

# Preparing Tomorrow's Teachers to Use Technology (PT3) at Boston University through Faculty Development

PREPARING TOMORROW'S TEACHERS TO USE TECHNOLOGY ES UN PROYECTO FINANCIADO A LA SCHOOL OF EDUCATION DE BOSTON UNIVERSITY POR EL MINISTERIO DE EDUCACIÓN DE LOS ESTADOS UNIDOS. EL PROYECTO ESTÁ CENTRADO EN LA FORMACIÓN DE LOS PROFESORES UNIVERSITARIOS EN EL USO DE LA WEB Y HERRAMIENTAS DIGITALES, ASÍ COMO EN LA REFLEXIÓN SOBRE EL VALOR DE LA TECNOLOGÍA PARA LA PREPARACIÓN DE LOS MAESTROS. ESTE ESTUDIO MUESTRA QUE LA FORMACIÓN EN TECNOLOGÍA EDUCATIVA FACILITA LA PRODUCCIÓN Y EL APRENDIZAJE DE LOS PROFESORES. LAS RECOMENDACIONES OFRECIDAS SON: APRENDIZAJE A TRAVÉS DE LA ACCIÓN, AYUDA A LOS PROFESORES DE FORMA INMEDIATA POR PARTE DE EXPERTOS, CENTRARSE EN LAS VENTAJAS PEDAGÓGICAS DE LA TECNOLOGÍA Y NO EN LA TECNOLOGÍA EN SÍ MISMA, Y EMPLEAR EVALUACIÓN FORMATIVA PARA GUIAR LA PLANIFICACIÓN. ESTE PROYECTO MUESTRA EL DESARROLLO DE NUEVAS HABILIDADES DE LOS PROFESORES EN EL DESARROLLO DE MATERIAL BASADO EN LA WEB.

PALABRAS CLAVE: FORMACIÓN DEL PROFESORADO, UNIVERSIDAD, TIC EN LA FORMACIÓN DE ADULTOS, FORMACIÓN DE MAESTROS.

BOSTON UNIVERSITY SCHOOL OF EDUCATION RECEIVED A GRANT FOR PREPARING TOMORROW'S TEACHERS TO USE TECHNOLOGY FROM U.S. DEPARTMENT OF EDUCATION. THE PROJECT FOCUSED ON FACULTY DEVELOPMENT IN LEARNING THE WEB AND DIGITAL TOOLS AND REFLECTING ON TECHNOLOGY'S VALUE FOR TEACHER PREPARATION. QUALITATIVE DATA SHOWED GAINS IN UNDERSTANDING AND USING TECHNOLOGY BUT LITTLE RADICALLY NEW PEDAGOGY. TRAINED EDUCATIONAL TECHNOLOGISTS FACILITATED FACULTY LEARNING AND PRODUCTION. RECOMMENDATIONS INCLUDE: LEARN BY DOING; PROVIDE "JUST IN TIME" EXPERT HELP; FOCUS ON THE PEDAGOGICAL ADVANTAGES OF TECHNOLOGY, NOT ON TECHNOLOGY ITSELF, AND USE FORMATIVE EVALUATION TO GUIDE PLANNING. THE PROJECT PROPOSES TO SUSTAIN FACULTY'S NEW SKILLS IN DEVELOPING A WEB-BASED CURRICULUM.

KEYWORDS: FACULTY TRAINING, UNIVERSITY, PREPARING TOMORROW'S TEACHERS TO USE TECHNOLOGY PROGRAM (PT3), ICT IN CONTINUING/ADULT EDUCATION.

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## I. INTRODUCTION

The U.S. Department of Education project “Getting America’s Students Ready for the 21st Century: Meeting the Technology Literacy Challenge” started in 1996 with the aim of preparing public schools and teachers to use educational technology at the beginning of the 21st Century. This project was based on four cornerstones (hardware, software, connectivity and training teachers). Many reports have evaluated this project, emphasizing the following points: access to technology in public schools, use of educational technology by teachers, and use of educational technology at Schools of Education [CEO (1997, 1999, 2000a, 2000b, 2001), OTA (1995), NCTAF (1996), NCATE (1997), ACE (1999), WBC (2000), NCES (2000) y NCREL (2001)]. Most reports conclude that schools have hardware,

software and connectivity to Internet but teachers are not well prepared to use educational technology (Lara, 2003). This fact, plus Hussar’s estimation that the U.S. will need 2,5 million new teachers by 2010, (Hussar, 1994), pointed at Schools of Education as crucial elements in training tomorrow’s teachers. In order to aid them in improving training of tomorrow’s teachers, the U.S. Department of Education started in 1999 a new initiative: Preparing Tomorrow’s Teachers to Use Technology (PT3).

