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The Effect on Cooperating Teachers of the Teacher as Web Site Developer Program

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Abstract

This article describes the impact on cooperating teachers of a programmatic stage of teacher preparation to use technology. The Teacher as Web Site Developer is an arrangement for linking a university-based instructional technology lab with preservice teacher placements in a pre-K-12 public school classroom. The preservice teachers consider their cooperating teacher as the client for their work in the technology lab. The purpose of the program is to better prepare tomorrow's teachers to use technology. However, anecdotal evidence suggested that the program also has an impact on the technology expertise of the cooperating teacher. A pilot study found that the program positively influenced those teachers who actively participated but that there were procedural weaknesses in the program. After making changes to address the identified weaknesses, a follow-up study found significantly higher compliance with the program and continued evidence of its contribution to the technology expertise of the participating cooperating teachers. The research suggests that the program is another way in which to improve use of technology in teacher preparation as well as to improve the technology mentoring of participating cooperating teachers. It also identifies obstacles to these improvements.

The Teacher as Web Site Developer program describes the desired outcome of the most recent (2003-2007) form of an introductory technology lab required of all undergraduate education majors at Boston University (BU). The goal is to produce teachers who can develop their own instructional Web sites that effectively support their teaching. The Teacher as Web Site Developer program (T as WD) is the "most recent form" because it is descended from earlier forms of the lab based on HyperCard and HyperStudio (1998-2002), which preceded widespread penetration of the Web. As such, it is part of a more

generic structure known as the Teacher as Software Developer, which refers to teachers who are capable of producing all kinds of instructional software, not only Web sites (Whittier, 2005). In either form, the objective is for preservice teachers who successfully complete the introduction to technology lab to be well on their way to becoming teachers who can produce instructional software customized to their own classroom, that is, teachers as "software" developers. The program does not refer to teachers writing code or systems level programming. It refers to teachers capable of developing their own instructional Web sites and other multimedia resources using authoring instruments such as Dreamweaver, PowerPoint, and iMovie and who are comfortable with their students doing the same.

The program addresses weaknesses in the design of educational software prepared by nonteachers identified in historical studies such as Saettler (1990) and Cuban (1986, 2001). It also works toward integrating technology into preservice field experiences, thus improving the ability of new teachers to use technology in their first classroom position, a weakness in teacher preparation identified by Strudler, McKinney, Jones, and Quinn (1999).

Although the main thrust of this program is to improve teacher preparation to use technology in the classroom, anecdotal evidence over the years suggests that the impact of the program was not limited to the preservice teachers. It affected the cooperating teacher as well. Although improving the cooperating teacher's competence in using technology in teaching is not an objective of the program, I wanted to begin learning more about the validity of these anecdotal reports. This paper reports the results of a pilot study of the impact of the preservice teachers' work as instructional Web site developer on the technology competency of the cooperating teacher.

The Teacher as Web Site Developer Program

The T as WD program begins with a prepracticum placement in which the university assigns undergraduate education students to a public school classroom one full day a week. The program links coursework in the introductory technology lab and the field experience by requiring that the assignments completed by the education students in the lab serve the prepracticum classroom. In the lab, students learn basic technology and curriculum integration skills in conjunction with basic lesson planning. They then apply this introductory knowledge to producing resources for use in their field placement classroom. Based on a simple agreement between the preservice teacher and the supervising classroom teacher, the design builds on the premises of project-based learning (Moursund, 1999). However, a number of obstacles exist to securing the involvement of a large majority of the cooperating teachers so that the program becomes a systemic innovation.

To get started producing their Web sites, the preservice students are instructed to think of their supervising teachers as their "clients" for the lesson and the Web site they must produce as a requirement of the lab. Working through a doctoral student who teaches the lab, I ask the supervising classroom teachers to direct the preservice teacher to authentic curriculum objectives that will serve as the subject of the lesson and Web site and that will occur at the appropriate time, approximately 9-12 weeks into the semester. This gives the preservice teachers enough time to write a lesson plan, learn what they need to know about Dreamweaver, and complete an instructional Web site project in the university-required technology lab. It also requires the cooperating teacher to plan far enough ahead in the context of the mentoring relationship for the prepracticum student, a task some report as difficult.

The Teacher as Web Site Developer program aims to begin preparing teachers to produce technology-based resources that support instruction *before* they have responsibility for a classroom. It also works toward preparing future teachers to work in partnership with instructional technology specialists (ITS), although in this case, the preservice teacher's role is more of an ITS than a classroom teacher. However, some cooperating teachers reported in casual conversations that the program gave them an opportunity to learn about deploying customized computer-based resources through supervising the development of resources that they would never have the time to create themselves.

I theorized that this occurred through providing the cooperating classroom teachers opportunities for experience in designing and using a Web site based on their mentoring relationship with the preservice teacher placed in their classroom. The theory is that through selecting the content and learning objectives for the preservice teacher produced Web site and through guiding the preservice teachers' implementation of that Web site in the classroom, the cooperating teachers would have the opportunity to improve their own conceptual and practical understanding of how to enhance learning with technology.

