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Net Generation Undergraduates as Technology Mentors for Teacher Educators

Jon J. Denton (corresponding author),
Professor and Executive Director of eEducation

Trina J. Davis, Director of eEducation Group
Ben L. Smith, Project Coordinator of eEducation Group
R. Arlen Strader, Director of Computer Support of COEHD
Francis E. Clark, Professor of Teaching, Learning & Culture
Li Wang, Graduate Assistant of eEducation Group

College of Education and Human Development (COEHD),
Texas A&M University, College Station

ABSTRACT

This project extending over three years was based on the premise that a digital divide exists between the technology skill levels of teacher education faculty and K-12 classroom teachers compared to those of undergraduate students. The Technology Mentor Fellowship Program (TMFP) matched technologically-proficient undergraduate students with K-12 teachers to model technology as an instructional tool. A consortium consisting of seven school districts and a university designed an approach for integrating technology into teacher preparation programs that allowed over 5,000 high-need learners to access teachers prepared to teach in increasingly high-tech classrooms. Increasing technology knowledge and skills among participating teachers became evident, but perhaps the greatest change was the realization of the substantial technology integration expertise of the undergraduate technology mentors.

The Net Generation (ages 20s – birth) currently represents 30 percent of the population as compared to 29% for the baby boomer generation making it large enough to rival the boomers and their culture. What makes it such a cultural influence? It is not Net Generations' size but their growing up during the infancy of a revolution in telecommunications. Although their boomer parents may have spent their formative years around television, this medium was much more limited than the medium that the Net Generation is engaging during its formative years. The context and environment are fundamentally different from those of their parents and for sure the experiences of their grandparents. Keeping abreast of changes and expectations is increasingly difficult as organizations and individuals become digitally enabled (Milliron & Miles, 2000). Perhaps forming dyads of an undergraduate student with a faculty member to collaborate in sharing ideas and techniques will enable technology transfer between generations to occur.

Statement of Problem

As a beginning step, a needs assessment was conducted to determine the changes in Texas public schools regarding technology infrastructure, financial support for this infrastructure, staff development related to technology, and use of the technology infrastructure. A second survey was carried out with all public and private teacher education programs at institutions of higher education in Texas. This activity was designed to determine how and to what degree instructional technology was being incorporated into teacher preparation programs; and to determine the status of technology support to faculty and students provided by institutions of higher education. Both surveys were then compared to see if Colleges of Education in Texas were indeed keeping pace with the advances in technology occurring in K-12 schools and whether teacher preparation programs were providing the necessary pre-service experiences in technology to teachers entering the profession.

Technology in Texas Public Schools - 1998 Survey

This state-wide survey, the <u>Levels and Use of Technology in Texas Public Schools: 1998 Survey</u> cited in Denton, Davis, Strader, Jessup and Jolly (1999), was based on the hypothesis that federal and state funding had affected technology infrastructure of school districts through nearly 1000 grants awarded to Texas public schools between 1996 and 1998. All 1043 school districts in Texas were invited to participate in this survey by completing the survey online or completing a mark-sense instrument and remitting it by mail. At the close of data collection, 789 surveys were submitted representing 75.6 percent of the state's public school districts. Key findings from this survey included:

- Computer to student ratios of 1:5 (secondary) and 1:10 (elementary) were cited most often.
- T-1 connections were the most common Internet connection to school districts.
- The modal value of computers per classroom was one with many of these computers having an Internet connection.
- Ninety-one percent of the districts reported having connectivity to the Internet.

In addition to the increasing presence of technology hardware in schools, professional development opportunities increased dramatically from 1996 to 1998. Topics that received much attention in Texas schools were Internet applications, in-depth instruction on software applications, and content-focused applications for classroom instruction. Further, a modest percent of respondents (20 percent) indicated that their teachers and students were beginning to access the Internet in class. The findings from the total survey indicated that both teachers and their students were in the initial stages of employing technology at the instructional level in 1998, but with equipment in place and professional development opportunities expanding, much expansion of Internet-aided classroom instruction was expected.