The PT3 initiative is a U.S. Department of Education Grant ([www.pt3.org](http://www.pt3.org)), focusing on supporting faculty training, preparing preservice teachers to use technology before they are in the classroom, and development of resources. It has financed over 441 projects among American educational institutions since 1999. Boston University School of Education (SED) was awarded a grant in 2001, with a proposal for a three-year project that focuses on faculty development and modeling of appropriate use of technology, development of technology-based curriculum resources, and pre-service teachers use of technology in pre-practica and student teaching. With two years of the project completed, we can report that many of these goals have been accomplished with far greater speed than expected. SED faculty are now much more skilled and more engaged in using technology where they think it can help them to be more effective, and consequently, they are better able to use technology-based resources in their instruction as well as to model that use for their students (tomorrow’s teachers).

The purpose of this paper is to explain and assess the first two years of this project at Boston University School of Education (2001-02 and 2002-03). In the first section we explain the goals and methodology on Faculty’s training. In the second section, we describe the main results of external assessment of this PT3 grant and provide an overview of objectives and results of the first two years of the project. We conclude with a brief discussion of the prospects for the third year (2003-04) and the potential for sustaining the work of the grant beyond its conclusion.

## 2. GOALS AND METHODOLOGY IN FACULTY’S DEVELOPMENT

In July 2001, the United States Department of Education (US-DOE) awarded Boston University School of Education faculty a three-year grant to improve the preparation of new teachers to use technology. Titled *Preparing Tomorrow’s Teachers to use Technology*, or PT3, the BU-PT3 grant project had two principle goals. First, the infusion of high quality educational technology into all aspects of the School of Education’s (SED’s) student teacher preparation programs, and second, to *sustain* the infusion of educational technology achieved during the grant period beyond the withdrawal of the grant funding at the end of the grant. To facilitate achieving these goals, each one had a subset of carefully sequenced and progressive objectives, each objective building on the one before. Four objectives elaborated our first goal:

- One: The faculty will successfully update and refine their own pedagogical skills to take advantage of new technologies for diverse student populations.
- Two: The faculty will evaluate their courses and begin the process of infusing technology into their curricula allowing them to model such practices to their students.
- Three: The faculty will revise the academic content of their methods courses to ensure that their use of educational technology is matched to the best available scholarly content.
- Four: Students will acquire skills in using educational technology.

The second goal had two objectives:

- One: Implementation of a full program of integrated technology rich and academically rigorous teacher preparation courses in SED.
- Two: Long term support for curriculum and technology integration at SED and its alternative teacher preparation programs through provision of a high quality, Web-based academic curriculum designed for use in schools.

This paper reports the thinking from which our goals and objectives were derived, our methodologies for achieving them, and the progress made during the first two years of the grant.

From the beginning of our grant writing, we thought that to achieve our first goal, to infuse high quality educational technology into all aspects of the School of Education's (SED's) student teacher preparation programs, we had to begin with improving the ability of the SED faculty to utilize technology in their teaching. The faculty model good teaching and if they did not use technology, how could they prepare their students –tomorrow's teachers– to do so? This was a critical first step up the ladder and we knew that any hope of achieving our subsequent objectives would be dependent on first involving our faculty in using, and becoming invested in using, technology in their teaching. This thinking led to setting our first objective: *faculty will successfully update and refine their own pedagogical skills to take advantage of new technologies for diverse student populations*. Guidance in designing our program for generating this involvement came from historical studies of how teachers have used technology, any technology, in their teaching in the past, principally from the work of Larry Cuban.

