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Electronic Documentation and the Scholarship of Teaching Lessons from CS092

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In his keynote address at the Dedication of the Sheridan Center last October, a speech discussed in the [January issue](#) of *The Teaching Exchange* [\(1\)](#), Professor Lee Shulman, President of the Carnegie Foundation for the Advancement of Teaching, called for a "scholarship of teaching" characterized by a culture of active communication, revision, and peer-reviewed evaluation of teaching strategies and materials. Of course calls to change the culture of universities so as to value undergraduate teaching more highly are hardly new, but perhaps most intriguing about Shulman's remarks was the idea that we could and should document our teaching activities in such a way as to make a rigorous and dynamic model of teaching scholarship possible [\(2\)](#).

The topic of documentation was especially interesting to me last fall, because I was preparing to teach the Educational Software Seminar at Brown (CS092), a course in which teams of Brown undergraduates work with local teachers to design, build and implement classroom software [\(3\)](#). The course, which owes its invention to Andries van Dam, the Thomas J. Watson Professor of Technology and Education and Computer Science at Brown, is a rather unique approach to university-school and even inter-departmental university collaboration, because each team of undergraduates begins with a specification for software written by the teacher requesting that software. The students, typically 3-4 per team, work closely with the sponsoring teacher throughout the development of the software, and thus the historically unproductive method of top-down design and implementation of classroom technologies can be avoided [\(4\)](#).

As I prepared for CS092, I realized how little I could learn about the details of what had gone on previous years' Seminars from the printed and electronic materials that constituted the course archive. This was surprising, because the CS092 files and web site contain a great deal of material, more material I expect than can be found on most courses

at Brown. It is true that the syllabus gave me some idea of what was covered in the course week-by-week, but I found I couldn't tell exactly how the class time had been spent, couldn't tell whether or how the course worked as a "seminar," and couldn't tell how the readings and outside speakers were interpreted and received by the students in the seminar. Furthermore, although the CS092 software that was built in previous years was available, and remains useful and interesting, it was nearly impossible to glean what the original specifications were like, how different teams of students collaborated differently with their sponsoring teacher or her students in the production of the software, and why particular design decisions were made by each team (e.g. did they reflect constraints at the school, or reactions to research that students discussed in the seminar, or time constraints on the project, or the impact of seeing a particular demonstration of commercial software?).

Fortunately, I knew a good deal about the structure, content, and anecdotal details of the course from my conversations with Professor van Dam, and some of the students and teaching assistants from previous years; but, like most courses, the record of the details of the teaching activities in CS092 over the years was unwritten, and arguably not something upon which a "scholarly" attempt to improve the teaching of the course could be based. However opaque a published scientific paper may be, as an insight into what actually goes on in a research laboratory, it seems positively transparent compared with the publications we typically use to "describe" the teaching and learning activities that go on in a college course.

In the Spring of 1998, therefore, I tried to improve the documentation of what went on in the Educational Software Seminar, both of the activities that occurred when the seminar was in session and of the software projects themselves. Using the course web site and the features of hypertext, I focused on two "documents" that I thought could easily reflect more detail and provide interesting data for the evaluation of teaching and learning in CS092: the syllabus and the student project pages [\(5\)](#).

Michael Woolcock's [Constructing A Syllabus](#) handbook and the [Syllabus Workshop](#) developed electronically by the Scholarly Technology Group for the Sheridan Center, is a wonderful addition to the scholarship of teaching at Brown [\(6\)](#). Promoting reflection and academic excellence in the planning of courses, it can help faculty produce rich syllabi that encapsulate and record both scholarly knowledge and pedagogical expertise, and the electronic version of the Handbook allows faculty to easily produce syllabi for publication on the Brown Web. But the Constructing A Syllabus handbook is designed for faculty preparing their courses, and even the most perfectly prepared syllabus needn't be a static document once the course is underway. Indeed, if the syllabus is to help with a detailed description or evaluation of teaching activities, it needs to reflect the decisions and activities that occur throughout the semester. While the thought of revising, printing and xeroxing one's syllabus twice each week for an entire class rightly inspires cries of "No Way!" from teaching assistants, administrative assistants and instructors alike, the possibility of an electronic syllabus, made available to students on the Web, removes a good deal of the administrative burden and allows faculty to think of their syllabus as a record of decisions, reflections and work as the semester proceeds.

It is not merely that typographical errors can be quickly corrected on documents

published on the Web, or that assignments and sessions can be quickly reorganized; rather, a Web-based syllabus can easily be made a repository for faculty and student notes and reports, scholarly bibliography and publication, and virtual discussions that take place when the class is not officially in session. Including all of these materials in a single enormous on-line file would, of course, discourage students and colleagues from making use of such a resource, but by using hypertext to organize the materials, one can make it easy for users to use the syllabus for various purposes, and find exactly the materials in which they're most interested at each visit. The on-line version of the [CS092 syllabus](#) illustrates some of these ideas.

