

Training in instructional technology gives teaching assistants skills to enhance student learning

The TA Web Certification Program

By **Bradley A. Cohen, William Rozaitis, and J. D. Walker**

For the past five years, staff from a number of central support units at the University of Minnesota have collaborated to provide a comprehensive course of training in educational technology to teaching assistants at the university. This intensive, non-credit course, called the TA Web Certification Program (<http://dmc.umn.edu/ta-web.shtml>), is intended to give TAs the skills needed to create course Web sites that are both technically robust and pedagogically useful. Consequently, the program offers a unique blend of pedagogical instruction and technical skill-building designed to prepare TAs to use technology effectively to enhance student learning.

Here we provide an overview of the successes and challenges we have encountered as designers of and instructors in the TA Web Certification Program. After describing the history and goals of the program, we highlight salient data from recent evaluation efforts and conclude with an account of

the ways in which the program will be adapted to changing TA needs. Our hope is that the TA Web Certification Program will provide a training development model and process that can be reviewed, modified, and implemented at other institutions.

History and Background

The TA Web Certification Program began in the fall of 1998 as a three-week course comprising 21 instructional hours.¹ Since then the program has grown by more than a third to accommodate new applications and approaches to delivering Web-based instruction. Offered approximately six times per year, the program integrates software training, fundamentals of multimedia design, and pedagogy of technology-enhanced learning.

TA Web Certification began as a collaboration between the Office of Information Technology (OIT), the University Libraries, and the Center for Teaching

and Learning Services. Currently, a total of seven instructors from OIT and the libraries staff the course, teaching subjects in their areas of specialty.

The program was designed to be modular and scalable. That is, much of the curriculum in the course was developed previously and is currently used in other university training workshops, such as WebCT Basics, Dreamweaver Basics, and Photoshop Basics. In this way, staff time and resources are used to best advantage. However, running the program does require considerable resources. Two staff members from the Digital Media Center (a unit within OIT) spend between 80 and 100 hours per semester running the course and updating curricula. Developing the program five years ago took several months and hundreds of staff hours.

Participants receive no university credit for the program,² but as an incentive, TAs who attend all eight classes, complete the requisite assignments, and



pass a skills test during the final class session receive a certificate of completion. In addition, a free copy of Dreamweaver software is sent to the TA's sponsoring faculty member to support future Web-development efforts. Since 1998 more than 250 TAs have participated in the program.

Program Goals and Objectives

The TA Web Certification Program has two main goals. First, it is intended to support faculty in the development and implementation of instructional technology. TAs who participate in the program must have a faculty sponsor and must be working with that sponsor on a technology-enhanced learning project. In this way, the program seeks to address the most salient barriers to faculty use of educational technology at Minnesota—the lack of time to learn about and to use technology—by supplying faculty with an important resource: TAs who understand both dis-

ciplinary content and educational technology. As a further benefit, we expect that graduates of the program will function as technology-enhanced learning mentors and change agents in their departments.

Second, the program is intended to provide TAs with the skills and confidence to create and use instructional technology. We hope to do this by introducing TAs to a methodology for developing instructional technology environments, by integrating software training with thoughtful pedagogy and by providing opportunities for practice, reflection, and application of what they have learned. It is our expectation that TAs who go on to become faculty members will continue to use and improve technology-enhanced learning environments.

Program Curriculum

The curriculum of the TA Web Certification Program has evolved since the

program's inception, in response to changes in educational technology itself and in the needs and skill sets TAs bring to the program. Noteworthy changes include:

- Increasing the total instructional hours from 21 to 30 and adding an expectation of 15 hours of out-of-class work.
- Incorporating open lab time into the program, which TAs can use to work on their own projects with instructors' assistance.
- Adding WebCT training to the program in response to WebCT's increasing prominence at the university.
- Requiring students to produce a hands-on, deliverable product in the form of a functional WebCT site at the end of the program. Currently this site may be a simple informational resource for a class, but in the future we will require the production of a more pedagogically ambitious site (see "The Future of TA Web Certification" below).