Colleges of Education (COEs) Needs Scan

The college survey entitled, Technology and the Pre-service Teacher Education Program: A Survey of Colleges, Schools, and Departments of Education, [available at http://eeducation.tamu.edu/ihe/allstates-1.html] was distributed to all deans of the Colleges of Education across a five-state region (Kansas, Missouri, Nebraska, Oklahoma, and Texas) during 1998. For our purposes, Texas data were extracted from the group data of the other four states. Responses from the Texas sample occurred from small private institutions of higher education to large state sponsored institutions of higher education and included both public and private institutions. Continuing data collecting activities occurred until a 60% response ratio was attained.

Interpretation of the collected data revealed that Texas College of Education administrators sensed an increased level of support for technology but many still felt that support for technology in their college was meager at best. COE administrators were asked about technology skills considered to be important for teaching candidates and their perception of the adequacy of general skills training currently received by their pre-service teachers. The respondents noted that pre-service teacher skills were currently adequate regarding candidates' ability to operate a computer system, and to use software and tools that were directly related to their own professional use (such as, productivity tools - databases, word processing, and spreadsheets). Respondents reported that pre-service teachers were just beginning to use multimedia in projects. These teaching candidates seemed to possess the skills to produce multimedia projects with little assistance provided by the faculty.

Integrating these findings with the extant literature, it seems that faculties have found that today's teaching candidates representing the "Net Generation" (first wave being ages 18-22 years of age) feel much more comfortable with the new technologies and take the initiative to use the technologies without much prodding (Tapscott, 1997). The Net Generation, having grown up with the new technologies, is entering our institutions of higher education with a much better comfort level for technology than many of today's public school faculty who grew up with television and computers, sans Internet. Consequently an "Intergenerational Digital Divide" exists.

At the time these surveys were conducted a majority of teacher preparation faculty in the College of Education at the land grant university was not integrating technology into the restructured field-based teacher preparation programs, nor were they encouraging their teaching candidates to become proficient with technology applications for the classroom.

Applying the findings from these surveys, the project staff identified the following needs to be addressed by this project:

- development of faculty in the College of Education to be proficient in the use of various instructional and communications technologies;
- development of capacity within the College of Education in digital media that supports the National Council for the Accreditation of Teacher Education (NCATE) standards and the International Society for Technology in Education (ISTE); and
- development of support to faculty transitioning to new teaching preparation programs by supporting their technology infusion efforts into the curricula.

Given these needs that led to the Technology Mentor Fellowship Program (TMFP), the following evaluation questions were phrased to guide this three-year project. In order to emphasize the role of classroom teachers in the preparation of future teachers, the term, "school-based faculty" is used rather than "classroom teachers" throughout the remainder of this report.

1. Can sufficient numbers of net generation undergraduate students be recruited and developed to provide technology professional development to teacher educators (both campus-based faculty and school-based faculty)?
2. Can net generation undergraduate students serve as technology mentors to successfully implement a program for teacher educators (both campus-based faculty and school-based faculty) to develop digital instructional objects for their instruction?

Related Literature

A brief account follows of the societal influence of the net generation. This literature is briefly examined to determine if establishing an undergraduate student – faculty member dyad has potential to succeed as a professional development model. Then recommendations from the professional development literature are noted that have influenced the development of an extended effort to integrate technology into a teacher preparation program applying the idea of an undergraduate student-faculty member dyad.

Net Generation Change Agents

Net Generation members have become the new youth wave given the large numbers in which "Net Geners" are being born. The creation of this wave of youth overlays with the digital revolution that has transformed all corners of our society. Together these two factors have produced a generation that is not just a demographic bulge but also a wave of social change and transformation (Tapscott, 1997). Net Geners have grown up in households with the greatest penetration of digital media. Further during the Net Generation's school years, interactive technology has begun to really pour into the schools with an impressive 90 percent of all children today having used a computer (Debell & Chapman, 2003).

