

Using Student Portfolios to Evaluate and Improve an Engineering Writing Program: A Case Study at the University of Washington

Cathie Scott, Carolyn Plumb
University of Washington

Abstract

Using portfolios of student writing to evaluate both writing programs and individual student performance has become popular at all levels of education. However, few (if any) engineering programs have adopted this method of assessment. The call from industry for engineers with better writing skills demands that engineering educators look to new tools to evaluate the effectiveness of writing instruction and the preparedness of students to write on the job.

At the University of Washington, we have embarked on a portfolio assessment project that involves collecting writing samples and other indicators of the engineering student writing experience. Through this program, we hope to gain a better understanding of what students are learning about written communication; we also plan to use the data from the project to establish clearer performance outcomes for our writing program.

This paper describes the goal of the project and the rationale behind our decision to adopt portfolio assessment. In addition, it describes the information being collected and the process being used to collect this information. This paper will be helpful to other engineering educators who are grappling with the assessment demands of ABET 2000.

What Is the Goal of the Portfolio Assessment Project?

The College of Engineering at the University of Washington (UW) admits about 800 students into its ten departments and programs each year. In order to prepare these students for writing in their profession, the college offers a writing program that consists of three components: two dedicated technical communication courses, writing completed in many department courses, and writing completed at work or co-ops.

In spring 1997, the college embarked on an ambitious three-year portfolio assessment project to gather detailed and comprehensive information on the nature and effectiveness of its writing program. The overall goal of this evaluation is to provide a baseline understanding of the program so that we can start to establish a common approach for teaching and assessing writing in the college. To attain our goal, we will use student portfolios to meet the following objectives:

- Identify the writing status of students when they enter the college.
- Characterize the writing experience of students while they are in the college.
- Determine student writing status upon graduation.
- Create performance-based learning outcomes, establish criteria for assessing these outcomes, and propose changes in curriculum and instruction to promote these outcomes.

The procedure used in this evaluation can be used as an ongoing assessment tool to monitor the effects of any changes we make in response to what we learn from the baseline evaluation.

Why Are We Undertaking the Project?

Despite our efforts to prepare students for writing in their profession, feedback from industry indicates that we are not keeping up with demands in the workplace. Now, with the adoption of ABET's *Engineering Criteria 2000*, we will be required to demonstrate that we can.

Industry Wants Better Writers

For decades, industry has been saying that engineering students are not learning the communication skills they need on the job.¹⁻⁶ Writing has been at the center of these complaints. Engineering colleges have adopted measures such as writing practicums,⁷ integration of more writing into existing courses^{8,9} and team teaching.¹⁰ But the gap between the writers that industry wants and the writers that academia produces still persists.

We think that the gap persists because we do not collectively have a clear idea, nor a clearly articulated description, of "good engineering writing." As a result, engineering students are not learning to write because there is no common approach to teaching and talking about writing among the major players: students, faculty, and industry. Regardless of the overall instructional model, the information and feedback that engineering students receive about their writing skills are inconsistent and fragmented, not only from one course to another but also from school to work.

ABET Requires Better Instruction and Assessment

Starting in fall 2001, our engineering program must meet ABET's new *Engineering Criteria 2000* accreditation standards. These standards were developed in response to claims from employers that "engineering success today requires more than up-to-the-minute technical capability; it requires the ability to communicate, work in teams, think creatively, learn quickly, and value diversity."^{11, p.1} Accompanying these standards are new ways to evaluate program compliance that rely less on the previous quantitative criteria and more on holistic ways to evaluate innovation in curriculum.

Under the new standards, engineering programs will be required (1) to develop objectives (program outcomes) for a number of skills, including an ability to communicate effectively; (2) to design a curriculum that ensures achievement of these objectives; and (3) to implement an ongoing internal assessment process to demonstrate achievement of these objectives and to improve the effectiveness of the program.¹¹

Why Use Portfolios?