The present study identified substantial obstacles to this program. For one, data from both education students and cooperating teachers participating in this program consistently report on the lack of sufficient technology and infrastructure to support reliable use of technology in the classroom when it is needed, despite gains in Internet access and the reliability of computers. Second, the reality of cooperating teacher support and willingness to participate in the program varies considerably. Having enough time to mentor the preservice teacher, especially when standardized testing drives much of the teacher's agenda, is a frequently cited obstacle.

Despite these obstacles, however, results from surveys of the cooperating teachers demonstrated that those who made the time to help the preservice teachers design and implement their instructional Web sites reported many examples of the sites' effectiveness. For example, cooperating teacher comments included statements that the Web sites "worked great," were "really helpful," were "very user-friendly," and were an "excellent reinforcement" to what they were teaching. Others reported that the Web site produced by their preservice teacher "finds sources I've not had," was a "nice supplement," and "meets my instructional needs."

The cooperating teachers' comments reinforced the observation that they valued the customized instructional Web sites produced for them by the preservice teachers. This, in turn, supported thinking that the overarching organizational scheme of the T as WD showed promise for improving teacher preparation to use technology. If the preservice teachers could produce instructional Web sites as students that were judged effective by their cooperating teachers, then is it not more likely they will be better prepared to do so as teachers?

An important dimension of the T as WD program is that the cooperating teachers gain the assistance of energetic undergraduates who bring the supportive environment of the university-based instructional technology lab to the design and production of the educational software, in this case a Web site. To the extent that the preservice teachers are able to generate opportunities for supervising teachers to improve their competency in technology-enhanced teaching, the program represents another approach to improving the outcomes of the mentoring relationship.

Whereas Grove, Strudler, and Odell (2005) emphasized developing the cooperating teacher as the strategy for improving the use of technology in field experiences, the T as WD program organizes a project-based learning experience where the work of the student

teacher may stimulate growth in the cooperating teacher. Of course, these methods are not exclusive and may even provide more of the pressure and support needed for change that Fullan (1991) identified.

Readers may view examples of the preservice teacher produced Web sites at the Boston University ED101 Educational Technology Lab Resources Web site: http://ed101.bu.edu/halloffame.html.

Methodology

To begin learning how the program was affecting cooperating teachers, the researcher and a doctoral student who was teaching the technology lab prepared a 20-item questionnaire with both open comment and closed, Likert-type or yes/no questions. Through the questionnaire, we asked teachers to respond to questions about their experiences with and evaluation of their preservice teacher's Web site and to describe and/or rate the effectiveness of the Web site in their classroom. Although this method suffers from the weaknesses of all self-reported data and no funding was available for interviews or onsite observations, it provided a start toward learning what the cooperating teachers thought about the program and the resulting technology-based resources.

This paper reports results of two questionnaires administered to cooperating teachers. The first collected data at the end of the fall 2005 semester. The second was a follow-up survey in spring 2006 after adjusting the program based on data from the first survey. Because this pilot study emphasized the effect of the program on cooperating teachers, there is little discussion on its effect on the preservice teachers. An earlier paper is devoted to the effect of the program on our preservice teachers and how it improved their self-reported knowledge of teaching with technology (Whittier, 2005).

Background on the Teacher as Web Site Developer Program

Although preservice teachers benefit from the T as WD arrangement, the technology lab has presented many structural challenges consistent with reports of insufficient preparation to teach with technology from other studies (Moursund & Bielefeldt, 1999; Strudler, Archambault, Bendixen, Anderson, & Weiss, 2003, Web-Based Education Commission, 2000). For example, from its inception in 1989 to fall 2003, the introductory technology lab was required of all students seeking a state teacher's license but it carried zero credit. The administration's position was, and is, that the existing requirements for an education major's undergraduate degree occupy 100% of the credits needed to graduate, and any additional credit requirements would necessitate their paying an extra fee above full-time tuition. Costing students more money was unacceptable but because the state had some very general requirements for the use of technology (Massachusetts Department of Education, n. d.), the school opted for a required, no credit lab.

This structure set up the potential for an unhealthy psychological situation, requiring work for no credit, and always led to some disgruntled students. Most, however, accepted that the lab required work even though it offered no credit, and they found their rewards in the work itself. Beginning in the fall of 2003, the instructor of the main course, the six-credit ED-100, agreed to count the lab as 10% of a student's grade, likely resulting in part from his participation in the BU-PT3 faculty development program (http://emt.bu.edu/bupt3/htdocs/fac_dev.htm).

Although 10% of a six-credit course is still less grade value than the level of work required in a lab that meets 1 hour per week for the entire semester, this was an improvement over the zero credit status it carried before the fall of 2003.

