WAC Meets the Ethos of Engineering: Process, Collaboration, and Disciplinary Practices

Linda S. Bergmann
University of Missouri-Rolla

This paper considers some ways in which WAC theory can conflict with disciplinary practices in applied or technological fields like engineering, so that even though there is a significant demand in engineering education for improving students' communications skills, in many local institutional situations WAC theory and practices may have little actual effect on the kind of writing projects that are set up or on the ways in which students actually learn to write. This apparent failure to communicate or implement WAC knowledge between disciplines is hardly surprising, since a considerable amount of WAC theory, in the early days at least, was based on expressivist interest in personal writing and on the belief that students are given too few opportunities in school to use writing as a means of personal development and intellectual growth (Russell 278). WAC programs have conventionally promoted activities and ideas to generate "writing to learn" for students in all disciplines, very often without much inquiry into what other modes of learning are more common in those disciplines, or why this is so. Although we have made some progress in understanding the rhetoric of other disciplinary discourses (see, for example, Bazerman and Paradis), and although some programs call themselves "Writing in the Disciplines" in order to acknowledge their teaching of writing as disciplinary discourse, these are at best uneasy relationships. I still hear considerable frustration with "the engineering mentality" from writing people, and considerable suspicion on the part of engineers that "English" wants to determine their curricula. Departments "on the other side" of campus tend to buy into WAC not to foster students' general development as writers and learners, but in the hope that their students will learn—as quickly as possible—to write clearly and coherently and in what they perceive as a professional manner. When the process-driven theories of rhetoric and composition confront the product-driven practices and traditions of engineering and business educa-

tion, the resulting conflicts can lead these departments to modify writing programs and projects in ways that move them away from the principles of process and collaboration that are central to the WAC approach.

The accounts of writing projects in science and engineering that are published in venues like the *Journal of Engineering Education* reveal some of the ways in which WAC theory is adapted—and often ignored or effaced—by faculty in applied or technological fields.[1] My understanding is that this effacement occurs not because of the ill-will or ignorance of the faculty undertaking these projects, but rather because of their deeply-ingrained and often tacit assumptions about the nature of writing and of learning to write, assumptions that are bound up in the process of how disciplines like engineering actually produce knowledge. The disciplinary conflicts I am considering in this paper are hardly new; they are pretty much the same issues described by Toby Fulwiler over fifteen years ago in "How Well Do Writing Across the Curriculum Programs Work?" and are rooted in some fundamental differences in how different disciplines understand knowledge, education, and writing. But now that there are so many WAC programs, and so many writing projects in applied disciplines like engineering, these differences merit re-examination, particularly if we think that it is desirable to maintain those WAC principles even in WID programs in order to foster students' growth as writers and thinkers, and not merely to serve the narrowly-defined communication needs of particular disciplines. Learning to write, even for an engineering student, is not merely a process limited to learning to write an acceptable lab report.

In this paper, then, I am going to revisit three fundamental differences in assumptions between WAC faculty and faculty in applied disciplines. The first difference is that WAC looks at writing as a process, whereas engineering is heavily oriented toward products–dare I say "deliverables"? Engineers value processes–the writing process included–not for their own sakes, but only insofar as a particular process leads to a cost-efficient product. The second difference is that WAC looks at collaboration in the context of several decades of research into collaborative learning, which values the learning that results from a group of people working together. Engineering, on the other hand, conceives of collaboration as "teamwork," which has its own body of research and its own record of success. Engineers working on a project generally assemble a team of specialists, each of whom does what s/he does best, and who very often work apart from each other on different aspects of a project. Finally, engineering faculty seldom really understand that learning to write is a recursive and time-consuming process, that listing specifications is not the same thing as teaching a student to write; and WAC faculty seldom really understand that merely pointing out the limitations of this approach

is not sufficient to produce changes in deeply-rooted disciplinary practices.