Cuban has studied the use of and impact of technology in the classroom from both historical and evidence based perspectives. His work from both 1986 and 2001 guided our choices for BU-PT3. For example, Cuban attributes the ongoing success of the chalkboard and textbook in teaching to evidence that these technologies are "*simple, durable, flexible, and responsive to teacher defined problems*" (Cuban, 1986, p. 58). In choosing our design and methodology for implementing modern technology with our education faculty, we wanted to meet this criterion. Cuban elaborated further the circumstances under which teachers would adopt technology in stating that "teachers have altered their practice when a technological innovation helped them do a better job of *what they already decided had to be done* and matched their view of daily classroom realities" (Cuban, 1986, p. 66, italics added). In adapting these conclusions to the objectives of the BU-PT3 grant, we knew that any technology training we offered to our faculty must be focused on their teaching, on what they had already decided was important.

Cuban's criteria suggested that the work of the BU-PT3 grant in professional development for faculty had to be focused on what the faculty were already doing, at least initially. Their use of technology would need to add value and improve their effectiveness in teaching. This meant that we would ask them to develop digital resources for courses they were teaching at the moment or would be in the near future.

Another set of decisions we had to make in designing the BU-PT3 program concerned what specific technologies would we train our faculty to use and where should we begin. Should we start with Microsoft Word, PowerPoint, digital video, or the web? A needs assessment of the 10 participating faculty showed that a few had already begun to use Power Point and videotape but most had never specifically addressed the task of developing electronic resources. Moreover, all had learned their disciplines before computing was significantly available to aid in teaching. Here again we employed a historical perspective to help in deciding our topics and sequence. Viewing the evolution of technology as progressing from writing to the book, and, of course, the textbook, to film, radio, television, and the introduction of computing, the major technology of today is the Web. Whi-

le history shows that the use of previous technologies in education suffered from similar problems, the Web overcomes some of these major obstacles. For example, Cuban (1986, 2001) and Saettler (1990) identify quick and convenient distribution of resources to classrooms as a typical problem in earlier technologies. Once installed in the office and classroom, the web offers easy access to educational resources stored there at any time, and in multiple forms.

In addition, digital resources available through the web are relatively easy to revise and customize, and, once the infrastructure is in place, rather inexpensive to maintain and use. Although these attributes aid in overcoming the significant obstacles to using technology of distribution and expense identified in historical studies, they offer two more characteristics that are powerfully appealing to teachers: flexibility and interactivity. Finkelstein (1971), for example, attributes the predominance of the textbook as a teaching tool to their flexibility in allowing teachers to make their content interactive, to quickly stop and start, and how these features support teacher control of both content and classroom management. For computing to be as useful as textbooks, it must as flexible and interactive as they are and making resources available through the web moves further toward meeting this standard.

In this view, the Web is a more general and inclusive technology that can support, and does not exclude, any of the more particular technologies such as PowerPoint or digital video. Bandwidth is, of course, a constraint with such a demanding technology as digital video but in the last few years we have seen steady improvement in video compression and better structuring through video streaming and so there is good reason to believe that our ability to deliver video over the Web will only improve. In addition, because the focus of our grant had to be on *tomorrow's teachers*, we decided to build our technology instruction on the use of the Web.

### 2.1. The Faculty Training Program

There were three primary elements of faculty training program: Instruction on CourseInfo, the Web-based course support system from Blackboard; "just in time" help by the Educational Technology Group (ETG); and formal training sessions and roundtables. The roundtables came at the end of years one and two and allowed faculty to share the resources produced in the context of the grant. Personnel in the grant included two principal investigators one of whom, Dr. Whittier, who also served as director of training, nine faculty, all of whom actively teach and supervise student teachers, one senior technology consultant, and four members of the ETG. The grant also included significant partnerships with three public school districts, Apple Computer, the Teacher's Center at WGBH-TV, a Boston public television station, and the Boston University College of Communication, which provided extensive technical support including video production and web-casting services. Because PT3

required that the grant attract donations from relevant partners on a dollar to dollar (1:1) basis, a position of external consortium manager was added to manage these relationships.