The technology resources taught in the lab have changed over the years as technology has evolved. The lab began in 1989 with preservice teachers producing overhead transparencies and various video and photographic resources, quickly moved to HyperCard, then HyperStudio. Beginning in 2000, the instructors assigned the preservice students to produce an instructional Web site, first using Claris Home Page, then switching to Dreamweaver in fall 2002. Since the spring semester 2005, I asked the instructors to assign a Web site with both instructional and assessment components. I first asked the instructors to link the technology lab to the prepracticum field placement in 1998, in the context of a Massachusetts Department of Education Technology Literacy Challenge grant program conducted in conjunction with the Alcott School in Concord, Massachusetts. This grant allowed piloting the program at the Alcott School, one of approximately 10 different schools where preservice teachers have their first field placement. It provided funds to ensure that the cooperating teachers were involved in mentoring the preservice teacher's technology project, and the results were outstanding. Until that time, the work in the lab was not well grounded in classroom practicality.

Even though the instructor assigned educational projects, the students did not have enough experience to know what was realistic. Without a classroom context, the projects were too abstract and lacked a sense of process. With the grounding of the Teacher as Software Developer program, the preservice teacher's lab projects immediately became far more authentic to the classroom learning experience because the classroom teacher and mentor directed them to realistic learning objectives and the process was evident in the classroom.

In the current form of the lab, the lab instructor requires the preservice students to ask their cooperating teacher at the beginning of the field placement what content and learning objectives they would like their lesson and Web site to address. The theory is that if supervising teachers take seriously the task of directing the preservice teacher to appropriate curriculum objectives, then they will have the opportunity to gain experience in using Web sites tailored for their classroom as part of their instruction. There is the potential for a payback to the cooperating teacher in that they get to have a custom designed Web site to use with their students. Additionally, feedback from the cooperating teachers has strongly suggested their interest in continuing to use the Web sites in subsequent semesters. After consulting with the cooperating teacher, the preservice teacher completes a simple lesson plan describing the topic and learning objectives for the lesson and ways in which the Web site will address these objectives.

Helping teachers design and apply software to use in their own classrooms forms a theoretical framework for the program as a whole. Historical analyses of many failed attempts to include technology in classrooms shows that technology materials designed by nonteachers overly emphasize products providing generalized content transmission and ignore the process of learning and efforts at individualization that normally occur in the classroom (Saettler, 1990). These "products" typically ignore the emphasis on technology-enhanced instructional design that has emerged as so crucial to effectiveness in using technology in the classroom (Roblyer, 2005).

Research and historical accounts have strongly suggested that the consequences of emphasizing products without regard to educational processes results ultimately in the low productivity of technology in the classroom (Cuban 1986, 2001; Dockterman 1988). This program aims to make teachers the principal architects of the software they use in

their classrooms, resulting in software that is responsive to educational processes, thus avoiding the pitfall of putting products over process. The aim is to put teachers in charge of ensuring that the software complements their teaching style, is carefully adapted to the needs of their particular students, is focused on the goals of their curriculum, and is carefully integrated into the flow of learning activities in their particular classroom.

Questionnaire Objectives and Rationale

The survey of cooperating teachers collected data on a variety of topics related to the effect of the program, though two objectives were most important. One was to determine if the program is improving the cooperating teachers' sense of competence in using technology effectively in support of classroom learning. This outcome would be desirable not only for their improved ability to use technology in support of teaching and learning, but also for improving their performance as supervisors and mentors for the preservice teachers placed in their classrooms – at least with regard to the use of technology. This need is clearly identified in previous research (Moursund & Bielefeldt, 1999; Strudler et al., 2003). Another objective was to learn more about how the cooperating teachers rated the effectiveness of the Web sites.

Part of the rationale for the questionnaire was to learn if the program could reinforce itself. That is, if the program can improve the supervising teachers' ability to use technology, then it also might improve their guidance to the preservice teacher and, hence, the Web resources they produce. I also wanted to learn more about the possibility that some teachers would want to reuse the Web resources produced by the preservice teachers after they had completed their prepracticum. If so, then these resources could represent a substantial way for the teacher preparation program to give back to cooperating teachers. The connection between the preservice teacher preparation program and the in-service community could also be strengthened. The program could serve as a method of organizing essential field experience and mentoring, and it could begin to leverage technology to strengthen the community of practice around teaching and using technology to improve education.

This paper, then, reports on a pilot investigation into the effect of the program on the supervising or cooperating classroom teacher in the following areas:

1. Assessments of the Web site's effectiveness.
2. Cooperating teachers' plans for continued use of the Web site.
3. Effect of the program on cooperating teachers' competence in using technology.
4. Factors limiting the usefulness of the program.
5. Suggestions for improvement.

