USING COURSE PORTFOLIOS TO CREATE A DISCIPLINARY COMMONS ACROSS INSTITUTIONS*

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ABSTRACT

A key concern among faculty in Computer Science at both 2-year and 4-year institutions is ensuring a smooth transition for students between institutions. In this paper, we describe a joint a collaborative effort in bridging this institutional divide. Our goal was to open our classroom doors to one another, to critically examine the teaching that we are enacting and the learning that our students are undertaking. We wanted to ask of ourselves and of one another why we are teaching the topics that we teach, in the ways in which we teach them. And we wanted to more systematically examine and reflect upon evidence of student learning from the work that students are providing to us. Our mechanism for carrying out this project was to each construct a *course portfolio* for a course that we separately teach at our respective institutions. Our use of the course portfolio is novel, not in the concurrent preparation and critique of our portfolios, but in our using this setting to examine different courses within the same discipline and curricula across institutions. This paper situates our use of the course portfolio in the literature on the Scholarship of Teaching and Learning, describes the contents of our portfolios and rationale for these contents, and discusses lessons learned, both about our own courses and about the use of course portfolios as a means for disseminating knowledge and practice.

INTRODUCTION

In this paper, we describe a small-scale, collaborative effort to address the following prerequisite to any meaningful articulation across the divide that separates 2-year from 4-year institutions: what are we teaching in our classrooms, and what are students learning there? We answered this question by each preparing a course portfolio for different courses that we teach at our respective institutions during the winter 2005 quarter, and meeting weekly to share our progress, peer review one another's work, and discuss the teaching and learning that occurs in our classrooms. Qi prepared a portfolio for her *Introduction to Programming* course at Tacoma Community College, and Josh prepared a portfolio for his *Software Engineering* course at the University of Washington, Tacoma. From the mutual preparation and discussion of one another's course portfolios, we hoped not only to gain insight into our own teaching, but to share best practices, to learn about differences in institutional contexts that constrain and shape our teaching, and to reveal the teaching and learning that occurs within our different classrooms. Because we share students within the same geographical region, we hoped to shed light on larger issues concerning the nature of the transition students might experience in going between our respective institutions.

In the next section, we discuss previous uses of course portfolios, and highlight the novelty and benefits of our discipline-specific use of this technique. We then discuss the nature of our interaction throughout the course of this project. We follow this with a discussion of what we included in our portfolios along with a brief description of each section. We summarize our lessons learned, both about our individual classes and about the use of course portfolios to bridge this institutional divide. And we conclude with remarks on the extension of this project to a larger set of faculty working regionally within a common discipline.

BACKGROUND

The course portfolio, well known as a method for advancing teaching practice and improving student learning (Hutchings, 1998), is a set of documents that "focuses on the unfolding of a single course, from conception to results" (op cit, p.13). Course portfolios typically include a course's learning objectives, its contents and structure, and the course's role in a larger degree program. Importantly, the portfolio also includes evaluations of student work throughout the term, indicating the extent to which students are meeting course objectives and the type and quantity of feedback they are receiving. What distinguishes course portfolios from teaching portfolios is the focus of the former on a single course. Rather than describing an abstract philosophy of teaching devoid of context, the course portfolio exposes teaching philosophy as it is enacted in the particulars of a single course.

We decided to use the course portfolio since it lies at the intersection of scholarship, teaching, and student learning, an element of the emergent cross-discipline of the *Scholarship of Teaching and Learning* (SoTL, 2004). Through the use of scholarly practices, we hoped to gain insights into one another's teaching and to enhance the learning that occurs within our respective classrooms.

Literature on course portfolios has shown clear benefits for a teacher in preparing a course portfolio, primarily through making course objectives explicit, reflections on rationale, and systematic study of student learning (Cerbin, 2001). Reports by a cross-disciplinary group of university educators participating in an AAHE project that involved the construction by each of a course portfolio in a mutually supportive environment indicated gains in self-insight and improvements to teaching (Hutchings, 1998). Portfolios were also used by a cross-disciplinary group of university faculty as a means to increase faculty publication in forums within their each participant's discipline-specific educational community (Robinson, 2004).

Our use of course portfolios differed from the previous efforts by being carried out by faculty within a single discipline. Developing this expertise can be furthered by a discipline-specific pedagogic discourse. As a result of our shared language and knowledge, we could assume one another's understanding of discipline-specific issues (e.g. what a software design is, what a control structure is), placing more emphasis on issues of rationale for the teaching choices we have made in content and method.