The bibliography included in printed, xeroxed course syllabi, at least at the undergraduate level, is typically concise; in many courses the syllabus includes only a list of required and recommended texts. In contrast, one of the most valuable resources graduate students take from "pro" seminars, especially in the Humanities, is an extensive, often annotated, bibliography that represents the teacher's sense of the scholarly literature on the seminar's topic. Such bibliographies are typically large documents and are rarely made available to undergraduates, but when one eliminates the problem of printing costs and can create various paths through a single document with hypertext, there is no reason why such bibliography should not be part of all Web-based syllabi; on the Web, these documents can be revised and accessed easily and serve as an important resource for various members of the Brown community, but they can also be avoided easily by students who come to the syllabus looking just for required texts.

In addition, as relevant electronic texts become available on the Web, one can make direct links to them from the syllabus; for example, in addition to traditional categories of bibliography on the CS092 syllabus, there is an "electronic texts" section with links to on-line texts ranging from John Dewey's *Democracy in Education* (at Columbia University), to a recent issue of *Education Week* devoted to K-12 technology and reform issues.

Perhaps more importantly, the Web-based syllabus can serve to organize and make available teaching notes, student writing, as well as links to similar topics and discussions in other courses at Brown, or at other institutions, that use Web-based documentation. In CS092, for example, the description of each week of the seminar includes not only assigned readings and my notes for that week, but also the questions and notes that students prepared when they were asked to lead particular discussions or present particular texts in class [\(7\)](#). This Web-based syllabus, therefore, became a web of documents that gave more detail about the teaching and learning that went on in CS092 than in previous years and, now that the Seminar has ended, provides me (and my department) with material with which to evaluate my decisions and strategies as a teacher, and upon which my students and I can continue this year's work in next year's Seminar.

But the readings, demonstrations, and class discussions are only part of CS092; indeed, many of the students consider the readings and discussions important only if they directly inform the (team)work they engage in to develop the software for their sponsoring teacher/classroom. Thus documenting the software projects was also critical to being able to evaluate and build on what went on in the Seminar.

Successful CS092 projects are remarkable in the way they embody those rare elements of successful collaboration identified in the literature of school-university

partnerships. CS092 projects combine characteristics likeshared decision-making and the presentation of valid opportunities for experiment, combined with the fact that the projects are chosen (by the teachers and the students) rather than mandated (8). In the area of school-university partnerships in teacher education, we know that collaborations work best when partners can "revisit plans, incorporate new understandings and ideas, and change priorities as experience dictates," and these are among the aims in CS092 when the students undertake their projects (9).

But how do we know whether the CS092 collaborations were really successful? Clearly the software itself, the finished product, is part of the outcome, but considered alone it may not tell us much about the decisions and revisions that produced it. Furthermore, this year's partners formed such a diverse group, from Lona Robbillard's 1st grade mathematics class at the Blessed Sacrament School and the computer lab at Classical High School to Roger Mayer's Visual Arts students at Brown, at the "City Streets" exhibit at the Providence Childrens' Museum, that the differences between the collaborations were as interesting and important as their similarities.

Therefore, this year, the student teams were required to keep a Web-based "project page" that included not only the sponsoring teacher's original specification, but the team's revision of that document, logs of team meetings, descriptions of classroom observations, early design considerations and prototypes, and results of testing those prototypes (10). Some teams designed and maintained their own web sites for this documentation, while others mailed me files that I posted at the course site, and of course the teams each developed its own approach to documenting their project. But in each case, the result is that this year's Educational Software Seminar web site includes not only the finished software, but pages that document the programs' motivations, design decisions, and pedagogical context. Response to the site and the software, from local teachers and technology coordinators, has confirmed my sense that such documentation is important to those evaluating the software for their own classrooms. But for teaching purposes, the emphasis on documentation this semester has led to a web site that gives a richer picture of what went on in CS092 this year, providing more data for evaluating teaching and learning activities, and also providing a useful foundation for next year's projects and discussions.

(1) The Teaching Exchange, vol. 2, number 2, January 1998, p. 1.

(2) Reference to the Boyer Report, Spring '98.

(3) The course web site can be found at <http://www.cs.brown.edu/courses/cs092/>.

(4) The best study of how and why the top-down model has failed, and is likely to continue to fail, in K-12, remains Larry Cuban's *Teachers and Machines: The Classroom Use of Technology Since 1920* (Teachers College Press, 1986).

(5) See <http://www.cs.brown.edu/courses/cs092/CS92.syllabus.html> and <http://www.cs.brown.edu/courses/cs092/CS92.course98.html>.

(6) Sheridan Center website <http://Sheridan-Center.stg.brown.edu>.

(7) It is worth noting that the quality and effectiveness of these questions and notes improved noticeably when the students were asked to send them as e-mail to the CS092 listserv prior to our class meetings. The e-mail was converted to an HTML file and linked to the syllabus before the class meeting as well.

(8) See e.g. Judith Haymore Sandholtz. "A Model, Not a Mold: A Comparison of Four School-University Partnerships," in David M. Byrd and D. John McIntyre (eds.), *Research on the Education of Our Nation's Teachers. Teacher Education Yearbook V* (Corwin Press, 1997), pp. 258-76.

(9) S. Robinson and L. Darling-Hammond, 1994. "Change for collaboration and collaboration for change: Transforming teaching through school-university partnerships." in L. Darling-Hammond (Ed.), *Professional Development Schools: Schools for developing a profession* (pp. 203-209). New York: Teachers College Press.

(10) Links to each of the project pages for the Spring 1998 Seminar can be found at <http://www.cs.brown.edu/courses/cs092/>.