### 2.1.a. A course on the web: CourseInfo

Deciding to focus on the use of the Web, and keeping in mind Cuban's evidence-based conclusions, we chose to train our faculty in the use of Blackboard's web-based course support system called "CourseInfo" (<http://www.blackboard.com/>). We chose CourseInfo (CI) as a web-based course support platform in part because a survey of faculty participating in the BU-PT3 grant program showed that they had little, or no knowledge of this type of software: only one in ten had ever used CourseInfo or any similar product such as WebCT. CI was a prominent example of a new class of software products designed to support classroom instruction in higher education. While CI had fewer features than its main competitor WebCT, it was easier to learn and we did not anticipate that our faculty would require the advanced features of WebCT any time soon. Additionally, knowledge gained in using CI should be highly transferable to WebCT, should the need arise. Another reason for choosing a system such as CI on which to focus our initial instruction was that CourseInfo could serve as a limited electronic portfolio for products produced in subsequent instruction on more specialized instruments such as PowerPoint or iMovie for supporting instruction using digital video. Because CI can store files in a variety of formats, choosing it would not exclude documents supportive of teaching made with other applications.

Our initial challenge was to train and support our faculty so that they could set up CourseInfo web page(s) for the course(s) that they would be teaching in the coming year, 2001-2002. At Boston University this was simple to do, faculty merely had to go to the right page on the university's web resources and request that a CI web page be set up for their course(s). Having done this, we asked the faculty to put their syllabus on their CI web page. This was not any great leap forward in their use of technology in teaching, but it did provide the opportunity to teach them to use CI, and to a lesser extent, the Web, and it was focusing on *their* teaching, *their* course(s), and *their* syllabi.

### 2.1.b. Educational Technology Group (ETG)

A key feature of the BU-PT3 program design was hiring four graduate students to serve as the "Educational Technology Group" or ETG. The ETG were to provide "just in time" support to the faculty. In addition, they were matched to individual faculty based on complimentary technology skills, subject matter knowledge, and perceived personality compatibility. The ETG were to provide continual technical assistance to the faculty in the area of hardware and software problem resolution, and, where appropriate, to suggest strategies for instructional design of technology-based resources.

Formal training sessions for introducing participating faculty to specific software and design issues were a major part of the BU-PT3 program. The ETG attended all of the training sessions and then, in the time between one training session and the next, met individually with the faculty in their offices to assist them in applying the instruction of the session to their own course materials. For example, if our instruction was on how to create a web page in Microsoft Word, and then how to post that document to their CourseInfo web site, faculty would start doing this with a document related to their course in a training session but then complete it and add other documents when working individually with the ETG. This helped the faculty to assimilate better their new skill and allowed us to learn what,

if any, technical obstacles the faculty faced in their offices and classrooms. The schedule of the training sessions was explicitly designed to allow time between sessions for the ETG to work with the faculty in helping them in utilizing, and gaining comfort with, their new skills introduced in the training sessions. Further, the ETG were instructed that they were not to do the work *for* the faculty. Rather, the ETG were explicitly instructed that they were to help the faculty to “*do it themselves*”.

As the director of training, Professor Whittier met regularly with the ETG to review faculty progress and to learn of any particular obstacles that the faculty might be facing. Obstacles relating to hardware and software were removed with great urgency, especially during the first months of the program, to ensure that the faculty would not be blocked from assimilating their new skills and from building their web-based course resources. The ETG were very skilled with software, hardware, and with issues of teaching and they were able to do most of the instruction and problem solving on the spot. It was significant that three of the ETG were graduates of the masters degree program in Educational Media and Technology (EM&T) at the BU School of Education and the fourth, a doctoral candidate in curriculum and teaching, took courses in EM&T and had extensive classroom and technology experience. In sum, all were experienced educational technologists and were able to instruct the faculty in all of the software we were using as well as consult with them on pedagogical issues when requested to do so.

### 2.1.c. Training Sessions and Roundtable

The BU-PT3 program for faculty, development for the 2001-2002 and 2002-2003 academic years, was comprised of a series of two-hour sessions designed to build the skills and competence of participating faculty in applying carefully selected computer and Internet technologies to their particular disciplines and circumstances at the School of Education (SED). Most sessions followed a similar format, with:

Pre-meeting emails serving as advanced organizers by giving notice of what we would be addressing in our next session and requested that they accomplish certain activities, such as preparing a list of web sites they used in their teaching, before the meeting. Often there were suggested readings and/or reflections on the previous session and/or requests for certain materials to be collected for use at the training session.

The meetings typically contained three parts:

- 1) A demonstration, typically 15-30 minutes, of an application of the session topic.
- 2) Hands on work with the topic at hand, by participants, each at their own computer station, for about 45 minutes, with support of the ETG (Educational Technology Group) and other project staff.
- 3) Discussion. How would the application at hand affect on teaching and learning?

