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Partnership Strategies for Systemic Integration of Technology in Teacher Education

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Less than a decade ago the majority of teacher education programs in the country offered stand-alone technology courses that focused primarily on technical skills and trouble-shooting strategies to prepare teachers to use technology (U.S. Congress, Office of Technology Assessment [OTA] 1995; Willis & Mehlinger, 1996).

It is now recognized that such stand-alone courses are not sufficient to prepare effective technology-using teachers; hence, many teacher education programs have evolved to include content-specific technology courses (Niess, 2001), technology-based field experiences (Dawson & Nonis, 2000) and technology requirements in student teaching (Strudler & Grove, 2002). This evolution is aided by the development of standards related to technology integration in teacher preparation programs (International Society for Technology in Education [ISTE] 2002b; National Council for Accreditation of Teacher Education [NCATE] 1997), national teacher education reports advocating technology integration (American Council of Education, 1999; National Commission on Teaching

and America's Future, 1996), awards and recognition for teacher education programs demonstrating exemplary technology integration (American Association of Colleges for Teacher Education, 2002; ISTE, 2002a) and federal grant initiatives that support the integration of technology in teacher education (United States Department of Education [USDOE] 2002).

In fact, a new field, Information Technology and Teacher Education (ITTE), has emerged in the teacher education literature over the last decade (Willis, Thompson, & Sadera, 1999). Educators working within this relatively new field have tremendous opportunity and responsibility. An opportunity exists to work toward improving the education of preservice teachers, and a responsibility exists to do so insightfully and collaboratively, because the field of ITTE is ripe with potential for educational renewal.

Educational renewal, "the process of individual and organizational change" that "nutur[es] the spiritual, affective, and intellectual connections in the lives of educators working together to understand and improve their practice" (Sirotnik, 1999, p. 6), can thrive in the field of ITTE. The processes and products used within this field can function as a catalyst for rethinking teacher and student roles, knowledge acquisition strategies, collaboration, curriculum design, and assessment.

However, for such renewal to occur professors of ITTE must remain cognizant and respectful of the multiple organizations and individuals involved in the preparation of teachers and the common barriers these organizations and individuals often face related to technology integration. These barriers include inadequate faculty development, lack of time to learn about new technologies, insufficient reward and recognition for innovative teaching, insufficient technical support (Thompson, Schmidt, & Stewart, 1999), and lack of collaboration and resource sharing (Bull, Sprague, & Bell, 2001).

This article, in keeping with the Current Practice section's mission statement to provide "up-to-the-minute snapshots of technology in practice," describes five partnership strategies currently being implemented in the University of Florida Teaching and Technology Initiative (UFTTI), a federally funded Preparing Tomorrow's Teachers to Use Technology (PT3) grant. These strategies are (a) Teaching and Technology Teams, (b) Technology-Based Field Experiences, (c) Portfolio Buddies (d) Consulting on Demand and (e) Inter-University Collaboration and Evaluation. In combination, the strategies are intended to facilitate and accelerate the integration of technology in the University of Florida's (UF) teacher education program.

The University of Florida Teaching and Technology Initiative

The mission of the College of Education (COE) at the UF includes preparation of "exemplary professional practitioners." In addition to having strong content and pedagogical knowledge, an exemplary practitioner needs the knowledge and ability to use technology as a tool to improve teaching practices and student learning opportunities (USDOE, 2002).

The Florida Department of Education echoed these requirements for exemplary professional practitioners in the *Florida Educators Accomplished Practices* (Florida Education Standards Commission, 1999), a document offering 12 standards, in which all preservice teachers in state-approved teacher preparation programs must demonstrate proficiency prior to certification.

Despite the national recognition our COE has received for its traditional elementary education and secondary programs (referred to at UF as Proteach programs), we struggled in the area of *systemic* technology integration prior to our PT3 award. There were strong courses for preservice teachers to take within the Educational Technology program and content faculty members who effectively and innovatively integrated technology, but the preservice teachers' experience with technology was dependent on the professors and cooperating teachers with whom they had an opportunity to work.