I address the concept of process first, because the differences here are the most obvious, and perhaps also the most difficult to overcome. For example, in "How Well Does Writing Across the Curriculum Work?" Toby Fulwiler admits a note of exasperation in describing his work with a forestry professor:

> I've come to believe that you can only teach a writing process approach to process-oriented people. This implies first, that some colleagues, already on our wavelengths, are already doing some of the things we suggest and use workshops primarily for reinforcement. That's good. But it also implies that many others who attend have a rather product-oriented approach to the whole teaching business: students must learn that what counts in the real world is the final report, the finished letter, the completed project—not the evidence of effort as one struggles to get there. . . . For these teachers, no matter how much we stress techniques and strategies to *generate* good final products (journal writes, freewrites, multiple drafts, etc.), the workshop produces only superficial change in their attitudes or practices. (Six months after she attended a workshop and told us how much it meant to her, a professor who teaches in forestry said that the main things she looks for on papers are "spelling, style, and neatness." While we don't dismiss these items, her answer dismays us.) (56)

While Fulwiler is definitely promoting a process pedagogy, the writing process he proposed was directed at moving students toward producing "good final products"— indeed Daniel Mahala roundly attacked what he saw as the product and program orientation of Writing Across the Curriculum in his 1991 article, "Writing Utopias: Writing Across the Curriculum and the Promise of Reform." The published accounts of WAC projects in engineering and science programs suggest that Mahala was right, at least about WAC's non-progressive applications. Indeed, many of the projects that I've read about or been involved with demonstrate that when faculty in science and engineering incorporate the idea of process into their curricula and syllabi, that process tends to become not only a process toward a final product, but also a series of discrete products, each of which can be graded.

The following excerpt from a term paper assignment in General Chemistry at the University of North Carolina at Pembroke illustrates what hap-

pens: i.e., process pedagogy turns into a series of "current traditional" products with specific point values for easy accounting:

Dates and Deadlines

Friday Jan. 24	Topic (issue) due in writing in class.
Monday Feb. 10	Paper outline and preliminary bibliography due in class. For your preliminary bibliography, you may turn in printouts from the library's data bases indicating what sources you plan to use.
Wednesday Feb. 12	Peer review of organization and logic flow due in class.
Friday March 7	Rough draft due in class. Peer editing session in class.
Monday April 7	Final paper due in class.

Grading

The process of writing this paper, and the final product will each be worth 100 points for a total of 200 points. A partial breakdown of these points is:

Activity	Points
Turning in the topic *on time*	10
Turning in the outline and preliminary bib. *on time*	20
Rough draft with bibliography, *turned in on time*	30
Peer editing process	
(to participate you must have the proper document)	40
Final draft	100

(Roland Stout 4)

This may be a very useful writing assignment for the students in this class—Roland Stout claims that it leads his students to write better and think more clearly about chemistry, and I believe him— but it does not seem to incorporate "writing to learn" or any sign of what people in writing conceive to be progressive pedagogy. What it does incorporate are peer review and editing and the provision for re-writing; it sets up a process clearly designed to produce a better final product for the professor to read. If this is, as I believe it is, a typical example of how writing is incorporated into science, engineering, and business courses, it offers a good case study of how WAC ideas get diluted and undermined in practice.

Although we like to document WAC successes by counting the writing projects that are brought into courses in other disciplines, we also need to consider the extent to which they actually reflect WAC principles. We need to notice, at least, when WAC principles are ignored, misunderstood, or undermined—and perhaps we need to reconsider whether that is a bad thing, particularly when both students and faculty indicate satisfaction with the work they have done.

Although what we have in the example above is an outline for an assignment rooted in the product-oriented, current traditional pedagogy that WAC was supposed to surmount, I generally assume the best of intentions on the part of the faculty member who designed it. The faculty who undertake these projects and then write articles about them for professional conferences and publications are the *student-oriented* folks in the other buildings, the ones who come to us for help and who *care* that their students get practice in writing in their fields, the ones who may actually be willing to sacrifice time to work with student writing. They do not, however, see the writing process in the same way as we do, and I suspect that they experience it differently in their own writing. One of the reasons that what we say about the writing process does not fully communicate to this audience is that for faculty in science and engineering, themselves practitioners in their discipline and writers of their disciplinary discourse, much of what we think of as the writing process is embedded in the larger process of experimentation, which can take place over the course of years and may involve several kinds of oral and written discourse. They think in terms of "writing it up"—which is something quite different from the writing process proposed by most people in rhetoric and composition.