Pedagogical Sources

The pedagogical component of the class draws, among other sources, from

■ A. W. Chickering and S. C. Ehrmann, "Implementing the Seven Principles: Technology as Lever," *AAHE Bulletin*, October 1996, <<http://www.tltgroup.org/programs/seven.html>>.

■ R. M. Felder and R. Brent, "Navigating the Bumpy Road to Student-Centered Instruction," *College Teaching*, Vol. 44, 1996, pp. 43–47, <<http://www2.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Resist.html>>.

■ R. M. Felder, "Matters of Style," *ASEE Prism*, Vol. 6, No. 4, December 1996, pp. 18–23, <<http://www.ncsu.edu/felder-public/Papers/LS-Prism.htm>>.

■ T. Marchese, "The New Conversations About Learning: Insights from Neuroscience and Anthropology, Cognitive Science, and Work-Place Studies," in *Assessing Impact: Evidence and Citation* (Washington, D.C.: American Association for Higher Education, 1997), pp. 79–95, <<http://www.aahe.org/pubs/TM-essay.htm>>.

■ M. D. Merrill, "First Principles of Instruction," submitted for publication to *Educational Technology Research & Development*, <<http://id2.usu.edu/Papers/5FirstPrinciples.PDF>>.

■ J. L. Ross and R. A. Schulz, "Using the World Wide Web to Accommodate

Diverse Learning Styles," *College Teaching*, Fall 1999.

For studies that explore how pedagogical training at the graduate level leads to improved teaching, see

■ A. L. DeNeef, *The Preparing Future Faculty Program: What Difference Does it Make?* (Washington D.C.: Association of American Colleges and Universities, 2002)

■ J. D. Nyquist et al., eds., *Preparing the Professorate of Tomorrow to Teach: Selected Readings in TA Training* (Dubuque, Iowa: Kendall/Hunt, 1991).

The idea that experienced teachers understand that teaching with technology requires very different skills and approaches is supported by a large body of scholarly work, including

■ J. Boettcher, *Faculty Guide for Moving Teaching and Learning to the Web* (Mission Viejo, Calif.: League for Innovation in the Community College, 1999).

■ B. Khan, ed., *Web-Based Instruction* (Englewood Cliffs, N.J.: Educational Technology Publications, 1997).

■ D. Brown, ed., *Teaching with Technology: Seventy-Five Professors from Eight Universities Tell Their Stories* (Bolton, Mass.: Anker Publishing Co., 2000).

■ Modeling the active learning the program encourages through online and in-class discussions of pedagogical issues.

Currently, the program's curriculum is structured by a four-part multimedia development process:

■ **Instructional design:** identifying educational goals and objectives; planning

the content, delivery, and interactive components of a course Web site

■ **Interface design:** planning the overall look and feel of the site, as well as its navigational structure

■ **Web authoring:** building the HTML-based components of the site, creating a site structure within WebCT and testing for usability

■ **Graphics development:** creating the images that give the site character and tone

Certain components of this process are directed at providing technical skills. In particular, students learn Macromedia Dreamweaver as an HTML development and site-management platform, Adobe Photoshop as a graphics development and manipulation tool, and WebCT as an overall course management environment. We present these programs as complementary and encourage students to use them in an integrated fashion as they develop their course Web sites.

Other components of the curriculum are designed to encourage TAs to reflect on the pedagogy of technology-enhanced learning and to design educationally useful learning environments. (See the sidebar "Pedagogical Sources.") Students reflect on the goals and objectives of their courses, on methods of employing active learning strategies and tools in those courses, and on ways of using technology to appeal to a variety of learning styles.

Program Assignments

To support thinking about online pedagogy and development as teachers in this environment, each student is required to complete three out-of-class assignments. First, students are expected to participate in an ongoing "virtual" discussion of pedagogy using the WebCT threaded discussion tool. The exercise forces students to confront the challenges of communicating in an online environment. It also provides topics for face-to-face discussions that model how online communication can be used to build community and encourage active learning.

Second, each student is required to write a formal planning document, called a design plan, which is peer reviewed by at least one other student in the class. The design plan formalizes the student's instructional and functional decisions.