Some analysts predict a raging war between the generations brought on by the new technologies. But many see ways to pair the generations together to get the most benefit for all involved. This project was based on the assumption that the Net Generation would assist other generations in learning new ways to use technology in both public schools and colleges of education. These institutions, as noted previously, have been slow to embrace new telecommunication technologies. Pairing a faculty member with a mentor to integrate technology is supported in the literature (Beisser, Kurth, & Reinhart, 1997; Fox, Thompson, & Chan, 1996). Mentors provide support, guidance and information to mentees through monitoring, modeling, providing feedback, and jointly contributing to projects (Smith, 2000). According to the literature on professional development (Alderman & Milne, 1998; Fullan, 1991; Gratch, 1998; Hawkey, 1998; Smith, 2000), these mentoring activities are very similar to the qualities of coaching set forth by Joyce & Showers (1995).

Effort Expected from the Teachers

A decade ago, Rogers (1995) suggested that helping faculty adopt and integrate technology into their teaching should combine not only individual initiatives, but also top-down mandates, and consensus building across constituencies of the institution. Integrating technology into teaching means changes to routine practice and this change, according to Tough (1982), creates chaos and anxiety. To make change happen, the individual needs to experience different stages from preparing to change to executing the plans. Tough notes, "The change must be definitely chosen and intended" (p. 20). In other words, teachers must decide to change in a certain direction. For professional development in technology to occur, teachers must first be prepared to adopt technology by assessing their teaching and choosing an improvement goal. Reflecting on and then recording ideas are important parts of that process. If teachers experience how technology facilitates their own learning, then considering professional goals of proficiency with technology tools can be expected.

Also, the literature indicates that teachers' professional development has not "kept pace with the rapid changes in the quality and quantity of information technology" (Moursund & Bielefeldt, 1999), and external and internal factors that impede effective use and integration of technology have been identified. According to Ertmer (1999), teachers and administrators must overcome external barriers including limited access to technology, low funding, and absence of just-in-time technical support, and internal factors including resistance to change and personal fear of technology. In considering these factors it should be kept in mind that providing one-shot workshops with little or no follow-up has not been effective for faculty professional development in teaching and learning strategies (Hargreaves & Fullan, 1992; Joyce & Showers, 1995).

Successful professional development for individuals involves much interaction between administrators and the teacher. To illustrate, Stellwagen (1999) reported a case of a veteran high school teacher who benefited from the help network that the school district established for classroom teachers who needed quick support. The teacher said that assistance was invaluable as she struggled in learning how to integrate technology. Providing teachers with sufficient facilities, resources, access, and support are critical but not sufficient. Organizational change in instructional technology integration will only occur if faculty members have sufficient preparation and planning time (Becker, 1994; Ennis III & Ennis, 1995-6; Ertmer, 1999; Gilmore, 1995; Hunt & Bohlin, 1993; Lawler, Rossett & Hoffman, 1998; Moursund & Bielefeldt, 1999; Schrum, 1999; Strudler & Wetzel, 1999; Walker, Ennis-Cole, & Ennis III, 2000; Yildirim, 2000).

Procedures

Description of Professional Development Model

The Technology Mentor Fellowship Program (TMFP) model of professional development was designed to match technologically-proficient undergraduate students with teacher education faculty to apply technology as an instructional tool in K-12 classrooms and college classrooms. Undergraduate student mentors and a web-based resource bank were established to support campus and school-based teacher preparation faculty involved with technology professional development. The Technology Fellow-faculty dyads collaboratively developed digital instructional objects across a wide range of content areas with the expectation that many of these digital resources would be integrated into on-line courses.

Recruitment of Teacher Education Faculty and Technology Fellows

Extensive processes were developed for recruiting, providing continuous technology skill training, and monitoring the work of technology undergraduate fellows with teacher education faculty. These processes were essential because the key strategy was to match technologically-proficient undergraduate students with teacher education faculty to model technology as an instructional tool.