Video recordings of all sessions were edited and posted to our own PT3 CourseInfo web site along with supporting documents and external resources for further study. To make these one to two hour long videos easier to use, we devised “clickable menus” that would take the user directly to a section of the video. During the first two years of the grant, we focused our instruction on the use of CI, MS Word for posting documents to the web, digital video, Power Point, and learning web-based pedagogical activities. An important resource to our instruction on using the web in support of teaching were the pedagogical distinctions of “Filamentality” which “combines the ‘filament’ of the Web with a learner’s ‘mentality’”. Filamentality guides the teacher to organizing web resources for different levels of learning activities (<http://www.kn.pacbell.com/wired/fil/index.html>), which helped us to move beyond talking about “where to click?” and to talking about teaching with technology. With the help of

the ETG, the faculty designed and produced their digital video work for posting to their CI web sites with what we called “wrap around” instructional activities. These were questions or activities designed to optimize the use of the video. Video resources were comprised both of those the faculty made themselves and professionally produced resources made available through one of our partners on the grant, the WGBH-TV Teachers Center. See more information about syllabus 2001-2002 and 2002-2003 in Appendix.

Finally, each academic year ended with a *roundtable* where faculty showed the use of technology in their teaching. The roundtables were useful in order to encourage each one of the faculty to develop their resources well enough so that they would be comfortable sharing them with their colleagues and to show evidence of their progress over the two years. (See videos of roundtable year 2000-2001 on <http://emt.bu.edu/bupt3v2/htdocs/roundtable.htm> and roundtable year 2002-2003 on <http://courseinfo.bu.edu/courses/03sprgsedpt3/>).

### 3. THE MAIN RESULTS OF EXTERNAL EVALUATION

During the 1990s, when there was a rapid expansion of the use of technology in education, the Boston University teacher preparation program was not ready to support its use. There was skepticism that technology could improve education more than it would distract from it. We are pleased to report that after two years our PT3 grant has fundamentally changed that reality for the participating faculty. In our end-of-year roundtables, faculty amply demonstrated their newly acquired technological skills and the rich variety of ways in which they are modeling the use of technology in their classrooms. Throughout this period, we have built a video archive through which we can demonstrate and preserve this work, as well as preserve for new faculty the training programs that have made that work possible. Video recordings of the faculty roundtables provide evidence of their increasing competency in using technology but more detail and results from different measurement instruments are available from our external evaluator.

The federal PT3 grant program required evaluation of all grant recipients. An external evaluator attended all sessions and roundtables to make observations and to ask faculty to complete a survey about the content and educational utility of each session. The evaluators summary of their research include these prominent findings:

- Faculty engagement. Faculty were most engaged in training sessions where they given hands-on opportunities to use technology in ways immediately applicable to their professional lives or where they were learning about K-12 instructional uses of technology.
- Faculty learning. Faculty learned not only how to use specific technologies in their instruction but also reflected on the appropriateness of those uses.
- Faculty end of year roundtable showcase. All had used CourseInfo in some way, the majority for the first time, and had posted to their CI web site updated syllabi reflecting their new technology expertise, assignments, surveys, and class notes. Most had also used PowerPoint and digital video clips with instructional framing, and a few had constructed web-based learning activities.
- Role of ETGs. The ETGs provided hands-on technical assistance during and between training sessions. Between training sessions, ETGs have been working with faculty around establishing CourseInfo sites for their fall courses. (External evaluator reflections (TERC) cfr. Appendix (report 2001-2002):

Faculty improvement in the use of technology was evident after the second year training. For example, after our second roundtable at the end of the second year 2002-2003, our evaluator wrote:

“Field notes from this observation reveal that the five faculty who presented at this session were using technology in far more sophisticated and complex ways than they had done the previous school year, as evidenced by the presentations at the first faculty roundtable. A year ago the major accomplishment for most was their use of the BU CourseInfo website for one or more of their courses. This year the faculty demonstrations included WebQuests, uses of the discussion board feature of the CourseInfo site, successful and ‘problem-free’ online assignments, and required student use of technology curricula like art education methods and physical education methods.

One statement that captured the dramatic change in beliefs of the faculty is this one: “My laptop is now my best friend”. This statement is from a professor who had very little technology experience prior to joining the PT3 group at BU”. (*Observation and field notes*, Session 6: Faculty Roundtable –4/9/03–).