"Writing it up" may encompass only a small part of what people in WAC conceive of as the writing process; and the engineering faculty member may see the production of a report not as a process itself, but as a small part of a larger and more important process with research. For example, a chart that accompanies an account of a research writing project in aerospace engineering at MIT (Waitz and Barrett) visualizes the larger research process as a linear process, in contrast to the messy, creative, and recursive process WAC people tend to see writing to be. The research process has a beginning, middle, and end, punctuated with reports. The individual reports are seen as points, not lines, and a good bit of the thinking, discussion, and collaboration that *we* might consider prewriting is embedded in the research process itself, not in the production of the report. This view of writing also differs from commonplace WAC thinking because "writing it up" does not seem to include much discovery. The two fields conceptualize the production of knowledge differently. Engineers, for the most part, expect to discover knowledge through

experimentation, calculation, and oral discussions among team members, not through intellectual work that transpires mostly in the individual mind of the writer. Moreover, they do not expect to discover a form; the form of much technical writing is pre-determined by the publication or recipient for which it is destined. What I am suggesting here is that the process-oriented approach that WAC people bring to these projects from composition theory may not fit very well into the actual process that goes on in these applied disciplines. This disjunction may mean that much is lost in translating WAC principles to writing in engineering courses. The result may be a watered-down version of "writing in the disciplines," i.e., writing projects that merely teach the formats and surface conventions of technical writing. What I am suggesting, moreover, is that we may need more than simple translation to move from "writing it up" to "the writing process"; we may need to reconceptualize a larger process that is *not* a process of writing, but rather a process of producing knowledge.

The second problem this paper addresses, the slippage between collaboration and teamwork, is closely related to this product orientation. When writing people envision collaboration, they think of a bunch of people in the same room, working together—or these days, maybe on the same list serve or MOO. For example, as part of a national project of the Council of Writing Program Administrators, I've been involved in producing a series of drafts of a statement defining outcomes for first year composition. The resulting Outcomes Statement[2] has been composed collaboratively, through a recursive process of composition faculty meeting at various conferences and corresponding on at least two electronic discussion lists; this has been a process of throwing ideas at each other and playing with them until they work. I have high hopes for the final document, drafts of which have already proved useful in a number of articulation negotiations and similar situations. But while this collaborative process has worked well for this group of writing program administrators, it is not the way I have collaborated with engineering faculty. For example, I have been involved in writing a successful grant proposal with a group of engineering professors at my university. This collaboration involved a single meeting at which tasks (parts of the paper, budget items, contacts to be made) were distributed. Each team member sent his or her pieces to the Principle Investigator, who pieced them together, possibly with the help of a technical editor for some final tweaking. Each of us did our specialized part, and did it well enough to net our project a substantial amount of money. It would be hard to claim that this was *not* a successful writing project. But what we did was very different than the concept of collaboration defined by John Trimbur as "engaging in a process of intellectual negotiation and collective decision-making" (602).

Because engineering faculty think in terms of working in teams and bringing in consultants to ply their own specialties, they bring different expectations to collaboration than English faculty do. Again, I think it is useless to dismiss these differences as mere stubbornness or as submission to a corporate ethos. Because teamwork is a whole different way of looking at knowledge than collaboration, a perspective rooted in disciplinary assumptions, it is not going to be changed by the introduction of a few new pedagogical techniques. If we understand the centrality of teamwork and consulting to fields like engineering, we might see, for instance, why engineering faculty maintain the idea that the "English" in a paper can be separated from its "technical content" and its features assigned separate grades, even in the face of some twenty years of insistence by WAC people that this approach is futile or counterproductive.