Teacher education faculty, defined as campus-based faculty and school-based faculty were recruited to participate in the project. Fortunately, this process was an "easy sell" with the recruitment of school-based faculty being coordinated through district technology directors who worked with building principals. One hundred (100) to 125 school-based faculty participated in the program each semester following the start-up semester where 44 school-based faculty were recruited to participate. As the project continued, demand for Technology Fellows outstripped the resources to provide additional fellows. During year one, 25 campus-based faculty members were recruited through personal visits and presentations at faculty meetings by project staff members. Additional recruiting support was garnered as other college department heads encouraged their faculty who taught teacher preparation classes to participate in the program. While not every campus-based faculty member who worked with teacher preparation candidates chose to participate in this program, the response to the program was quite positive (i.e., 35 university faculty participated across the remainder of the project), but within the range of what was expected.

Technology Fellows were initially recruited from the undergraduate classes of educational technology students who were also teacher preparation students. Project staff visited each class to explain the project and benefits for participating as a Technology Fellow, such as,

- paid training ($7.50/hr for 20 hrs of training)[1] to work as technology mentors that includes using web resources, Microsoft productivity tools and coaching on communication and team-building skills before beginning their experience with faculty partners;
- a paid field experience ($7.50/hr for 10 clock hours per week) [1] with an opportunity to continue this experience across ensuing semesters;
- working with an experienced teacher or faculty member on an individual basis to learn about pedagogy and their personal views about teaching; and
- providing technology support to an individual faculty member for integrating technology into their instruction.

This recruitment strategy resulted in 69 Technology Fellows being selected during the first semester of the project. At the beginning of the following semester (year 2 of the project), recruitment efforts were expanded to all teacher preparation classes with disappointing results. Paid advertisements over a local radio station and in the campus paper for Technology Fellows at the beginning of the semester produced telling results. The radio ads produced modest returns for the cost, but the campus paper ad resulted in doubling the number of Technology Fellows within a three-week period. Advertising in the campus newspaper was used throughout the remainder of the project with much success.

Developing a Schedule for Professional Development

The following schedule of activities was developed and implemented with the Technology Fellows and their faculty members consistent with the models of professional development offered by Clark and Denton (1998); and Loucks-Horsley, Hewson, Love and Stiles (1998) that incorporate suggestions from the professional development literature cited previously. These activities quickly moved the dyad from becoming acquainted and arranging meeting times to identifying tasks and deliverables to accomplish.

First month

As a beginning step, schedule a face-to-face meeting with the faculty member to become acquainted and learn about her/his teaching responsibilities. During this initial session or perhaps in your second session with the faculty member, complete Profiler (an online tool that compiles self-ratings of technology skills. This tool is available at <http://profiler.hprtec.org/>) and suggest possible projects while reviewing digital instructional objects available on the project website. Before concluding this meeting establish a calendar for mentoring sessions and outline tasks/projects/due dates for the next two months or remaining weeks in the semester. Please contact the project coordinator if this assignment will not work due to scheduling or other reasons.

Second and third months of semester

We recommend that you and the faculty member begin with a project such as a web-page (if the faculty member does not have a web-page) and/or a Track project using the TrackStar tool (an online resource that organizes websites for a lesson or presentation. This tool is available at http://trackstar.hprtec.org/). It is reasonable that as a team you will plan to develop two or three projects during the coming 6 to 8 weeks in the semester. Also, for program purposes, please submit weekly reports to your faculty member and communicate weekly about progress on current projects and strategies for undertaking future projects.

Fourth through eighth months of project

During the coming semester, you and the faculty member should take stock of projects completed and needs for integrating technology into courses. We encourage you to participate in an early Spring Semester seminar with your faculty member on your dyad's progress and future steps, and then develop a project calendar for the Spring Semester. Finally, remember to continue providing weekly reports to your faculty partner and complete an end-of-year Profiler.

These timeline activities for the Technology Fellows and teacher education faculty are consistent with recommendations of a large-scale empirical examination of professional development experiences. Investigators in this study have reported that professional development experiences that emphasize academic subject matter (content), provide opportunities for "hands-on" activities (active learning), are integrated with ongoing classroom operations (coherence), and provide many development experiences for an extended period of time are more likely to produce desired knowledge and skill changes (Garet, Porter, Desimone, Birman & Yoon, 2001). Similarly, recommendations from a national survey on the preparation and qualifications of public school teachers by Lewis, et al., (1999) that collaborative activities for professional development include a common planning time, regularly scheduled meeting times, and having a formal mentoring relationship are consistent with the timeline activities we employed.