The design plan also forms the foundation for the third and final assignment, a WebCT course site, which is reviewed by instructors a week after the last session of the program.

Program Evaluation

Our efforts to evaluate the impact of the TA Web Certification Program have taken two forms. First, in December 2002, we made a Web-based questionnaire available to all graduates of the program.³ The point of this survey was to collect follow-up data reflecting how graduates regard the program now that they have some distance from it and are—we hope—actually using what they learned.

We were unable to contact everyone who participated in the program, but we obtained 56 records, a response rate of more than 27 percent. Our survey respondents were 63.6 percent female and 36.4 percent male, and they were relatively young—48.8 percent reported being 30 years old or younger, with 51.2 percent reporting ages of 31 years or older.⁴

Second, since the program's inception we have collected data from TAs in the form of pre- and post-class questionnaires. Here the idea was to discover our students' expectations about the program and learn how well the program met those expectations. Most of this is qualitative data, which we've handled by collating student responses and extracting some of the most salient themes.

In the following section, we outline the most interesting and important findings from these two sources. In some cases, we illuminate these findings by comparing them to results from a survey of faculty from four colleges at the University of Minnesota conducted in spring of 2002.⁵

Survey Results

One goal of the December 2002 survey was to determine the topics about which TA Web Certification graduates felt they had learned the most in the program. We divided the relevant items into two broad categories that reflect the dual focus of the program—technical skills and elements of good online instructional practice. These became the possible responses for Question 1: "To what degree did the TA Web Certification Program enhance your technical skills in the following areas?"

- a) WebCT

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- b) HTML/Web editors (e.g., Dreamweaver)
- c) Photoshop/Web graphics
- d) Uploading files to Web sites (e.g., WebCT's file manager, FTP)

For Question 2: "To what degree did the TA Web Certification Program enhance your understanding of the following components of good online instructional practice?"

- a) Teaching students with different learning styles
- b) Identifying teaching objectives and strategies
- c) Complying with copyright law and intellectual property policies
- d) Using pedagogically effective Web design
- e) Using online communication tools
- f) Performing usability testing on Web sites
- g) Evaluating the effectiveness of technology-enhanced learning
- h) Using a systematic development process that includes planning, design, and usability testing

WebCT

In Question 1, participants gave the highest rankings to the HTML/Web editors item and the lowest to WebCT. We were surprised by this result because previous students had demanded increased WebCT training, in response to which we began spending an entire instructional day on that program. One possible explanation for this pattern is that when participants are exposed to WebCT in TA Web Certification, they can do no more than scratch the surface. The TAs learn the very basics of WebCT, but the program is far too complex, and our time too limited, to do much more than that. So the ratings given to this item might reflect participants' sense of how much there is about WebCT that they have not learned.

This hypothesis is borne out by participants' responses to Question 9: "What topics were not covered in the TA Web Certification Program but should have been?" For this question, the most common answer was "more and different WebCT tools," which seems to reflect an awareness that there is much more to learn about WebCT and a desire to do so.

Technical Versus Pedagogical

Another interesting result is that, on average, students gave significantly higher ratings to the items in Question 1, which asks how much they have learned about technical matters, than they did to Question 2, which asks how much they have learned about various aspects of online pedagogy.⁶ This pattern may have to do with the fact that our students are polarized about the usefulness of the pedagogical material.

One of the toughest challenges we have faced in the TA Web Certification Program is finding the right balance between technical training and reflection on online pedagogy. For a variety of reasons, many students simply don't seem to care about the pedagogical training we provide. On the other hand, many other students say that the pedagogical side of the program is by far the more valuable. (See the sidebar.)

The deeper explanation here may be students' lack of teaching experience. Most participants do not have extensive teaching experience.⁷ Despite this, we know from their contributions to in-class and online discussions that many believe they already know how to teach well.

There are likely several reasons for this. As with faculty members, not every TA years to teach. Some are more interested in their research agendas and see teaching (as well as their current appointments) as a compulsory part of graduate school. Second, and perhaps more interesting, many novice teachers mistakenly believe that understanding a discipline is all that is required to teach it effectively. Because our students are in the process of mastering discipline-specific knowledge, they may feel their ability to teach will necessarily follow. Often they seem suspicious of the

pedagogical training we provide, either because it differs from what is common in their own disciplines or because they think it is superfluous.