THE NATURE OF OUR INTERACTION

We met weekly throughout the 10-week term, using each week to discuss our work-in-progress on our own and the other person's portfolios. For ease of sharing, we created our course portfolios in a hyperlinked format and posted them on the Internet. The initial meetings, when we had little to review, lasted only 30 minutes, while the final meetings were as long as two hours. Our meeting time was split between discussing our own work and discussing the work of the other person. For our own work, we often had questions about the specifics of portfolio construction ("should I link to the syllabus or include excerpts within the portfolio?", "what student work should I examine?"). Often, we shared things that we were learning about our course ("I think that my students need more time to learn about alternative representations for encoding algorithms"). For the other person's work, we sometimes made comments on the materials that students were seeing ("Why don't you use consistent language throughout all of the documents given to students in describing each of the phases of the software development lifecycle"), or on the purpose and goal of an assignment.

Our most fruitful conversations, however, were when we asked why questions, questions that brought us deeper into the other person's reasons for designing and enacting their course in their unique way. "Why do you teach flowcharting?" "Why do you use a guided demonstration to teach levels of nesting rather than have students work in small groups?" It is these kinds of discussions that highlight the disciplinary nature of teaching, even, or perhaps particularly, in the introductory levels. These kinds of conversations can only occur between people who share a common conception of the discipline, its defining concepts, problems and methods, even if they disagree on how students acquire this knowledge and how it should be taught.

THE STRUCTURE AND CONTENT OF OUR PORTFOLIOS

Lee Shulman writes that "A scholarship of teaching will entail a public account of some or all of the full act of teaching – vision , design, enactment, outcomes, and analysis – in a manner susceptible to critical review by the teacher's professional peers and amenable to productive employment in future work by members of that same community" (1998, p6).

How did we carry this out in practice? Our portfolios were between 15 and 25 pages in length, and we each took about 20 hours to complete the writing (not counting time for reflection and meeting). Given our goals, we determined that the following sections would be necessary to include in our portfolios for us to understand one another's courses at a deep level: Audience and Purpose, Course Objectives, Content and Structure, Student outcomes, Rationale, and Lessons Learned. We briefly discuss what we mean by each of these terms.

Audience and Purpose

In this section, we made explicit the main audience and purpose for the portfolio, following advice given in (Cerbin, 2001). Not only did we intend the portfolio to be read by one another, we also identified colleagues within our respective departments who might teach our courses in the future as our audience as well, since we wanted to share our completed portfolios with this larger group of peers. And finally, we identified an audience consisting of the other community college and university teachers of Computer Science within the region with whom we also wanted to share our portfolios. Making explicit the audience and purpose helped us to determine what to include in the portfolio, and at what level of detail.

Course Goals

In this section, we provided a brief statement of the course goals. The main goal of Qi's *Introduction to Programming* course is to introduce students to the basic elements of syntax and semantics of a high-level programming language, to provide students with practice in algorithmic thinking and problem-solving, and for students to be able to translate simple algorithms into executing programs. The main goal for Josh's *Software Engineering* course is for students to learn about and adopt professional software development lifecycle practices – in requirements gathering, design, programming, testing, and working effectively in a team – and to apply these effectively within a group-based, term-length software project.

Content and Structure

This section summarizes the material that is typically included in a course syllabus, detailing the specific topics that are taught, the order in which they are taught, the assignments that students will carry out, and the ways in which students will be graded. Qi's course was structured around a set of small programming assignments of increasing complexity so as to scaffold students 'programming and problem-solving ability. Josh's course was structured around a term-length software development project delivered in three major milestones spread across the term.

Teaching Method

In this section, we included a brief summary of the range of teaching methods that we used throughout the term (e.g. lecture, demonstration, walk-through, small group work). We found it most helpful, however, to provide a detailed description of a key subset of our course. This focused view provided the reader the opportunity to examine some of the finer-grained texture of our courses without being overwhelmed by detail. Qi focused on a unit in which she teaches flow-charting and pseudo-code as an alternative and less constrained representation than programs for expressing and reasoning about algorithms, and a unit on the selection control-flow constructs. Josh focused on his teaching of software design.

Student Outcomes

In this section, we provided samples of student work, and most importantly, an analysis and interpretation of how this student work provides evidence of student learning. This focused primarily on the learning units detailed in the Teaching Methods section. For Qi, one of the things this section revealed is that she needs to simplify the problems that she gives to students in the flow-charting and pseudo-code unit. For Josh, this section revealed that students are not transferring their use of Class-Responsibility-Collaborator (CRC) cards outside the classroom environment.