This evaluator’s observation is consistent with the faculty’s answers to the question: *In general, how would you compare technology use now with your use last year?* which demonstrate strong growth in their use of and understanding of educational technology. Reviewing the faculty’s answers, the evaluator summarized that the faculty:

- Can do more technologically than they could last year
- Can converse with their students more knowledgeably about technology
- Are more deliberate in their pedagogical use of technology
- Have discovered the value of the management tools now available to them (TERC, 2003).

#### 4. OUTCOMES AND RECOMMENDATIONS

External evaluation found that the education faculty participating in BU-PT3 achieved substantial gains in improving their teaching with technology during the first two years of the grant. We attribute some of that to good planning and receptivity to adapting our plan to feedback from evaluation and some to good timing. The good timing came because before the grant the faculty had a disincentive to use and learn to use technology in their teaching because of the administration’s philosophical skepticism of the value of the technology. Hence, with little support and active distrust, the faculty made little progress in effectively using technology during the 1990s. Knowing of this skepticism, the co-directors of the grant structured it to include a second phase of curriculum development beyond the work of faculty development in learning to use technology to improve their existing teaching. The planned second phase, now just beginning, helped to earn administrative support for the proposal and provided an opportunity for the project to go forward. We discuss the second phase of curriculum development in the section BU-PT3: The Judgment Curriculum-Hopes and Plans for Year 3.

1) The main recommendations of BU-PT3 for a methodology of faculty development are:

- Spend time in learning by doing. The faculty valued time spent during the training sessions to practice and apply to her/his teaching the technology instruction of that session. In second year, based on faculty feedback, time spent in formal training presentations was further reduced to allow more time to help faculty infuse technology into their teaching;
- Provide “just in time” expert help from trained educational technologists *during* the training sessions and on an ongoing basis, as needed, throughout the period of the development project.



- In the case of BU-PT3, the graduate students or recent graduates who comprised the ETG were experienced teachers and trained educational technologists, three of them having earned degrees in educational media and technology, and they were paid for their time;
- Focus the training on improving teaching and the pedagogical advantages of employing technology, and not on the technology itself. This means selecting technology that serve faculty's need to author their own, customized, instructional, assessment, and informational software-based resources;
  - Provide for formative evaluation and include the evaluator(s) in the team so that leadership can adapt and adjust their program based on ongoing evaluation. Of course, summative evaluation is also important for reporting to funders but formative evaluation improved the process and the outcomes during the first two years of the grant and hence, should improve the summative evaluation once the grant is completed.
  - *Do not underestimate the beliefs of teachers.* It is clear that the teachers who tend to adopt technology quickly are often the ones who feel comfortable and enthused by active, student-centered methodologies. On the other hand, the most resistant teachers frequently are those who cling to their magisterial lessons because they are afraid that they will lose control of the class if they abandon the teaching style that they know. This suggests that orienting the training of teachers not toward the technical, not toward learning how to use the software per se, but rather, focusing software instruction on the positive pedagogical effects the new style would render. In this way software instruction is directed toward supporting specified learning objectives and methodologies such as cooperative work, problem solving, and research. Of course, it is true that teachers become familiar with cutting-edge technology in the process, but the goal is supporting teaching and learning, not learning technology. In the BU-PT3 project, we continually tried to focus on learning objectives and what technology could do to support learning them. This defined what technology we needed to teach and the faculty needed to learn.
  - *Pay attention to the process of acquiring technology expertise.* Both Cuban (1986, 2001) and Saettler (1990) describe how over time, the same mistakes have been committed when trying to introduce technology in the classroom, from the radio to cinema to television, and now to computing. History shows that the vast majority of these mistakes occurred because the development of the technology-based resources was directed by non-teachers, who simply did not understand the necessity of producing materials that fit perfectly with the teachers' curriculum, were matched to the learners maturation and prior knowledge, and were totally responsive to teacher control. In this regard, teachers need to control the amount and pace at which to introduce new material. Taking these standards as criteria for producing effective technology-based resources, we decided that the only way to meet these standards was for the faculty to produce their own. This part of the project focused on faculty or teachers authoring their own materials, what we like to call the "teacher as software developer".
  - *Gain the support of the institution.* For a plan to be successful at any institution, it is necessary to have their support. This support may come through action plans such as those described earlier, standards that promote the integration of technology, procedures for evaluating its efficacy based on student responses and teachers' labor and effort, and incentives that recognize new skills learned with technology such as through hiring, salary increases, and promotion. The institution

also must provide the necessary infrastructure of equipment and support personnel to make technology reliable, easy to use, and readily accessible.