The University of Florida Teaching and Technology Initiative (UFTTI) implements strategies to ensure that all preservice teachers in our program have the knowledge and skills necessary to be competent technology-using educators. The partnership strategies described in this article are major pieces of UFTTI and are, in part, responsible for our recent receipt of an ISTE's Distinguished Achievement Award for technology integration.

Guiding Change Models

Several educational change models inform the design of UFTTI and provide the impetus for our focus on partnership strategies. The C-R-E-A-T-E-R model (Havelock & Zlotolow, 1995) provides teacher education faculty members with seven nonlinear steps that help them explore how the various components of the teacher education program operate and interrelate. This model was useful for the partnership strategies, because it required us to look at our teacher education program holistically and consider the components of the program whose primary responsibility was *not* preparing teachers. For example, it required us to explore, acknowledge, and address the concerns of faculty in other locations on campus, such as the College of Liberal Arts and Sciences, of faculty in other departments in the COE, and of teachers and administrators in the local schools.

The C-R-E-A-T-E-R model and its focus on systemic change dovetails nicely with Ely's (1990) Conditions for Change. This model outlines five environmental and three administrative conditions that facilitate the adoption and diffusion of an innovation. We explicitly considered each condition as we designed the partnership strategies (Swain & Dawson, 2002). For example, when designing the Teaching and Technology Teams discussed later in this article, we specifically considered the following conditions outlined by Ely:

- The people who will ultimately implement any innovation must possess sufficient knowledge and skills to do the job.
- The things needed to make the innovation work should be easily accessible.

- People must have time to learn, adapt, integrate, and reflect on what they are doing.
- Rewards and incentives are necessary components of change.

Obviously, the individual adopters must not be forgotten in the renewal process and the Stages of Concerns component of the Concern-Based Adoption Model (CBAM; Hall & Hords, 2001) helped us determine the concerns of faculty members within our teacher education program related to the integration of technology. Specifically, we administered the CBAM survey and discovered that the majority of faculty members within our program were currently operating at Stage 1 (Informational) or Stage 2 (Personal) (Johnson, 2002). In other words, they either wanted to know more about technology integration or were uncertain about whether they were capable of successfully integrating technology in their courses.

Our partnership strategies have been designed to meet these individuals where they are regarding technology integration. Our goal is to guide them toward Stage 6 (Refocusing Concerns), where they explore how technology can alter and, possibly, renew the way they prepare preservice teachers.

The partnership strategies described in this article enable us to work collaboratively toward educational renewal by considering the many individuals and organizations forming the educational ecology of our teacher preparation process. We are currently collaborating with the College of Liberal Arts and Sciences (CLAS), the Office of Educational Technology (OET), the School Board of Alachua County, multiple departments within the COE, and the Center for Technology in Learning and Teaching (CTLT) at Iowa State University (ISU).

Partnerships involve university faculty, graduate students, preservice teachers, and in-service teachers. All partnerships are built on John Goodlad's concept of simultaneous renewal (1994) in that they are "mutually collaborative arrangements between equal partners working together to meet self-interests" related to technology integration, as opposed to "partnerships that are merely symbolic, one-sided, or noblesse oblige" (Sirotnik & Goodlad, 1998, p. vii).

Teaching and Technology Teams

Teachers are heavily influenced by their years of experience in schools and classrooms during their "apprenticeship of observation" (Lortie, 1975). Thus, the Teaching and Technology Teams strategy is a way to change the way preservice teachers are taught by providing technology-related professional development to faculty members responsible for preparing preservice teachers. By applying this strategy, faculty members seek to influence the way preservice teachers are taught in both their content and pedagogy courses and, in turn, influence the way these preservice teachers will teach. In our university, and in many others around the country, we must reach beyond the confines of the COE to other areas, like the College of Liberal Arts and Sciences, where our preservice teachers take many of their content courses.

The Teaching and Technology Teams strategy involves pairing selected graduate students with specializations in Educational Technology with faculty members in either the COE or the College of Liberal Arts and Sciences. Together, the pair examines the courses taught by the faculty member to determine appropriate uses of educational technologies in the teaching and learning environment. We strive to pair graduate students and faculty members with similar backgrounds. For example, we matched a former high school physics teacher in our Educational Technology program with a physics professor who teaches a physics course for elementary education majors. Because the pair was able to "speak the same language," the chances of effectively integrating technology increased.

