# Transformations in Technical Communication Pedagogy: Engineering, Writing, and the ABET Engineering Criteria 2000

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*Recent transformations in engineering education accreditation have shifted emphasis away from simple counting of required courses to a focus on the documentation of student learning outcomes. The Accreditation Board for Engineering and Technology's (ABET) Engineering Criteria 2000 (EC 2000) demands that engineering programs show evidence of eleven skills in their students. Only five of these skills relate to a student's technical abilities. The remaining six define what have been called "soft" skills, and it is this shift in emphasis that will have a significant impact on technical communication programs and pedagogy. In essence, EC 2000 has redefined both who is responsible for developing students' communication skills and for documenting evidence of student learning outcomes. Given the changes at the accreditation level, transformations within technical communication departments that serve engineering programs are inevitable. These changes offer problems as well as benefits for technical communication faculty.*

There have been several important changes in engineering education during the past decade: the reinstitution of client-centered design projects, the move toward integrated curricula, to name only two. And yet, perhaps the most significant of these transformations, the one that has far-reaching consequences, is the adoption of the Accreditation Board for Engineering and Technology's (ABET) Engineering Criteria 2000 (EC 2000). EC 2000 is remarkable for the



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way in which it has shifted emphasis within engineering programs, away from program requirements to the documentation of student learning outcomes. A cursory glance at ABET's website < http://www.abet.org > reveals how much expectations regarding engineering accreditation have changed. Criterion 3: Program Outcomes defines eleven student learning outcomes, but only five emphasize technical capabilities: ability to apply knowledge of mathematics, science, and engineering, ability to design a system, component, or process to meet desire needs, etc. Six of these eleven outcomes identify skills that have historically been the province of non-technical courses (see Table 1):

| | EC 2000 Criterion 3: Program Outcomes and Assessment |
|---|---|
| a | an ability to apply knowledge of mathematics, science, and engineering |
| b | an ability to design and conduct experiments, as well as to analyze and interpret data |
| c | an ability to design a system, component, or process to meet desired needs |
| d | *an ability to function on multi-disciplinary teams* |
| e | an ability to identify, formulate, and solve engineering problems |
| f | *an understanding of professional and ethical responsibility* |
| g | *an ability to communicate effectively* |
| h | *the broad education necessary to understand the impact of engineering solutions in a global and societal context* |
| i | *a recognition of the need for, and an ability to engage in life-long learning* |
| j | *a knowledge of contemporary issues* |
| k | an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice |

**Table 1 : EC 2000 Criterion 3; Program Outcomes and Assessment (ABET 2000, my italics**

EC 2000 also represents the end of the "bean counting" approach used in previous accreditation visits, when engineering departments merely counted up courses in each area—a required course in technical communication, a required course in chemistry, and so on—in order to meet the benchmarks set by ABET.

Clearly these revisions have shifted the emphasis in the accreditation of engineering programs to include what is often referred to as the "soft" skills: ability to work in teams, awareness of the ethical dimensions of engineering practice, and ability to communicate. In addition, ABET has tried to eradicate the silo mentality, indicating that students must develop their skills, "hard" as well as "soft," within the context of technical courses; communication skills, for example, should be developed in a broad range of technical courses, not only in communication courses alone. What remains undetermined within the ABET documentation is **how**: how should engineering programs meet these new outcome expectations in order to receive accreditation? ABET is, for most engineering faculty, annoyingly vague on this point: "each program must have an assessment process with documented results" (ABET 2000). Exactly what that process is, how it functions, who is responsible for its development and maintenance, and other issues are left up to the engineering program which seeks accreditation.



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In theory, the new engineering education envisioned by ABET will be inter-disciplinary, responsive to the needs of industry, and provide an effective background for technical professionals who must solve complex problems in the global workplace. But in order for the next generation of engineers to benefit, engineering programs will have to reevaluate and revise their current curricula. Revisions within engineering programs will necessarily bring technical communication courses that serve engineering majors under scrutiny, but the attention paid to technical communication pedagogy and curriculum may have positive effects on both technical communication and engineering faculty. This paper identifies possible problems with as well as potential benefits to technical communication teaching that could result from the move to EC 2000. The issues under examination here may be grouped under two main questions: who is responsible for teaching engineering students to communicate, and who is responsible for assessing student learning outcomes for the purpose of ABET accreditation?