2) Given the time, training, and support provided through the grant the main outcomes of the first two years of BU-PT3 were:

- Change in the faculty's skepticism. As the faculty learned that technology could help them improve their teaching, the skepticism about the value of technology reduced and their appreciation for what it could do for them grew. This was, however, directly tied to the development of resources for *their* teaching and was not an abstract idea. This finding is consistent with Cuban's idea that it is necessary for professors and teachers to find that the technology is useful for her/his teaching and that top down mandates and instruction in technology as a subject separate from that being taught is ineffective (Cuban, 1986, 2001).
- The focus on improving and enhancing pedagogy through technology resonated with the faculty and their response was to produce lessons and resources of great interest and variety. Most important, the resources they produced represented an improvement in their teaching. The evaluator's summary of interviews with the faculty at the end of year two expresses this outcome:

The majority of the faculty described ways in which they were integrating technology into their courses. These ranged from using PowerPoint instead of their old overhead slides to engaging their students in WebQuests to posting multimedia resources on their CourseInfo sites for the students to use for various assignments. Each faculty member has tailored their use of technology to specifically support their content area and to extend their own way of teaching in ways that fit their way of organizing the material and the learning experiences for their students (TERC Evaluation Report 2a, August, 2003).

One faculty illustrated this point when demonstrating a video that she has produced, digitized, and posted to her course web site. She introduced the video by saying that she wanted to produce it to solve problems she had been having with a particular assignment. Although the instructional value of the assignment was high, the questions it provoked and the difficulty of explaining it were also high. She designed and produced the video to illustrate what she meant. In describing her use of the video that semester she reported "and the most exciting part: This was a problem-free assignment. I have never had an assignment like this before. No questions! They didn't need me for any of the technical aspects, which was very good. They didn't need me for anything. It was amazing!" (PT3 Training Session Video, Apr. 9, 2003).

- The impact of the ETG on the progress of the faculty was a major outcome of the first two years of the project. Our evaluator summarized this impact in saying that:

Faculty members were unanimous in their high praise for the work of their ETGs. Several faculty members noted that they had worked with more than one ETG, and a few mentioned that they had worked with all four of them. The faculty praised the ETGs for their technology knowledge and skills, for their constant availability, for their patience and perseverance, and for their commitment always to be as helpful and supportive as they could possibly be (TERC Evaluation Report 8, August, 2003).

A participating faculty illustrated the evaluation of the ETG in reporting that the ETG "was one of the brilliant aspects of this plan [for PT3]. The technology experts, our graduate students, working hand in hand with us. So that I can take my little idea and with [ETG] and she can help

me see what technology is appropriate and then help me do those pieces, that is key to this whole project. Because I know I would not be where I am if we just had class here [and we] saw these great ideas and were just let loose on our own. I know I wouldn't [be able to follow through on my own] (TERC Evaluation Report 8, 2003).

- Another important outcome was the development of a community of learners comprised of the education faculty and graduate students who through participating in the grant were sharing an interest in learning how to improve teaching with technology. Based in large part upon the work of Brown, Collins, & Duguid (1989), Lave and Wenger (1991), Rogoff & Lave (1984), and Vygotsky (1978), developing the social integration of a community of learners that would support and reinforce learning to use technology was always one of the goals of the project. In response to the question: What value has your experience in the PT3 community added to your professional life at BU SED? our project evaluator reported that “the most frequent type of response described the value they are finding in a new professional learning community that the PT3 group has become for them. One faculty attested that “*PT3 has added value to my professional life at BU and at SED. We go there and together work [on projects for our students]. And it is wonderful to have both the social and professional [relationships with these colleagues]*” (TERC, Evaluation Report 10, 2003).

