A Doorway to New Tools and Practices: Supporting Teacher Education, Research, and Development with an Online Netcourse

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About the CILT-PT3 Netcourses

To help advance knowledge and practice in learning sciences, the CILT postdocs undertook to develop and deliver the following online "Netcourses" in eCILT's four theme areas:

1. Technology Supported Assessments (Jason Ravitz, Assessments for Learning)
2. Supporting Student Inquiry (Michele Spitulnik, Ubiquitous Computing)
3. Computer-supported Group Work (Nathan Bos, Community Tools)
4. Culture, Cognition, and Technology (Jim Gray, Community Tools)
5. Uses of Technology for Teaching Spatial Visualization-based Content (Yael Kali, Visualization and Modeling).

Goals for the Netcourses included giving technology leaders in the Department of Education's program, Preparing Tomorrow's Teachers to use Technology (PT3), an introduction to emerging technologies for learning. Because of the online delivery mechanism, participants could show what they were learning to others and potentially reuse parts of the Netcourses in their own institutions (Bransford, 2001; Wiley, 2000).

Before designing and moderating the courses, postdocs took a 12-week Netcourse from the Concord Consortium on methodologies for facilitating online discussions about "moving out of the middle" in a way that supports learning, as taught at the Concord Consortium (concord.org) and Metacourse.com and described by Collison, Elbaum, Haavind, and Tinker (2000). Activities and discussion prompts in this model are informed by an understanding that teacher-focused discussions are typically overwhelming for the teacher and often underwhelming for the student in online settings. The Netcourse designs also sought to maximize the benefits of discussions by using a "structured asynchronous" format (Collison et al., 2000) that gives participants a week to think about what they and their colleagues are doing and saying.

The TSA Netcourse

Technology Supported Assessments (TSA) lasted 6 weeks and ran twice, in the spring and summer of 2001, as part of a U.S. Department of Education PT3 Catalyst Grant involving the Concord Consortium in Concord, Massachusetts, and the University of Virginia. It was structured around weekly Readings, Activities, and Discussions (RAD) initiated by the instructor. Each week, the class read about and made use of one of these research-based tools and discussed its applicability to their work. The syllabus with a list of readings and activities is available online (http://www.bie.org/Ravitz/syllabus.html).

Netcourses like this can serve as a portal, providing multiple entry paths, to new tools and practices. They can make it easier for educators to learn to use online tools and easier for developers and researchers to study this use. One can envision the same Netcourse approach

used in different instructional environments, not just *Blackboard*. The designs here took advantage of the functionality in *Blackboard*, but they only require access to Web-based tools and documents and to online discussion capabilities.[19]

In summary, Netcourses can offer a series of "doorways" to various online projects or tools and easy ways to track new users through their participation in the course. The rest of this paper explains how this design can be used to help educators and teacher educators, as well as developers and educational researchers.

Helping Educators and Teacher Educators

The conceptual foundation and educational goals of the course rested on two points:

- The first key point for participating educators that was emphasized throughout the course was that providing timely feedback to learners may be the most essential instructional strategy. "Learning gains from systematic attention to formative assessment were found to be greater than most of those for any other educational intervention" (Black & Wiliam, 1999; see also Bransford, et al., 1999; Rose & Gomez, 2003; Shepard, 1995; Stiggins, 1997).

- The second key point for participating educators is that technology-supported tools offer exciting opportunities for improving formative assessment for teaching and learning. Technology-supported assessments that were reviewed by the class via the Internet included IMMEX (Underdahl, Palacio-Cayetano, & Stevens, 2001), Intelligent Essay Assessor (Foltz, Laham, & Landauer, 1999), CRESST's Knowledge Mapper (Baker, 1998; Ruiz-Primo, 1999), and the Analysis Toolkit of Knowledge Forum (Lamon, Reeve, & Scardamalia, 2001). In each case, there is reason to believe that technology can support teachers and learners through better formative assessments of learning.

In addition to being given instructions for trying a new tool each week, participants also read about the learning theories and research that supported use of the tool. The following quotes and many others suggest that teachers are learning about the key points: the value of formative assessment and how technologies can help.

> I liked the feature (discussed in the article) that identifies anomalous essays for human reading. This technique accommodates the student who takes a non-standard approach to the topic and gives room for individual style and perspective to be treated fairly.
>
> I like the idea that students can assess their work with the system before submitting it for teacher review. This is the kind of control students never had with traditional methods of evaluation, and one that should help empower them while providing teachers some relief.