Continuing Professional Development of Technology Fellows

Technology skills training experiences were provided to Technology Fellows in the project laboratory containing twenty workstations equipped with Microsoft Office Suite software that included graphics and web development applications. The laboratory was open from 8:00 AM to 5:00 PM Monday through Friday for Technology Fellows' use in developing projects for their faculty partners and upgrading their skills. During year 2, project staff began developing and implementing online professional development lessons for new Technology Fellows that effectively reduced face-to-face training sessions from 20 hours to 2 hours, with the remaining training being provided through online lessons. Formative evaluation of the training experiences (by staff and the project's external evaluators) indicated the online lessons were very effective training tools. The second year of the project also marked the beginning of Intel training for all Technology Fellows by a project staff member. The Intel curriculum was provided in addition to the initial training experiences that were used when the project began. The Intel curriculum did not extend the range of applications offered to the Technology Fellows, but it did offer additional examples of software applications.

Data Collection

Electronic Management System

An Electronic Management System was developed to track the Technology Fellow assignments; to provide work schedule targets; to provide payroll information; to serve as a repository for electronic learning objects developed by the Technology Fellow-Faculty teams; and to serve as an online communication system for the Technology Fellows, the Project Coordinator, and the Faculty members who worked with the Technology Fellows. The management system uses the Internet to address challenges associated with multiple levels of communications, project management and monitoring of digital instructional object development. Data presented later in this report under Findings and Interpretations were collected, compiled and stored via the Electronic Management System.

Formative Data

At the conclusion of each semester, **<u>Technology Fellows</u>** completed an informal, on-line questionnaire to reflect their perceptions about their experiences in the project ranging from 1 (strongly disagree) to 5 (strongly agree). These items provided formative data to project staff about daily operations and curricula offered by the project. Because we considered this questionnaire to an informal tool, no validity or reliability indices were determined for this scale. The following statements provide brief summaries across items on this questionnaire.

1TF. *The activities and strategies in the project facilitated my learning.* Technology Fellow ratings ranged from **4.00 to 4.37** across semesters with the higher ratings occurring during the final project year.
2TF. *The project was an important resource for me*. Technology Fellow ratings ranged from **3.90 to 4.22** across semesters with the higher ratings occurring during the final project year.
3TF. *The project helped me to learn important skills and knowledge*. Technology Fellow ratings ranged from **4.19 to 4.46** across semesters with the higher ratings occurring during the final project year.
4TF. *This project has or will assist me in helping others use technology*. Technology Fellow ratings ranged from **4.33 to 4.57** across semesters with the higher ratings occurring during the final project year.
5TF. *This project has or will assist me in helping others integrate technology into the curriculum, after-school or community program.* Technology Fellow ratings ranged

from **4.23 to 4.51** across semesters with the higher ratings occurring during the final project year.

Additional perceptions about the program were collected during end of year interviews conducted by the project's external evaluators. The following responses were gleaned from Technology Fellows during year 3 of the project.

"I have learned to search the Internet and find useful web sites. I have also learned how to use more technology and ideas for integrating it into my classroom."

"I have learned a lot about Web page design and many other aspects of computer software programs. Also, I have learned how to work with teachers on projects first hand."

"This project has greatly helped me understand the importance and accessibility of technology in the classroom."

"I have gained lots of knowledge that I will be able to use when I have my own classroom. I also got the opportunity to work with a veteran history teacher who taught me a lot of very practical things for when I am a teacher myself."

"I have benefited from TMFP through many experiences. My communication skills have increased and my knowledge about computers has grown, I also get gratification from helping others."

"I've learned valuable teaching skills as well as how to work with other teachers in a professional environment."

"Basically, working on this project has greatly benefited me. Now more than ever I wish to become a teacher. Before I was only considering it and leaning towards teaching in the future. But now, I know this is the career path I want to choose."

These comments are representative of the corpus of perceptions shared across the interviews by the Technology Fellows. Given these formative data, project staff concluded the project had established and maintained a healthy organizational climate.

