachers in other states, countries, contexts, or situations who will be invited to participate in our community of inquiry.

**Integration** - The integration of theory and practice eclipse the various kinds of integration that we envision. Integration of subject area knowledge and technology, integration of interdisciplinary concepts and principles in varied instructional settings, the integration of diverse cultures, the integration of perspectives supported by the
participation of professionals at all levels of experience and practice with preservice teachers or the integration of general and special education approaches to meet the needs of diverse learners are among the kinds of integration we envision.

**Internationalization** - Several initiatives within the current program are based on our interests in global education and social justice. Parker, Ninomiya & Cogan (1999) have discussed the importance of educating world citizens and the challenges of preparing curriculum geared to developing global perspectives. We concur and believe the technology tools and resources developed in for the Virtual PDS will support us in this important teacher preparation goal.

**Information** - Rather than focusing on the notion of “information sharing” or “information storage” in our Virtual PDS environment, we want the content of our conversations, curriculum and reflective inquiry to be situated in a broader “Information Ecology” which is a system of people, practices, technologies and values in a local environment that encourages people and technology to become interrelated (Nardi and O’Day, 1999). These authors contend that by asking more know-why questions rather than know-how ones we deepen our inquiries and become more critical in our use of technology.

For each of the foregoing themes specific goals and objectives for designing and deploying the Virtual PDS at the University of Kentucky are described in the section that follows.

**Project Design: The Virtual PDS**

I. Inquiry

II. Interaction

III. Integration

IV. Internationalization

V. Information Ecology
The summaries below detail various changes we envision to specific programs in the Department of Curriculum & Instruction. The programs are organized according to level and each outline innovative strategies for preparing technology proficient future educators and profiles of who those prospective teachers are.

**Elementary**

**Middle**

**Secondary**

**MIC: Core**

- **Technology:**
- **Special Education:**
- **Adolescent Psychology:**
- **Education Reform:**
- **EPE:**

**MIC: Business:**

**MIC: English:**

**MIC: Math:**

**MIC: Science:**

**MIC: Social Studies:**

**The Project Design**

**I. Development of On-Line Tools and Resources**

While our goal is to re-invent aspects of our program, we do not intend to re-invent the wheel. We have been studying various on-line tools and resources that range from highly interactive, multi-dimensional virtual collaborative environments being used at Ucal Pomona to the collaborative tool SLATE developed at the University of Michigan. The
Virtual Professional Development School Environment we will create is modeled after the SLATE application (soe.umich.edu/tech/slate/slate.htm)...

The UK Virtual PDS will contain a) products of the collaborative knowledge building among students, teachers and faculty  b) curriculum materials  c) and search and retrieval tools that will make the information accessible in a variety of forms for multiple purposes.

For example:

1. Student work could be stored and critiqued

2. Digital video tapes of actual classroom practice would be available for modeling critique and professional conversations

3. Similar to the audio CD “on-demand” compact disc generation services (cf. www.cdnow.com), teachers in partnering schools and their student teachers could select on-line materials from the database at the VPDS and a customized curriculum CD would be delivered to their school.

4. Curriculum materials and collaborative exercises could be downloaded as PDF

II. Collegial Training and Mutual Support

Training in the use of the various tools and resources will occur in the context of professional work to improve the quality of coursework, field experiences and curriculum for teacher preparation. For example, university faculty, school mentors and placement teachers will learn to use the collaborative communication tools by discussing readings in diversity, history of education, social and ethical implications of technology etc., suggested by participants.

III. Development of Technology Infused Curriculum Materials

IV. Ubiquitous, Mobile Computing strategies.

Partnerships and Adequacy of Resources:

Joan is currently writing this and the assessment plan
References