These quotes also demonstrate that participants are applying what they learn in the readings to their use of the tools. Research suggests that providing structure for learning about online resources, as is done in this Netcourse, is a major improvement over "discovery learning" that

[19] This is an important point because for some developers of reusable materials having to go into *Blackboard* is probably antithetical to what they are trying to do. This does not negate the value of the proposed approach.

might occur otherwise (Mayer, 2004). For additional examples of professional development efforts that involved teachers providing critical review of online resources, see Bannan-Ritland, et al, 2000; Chitwood, et al, 2000; Orril, 2000.

Helping Developers

In the Netcourse, tool providers saw a unique opportunity to interact with educators. Creating a "doorway" to their tools that brings well-informed educators their way is valuable to developers, who are often keenly interested in obtaining high-quality user feedback and design suggestions, or exploring opportunities for extending use of their tools to new audiences. When online feedback is provided as part of pedagogically guided and structured inquiry and the educators who provide feedback are available to discuss and clarify their responses, their contributions have added value.

Several of the tools in the Netcourse did not yet have complete user documentation and training systems in place for online users. For this reason, the developers were particularly keen to see how someone else could teach others to use their tools via the Internet or how someone might manage with scant documentation.

The rest of this section discusses the costs and benefits of the TSA Netcourse design for developers.

To varying extents, special arrangements were needed to support the class. Additional collaboration with developers was required in order to:

- Secure passwords and login access to the tools when necessary.
- Modify a current instructions Web page.
- Secure technical support during the week scheduled for use.
- Obtain or create instructions for using the tool.
- Provide perspective on available readings and research, including discussion prompt ideas.
- Explain opportunities for extending use to interested educators or institutions.

Generally, there was someone from each research and development group who was available to help in these areas. Sometimes there was a researcher, a technical support person, or a professional developer who expressed interest. They were pleased to participate as "guest experts" in *Blackboard* during their assigned week. They monitored and responded to the progress of class participants, offering insights about their work and seeking suggestions on the best way to share it with educators. Some of this happened on the class discussion board where others could see. Sometimes the instructor discussed issues with the developers offline and summarized for the class. One exception communicated only with me in a very helpful manner, but never joined *Blackboard*.

The following is a comment from a developer to the class.

> Hello. Dr. Ravitz invited me to join your discussion group so that I can address any questions that might emerge from your participation and experimentation with our software. So, hello. [snip] While the scoring feature is in place to encourage efficiency and to simulate real world situations, most teachers do not typically pay attention to score in the first few performances of their students. In fact, most teachers tell their students that, initially, they should explore the problem space thoroughly (open up all those little rectangles) so that they know what is available and can make informed decisions in subsequent attempts . . . Have fun with the problem-sets.

In return for the small amount of time spent working with the course author, various developers saw evidence of the following:

- Teacher educators using their tools in their own local PT3 workshops.
- Teachers trying tools with new audiences, e.g., different ages or subjects than described.
- Generation of substantial amounts of user data.
- Evidence of the discussion being informed by their published literature.
- Design suggestions from users, as well as possible bug reports.
- Descriptions of the learning curve for different tools.
- Endorsements and testimonials, like "my kids would love this."
- Teachers overcoming initial hostility to technology—e.g., automated essay grading.

Developers seemed to value hearing about the experiences of educators who were trying their tools for the first time. Perhaps they recognized with Recker, et al. (2002) that obtaining worthwhile feedback from Internet users is very difficult. With little effort, developers can obtain "fresh eyes" on a recurring basis—e.g., potentially every 6 weeks if TSA ran continuously. It would seem to be ideal for developers who are using a "rapid prototyping" or iterative approach to design if they could obtain formative evaluation data from each new cohort that would provide a review of their latest work.

The following quotes illustrate that the Netcourse allowed tools that were presented to be taken up and used, or considered for use, with a variety of new audiences.

> What I would like to do is demonstrate this course itself and the tools which I have been exploring to a small group of faculty registered for the four-day institute next week. None has taken an online course. None has used any tools like the ones we are examining.

> Thinking of my second and third grade emerging writers an evaluation tool such as this would have helped them to better develop their essays while freeing me to facilitate more advanced learning.

> The director of [our high school's] placement testing program and the director of the writing program (supporting and developing writing intensive courses) just brought in

> their essays on college and long-term life success for LSA evaluation and discussion. . .Whom should we contact if we want to know more?
>
> I sent the site to two of our English professors and am anxious to hear their comments and/or reactions! I would like to experiment with this with my students.