Integrating educational technologies into the teaching and learning environment can be extremely difficult and time consuming and many times involves an entirely different mindset and approach to teaching. It can even involve altering one's philosophy of education and one's conception of teaching. In fact, this strategy supports the assertion that "the teacher must also be a learner," and "being a good learner may call on different capacities and skills than being an instructor" (Fenstermacher, 1999, p. 192). Such changes may produce great uncertainty and anxiety; hence, the importance of the support involved in the partnerships established at UF.

After one year of operation, these partnerships have resulted in a number of positive changes in the education of our preservice teachers, including

- Development of a new course in the College of Liberal Arts and Sciences, entitled Our Physical World: Science for Elementary Teachers, which focuses on the acquisition of pedagogical content knowledge in science and on the integration of educational technology.
- Use of digital video to improve student dialogue in German, an online bulletin board to encourage students to practice German grammar in more creative and collaborative ways, and student-created web pages to facilitate authentic uses of the German languages.
- Development of a suite of web pages designed to model how technology can be incorporated into science education.
- Development of a relational database enabling preservice teachers to access quality science lessons based on many criteria, including topic, grade level, activity type, amount of materials necessary, and *Sunshine State Standards* (Florida Department of Education, 1996)
- Integration of technology as a tool for assessment, information gathering, collaboration, data collection and analysis, and presentation in a large science methods course in the College of Education.
- Integration of technology-enhanced, distributed learning strategies, digital video and technology-based collaboration in an English Education seminar coinciding with preservice teachers' student teaching experience.
- Development of a new course in the COE, entitled Integrating Technology in the Early Childhood Curriculum.
- Development of online supplemental material for a precalculus class delivered via WebCT to 360-1,700 students per semester.

Each of these results (and others) can be viewed online at (http://www.coe.ufl.edu/school/pt3/FacDev/FacultyDev-CS.html). These partnerships are works in progress, and additional work is currently being completed and will be included on the Web as it becomes available.

These partnerships provide an example of reciprocal mentoring, in which graduate students learn the complexities involved in being a successful faculty member at a Research I university. The faculty members learn from their student mentors instructional strategies for integrating technology into their courses and increase their technological skills. These mutually beneficial partnerships serve as a means for influencing the way preservice teachers will teach.

They model effective uses of technology in instruction, providing both graduate students and faculty members opportunities to be transformational learners, "who set out to learning something not only to teach that thing, but to change oneself and to change one's students" (Fenstermacher, 1999, p. 192).

Technology-Based Field Experiences

Over three decades ago John Goodlad (1970) argued that K-12 schools and teacher education programs must simultaneously improve their practices through mutually beneficial partnerships. Years later he used the term "simultaneous renewal" when referring to this concept (Goodlad, 1994). This concept is particularly poignant to the integration of technology in education. Preservice teachers need opportunities to implement curriculum-based, technology-enhanced learning activities in K-12 settings, and inservice teachers need assistance in keeping up with the latest technologies and instructional strategies available to them. Both parties have significant contributions to make to the partnership, as well as significant benefits to be gained from participation.

Through the UFTTI, we have designed and implemented technology-based field experiences that enable preservice teachers and K-12 faculty to share new teaching and learning models, expertise gained from current research and literature on classroom teaching, and additional resources in the forms of personnel, materials and support. These experiences were modeled after the Technology Infusion Project (TIP; Dawson & Nonis, 2000), which was recognized as a model K-12/university collaboration (NCATE, 1997).

The goals of these experiences are to (a) provide preservice teachers with practical experience using educational technologies in a classroom setting, (b) provide in-service teachers with the opportunity to explore instructional applications of educational technologies in their own classrooms using their own curriculum, and (c) develop and maintain positive relationships between local public schools and the university.

Preservice teachers participating in these technology-based field experiences enroll in a semester-long, specialized practicum. In addition to learning more advanced instructional strategies using educational technologies and gaining new perspectives on the integration of educational technologies into the daily teaching

and learning environment, each preservice teacher is paired with an in-service teacher. Together, they focus on implementing an in-depth instructional project or series of minilessons in the classroom. Initial analysis suggests that these in-service-preservice partnerships provide in-service teachers with the expertise to implement similar projects without assistance from the preservice partner, the experience necessary to design and implement other curriculum-based, technology-enhanced lessons and activities, and the confidence and initiative to share what they have learned with their peers.