Assessments of the Web Site's Effectiveness

Cooperating teachers were asked to rate the effectiveness of the Web site produced by the preservice teachers placed in their classrooms on a 1 to 5 point scale, where 5 was *extremely effective* and 1 was *not effective* at all. At the end of the fall 2005 semester, the lab instructor, a doctoral candidate in the program in educational media and technology, distributed the questionnaire to 64 teachers and 28 (44%) returned it. He attributed the relatively low return rate to the timing of the administration of the survey, citing that "the distribution was close to Christmas break. People were too busy and then gone."

Twenty-eight cooperating teachers returned the survey. Thirteen (46%) indicated that the education student assigned to her/his classroom had "implemented a technology-based

resource." Fifteen indicated they had not. These responses, that roughly half of those completing the questionnaire did not implement the Web site, indicated a weakness in the program. It highlighted the difficulty of integrating technology use into the mentoring relationship in the classroom, the difficulty of moving "from 'pockets' of innovation to systemic change" (Strudler et al., 2003, p. 42).

The low percentage of cooperating teachers who reported using the student-produced Web sites in the fall 2005 survey might suggest eliminating the program were it not for the high degree of effectiveness reported by those who did use them. For example, of those who did implement the Web sites, 11, or 85%, reported that the Web site was *very effective* (*n* = 6), or *extremely effective* (*n* = 5) "as a single-lesson learning tool." Ninety-two percent rated the Web site *very* or *extremely effective* "as a permanent resource" for their class, with six rating it a 4 and five rating it a 5. (These data appear in tables 8 and 9 in comparison with data from the spring 2006 survey reported later in the paper.)

The results indicated both promise and problems. The problem was that only 46% of those returning the questionnaire reported that their preservice teacher had developed a Web site in the classroom. The promise was that most of the teachers who had either implemented a Web site in the classroom as part of the program or allowed a student to implement it as part of the field placement, perceived it as very effective, thus providing some validation for the design. These results suggested that instead of eliminating the program, I should work with the instructor to find ways to improve it.

The comments in the questionnaires provided some explanations for why only about half of the teachers used the Web site developed for them. Nine of the 15 teachers who did not use the Web site (60%) described the situation in language suggesting that the preservice teacher either "never mentioned" the project or did not follow up "after initial inquiries." One cooperating teacher provided a useful explanation: "Although I was asked about areas of curriculum that [the preservice teacher] could develop a Web-based project – and I offered her the chance to use it in my classroom once she developed it, she never mentioned it again." These comments clearly indicated reluctance on the part of some of the preservice teachers to follow through on the agreement.

The explanation that some of the preservice teachers did not follow up in presenting their Web sites to the teachers and did not ask to use it with the students was relatively common among the teachers who did not use it, accounting for 60% of the results. I categorized this response as "drop out" to indicate that the preservice teacher and the cooperating teacher had "dropped out" of the T as WD agreement.

To address this weakness in the program, the lab instructor devised a simple "Web-Based Project Acknowledgement Form" (Appendix A) that the cooperating teacher signed as evidence that the student had shown the instructional Web site to the cooperating teacher. By asking for signatures from both the preservice teacher and the cooperating teacher acknowledging review of the instructional Web site, the form states that it works "to provide a record that a completed Web site has been presented to each cooperating teacher."

The form provided a procedure for ensuring that the cooperating teacher at least sees the Web site. The instructor implemented the acknowledgement form procedure in the fall semester of 2006, and 85% of the preservice teachers (57 of 67) returned the signed form. These data demonstrated significant growth from 20% (13 of 64) of teachers reporting that they had seen their preservice teacher's Web site in fall 2005.

Although 60% of the non-users identified in the fall 2005 pilot study were categorized as "drop outs," 40% had other explanations for why they did not use the preservice teacher's Web site. Two teachers (13%) indicated that they had already addressed the curriculum objectives of the Web site by the time it was ready, but they had seen the Web sites and planned to use them in the future. This would more appropriately put them in the category of those teachers who rated the Web sites as effective. Two teachers (13%) indicated that they lacked time to use the Web site in the classroom and offered no further explanation. One teacher indicated that the technology failed and the Web site was lost, and one made no comment (Table 1).

Table 1
*Explanations for Not Implementing Web Sites (*N = *15)*

Semester	Drop Out	Curriculum Already Addressed but Plan to Use in Future	Lack of Time	Technology Failed	No Response
Fall 2005	60% (9 of 13)	13% (2 of 13)	13% (2 of 13)	6.6% (1 of 13)	6.6% (1 of 13)
Spring 2006	Data not collected				

Cooperating Teachers' Plans for Continued Use of Preservice Teacher Produced Web Sites

The survey asked our cooperating teachers if they "anticipate using this resource in the future, after the BU student who produced it has concluded the practicum?" Eighty-five percent of those who had implemented the Web site answered "yes," with one answering "possibly," and one who did not respond. In the follow-up survey at the end of spring 2006 semester, 93% (25 of 27) of those who responded answered "yes" to this question. These results indicate the ongoing potential of the student-produced Web sites (Table 2).