Summative Data

During year 3 of the TMFP effort, project staff began a data collection activity under the auspices of a U.S. Department of Education project (P342B010016A), entitled Knowledge Innovation for Technology in Education (KITE), with a consortium of universities led by the University of Missouri-Columbia. The idea for data collection was to simply invite classroom teachers to tell a personal story about using technology in their classroom during a brief interview. This story was then classified and categorized as a case, then stored with other cases for retrieval using a search engine. The following excerpt is from a case collected from a first year teacher who had served as a Technology Fellow the preceding year. This case (Case Number 7074-1) is available at http://kite.missouri.edu/

Interviewer: How would you describe your experience with technology?

Teacher: Well, I did participate in a technology mentor fellowship program at the university, so I was around technology a lot. At home, I use technology and the Internet to prepare lessons for school but all of the school computers are Macs, and my home computer is a PC, so I do have compatibility issues.

Interviewer: We are looking for a good use of technology in the classroom, do you have one that comes to mind?

Teacher: I've had many good technology experiences this year with my second graders. Our students take their Accelerated Reader tests on our classroom computers. Also, they publish their writing assignments using the computers. It is a big deal for the class to use the computers in keyboarding their writing assignments, spell-checking their work and then printing their products to share with the class. At other times, I will do whole class lessons using a monitor to present resources from the Internet. Those are technology uses that come to mind.

Interviewer: Do you have any advice to share with future teachers as far as using technology in the classroom?

Teacher: Well, the more you can do, the better. I have many projects in mind because the learners get so enthused about doing class activities on the computer. It seems they love working on the computers so much that it is a reward to have computer activities. So, my advice is to definitely incorporate technology as much as you can, across all subjects.

This dialogue was gleaned from 1 of 135 interviews obtained from Texas classroom teachers representing a full range of grade levels and content areas. Because the identity and location of participants were removed from the interview transcripts, the comment of the teacher indicating she had served as a Technology Fellow enabled us to include it here. No claim is made that this teacher's experience is representative of all former Technology Fellows, but it is a testimonial of the influence of the project on a young teacher's classroom practice.

Findings and Interpretations

The preceding data and deliverables associated with the project were organized into the following evaluation question summaries.

Evaluation Question 1: Can sufficient numbers of net generation undergraduate students be recruited and developed to provide technology professional development to teacher educators (both campus-based faculty and school-based faculty)?

Benchmark assumption. Placement of 100 Technology Fellows each semester.

Outcome. Recruitment of undergraduate students and their technology and communication skills training resulted in the following Technology Fellow placements each semester across the program: Spring semester, 00 – 69; Fall semester, 00 – 137; Spring semester, 01 – 156; Fall semester, 01 – 132; Spring semester, 02 – 134. An average of 125.6 placements per semester was realized. Given the stated benchmark, the training protocol (initial intensive experience with continuing development opportunities in the computer laboratory examining skill enhancement related to interpersonal communications and technology software applications), and the formative data gathered from Technology Fellows about their experiences in the program, evaluation question 1 can be answered in the affirmative.

Analysis and Interpretations. The initial semester of the grant program (Fall 99) was spent in getting the program started and Technology Fellows recruited from teacher education classes. Processes used the first year were not sufficiently robust to place 100 Technology Fellows/semester. Thus additional recruitment approaches (placing radio ads and placing ads in campus newspaper) were used beginning with the Fall 00 semester. The ads placed in the campus paper were very effective in recruiting sufficient undergraduate students for the remaining semesters of the grant. We proposed placing 600 Technology Fellows across the grant and placed 628. The process of recruiting teaching candidates to serve as Technology Fellows (mentors) evolved to recruiting undergraduate students to serve as Technology Fellows. An unexpected benefit from expanding the resource pool has been that 7 undergraduate students from other colleges (engineering, business, science) began to consider teaching as a career option. A value-added aspect of this process has been the substantial technology and leadership skill development experiences completed by the Technology Fellows.

Evaluation Question 2. Can net generation undergraduate students serve as technology mentors to successfully implement a program for teacher educators (both campus-based faculty and school-based faculty) to develop digital instructional objects for their instruction?