Consider, for example, the following statement co-authored by a faculty member in chemical engineering, who has been a staunch advocate of Writing Across the Curriculum, and who has authored articles on writing and given presentations at WAC meetings and workshops. Despite—or perhaps because of—his involvement with writing projects, his department hires a writing consultant trained in English, and distinguishes technical content from "readability." We can see that his involvement with WAC has aroused some discomfort with the binary grading scheme, although not so much discomfort that the practice is abandoned:

> During the third year the students have access to a writing consultant who is available to help students with any writing mechanics or style. The writing consultant is an English instructor who is employed by the department to be available for student consultation for 10 hours a week. In addition, the consultant reads all of the student papers, makes comments (in a different colored pen), and grades the readability. The final report grade is a composite (80% Professor, 20% Consultant) of the two grades given. The consultant has an office in the department that is near the undergraduate laboratories. The students are required to meet with the consultant at least twice each semester. Most students find the consultant to be helpful and make several visits beyond those required.
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> The idea of a writing consultant is a long time tradition at UND (about 15 years), however the job description and emphasis has changed over time from being an "English grader" to a "writing consultant." This change in emphasis is motivated by the argument that split grading of the "technical content" by the professor and the "writing mechanics" by the

English grader emphasizes and acknowledges that learning in this course is somehow distinct from writing in it. Since this is contrary to the departmental philosophy that clear writing is an indication of clear thinking (and hence good learning), the emphasis has been placed on being a writing consultant more than just an English grader. Both the professor and the writing consultant grade the entire paper for readability and clarity. By necessity the professor checks the calculations and technical arguments, but also grades the presentation of the material. Another advantage of using a writing consultant is that it gives the students additional contact with a professional who is interested in helping them improve their writing skills beyond (but not replacing) the time given by the professor. (Ludlow and Schulz 166)

Despite the authors' philosophical move to the idea of unified knowledge and their semantic move from "English grader" to "writing consultant," this chemical engineering department preserves the underlying structure of distinct knowledge and split grades.[3] Moreover, the stated departmental philosophy that "clear writing is an indication of clear thinking (and hence good learning)" is decidedly *not* a philosophy of writing to learn, but one that locates "good learning" only in a successful written product. In trying to represent writing as a crucial part of the professional practice and education of chemical engineers, they are taking an unproblematized view of writing and its evaluation, ignoring, for example, the possibility that clear writing may indicate oversimplification rather than clear thinking, and ignoring the research that suggests that student writing often declines in clarity and organization as students move into more professional levels of discourse (Williams and Colomb). This slippage from WAC principles notwithstanding, however, the project is conceived of and written about as a successful project in teaching students disciplinary writing and presented as a model for other departments to imitate. And, having been involved in similar projects, I believe that the work may indeed be beneficial to the students and that the "Writing Consultants" may be well enough trained to bring into their consultations a process pedagogy with a less immediate product orientation than that articulated in the assignment, i.e., that they may bring to the team pedagogical practices that are not noted in the article. So even as I point out the slippage, I am willing to be persuaded that writing projects like this one—which by local accounts do indeed work—can be valuable experiences for students. My point is merely that the slippage should be noted and admitted, and that the argument for the project's effectiveness must be made.

The distinction between collaboration and teamwork points to the final difference that I am going to discuss in this paper. Probably all writing faculty have experienced the tendency of engineering faculty members to think of English departments as chiefly engaged in teaching and judging students' writing, and to think of good writing as consisting primarily of grammatical correctness (we may hedge and call it "clarity" or "readability"); thus, they tend to assume that we are neglecting our mission if we are not functioning as grammar police. Although we have been preaching to each other for some twenty years or so the idea that grammar instruction is not central to teaching writing, that idea has not filtered over to the other departments of the university to any noticeable extent. We have been much more effective at talking to each other about what constitutes good writing theory and practice than we have been at disseminating our current understanding of writing and writing instruction more widely across the disciplines. The misconceptions that Fulwiler's colleagues expressed fifteen years ago are *still* alive and well among the engineering faculty on my campus, and probably on many others:

> No matter how hard and lucidly (we thought) we explained the crucial distinction and relationship between the two functions of language, a number of faculty would never accept the idea that informal writing to oneself had anything to do with formal communication to somebody else—teachers, for instance. My School of Business friend tried to explain his colleagues' misconceptions: "I think the attitude of the School of Business for the most part is that . . . transactional writing has been replaced by expressive writing, poor sentence structure, and no concern for spelling" (Fulwiler 53).