Our students' lack of teaching experience contributes to another misconception that colors their attitudes toward our pedagogical instruction: that teaching online is not significantly different from teaching face to face. All of our pedagogical training is rooted in the unique demands of the online teaching environment, yet many students seem to believe that existing courses can simply be transposed from the classroom to the computer. This belief is echoed in students' preference for course sites that just deliver information (see "The Dominance of Information Delivery" below). It also shows up clearly in students' final projects, many of which lack innovative strategies for implementing online learning, as well as in their asynchronous discussions, which often show little appreciation for how online discourse differs from what takes place in the classroom.

By contrast, more experienced teachers appear to recognize that teaching is not a simple matter at all and that teaching with digital technology requires new skills and a new knowledge base. This idea is supported by results from the aforementioned 2002 faculty survey at the university, in which a substantial majority of faculty reported that they both need and want to learn more about the pedagogical aspects of teaching online. (See the sidebar for other works supporting this idea.)

The Dominance of Information Delivery

Question 5 asks graduates how they view the usefulness of various ways of using course Web sites: "Please rate the value, for the courses that you teach, of each of the following possible ways of using a course Web site."

- a) As an informational resource for syllabi, lecture notes, course content, etc.
- b) As a means for students to check their grades
- c) As a tool for collecting student data (e.g., quizzes, self-tests, surveys, assignments)



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- d) As a tool to support interaction with and between students (e.g., online discussion, chat, presentations)

The Minnesota faculty survey indicated that faculty members view educational technology first and foremost as a way of delivering information. Our survey of TA Web Certification graduates reflects this: respondents gave the highest rating to using a Web site as an informational resource. What is unusual is that our graduates ranked information delivery head and shoulders above any other use of a course Web site listed in Question 5. (On a scale of 1–5, the other items had means that fell below the third or "moderate value" response, whereas 86.3 percent of respondents gave the "informational resource" item as one of the top two responses.)

This difference is striking. It is also

out of step with the results of the faculty survey, inasmuch as faculty expressed a desire to use educational technology to deliver information but gave similarly high rankings to items having to do with interaction, addressing different learning styles, and so on. The explanation here may again be lack of teaching experience. As teachers gain experience, they come to see teaching as more than just delivering information and become more eager to explore different teaching strategies.

Gender, Age, and Discipline Correlations

We found no significant correlations between respondents' gender, age, or discipline and their answers to questions on the survey. We take this to be good news because it suggests that we are serving several different populations equally well.

Themes from Open-Ended Questions

Several questions on the December 2002 survey were open-ended, in an effort to gather qualitative data about our graduates' use of and attitudes toward technology-enhanced learning.

- Graduates reported generally positive perceptions of the effects of educational technology on their students' learning, but they showed no evidence of having made serious efforts to evaluate the impact of their use of technology-enhanced learning.
- Many graduates said that the TA Web Certification Program increased their confidence and comfort level with educational technology.
- Some answers reflected a desire that the program prepare them better for the practicalities of their jobs as TAs. A number of graduates reported that they would like to see "topics on how to troubleshoot common things that occur with the technology" included in the curriculum.

Themes from Pre- and Post-Class Surveys

The pre- and post-class surveys from the past five years provided useful insights into program participants' con-

cerns and hopes about educational technology.

- The greatest concern among participants in all sections was that technology-enhanced learning might replace effective, face-to-face communication with “anonymous” and “dehumanized” education, thus inhibiting learning.
- Many participants feared that technology might be used for technology’s sake, gratuitously “tacked onto” classes, rather than being used as a well-considered tool that serves instructors’ learning objectives.

The Future of TA Web Certification

The TA Web Certification Program has been under almost constant revision since its inception. The December 2002 survey provided us with information that will help us continue to improve the program in response to input from its graduates. In particular, survey results raised two important challenges: participants’ desire for more advanced WebCT training, and the polarization resulting from the inclusion of both pedagogical and technical material in the program.