## WHO IS RESPONSIBLE FOR TEACHING ENGINEERING STUDENTS TO COMMUNICATE?

By the terms of EC 2000, this question is easily answered: everyone is responsible, from the technical communication faculty member who teaches engineering students to write to the engineering faculty member who incorporates team oral presentations in her Machine Design course. But the simple answer belies how problematic it is to spread responsibility so widely. If everyone is responsible, then unfortunately no one may be held accountable (Youra 1999). Technical communication programs have traditionally been assigned responsibility for developing the communication skills of engineering students for three reasons: technical communication faculty understand writing pedagogy, they possess expertise in the field of technical communication, and engineers were either disinclined or unable to teach it. What the technical communication faculty may not possess, however, is familiarity with the conventions and models appropriate to communication within the engineering profession, in other words, what it means to write and speak like an engineer (Winsor 1996). Changes in accreditation demands, as well as research in the areas of Writing Across the Curriculum (WAC) and Writing in the Discipline (WID), have led many engineering faculty to experiment with bringing communication into technical courses. Documentation of these attempts comprises a third of the July 1999 issue of *Language and Learning Across the Disciplines. Special Issue: Communications Across the Engineering Curriculum.* In addition, the *Journal of* Engineering *Education* documents comparable efforts but from the engineering faculty perspective (Randolph 2000).

Clearly ABET demands have, at least in part, prompted many engineering faculty to begin incorporating communication assignments in their technical courses. The results of these experiments are often mixed. Engineering faculty feel unprepared to teach writing, and they are often disappointed with the results of the assignments they develop. Technical communicators also express concern: if engineers, untrained in technical communication pedagogy, incorporate written and oral communication in their courses, it is possible that they may do so incorrectly, thus jeopardizing the development of student skills. We will have to wait to determine the long-range effects of these new approaches on engineering students' communication skills. More immediate, however, is the impact the WAC/WID approaches will have on engineering programs' ABET preparation and site evaluation. Engineering faculty who are developing and maintaining their department's assessment plan can make a very good case for the ways in



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which the WAC/WID strategy fulfills the demands of EC 2000; students are developing their communication skills in technical, as well as in non-technical, courses. The only problem that remains, and a significant problem too, is the need to document student learning outcomes.

## WHO IS RESPONSIBLE FOR ASSESSING STUDENT LEARNING OUTCOMES FOR THE PURPOSE OF ABET ACCREDITATION?

Again, the answer to this question would appear to be the same: everyone. Unfortunately, the early accreditation efforts in engineering programs nationally have fallen into a familiar pattern: since teaching students to communicate is the responsibility of the technical communication program, some engineering educators argue, then that program should do the assessment of student learning outcomes. Engineering programs, concerned that they have their hands full with documenting student learning in technical areas, have, in many cases, attempted to pass the buck. Such attempts, however, are questionable for two reasons. First, this thinking reverts to the silo mentality that ABET has tried so vigorously to modify through EC 2000. Second, refusing to take responsibility for students' communication skills reveals engineering programs' lack of ownership for the totality of their students' engineering education. In the worst case scenario, engineering programs that rely on adjunct, temporary, and/or non tenure-track instructors to staff technical communication courses endorse even further exploitation of these workers.

## POSSIBILITIES FOR TECHNICAL COMMUNICATION PEDAGOGY

Accreditation under EC 2000 is only now getting underway. Rose-Hulman Institute of Technology and the Colorado School of Mines, for example, will undergo accreditation visits during the fall of 2000 (Rose-Hulman Institute of Technology, 2000). Only a handful of engineering schools have had to document student learning outcomes under this new system. Further consideration and analysis of the effects of EC 2000 will occur as more schools develop assessment processes and attempt to provide evidence of their students' skills. There are clear benefits, however, that should derive from EC 2000 for technical communication programs that serve engineering students:

- Multiple opportunities for development and reinforcement of students' communication skills
- Increased sense of responsibility for development of students' skills, shared between engineering and technical communication programs
- Increased student perception that engineering skills and communication skills are connected and mutually beneficial
- Creation of a new breed of engineers who can apply technical and non-technical problem-solving strategies



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Julia M. Williams is Associate Professor of English and Coordinator of Technical Communication at Rose-Hulman Institute of Technology, Terre Haute, Indiana. In 1996, she developed the campus-wide Program in Technical Communication, which currently serves all engineering students in a variety of technical and non-technical courses. She is also the co-chair, with Dr. Gloria M. Rogers, of the Commission on the Assessment of Student Outcomes (CASO), the committee responsible for the development of an institute-wide assessment plan. CASO has created the RosE-Portfolio, an electronic portfolio system used to document student learning outcomes (currently marketed by ICTT, Inc., as the e-portfolio).



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