Lastly, it is important to underscore that *the introduction of technology in itself did not modify the methodology of the faculty*. Faculty either used the technology to implement methodologies which were familiar and effective or invented new methods by using technology to help them solve problems they had been experiencing in their teaching. This finding is consistent with the findings of Cuban and Dockorman, who, in a historical study on teachers' use of technology found that “in general, technological reform in the classroom has not changed existing pedagogy by itself. Most teachers did not change the way they taught in order to accommodate the motion picture, television, or even the chalkboard... Teachers latched on to what worked for them, and varying pedagogies led to various degrees and types of uses” (Dockorman, 1988, p. 94). Our experience with BU-PT3 has been entirely consistent with this idea.

### 5. BU-PT3: THE JUDGMENT CURRICULUM-HOPES AND PLANS FOR YEAR 3

As indicated in the discussion of the timing of our grant in the Outcomes and Recommendations section above, in year three (2003-2004) we are beginning a new phase of our work: development of a web-based curriculum on issues of judgment. The *Judgment Curriculum* (JC) project aims to bring to teachers and students lesson plans and resources on issues of judgment throughout history and into contemporary times and to focus on these issues both in and across disciplines. Our aim is to involve both the faculty and their students in developing, testing, and utilizing these resources not only to aid in teaching the content of their disciplines but also to develop their judgment about what is and has been viewed as important. Organized around great questions such as: what is truth?; what is democracy?; what is beauty?; what is justice?, these resources will add value to teaching and learning. However, in addition to content enrichment, the JC will provide a forum for faculty and students to sustain and develop further their ability to effectively employ technology in education. This phase of the project also will address goal three cited in our “Goals and Methodology” section: “The faculty will revise the academic content of their methods courses to ensure that their use of educational technology is matched to the best available scholarly content”. This is a goal that has been difficult to pur-

sue through other means. We plan to report on the status of this phase of the BU-PT3 project after the conclusion of the grant period in the summer of 2004.

## APPENDIX

### BU-PT3 Syllabus: 2001-2002

1. September 19, 2001 – Introduction and Overview: The BU-PT3 program: Technology and the Teacher.
2. October 3, 2001 – Online course support: Web-enhanced classroom instruction – CourseInfo 101.
3. October 17, 2001 – Adaptive and Assistive Technology.
4. October 31, 2001 – Presenting Ideas-Power Point University.
5. November 14, 2001 – Web Quests and other Pedagogies for the Web.
6. November 28, 2001 – Publishing on the Web.
7. December 12, 2001 – Apple Learning Interchange (ALI), Mobile Computing, and other topics of interest-Apple Market Center.
9. January 23, 2002 – CourseInfo 202 Revisiting CourseInfo for PT3 and SED faculty sites for spring semester.
10. February 6, 2002 – WGBH Educational Television and Digital Video Part 1: Resources. Session at the WGBH Teacher's Center 125 Western Ave., Boston.
11. February 20, 2002 – Digital Video Part 2: Digital Video for Teachers. Instruction and faculty lab time for resource development.
12. March 13, 2002 – Part 1: Report from the schools: Newton High Schools. Part 2: Faculty lab time for resource development.
13. March 27, 2002 – Part 1: Faculty lab time for resource development. Part 2: HyperStudio and Inspiration-Tools for schools.
14. April 10, 2002 – Part 1: Report from the schools: The Concord Public Schools. Part 2: History Pictures and Academics.
15. April 24, 2002 – SED Faculty Roundtable. Presentation of faculty resources developed from the PT3 stimulus.
16. May 8, 2002 – Part 1: Scholarship, Technology, and the Teaching of History. CAS Collaboration. Part 2: New tools for protecting intellectual property on the Web. Part 3: Using technology to support the knowledge building community.

### BU-PT3 Syllabus: 2002-2003

1. October 9, 2002 – CourseInfo 303.
2. November 6, 2002 – Web-based Pedagogies.
3. December 11, 2002 – Part I: Discussion-The costs and benefits of technology in education. Part II: Faculty work.
4. February 12, 2003 – Inventing the Judgment Curriculum.
5. March 19, 2003 – ePortfolios and Distance Education: Teleconference with Texas A&M University.
6. April 9, 2003 – Faculty roundtable V2.0.
7. May 7, 2003 – 1) Faculty Roundtable continued 2) The Judgment Curriculum-A Work in Progress: 3) Student-Teacher work 4) Faculty Development Projects: a) King Lear b) Are American elections democratic? 5) Invent Media's Prototype 6) Discussion.■

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