READING AND WRITING FOR ENGINEERING STUDENTS

Charlene M. Spretnak

Since numerous engineering colleges are currently creating or expanding programs in technical communication, many universities are debating whether the program should be placed in the English department or in the college of engineering itself. In arguing for the latter option, a number of technical writing teachers have published the opinion that our courses are markedly different from general courses on expository prose which are taught in English departments. This is true; there are essential points of departure. However, one difference that is frequently cited is the requiring of a good deal of reading during a writing course. This approach is generally associated with English departments, having no relevance to the way technical writing is properly taught. In this paper, I shall present two reasons for including numerous reading assignments when teaching technical writing to engineering students, and I shall suggest methods by which to do so.

The Value of Reading Skills in an Engineering Career

In the spring of 1980, I conducted a survey of 1000 engineering alumni from the U. C. Berkeley classes of 1948 through 1978 titled "Technical Communication and the Professional Engineering."¹ I found that, on the average, engineers spend twenty-five percent of their job-related time writing, twenty-three percent reading technical and business material, eleven percent supervising the writing of others, and seven percent giving oral presentations—that is, more than half of an engineer’s work is comprised of communication tasks. Once an engineer progresses beyond entry level, he or she spends a good deal of time reading technical material, analyzing it, and responding to it. According to the Berkeley alumni survey,
supervisors spend an average of ten percent of their time critiquing the writing of others, but this amount nearly doubles, i.e., nineteen percent, when engineers move into positions such as project head, department head, or division director. Critical reading skills, then, may be seen as a requisite for such advancement. Moreover, engineers at all levels must be able to assimilate written technical information efficiently. One respondent to the survey wrote, "Develop reading skills! Too many young engineers read (study) for details and miss the overall view."

Reading as an Aid to Learning Writing Skills

In addition to the fact that critical reading skills enhance advancement in an engineering career, there is a pedagogic reason for assigning reading: Readers write better. In an experiment involving two groups of high school students in Massachusetts, the group that read regularly but had few writing assignments wrote better at the end of the year than did the group that wrote a lot but had no reading assignments. One class in each of the four grade levels, the "writing" class, wrote the equivalent of a theme per week, which was rigorously corrected by the teacher and revised or rewritten by the student. The "reading" class in each grade wrote a theme only every three weeks and spent one period each week reading books they had selected. Writing skill was evaluated at the beginning and end of the academic year via an objective test of spelling, diction, style, mechanics, etc. (the STEP Writing Text, Form 2A and then 2B, designed by the Educational Testing Service), plus a composition test evaluated by three experienced graders of the ETS English Achievement Test.

At the end of the year, the average amount of improvement among students in the reading classes was nearly twice that of students in the writing classes, as measured by the STEP Writing Test: The readers improved by +6.5 points, the writers by +3.5. (The total number of points in the test is 60). The composition tests were graded in three areas with a range of nine possible grades (1-9). In content and organization, the average amount of improvement among the readers was more than one-and-a-half times that of the writers, i.e., +.7 of a grade compared to +.45. In mechanics, the average amount of improvement among the readers was more than three times as great as that of
the writers, i.e., +.38 of a grade compared to +.11. In diction and rhetoric, the average amount of improvement among the readers was ten times that of the writers, i.e., +.7 of a grade compared to +.07. A pilot study two years earlier in that high school had shown similar results, although they were not monitored as thoroughly as in the larger experiment.

These findings support the dictum that one must absorb examples of good styles while learning to write well—or, more simply, "Writers read." Numerous respondents to the Berkeley alumni survey shared this opinion, e.g., "If one does not read, it is difficult to write well," and "Reading technical papers is a very helpful aid in learning to communicate." In addition, cross-tabulation of the data from that survey showed a positive correlation between writing skills and the amount of time engineers spend in leisure reading. What is surprising is that research on this important correlation has been so scarce. Studies on how reading aids a writing student's progress would be worthwhile. From the Heys study, we can assume that the brain somehow assimilates examples of economical prose, extensive vocabulary, and effective ordering which the reading of good writing provides. Later, the writing student seems to draw creatively from his or her "data bank" of rhetorical possibilities.

Incorporation Reading Assignments into a Technical Writing Course for Engineering Students

One might suppose that the reading of engineering textbooks would have a beneficial effect, but many students have told me they develop a habit of scanning the words for "the facts," as if the real information were floating in a sort of prose pudding which is of secondary importance. Never having paid much attention to expository prose, they have difficulty producing it. Hence the discussion of every model of a genre of technical writing, e.g., feasibility study, research report, grant proposal, that is distributed to the class should include a basic rhetorical analysis, i.e., attention to the means by which the author introduces and develops the thesis. Teachers should also discuss the role of diction in the models; when students see that word choice is both efficient and strategic, they begin to develop an interest in the precision of language. Nurturing this attitude is important since engineering students often enter the course
with a low regard for prose as being more arbitrary, vague, and imprecise than mathematics.

Because the models represent genres that most of the students will eventually be critiquing in a supervisory capacity, the rhetorical analyses in class should include the identification of implicit assumptions that often inform "purely objective" technological conclusions. The selection of questions being addressed is as important as the answers themselves.

Although the core of a technical writing course should be numerous writing assignments, many of them can be designed to incorporate the reading of technical literature, such as the well edited articles in journals published by several of the professional engineering societies. In addition to academic and trade journals, most engineering college libraries contain thousands of engineering studies and reports. One can require students to read and refer to a certain number of these technical works in a formal technical report, the major project in the course. In practicing an outline and then several abstracts during the early part of the course, students can go to the library and select a technical article of their choice—which can later be applied as one of the research sources required for the formal report.

To ensure that students learn to read closely, not merely scan, the teacher can require them to write a rhetorical critique of an article, essay, or brief report on an area of engineering. They soon develop an awareness of the distinguishing features of good or bad writing; this is not to say that they can always produce good writing on their own, but that they have learned what to look for. Such discriminatory powers build the student's confidence. In practising revising, for instance, critical reading is the essential first step.

In summary, reading helps anyone learn to write, and analytical reading prepares engineering students for supervisory tasks, which involve critiquing. These are two reasons for incorporating reading exercises into a course on technical communication. They outweigh by far the objections to including reading that are based on a desire to distance technical writing courses from "regular" composition courses. There are numerous differences between the two types of courses, but every writing student needs to read. In fact, developing the ability to perceive style as well as content introduces engineering students to the pleasure of reading. To continue improving their language skills, students should be encouraged to keep reading after completion of the writing course; they generally appreciate a list of
suggested books and magazines. In fact, when I encounter former students they proudly tell me what they are currently reading—or, from a distance, they reach into their backpacks and wave *The John McPhee Reader* or *The Existential Pleasures of Engineering* or whatever it may be. At such moments, I feel the satisfaction of success: As long as those engineers maintain the habit of reading, I know their writing skills will continue to evolve.

University of California
Berkeley, California

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