Benchmark Assumption. All school-based and campus-based teacher education faculty-Technology Fellow teams will produce one digital instructional object per team for at least one course per semester. Benchmark for Year 1 = 10 digital instructional objects; Benchmark for Year 2 = 293 digital instructional objects; and Benchmark for Year 3 = 266 digital instructional objects.

Outcome. A large number of digital instructional objects (1,043) were created across a wide range of content areas and can be accessed from the Electronic Management System website <http://tmfp.coe.tamu.edu/projects/>. These digital resources (ranging from web pages for faculty members or for their classes, PowerPoint presentations, annotated lists of URLs, complete online, self-paced lessons, course syllabi, to complete on-line courses) have been developed across a broad continuum of learners for instruction in mathematics, science, social studies, language arts, history, English, ESL, teacher education, technology, reading, graphics design, fine arts, economics, physical education, special education, French, agriculture, and business education. In addition, five Technology Fellows participated in WebCT training (WebCT is the online system supported by the university) and worked with campus-based faculty in placing components of 13 courses online. Given the stated benchmarks, evaluation question 2 can be answered in the affirmative.

Analysis and Interpretations. The large number of digital resources developed across the project and the number of courses with components being placed online suggest faculty have begun to integrate digital instructional objects in their class experiences. Yet during the project, faculty members often needed help in identifying quality web resources for their classes. In response, demonstrations were conducted of the array of resources available to them and the *i-Folio* system (available at http://tmfp.coe.tamu.edu/document/ifolio/). This system was demonstrated to illustrate the capabilities of this electronic portfolio tool to organize and store the electronic resources for each teaching candidate. The idea that we must keep in mind is that substantial interest was exhibited by faculty members during this project to integrate technology into their courses, but sustaining this level of technology integration will require continuing organizational support.

Discussion

This study of a model of professional development was conducted to determine whether technologically-proficient undergraduate students could serve as viable mentors with teacher education faculty in applying technology as an instructional tool in K-12 classrooms and college classrooms. Key elements in this model were undergraduate student mentors and a web-based resource bank established to support campus and school-based teacher preparation faculty involved in professional development for technology integration into instruction. The professional development literature cited previously influenced the development of training protocols for Technology Fellows that emphasized regularly scheduled meeting times for planning, having a formal mentoring relationship, and identifying specific deliverables to complete.

Because the professional development experiences were “negotiated” between the Technology Fellow and teacher educator, the resulting experiences emphasized academic subject matter (content), provided opportunities for “hands-on” activities (active learning), and were integrated with ongoing classroom operations (coherence), over an extended period of time. These attributes of our professional development model are noted in the literature (Garet, et al., 2001) as necessary for a successful professional development program.

The Technology Fellow-faculty dyads collaboratively developed digital instructional objects across a wide range of content areas with the expectation that many of these objects would be integrated into on-line courses. These objects hint of the synergy that was generated by these teams that resulted in a cadre of undergraduate students with substantial technology skills and communication skills in providing technology support. Through their direct experience with technology instructional development, both the Technology Fellows and their faculty partners gained a greater appreciation of what is possible regarding technology applications for their classrooms.

In conclusion, the key to a successful professional development experience, from the point-of-view of the TMFP project staff, is to establish a dyad (faculty member and Technology Fellow) that opens communication channels quickly with the dyad members establishing regular meeting times to collaborate and share ideas, techniques and project products. The end result we believe is that as technology knowledge and skills grow among classroom teachers who supervise teaching candidates in their field experiences, the goal of encouraging future teaching candidates to integrate technology into their class activities will occur through modeling what they have directly experienced.

Note 1. Funding to support the Technology Fellows was provided by the grant, Preparing Tomorrow's Teachers to use Technology (P342A-990311) from the United States Department of Education from September 1999 through December 2002. Additional funding to support a data collection activity under the auspices of a U.S. Department of Education project (P342B010016A), entitled Knowledge Innovation for Technology in Education (KITE) provided formative data for this investigation funded from July 2001 through June 2004.

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