This section is important for two reasons. Not only is it central for ascertaining the effectiveness of one's teaching and its impact on student learning, but it also provides the opportunity to see if the assessments used are appropriate to the course goals. For instance, if a course goal is for students to engage in specific programming practices, then it is important to examine not only the final program that students produce, but to design assessments that provide feedback on the programming process, such as programming journals, retrospectives, or lab reports.

Rationale

Taking the perspective that a teacher faces a *design* problem in planning a course helped us to recognize the crucial importance of providing our reader with the rationale for our course design choices. As Kees Dorst (2003, p159) states "By looking at things with a designers' [sic] eye, you get an idea of the reasoning and design process behind them. This reveals not only 'how things work', but also the 'why' behind them." In examining sample portfolios from portfolio repositories at the *Peer Review of Teaching Project* (PRTP) and Indiana University (IUB), design rationale was often missing, hidden or implicit within the portfolio. We conjecture that this is because the portfolios were created for a cross-disciplinary audience.

But for *discipline-specific* course portfolios, where the audience and purpose are embedded within the discipline, the design rationale is critical in anticipating and answering the reader's why questions. In this section we tried to make explicit our assumptions about how students learn the subject area, our "folk pedagogy" (Bruner, 1996) of how students learn, both in general and within the discipline. For Qi, this revealed her reliance on learning style differences, and the importance for her of presenting material using a variety of formats and representations. For Josh, this articulated his perspective of software development as a reflective, iterated, and situated social activity.

LESSONS LEARNED

In this section, we summarized the lessons that we learned from completing the portfolio project, both in terms of our courses and in terms of using the portfolio as a bridge between our institutions.

Qi's course-specific lessons include:

Not all students know what and how to learn. She reconceptualized her role not only in helping students to master programming, but also to help students learn how to learn. She recognizes that she must integrate lessons on navigating the textbooks and breaking large problems into smaller, manageable subproblems along with the discipline-specific content.

Not all of the pair programming that she uses works as well as she thought. Although students indicate a preference for those with matching schedules, there might be a mismatch in learning styles. Instead, she will try to devote more time for pair programming in the scheduled labs.

The more students get involved, the more effectively they learn. She will experiment with having students work in small groups to replace some of her guided demonstrations as a way for students to become more actively involved in their learning.

Josh's course-specific lessons include:

Students dedicate significant effort to their project. They maintain group commitment throughout the term, though there is a range in the effectiveness with which the groups work.

There is little evidence of learning transfer beyond the course. Though students might engage in several of the software practices while in class session (CRC cards, unit testing), there is little evidence that students will transfer these skills beyond the bounds of this course and into their other courses and their professional lives.

The lessons that we learned about using course portfolios to bridge the institutional gap included:

- This project helped us to become more sensitive to the contextual constraints under which we each work
- We gained increased respect and admiration for one another's skills and passion for student learning at our partner institutions.
- Writing a portfolio is considerably aided when done with at least one peer. Doing so not only creates a perspective for evaluating and understanding the artifacts produced. But it provides, as well, the mutual inspiration to probe beneath the surface of things, to look more deeply at our courses and at our hidden assumptions about our students and the manner in which they learn.
- Our respective courses are at too far a distance from the interface between our institutions to give sufficient insights into "the institutional gap" that students have to bridge in going from the community college to the 4-year university.

CREATING A DISCIPLINARY COMMONS IN COMPUTER SCIENCE

To what extent have we bridged the gap between our respective institutions? Only to a small extent; this is the first of several steps that need to be taken to achieve this larger goal. Perhaps the most important contribution is in establishing the legitimacy of this form of cross-institutional collaboration within a discipline. We foresee extending this model, from a pair of faculty to a small group within a region, meeting face-to-face and working together throughout an academic year to create course portfolios. In so doing, this could foster a culture of scholarship of teaching and learning, disseminate knowledge and best practices within the discipline, highlight issues of common concern, and sensitize faculty at different institutions to the contextual constraints under which they each operate. This would also have the long-term benefits of developing an archive of persistent artifacts – the portfolios themselves – that could serve as a basis for use and extension by others.

The power of the portfolio approach is multiplied when there are several examples available for a single disciplinary aspect. When carried out over time, the development of a portfolio repository and archive would chart and calibrating excellence over time. This overcomes the dearth of public, peer-reviewed examples of teaching excellence that characterizes the legacy of even award winning faculty: "Aside from his syllabi and fading memories, he had no real record of what happened in those award winning courses" (Huber, 2002).

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