Table 2
Responses to the Question, "Do you anticipate using this resource in the future, after the BU student who produced it has concluded their practicum?"

Semester	Yes	No	No Response
Fall 2005	85% (11 of 13)	0	15% (2 of 13)
Spring 2006	93% (25 of 27)	0	7% (2 of 27)

In the spring 2006 survey, 40%, (27 of 68) of the cooperating teachers to whom it was distributed returned it. The doctoral student who administered the survey attributed its relatively low rate of return to the timing: he had to distribute it at the end of the semester when the cooperating teachers were engaged in standardized testing. The return rate was, however, consistent with the fall 2005 results when 44% (28 of 64) returned it.

To probe into how cooperating teachers might use the Web sites after our preservice teachers had completed their prepractica, the survey asked if they would be "interested in elaborating, updating, or refining the technology-based resource produced" by their

preservice teacher. In fall 2005, 61% responded "yes" to this question, 31% responded "no," and 1 responded "maybe." In the spring 2006 survey, 44% responded "yes" and 44% responded "no," with 11% reporting that the question was "not applicable" (Table 3). However, when asked if they actually *had used* the resource produced under the T as WD agreement *after* the preservice teacher had completed the classroom placement, in fall 2005 23% responded "yes, " 46% responded "no, " and 31% did not answer. In spring 2006, 30% responded "yes, " 52% responded "no, " and 18% thought it was "not applicable" (Table 4). This response indicated a discrepancy between intention and actual use. At this time, it is not clear if the discrepancy between interest and actual use is because there was not being enough time between the instance of the program and the questionnaire or if this discrepancy is likely to continue. Results also show that ongoing access to the Web sites is difficult because of their complicated URL addresses, and we plan to improve the address structure in the future.

Table 3
Responses to the Question, "Would you be interested in elaborating, updating, or refining the technology-based resource produced by your BU student?"

Semester	Yes	No	No Response
Fall 2005	61% (8 of 13)	31% (4 of 13)	8% (1 of 13)
Spring 2006	44% (12 of 27)	44% (12 of 27)	11% (3 of 27)

Table 4
Responses to the Question, "Have you used the resource produced under the teacher as Web site developer subsequent to the BU student completing their placement in your classroom?"

Semester	Yes	No	No Response
Fall 2005	23% (3 of 13)	46% (6 of 13)	31% (4 of 13)
Spring 2006	30% (8 of 27)	52% (14 of 27)	18% (5 of 27)

Teachers' comments on the questionnaires indicated interest in re-using the Web sites for both remediation and with subsequent students but also pointed to technical difficulties faced when making the Web sites readily accessible to teachers. For example, one teacher wrote that she would like to "have not only their [student's] project, but other students' projects to share and implement in class." Another wrote that she would "like to be able to use the Web site in future years" and lamented that "last year's great Mayan Web site is now gone." A third wrote, "It was great while it lasted, but we haven't been able to access it this fall. I actually got enthusiastic support from the curriculum specialists to use this site." These comments provide support for the program but also show an important challenge. Since beginning the program, the students have produced more than 500 Web sites. Finding funds to buy time to organize these Web sites into a Web-accessible database searchable by grade level, topic, school, and cooperating teacher's name and taking only a few clicks to navigate has proved challenging.

Effect on Cooperating Teachers' Competence Using Technology

The main interest of the present research was to determine what, if any, effect the program had on the cooperating teachers' competence in using technology. The responses to the 2005 questionnaire showed that 69% (9 of 13) of the teachers who had actually used the software thought the project provided an "opportunity" for them "to learn more about effective use of technology in the classroom," with one rating it "neutral,

" one rating it as "not applicable, " and one not responding. This figure rose to 74% (20 of 27) in the spring 2006 survey, indicating a strong potential for effect (Table 5).

Table 5
Responses to the Item, "Rate the effectiveness of the pre-service teacher produced Web site 'as an opportunity for you to learn more about the effective use of technology in the classroom.'"

Semester	Effective or Very Effective	Ineffective (2006 only)	Neutral (2005 only)	No Response
Fall 2005	69% (9 of 13)		23% (3 of 13)	8% (1 of 13)
Spring 2006	74% (20 of 27)	19% (5 of 27)		7% (2 of 27)

Two questions directly asked the cooperating teachers to rate the impact of the T as WD project, and the responses yielded encouraging if slightly clouded results. In the 2005 survey, when asked to rate the impact that directing a preservice teacher "toward appropriate curriculum and instructional design had on your own competence in supporting learning curriculum with technology," 31% (4 of 13) said it "helped a little," 54% (7 of 13) said, "It helped a lot," and 15% said it had "no impact." Combining "helped a little" and "helped a lot" yields 85% reporting that the project helped the cooperating teachers to gain competence in supporting learning of curriculum with technology. In the 2006 survey, this percentage dropped to 56%, with 26% reporting it "helped a little" and 30% reporting it "helped a lot." Also in 2006, 30% reported it had "no impact." This data suggests that the T as WD program does improve the cooperating teacher's competence in supporting learning with technology but that the results may be difficult to sustain (Table 6).