Advanced WebCT

In the existing program, we introduce students to the most basic features of WebCT (modifying the site home page, adding tools to pages, evaluating the site structure, and so on) as well as to the computer-mediated communication tools. We have insufficient time to cover more advanced features, such as quizzes and content modules, and it is clear from our pre-course surveys that, with few exceptions, our students are WebCT neophytes when they enter the program. This prevents us from simply replacing WebCT basics with more advanced training. To respond to our students’ desire for a more advanced understanding of WebCT, we plan the following changes:

- We will alter the final project to require that they add to their site one advanced tool, such as a quiz or a content module. This will test their ability to extend their basic knowl-

edge, and we will point them to necessary materials and offer help through one-on-one consultation.

- Currently, as part of the final project, we require students to upload a design plan, revised on the basis of peer feedback, to their Web site. While the creation of a design plan document remains a valuable exercise, the revised version is of limited value. We therefore intend to replace it with a set of WebCT troubleshooting exercises consisting of common support problems the TAs are likely to encounter from students. For instance, we might present our TAs with e-mails from students having problems in a WebCT site that are in fact related to improper browser settings and so should be referred to the university’s Technology Helpline.

These changes will not only serve to better acquaint students with WebCT’s subtleties but will also help us respond to students’ desire, expressed in the open-ended questions on the December survey, that the program prepare them better for the practicalities of their jobs as TAs.

Technical Versus Pedagogical Again

The December 2002 survey reflected clearly what we know from feedback from our students at the end of each course—that we need to do more to successfully integrate our technical training with our pedagogical material. Each time the TA Web Certification course has been taught, we see the polarization that was evident in our survey results. Some students love the pedagogical material, while others are downright disdainful of it.

If our explanation of the survey results in this area is correct—that the disdain of pedagogy is due largely to inexperience and to a view of course Web sites primarily as containers for information—there may be little we can do to overcome this problem. We plan to make the following changes to the program, however, in the hope of making the value of the pedagogical material more evident and its integration with the technical training more seamless:

- On the first day, we will more explicitly emphasize the dual nature of the course—technical and pedagogical—and our reasons for it. We will only be able to assert, and not yet to prove, that online teaching presents unique challenges and opportunities that must be considered and understood to design and implement an effective course site using the technical skills which our students will develop. We will back this assertion up with a bibliography⁸ and share relevant results from the university’s faculty survey, such as the fact that more seasoned teachers seem to understand the uniqueness of online teaching.
- Much of our attention to pedagogy beyond the first day is confined to two sections of the course—the session on computer-mediated communication tools and our online discussion using those tools. Both areas present us with an opportunity to focus students’ attention on specific ways in which online teaching requires unique understanding.

More can be done during the technical training, though, to make connections to the pedagogical material. For instance, facts about how users read online have a direct impact on how a page of text should be designed in Dreamweaver. Far more options are available in Dreamweaver and Photoshop than would be useful for a well-designed course Web site, and making this clear to students⁹ might help them better appreciate the value of the pedagogical material.

We will also point out that TAs (and faculty) express the fear that technology will be used for its own sake and that it has the potential to dehumanize the learning experience. The only way to avoid these pitfalls is to approach the use of technology with a thoughtful understanding of what makes for effective online learning environments.

- Because a resource Web site involves very little attention to the interesting features of online teaching, we will alter the final project constraints to require a more robust learning environment that will compel stu-

dents to address the deeper pedagogical issues of good design and implementation.

- As noted above, one explanation of some TAs' negative attitude toward our pedagogical material is that students are too focused on information delivery and on the use of the Web as another vehicle for this. In response, we plan to showcase pedagogically interesting possibilities and to point out the challenges inherent in them (for example, how does an instructor set up and facilitate successful student collaboration in an online environment?). We might also bring experienced faculty members into the class to discuss the ways in which their thinking about teaching has evolved.
- We plan to use our online discussion forum more effectively for the exploration of issues in online pedagogy, such as the threat of dehumanization in technology-enhanced learning, extending its use beyond resource containers, and so on.