A writing program evaluation "must proceed from a theoretical framework that can accommodate the complex workings of a writing program."^{12, p.38} ABET's new criteria provide such a framework. These criteria emphasize a process-oriented approach that allows for continuous improvement through ongoing, direct assessment. This approach reflects the current

trend to define writing as an iterative problem-solving process, similar to that used by engineers in the design process, and to assess writing skills in terms of mastery of this process.^{13, 14}

If writing is a process and is taught as such, a program evaluation must be process-oriented as well. Indeed, assessment in general is moving toward "direct" and "authentic" assessment rather than "indirect" assessment. Indirect assessment, which, in the case of writing, would be multiple-choice tests, sentence editing, or timed essays, is not a good indicator of how well students can actually *produce* writing. Writing programs are now embracing portfolio assessment, which is an authentic or direct assessment approach because it takes into account the process element of writing and it evaluates actual writing performance. In addition, portfolios can provide artifacts that reveal attitudes of both students and instructors toward writing, toward themselves as writers, and toward courses in the program.

What Are We Doing?

Our portfolio assessment project consists of four tasks (Figure 1): (1) recruiting student volunteers, (2) collecting evidence and compiling portfolios, (3) maintaining and analyzing evidence, and (4) holding a series of workshops to review portfolio contents and make curricular decisions.

Recruiting Student Volunteers

Our goal is to obtain a sample of twenty-four students, representing the departments in the college and the mix of students in the departments. Portfolio contents will tell the story of the writing experience of "typical" students in each department. Because we knew that the data collection process would be somewhat cumbersome, we decided early in the planning process to keep the number of students manageable. We are recruiting students who are currently taking the introductory technical communication course and who have just been admitted to an engineering department. Students are asked to stay with the project until they graduate, for about two years.

At this writing, we are into the third quarter of the project and, so far, we have fourteen participants. We had hoped to meet our goal of twenty-four students by now, but it is difficult to convince students to make the commitment. Although we offer incentives, such as credit for each quarter of participation, engineering students are busy and our screening criteria narrow the choices.

Collecting Evidence and Compiling Portfolios

Student portfolios include many artifacts and pieces of evidence:

- Syllabi for courses taken each quarter
- Student writing from engineering courses, along with assignment descriptions and "process logs" (similar to a journal in which students record their experiences while writing their assignments)
- Periodic reflective essays that students write about writing in general and their attitudes about their own writing
- Information from interviews with students

- Information from student records, including grades in writing classes and scores on standardized test

Students submit their portfolio contents at a designated drop-off spot. We compile the contents and periodically send e-mail reminders about overdue submittals. Considering that the project is not a priority for the students, we are encouraged by the fact that there have been no dropouts since the project began.

Maintaining and Analyzing Evidence

We are setting up a database in Microsoft Access and are entering information that lends itself to tabular format. Once this database is on firmer footing, we will start to analyze, synthesize, and summarize the less quantifiable information from artifacts such as reflection papers and process logs. We will also compute types and numbers of writing assignments.

Holding a Series of Workshops

Writing instructors, engineering faculty, students, and industry representatives will participate in five series of workshops. The workshop participants will examine selected portfolio contents and summaries of other portfolio contents in order to assess where we are now, decide where we would like to be, and propose ways to get there. Series 1 and 2 will take place during autumn quarter 1998 and autumn quarter 1999, after each year of portfolio collection and data analysis; series 3 and 4 will take place during winter quarter 2000; and series 5 will take place during spring quarter 2000.

Is It Worth All the Work?

Despite the difficulty of undertaking such a challenging and time-consuming project, we feel that we are on the right track. If we are to obtain useful information from a program evaluation, we must put care and energy into its design and implementation. The rewards of this process will be numerous. Not only will we have a valid tool that we can use to design and assess our current and future programs (a "self-test"^{11, p.3}), we will also promote greater communication, consensus, and collaboration among faculty and students, and thus serve as a model of communication for our students.

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CAROLYN PLUMB

Carolyn Plumb, Ph.D., is a lecturer in the Department of Technical Communication in the University of Washington's College of Engineering. She also directs the Engineering Writing Center and manages a program that provides communication courses to over 1,400 engineering students per year. She has published articles in several journals, including *The Journal of Technical Writing and Communication* and *Journal of Educational Psychology*.

CATHIE SCOTT

Cathie Scott, M.Ed., serves as assistant director of the University of Washington's Engineering Writing Center. She has taught undergraduate courses in technical communication and technical editing. She has extensive experience as a publications specialist for an environmental engineering company and has won numerous awards for her documents. Currently, she is working on her Ph.D. in educational technology.