A result weakening this finding came from a question that addressed the same topic in a slightly different way. When asked to rate their agreement with the statement that "the experience of directing the BU student placed in your classroom improved your competence in supporting learning curriculum with technology," 46% of the reporting teachers selected either "agree" or "strongly agree" and 54% selected "neutral." When the question was revised for the 2006 survey to eliminate the neutral position, 52% agreed and 26% disagreed. This appears to magnify the finding that the project "helped a little" (Table 7). It may also suggest that going forward, the program may not be able to improve the technology competence of the cooperating teacher, especially if they are ongoing participants.

Table 6
Responses to the Question, "What impact has directing a BU student toward appropriate curriculum and instructional design had on your own competence in supporting learning curriculum with technology?"

Semester	Helped a Little or a Lot	No Impact	No Response
Fall 2005	85% (11 of 13)	15% (2 of 13)	0
Spring 2006	56% (15 of 27)	37% (10 of 27)	7% (2 of 27)
Note. Fisher's exact test found the association between rows (groups) and columns (outcomes) not to be statistically significant where the two-tailed P value = 0.3039.			

Table 7
Answer to the Item, "Please rate your agreement with the statement that the experience of directing the BU student placed in your classroom improved your competence in supporting learning curriculum with technology."

Semester	Agree or Strongly Agree	Disagree or Strongly Disagree[a]	Neutral	No Response
Fall 2005	46% (6 of 13)		23% (3 of 13)	31% (4 of 13)
Spring 2006	52% (14 of 27)	33% (9 of 27)	NA	15% (4 of 27)
[a]Question phrased differently in 2006				

Despite some mixed results, the majority of the relevant responses suggest the strong productivity of the program. For example, 61% in 2005 and 74% in 2006 reported they saw the project as an "opportunity to learn more about the effective use of technology in the classroom." Eighty-five percent in 2005 and 88% in 2006 reported that the Web site was "very" or "extremely effective." Additionally, 92% reported in both years that they "anticipate" using the resources produced in the program "in the future." Taken in sum, they suggest the program is productive even if the cooperating teachers are only slightly improving their knowledge of how to use technology in the classroom effectively.

Factors Limiting the Usefulness of the Program

As reported in the section on "assessments of the effectiveness of the software" in the 2005 survey, teachers reported problems with the project, specifically a kind of drop out where the preservice students appeared not to follow through on their side of the agreement. Many were not following through on asking for learning objectives or showing their completed Web site to their cooperating teacher. The lab instructor attributed this in part to the complexity and time pressures of the field placement. He stated that "the hectic nature of the prepracticum field experience, with so many levels of involvement with school administration, cooperating teacher, university professor, and teaching fellow makes the prepracticum very complicated in implementation." As a result, "the addition of a nonrequired request such as implementation of the Web site by the pre-service teacher is the easiest thing for the students to forsake" (Lab Instructor, Personal Communication, 2007).

This feedback indicated a need to be more systematic regarding implementation, as the questionnaire revealed that about half of the students chose to invent a project on their own rather than engage with the complexities of interacting with the teacher, curriculum objectives, students, and technology. Implementation and close monitoring of the "Web-based Project Acknowledgement Form" in fall 2006 provided a procedure that significantly improved compliance with the terms of the T as WD agreement.

Another limitation was getting access to the computer lab or other adequate computer resources when necessary. One teacher reported,

> Part of the problem that I have using technology in the classroom is that I can't bring my class to the computer lab; therefore I have to rely on the less-than-reliable laptops. Possibly a technology focused class with an in focus machine [LCD projector] would have been better... either displaying a site they put together or leading a lesson with power point slides..."

Another reported, "We did not have computer lab on the day she was here. It is difficult to switch days." Apparently, despite enormous growth in the ratio of computers to students and growth of Internet access, access to computer projection technology is still a limitation in some classrooms (Chapman, 2000; Parsad & Jones 2005). The preservice teachers also reported many problems getting timely access to appropriate technology in the limited time they have in the classroom.

Suggestions for Improvement

Of the 28 who responded to the 2005 questionnaire, 10 teachers (36%) either praised the project saying the preservice teacher did an "excellent job" or that the projects were "great" or reported they had no suggestions for how it could be improved. Six teachers (21%) did not respond to the question. Two useful suggestions came from five teachers (18%), who reported that better time management or "progress reports" with checkpoints would make the project more manageable. Two teachers (7%) expressed the need for a clearer statement that use of the Web site with the class was an "expectation" of the lab.