Likewise, initial analysis suggests that preservice teachers develop classroom management and curricular integration strategies they are able to use during their induction year, gain confidence in their ability to integrate technology in the curriculum, and expand their marketability by having internship experiences that separate them from their peers during job interviews. Results from the first 2 years of these in-service-preservice partnerships are available at http://www.coe.ufl.edu/school/PT3/OurTeam/Resources/.

Portfolio Buddies

Another element of the UFTTI is the enhancement and advancement of the Electronic Portfolio Project (Ring, 2002). All ProTeach preservice teacher education students are required to develop an electronic portfolio over the course of their study (http://www.coe.ufl.edu/school/portfolio/index.htm). These electronic portfolios have multiple purposes, including to

- Demonstrate proficiency in the *Florida Accomplished Practices* (Florida Education Standards Commission, 1999).
- Promote technology integration in preservice teachers' preparation.
- Promote development of a professional vita.
- Provide a forum for connecting a student's university experience to personal and professional insights (Ring & Foti, 2001).

These portfolios encourage preservice teachers to develop robust tools for learning, communication, and reflection to capture the complexities of teaching (Wolf & Dietz, 1998) and to facilitate students' responsibility as active learners in the learning process (Courts & McInerney, 1993). Each student's portfolio is a dynamic, iterative document that evolves and expands throughout the student's collegiate experience.

Many types of support are extremely important (Astin, 1985) for preservice teachers to succeed with this form of assessment. While the need for technical support is obvious, support related to the intellectual process of creating a portfolio is equally, if not more important (Kilbane & Milman, 2002).

One strategy used to facilitate both types of support is "Portfolio Buddies." UFTTI hires exemplary preservice teachers to assist their peers in the portfolio process. Interestingly, the concept of Portfolio Buddies has spawned unofficial support groups created by our preservice teachers. These groups discuss everything from technical issues to why a certain illustration was selected to demonstrate mastery

of a certain Florida Accomplished Practice (Florida Education Standards Commission, 1999). These partnerships have fostered rich and substantial discussions about being a teacher and the role of educational technologies in the teaching and learning environment. Examples of preservice teacher portfolios from early childhood, elementary, and secondary majors can be found at http://www.coe.ufl.edu/school/portfolio/examples.htm.

Consulting on Demand

The Office of Educational Technology (OET) is a relatively new addition to the College of Education (Ring, Cilesiz, Ali, & Chen, 2002) and is based on the notion that a clear distinction must exist between technical support and curricular support related to technology integration (Dawson, 2000). Prior to the OET, the Office of Technology Support was equipped to handle only technical support issues. The OET provides faculty members with a variety of methods for increasing their technical skills and gaining knowledge of pedagogically appropriate uses of educational technologies in their teaching.

The OET is crucial to the success of UFTTI in many ways, including its implementation of a partnership strategy referred to as Consulting on Demand. This strategy is based on research suggesting that innovative faculty development models focusing on personal needs are most effective in producing educational change (Persichette, 1998; Strudler & Wetzel, 1999), effective technology-related faculty development efforts enable teacher educators to enhance their instruction (Cooper & Bull, 1997), and faculty members must receive support when they need it as opposed to when a training session is offered (Ring, Cilesiz, Ali, & Chen, 2002).

All faculty members affiliated with our teacher education program may participate in Consulting on Demand. The only stipulation is that they must seek assistance to integrate technology in their instruction. This strategy is effective in helping many of our faculty members integrate educational technologies such as web-based communications, digital video, and presentation tools into both teacher-led instruction and student-centered, project-based activities.

Of particular interest are the partnerships that have developed between the consultants (graduate students in Educational Technology) and the faculty members. Based on previous experiences, many faculty members specify the consultant they would like to work with when requesting assistance. Many faculty members even wait until the consultant they want is available to assist them. Although this strategy grew out of a partnership between the OET and UFTTI, more important partnerships have developed between faculty and consultants. Like the partnerships developed by the preservice teachers in the portfolio process, these unofficial, unintended partnerships are shaping the nature of technology integration in our teacher education program.