Conclusion

The TA Web Certification Program continues to evolve, but we believe that the program as it exists is basically very well designed. We are simply fine-tuning at this point. We are mindful of the fact that TAs are very busy students, so there is a limit to what we can reasonably ask of them in a non-credit course.

As we move forward, we must be alert to the changing nature of the graduate student population. More and more students will be coming to graduate school already in possession of significant Web-development skills. Moreover, new technologies create new possibilities for online learning environments. Collaboration is also becoming more common. Faculty are increasingly willing and able to work with others to create technology-enhanced courses. Finally, our understanding of these environments is evolving. Increasingly, for instance, the notion of a learning object (as opposed to the notion of a course or module) is taking center stage. All of these considerations point to more significant changes in the future.

In light of these changes, we are considering offering an advanced TA

Web Certification Program that would focus on more sophisticated multimedia development, such as Flash animations and iMovie production, and more generally on the creation of discrete learning objects. At this time, however, no concrete plans are in place to develop and offer such a course.

The TA Web Certification Program at the University of Minnesota is the result of years of development by a team of specialized instructors from a number of centralized support units. Not all institutions enjoy such resources. We are confident nonetheless that our program is widely exportable, at least in spirit.

At its core, the program aims to promote the effective use of technology to enhance student learning. This requires a synthesis of technological skill and pedagogical understanding. In our program, that synthesis is (ideally) manifested by individual TAs as the result of activities facilitated by a team of expert instructors, but these are not essential elements. A similar program with just one or a few knowledgeable instructors might even be more coherent and effective (and certainly easier to administer) than our version.

Moreover, institutions with few or no graduate assistants might create a version of our program aimed at preparing advanced undergraduate students to assist faculty in their development of effective course Web sites. We are eager to hear of such variations and, to the extent possible, happy to foster inter-institutional collaboration by consulting with schools developing their own programs. *e*

Acknowledgments

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Endnotes

1. For further information about the history of the program, see C. Goodland, "Training Future Faculty to Create New Learn-

ing Environments," *CAUSE/EFFECT*, Vol. 22, No. 4, 1999 <<http://www.educause.edu/ir/library/html/cem994b.html>>.

2. While there are no plans to abandon the non-credit version of the course, a two-credit version is currently being planned in collaboration with the School of Nursing as an elective offering in the graduate curriculum.
3. The full text of this survey is available at <<http://dmc.umn.edu/surveys/tawebsurvey.pdf>>.
4. As is often the case with survey-based research, we have no way of ensuring that our sample is fully representative of the entire population of TA Web Certification graduates.
5. See <<http://dmc.umn.edu/surveys/faculty/faculty-survey-2002.pdf>> for details about the faculty survey. More information about these evaluation efforts, including full survey results and copies of the surveys themselves, can be obtained by writing to <jdwalker@umn.edu>.
6. Question 1: mean 3.41, range 3.2–3.8; Question 2: mean 3.20, range 2.8–3.63.
7. Most students taking the TA Web Certification Program have no formal training in course design and very little experience teaching. On average, more than 50 percent are assisting or preparing to assist their first course while participating in the program. Less than a quarter report experience in course design, and about that number have taught or assisted three or more courses. A few students have a great deal of pedagogical experience, but they are in the minority. The rest who say they have some experience in instructional design have it by talking with advisors about their teaching, attending workshops offered by their departments or the university, or taking graduate-level courses such as those offered through the Preparing Future Faculty program.
8. Including the works cited in the sidebar.
9. Using materials such as R. Williams, *The Non-Designer's Design Book: Design and Typographical Principles for the Visual Novice* (Berkeley, Calif.: Peachpit Press, 1994), and J. Nielsen, *Designing Web Usability: The Practice of Simplicity* (Indianapolis, Ind.: New Riders Publishing, 2000).

Bradley A. Cohen (cohenb@umn.edu) is a Senior Instructional Technology Consultant, William Rozaitis (rozai001@umn.edu) is an Instructional Technology Consultant, and J. D. Walker (jdwalker@umn.edu) is a Senior Instructional Technology Consultant at the University of Minnesota.