Although the lab instructor and I thought we had made it clear to the preservice teachers that they were to communicate the expectations with their cooperating teachers, these responses indicated that we were not entirely successful. In response to this feedback, we adopted in fall 2006 the procedure of sending to the cooperating teacher on the first day of the preservice teacher's placement in their classroom an "advanced organizer." This document provided both a description of the tasks and a timeline for their completion. It asks the cooperating teacher to "please take a moment at times throughout the semester to sit down with your students and help them do the following:

- Select a content area.
- Write appropriate learning objectives.
- Review the general layout and appearance of the Web site.
- Prepare to implement the Web site as a classroom lesson.

Additional suggestions for improvement include those by two teachers who suggested they needed better technology to improve their access to the Web sites produced by their preservice teachers. Two teachers suggested that the preservice students review existing Web sites rather than produce their own, and one teacher suggested the student be required to review the Web site with individuals or small groups. In response to this suggestion I am working on devising a way whereby new students in the program can review, evaluate, and improve on previously produced Web sites instead of inventing their own from scratch. The possibility of organizing the sites into a Web-accessible database searchable by grade level, topic, and other useful fields would likely address this problem, just as it would make access easier for cooperating teachers, as previously mentioned. However, lack of funding has so far thwarted this effort.

Cooperating teachers clearly expressed their need for the type of Web sites our preservice program supplies in taking the time to communicate their needs for technology resources on a wide variety of topics. For example, teachers requested sites for "social studies, math, science, learning games, poetry, forms for letter writing, self-evaluation, writing tips, multiplication, word processing, and spreadsheet skills." They also requested Web Quests on "ancient civilizations, Egypt, China, Canada, Mexico, geography, rocks and minerals." They asked for Web Quests on the "human body, skeletal and muscular systems, electricity, circuits (parallel and series), magnetism, and any review material for science and technology (simple machines, water cycle, solids, liquids and gases, etc...)

that would help with our state standardized test (the Massachusetts Comprehensive Assessment System).

Given the small number in the 2005 questionnaire from which these are taken (n = 13), these requests indicate strong teacher need. To the extent that preservice teachers in the T as WD program can meet this need, this data identifies an opportunity to give back to the schools and teachers who supervise and mentor students.

Impact of Teacher as Web Site Developer as Project-Based Learning

The cooperating teacher's evaluations of the Web sites "as a single-lesson learning tool" provided evidence of the usefulness of the T as WD program. Of those cooperating teachers who reported using the Web sites, 85% in 2005 and 89% in 2006 rated them effective (Table 8). In addition to this rating as a one time use, 92% in 2005 and 89% in 2006 saw ongoing usefulness of the sites in rating them effective "as a permanent resource" for their class (Table 9). For both of these questions, Fisher's exact test found the association between the survey dates and effectiveness ratings was not statistically significant, supporting the conclusion that effectiveness ratings were independent of the dates (two-tailed P value = 1.0000).

Table 8
Cooperating Teacher Ratings of Implemented Web Sites "as a Single Lesson Learning Tool"

Semester	Number Implementing Web Sites	Effective	Ineffective	No Response
Fall 2005	13	85% (11 of 13)	0	15% (2 of 13)
Spring 2006	27	89% (24 of 27)	7% (2 of 27)	4% (1 of 27)

Table 9
Cooperating Teacher Ratings of Implemented Web Sites "as a Permanent Resource for Your Class"

Semester	Number Implementing Web Sites	Effective	Ineffective	No Response
Fall 2005	13	92% (12 of 13)	0	1
Spring 2006	27	89% (24 of 27)	7% (2 of 27)	1

Further evidence of the usefulness of the program came from the 77% of the teachers responding to the 2005 survey and 85% of those completing the 2006 survey that rated their experience "effective" or "very effective" "as a cooperative effort between your student-teacher and yourself" (Table 10). Fisher's exact test found the association between the groups and their ratings not to be statistically significant (two-tailed P value = 1.0000).

Several responses to open-ended questions reinforced this finding. For example, one teacher wrote, "We planned the content (in rough form) together and he included all the basic information they would need for a science research project. This whole class asked for the site address and many accessed it at home too." Another wrote, "The student prepared a lesson to match the curriculum we were currently working with. It was an

effective review." A third wrote that the Web site "meets my needs well. It was a great wrap-up to our animal adaptation unit." A fourth touched on secondary benefits of the program in noting "the opportunity to use technology to instruct students is always motivating for them and gives them the opportunity to utilize technology for learning purposes. It allows children guided experiences with technology and the confidence to use technology as a great learning tool."

Table 10
Responses to the Item, "Rate the effectiveness of the pre-service teacher produced Web site "as a cooperative effort between your student-teacher and yourself."