Interuniversity Evaluation and Collaboration

One effective way for faculty members in teacher education programs to learn about using technology is to form collaborations and partnerships with other teacher education programs working toward similar goals. The relationship formed between teacher education programs having similar missions of preparing preservice teachers may lead to systematic renewal and change in both learning organizations. In order for this to happen, teacher education programs must be willing to share information and resources. A lack of trust exists between and among some teacher education programs. Putting aside this age-old animosity can help teacher education programs move forward into the 21st century (Dede, 2000).

Since fall 2001, UFTTI program directors have worked collaboratively with the Center for Technology in Learning and Teaching at Iowa State University (ISU) to plan and evaluate the initiative. ISU has been a recipient of PT3 funds since 1999, and UF received its first award in 2001. ISU's prior PT3 experience in Technology Collaboratives (TechCo), particularly its experience developing internal and external partnerships, has provided important guidance for UFTTI. Conversely, the well-developed electronic portfolio initiative in operation at UF is being used as a template in ISU's College of Education. This exchange of ideas provided mutual benefit to both teacher education programs.

Likewise, this interuniversity collaboration is a catalyst for innovative research and evaluation related to systemic change in teacher education. This process recognizes the inadequacy of traditional research and evaluation approaches when dealing with systemic change and involves an innovative approach referred to as generative evaluation (Davis, Kemis, & Johnson, 2002).

The goal of this approach is not only to evaluate programs but also to improve them systemically via collaboration among implementers and evaluators, triangulation through multiple methods of data collection, an emphasis on accountability, impact, and effectiveness (Kemis & Lively, 1997), and results that are both rigorous and relevant to all stakeholders. Generative evaluation is currently being implemented to promote systemic change in both teacher education programs.

The partnership between UF and ISU reveals a shared commitment, mutual acceptance, respect, and trust between both institutions. Both institutions have a common vision regarding student learning and the opportunities to be gained from integrating technology in the teacher education curriculum. This common vision does not negate the reality that there are challenges, but partners can work through and learn from one another's challenges. This partnership between two land-grant institutions thousand of miles apart can serve as a model for others striving to integrate technology in their teacher education programs.

Implications for Teacher Education

Each partnership strategy described in this article has had a positive impact on UF's teacher education program, and descriptions of each could easily be expanded to stand-alone articles. However, we view the Current Practices section of this journal as a unique opportunity to provide descriptions and illustrations of how one COE is using partnership strategies to facilitate and accelerate technology integration in teacher education.

Although the local implications of UFTTI are clear, it also offers broader implications for those wishing to influence change in teacher preparation programs. This initiative demonstrates the importance of implementing a variety of strategies that meet the needs of diverse members of the teacher education community, while focusing on a common goal. UFTTI has moved beyond isolated programs and activities to systemic efforts that facilitate technology integration. Although any one strategy could influence a selected portion of teacher education, the strategies are working in tandem to produce more widespread change.

UFTTI also demonstrates the importance of flexibility and attention to the culture and context of individual units within teacher education programs. The technology integration strategies used in the Physics Department differ substantially from the strategies in the German Department, even though both are located in the College of Liberal Arts and Sciences. Yet, the outcomes are similar: increased use of technology in courses that prepare preservice teachers.

Likewise, the instructional strategies, content, and assessments differ for each in-service-preservice pair involved in the technology-based field experiences. Yet, all are working to integrate curriculum-based, technology-enhanced lessons and activities in the classroom.

The initiative also highlights the importance of recognizing and facilitating unanticipated partnerships that develop in the change process. Although explicit effort is certainly needed to establish partnerships, those working toward change must also be astute enough to recognize and facilitate partnerships like those between the faculty members and consultants described in this article.

Additionally, the importance of grounding change efforts in educational change theory, relevant literature, and collaborative exchanges with others working toward similar goals cannot be underestimated. Without support from each of these areas, we can safely say that this initiative would not be as successful.

As we embark on the third year of this project, we are pleased with our progress but recognize that we still have a long road ahead of us, because educational renewal and change "is not about a point in time; it is about all points in time —it is about continuous, critical inquiry in action related to any innovations (including current practices) that might improve education" (Sirotnik, 1999, p. 6).

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