The last three quotes followed experimentation with an online demonstration of automated essay grading—specifically, an essay about college and career planning for high schoolers. It is worth noting that participants at the elementary, high school, and college levels all expressed interest in having such a tool available.

Another apparent benefit was the provision of user feedback, including design suggestions and bug reports. Two examples follow:

> "You might have said more," doesn't provide very clear guidance to a student. Is there the possibility that a teacher can customize the comments section for more specific feedback?
>
> Well, I got frustrated quickly (not with the program but with the topic) so I decided to just guess. My first attempt was wrong so minus 100 points. My second and final attempt also came up as wrong so minus another 100 points—GAME OVER. However, when I journeyed on to the epilogue, the little story said that my second guess was indeed correct. What's going on with that? On a different note, my first reaction is that this activity felt like a game, I imagine that students (middle and high school) would enjoy it a great deal.

Although no substitute to developing their own user communities, the above quotes demonstrate that with a little collaboration from teacher educators, developers could help supplement data collected through the costly and time-consuming process of developing their own development sites.

Helping Research and Evaluation

In this section, we discuss benefits of the TSA Netcourse design to researchers and evaluators. Creating Netcourses in educational technology has the potential to generate a wellspring of knowledge about teaching and learning with technology, not just among individual learners, but across the field. Using the formative assessment component of the tools in TSA, educators could see analyses of their own performance. Their participation in the Netcourse produced artifacts that could be saved and compared with others. Their participation could offer developers access to new sources of pilot and user-testing data. In addition to the data produced by educators, their discussions contain information about how teachers think about assessments of learners and about technology.

Access to data from diverse users could help researchers understand the value of their tools to different populations. Although tool providers may increasingly offer their own Netcourses, the TSA Netcourse is unique in that it presents numerous tools to diverse audiences for comparison. This approach could help identify for whom and under what conditions different online tools and resources are likely to have an impact. Developers could use the Netcourse as a way to experiment with populations of users that they cannot support on their own—e.g.,

teachers of slightly younger or older students. They may be able to ask questions of these "distant" audiences that they would not want to ask at their own pilot sites. They could also guide data collection and discussion in the Netcourse toward answering central research and evaluation questions.

The following quote demonstrates the ability to of this approach to generate large amounts of data, not just from original Netcourse participants but from their reuse in their local institutions.

> Faculty benefited from working together this morning during a Faculty Institute presentation. Earlier [someone] wrote she thought middle and high school students would enjoy the program. Another talked about "stressing out" as they worked to resolve the question… Well [here you should have seen] twenty instructors—including two nursing faculty, two chemists, and two biologists—sitting around four tables learning about this biology problem.

The Netcourse provided a wealth of qualitative data about the use of different technology-supported assessments, but it did not collect systematic data for comparing the experiences of educators with the different tools. One way to address this issue would be to review tools by using a common framework for judging qualities of technology-supported assessments. Such a comparison could be based on a conceptual framework for teachers that would support long-term understanding (West et al., 1991). One effort that could lead to such a shared framework is the establishment of a database of design principles (Kali, et al., 2002). Using these principles, or another basis for comparison, one class could focus on user interface issues; another may focus on evidence of student impacts; it does not matter. One can envision Netcourses with tools and methodologies related to topics other than assessment—e.g., interactive gaming experiments (Bos, 2004) or Causal Mapper tools (2003). Having educators share their artifacts from and analyses of online resources would help meet the call for a decade of rigorous educational technology scholarship (Haertel & Means, 2000).

Discussion

Participants in the Netcourse were leaders in their institutions. They were able to reuse modules as professional development instructors in their organizations. Sometimes, participants became particularly interested in one tool that had special applicability for them. Questions arise about how flexibly one can experiment with reuse of one part of the Netcourse—that is, without requiring enrollment in the full Netcourse. A recent FIPSE grant received by the Buck Institute for Education to provide online project-based learning training (www.pbl-online.org) is experimenting with making parts of the course available to those who do not want full credit for participation.

Looking toward the future with ubiquitous computing, one imagines that handhelds could extend the observation and feedback of educators who are using particular methods—away from the computer screen and into the classroom or field. In this way, online teacher professional development may continue to advance scholarship in learning by providing a "doorway," not just to online tools and methods but into classrooms and communities.

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