Semester	Effective or Very Effective	Ineffective or Very Ineffective	No Response
Fall 2005	77% (10 of 13)	0	23% (3 of 13)
Spring 2006	85% (23 of 27)	7.5% (2 of 27)	7.5% (2 of 27)

Reports from those teachers who implemented Web sites produced in the program suggested the benefits of technology in teaching and learning. Finding that approximately 50% of the respondents in the fall 2005 survey did not use their Web site, however, indicated weaknesses in the program. The teachers' comments attributed 60% of this non-use to a lack of follow up by the preservice teachers. Many of these teachers reported that their student either "never mentioned" the project or did not follow up "after initial inquiries." I concluded from this that the reasons they did not use the Web sites had more to do with the implementation of the program rather than the quality of the Web sites produced by the preservice teachers. The lab instructor and I addressed this weakness by adding a new requirement that preservice teachers share their Web site with their cooperating teacher and have them sign an acknowledgment form to provide evidence that they did so. Implementing the procedure of the acknowledgement form in the fall 2006 yielded a dramatic improvement as 85% (57 of 67) returned it signed.

Further, reviewing the preservice students' reflections on the experience revealed that 38 actually implemented their Web site in the classroom, which amount to 67% (38 of 57) of those returning the acknowledgement form and 57% (38 of 67) of the total number of students in fall 2006. Either number represents a dramatic improvement over the pre-acknowledgement form data from fall 2005.

Discussion

The results of the present pilot study suggest that the program design is productive for improving the use of technology for both the cooperating teacher and the preservice teacher when fully implemented. The results supported the validity of the program design and highlighted important areas where it needed improvement. The research also suggests that other programs in teacher preparation can take advantage of the T as WD program concept to build authenticity into their instruction in educational technology by linking it to a field placement.

The procedures identified in the pilot study as necessary to strengthen the program's chain of events could also be useful. The advanced organizer for cooperating teachers serves to give them early and essential notice of expectations of the program, even though their participation in our case has been voluntary. On the other hand, a principal devoted to organizing his or her school as a place of professional development could certainly make participation more of a formal expectation. In considering a formal expectation, it is significant that the T as WD program gives back to the cooperating teacher, and the

school receives a payback in the form of instructional Web sites custom developed for the teachers' classrooms. Cooperating teachers report that they value these Web sites and would like to continue to use them even after the preservice teachers have completed their placement. This link further strengthens ties between the university and the pre-K-12 school as field placement.

Monitoring the preservice teacher's lesson plan to assess its relevance to the classroom in which he or she is placed is another procedural recommendation based on our experience thus far. Our most important lesson learned took shape in implementing the *acknowledgement form*. This simple form has proven to be an essential link in the chain of events that works toward ensuring that the preservice teacher interacts with the cooperating teacher in both designing and presenting the instructional Web site. It is highly probable that neither the preservice teacher nor the cooperating teacher will use the Web site if the cooperating teacher does not know about it and does not have the opportunity to be convinced of its usefulness.

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Appendix A

Acknowledgement Form

BU SED ED101
Fall '06
Student Name:
Section:

Web-Based Project Acknowledgement Form

The purpose of this form is to provide a record that a completed web site has been presented to each cooperating teacher. Please have your cooperating teacher sign below following your meeting with him/her.

To The Cooperating Teachers:

Please sign below indicating that you have seen and been made aware of the functionality and purpose of this web site/web-based lesson. If you have any questions or concerns about what you are seeing, feel free to contact me at either (123) 123-1234 or by email at <insert email>. Thank you for your time.

Cooperating Teacher Name:_____

Cooperating Teacher Signature:_____

Appendix B

Advanced Organizer

ED101 Web Based Lesson Project
Instructor

To Our Cooperating Teachers:

First and foremost, let me thank you for the wonderful work you do in providing guidance to our ED100 students as they enter the classroom for the first time.

As many of you know, our students are responsible for the completion of a technology project as the major component of their ED101 classroom technologies lab. This project takes the form of a content-rich Web site that we ask the students to then implement in your classroom or school computer lab as a full-fletched lesson. This will, of course, require your help in preparing our students to plan, design, and implement their projects.

I ask that you please take a moment at times throughout the semester to sit down with your students and help them do the following:

- Pick a content area
- Write appropriate learning objectives
- Review the general layout and appearance of the Web site
- Prepare to implement the Web site as a classroom lesson

The following is a list of (tentative) dates on which I would like our students to work with you (for just a few moments during the school day) on the following:

Wednesday, 2/7	Go over advanced organizer and help your student teacher pick a content area for the project (choose a tentative date for them to implement the project)
Wednesday, 2/14	Go over the project learning objectives with your student teacher
Wednesday, 3/7	View the rough form of the web-based project and sign the sheet indicating your approval
Sometime 3/21-4/18	Observe your student teacher implementing the web-based lesson in the classroom
Wednesday, 3/21	Go over assessment and brainstorm questions with your student teacher

Please feel free to email or call me with any questions you may have about the project. It is our intention to have the students serve you as a client, designing a Web site for your classroom that you can continue to use long after this semester. Thank you so much for your time.