The underlying feeling here is that the business department's rigorous writing initiatives are undermined by the laxity of the English faculty's approach to writing. Because engineering faculty tend to conceive of interdisciplinary work as teamwork rather than collaboration, and because they are highly product-oriented, it is hardly surprising that they would feel that English faculty in general and writing faculty in particular are not holding up their end of the deal if the students' writing does not immediately improve in demonstrable and measurable ways. As the engineers see it, *their* product is the research results, process, application, or thing that has been experimentally verified. *Our* product is the paper or report. Why don't we just teach students to *do it*?

Because English departments tend to justify their existence—or at least the existence of the required first year composition course—through an appeal to writing skills, it is hardly surprising that people in other fields

see teaching these skills as our primary job.[4] I know full well that I use a skills justification when I take my case to the university at large, even though I also know that writing skills are hard to define and difficult to measure. Even worse, WAC people know that their work is at best marginal to the activities, interests, and research of most of their colleagues in the English department; engineering faculty tend to conceive of teaching writing as being the crucial task of English departments, and simply do not understand that studying literature and meeting the needs of majors almost always take departmental precedence over teaching writing and providing general education. In universities noted for a primarily technological mission, these misperceptions are exacerbated by longstanding suspicions on both sides, resulting in an almost traditional ignorance and disdain for each other's professional assumptions and practices. There is obviously much room here for inter-departmental friction to eliminate the possibility of effective communication, not to mention to undermine the possibility of developing coherent and effective programs to improve student writing.

Because academics in all disciplines tend to look at their own discourse practices as naturally superior, much work has been needed to articulate the discourse practices of different disciplines. In a paper presented at the 1997 Conference on College Composition and Communication, Steven Youra argued for an anthropological approach to understanding and working with other disciplinary cultures, an approach that involves finding translatable points and working from them. In order to overcome interdepartmental ignorance and suspicion, WAC people working with departments like engineering, business, and other disciplines that focus on applied knowledge tend to seek out common assumptions, even if we do not share a common language—and maybe we are inclined to find similarities even where they do not exist. What I am saying here, though, is that we need to be equally clear about points of divergence, so that we can see and understand where our thinking and practices differ and even conflict. We need both to increase our knowledge of the disciplinary cultures that provide the context for their discourses, and to be aware of the tendency of faculty in particular disciplines to drift back to rather than re-think their disciplinary practices. And, finally, we need to repeatedly reassess the value of our *own* theories and practices, and to understand how they are embedded in the disciplinary culture in which we work.

Somehow, we tend to think that once an issue has been discussed, it is *settled*. But in academic dialogues in general, and in Writing Across the Curriculum in particular, this is simply not the case. Fulwiler described how faculty members, when they leave WAC workshops and go back to their disciplines, become re-immersed in their disciplinary expectations

and conventions, and how the WAC "mission" gets diluted in this disci-
plinary context. Moreover, individual faculty members within disciplines
may well drift in and out of WAC initiatives, so that new voices must
continually join the conversation and "old" discussions must be repeated
and reiterated. And although Writing Across the Curriculum programs
are by their interdisciplinary nature sites of negotiation and compromise,
we need to maintain a steady awareness of when our principles and ideas
are being modified, so that we can decide when to compromise and when
to fight. It may be that interdisciplinary tension and even conflict need not
and maybe should not be resolved; it may be that through these tensions,
conversations, and occasional outbreaks, Writing Across the Curriculum
sustains and renews itself as a vital academic force.

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Notes

[1] I am going to try to examine rather than defend what I see as the WAC position, because I am trying to understand the differences we face, not to win that conflict. In doing this, I run the risk of oversimplifying and over-generalizing: Even as I write "WAC thinks this" and "Engineering thinks that," I can see exceptions and arguments that I am neglecting. Nonetheless, I think that by looking at these differences, we raise the possibility of seeing the positions more clearly, and thereby we gain the opportunity of communicating effectively and of choosing where to compromise and where to hold the line.

[2] The Outcomes Statement and information about its development and potential uses can be found on the World Wide Web at the following address: <http://www.mwsc.edu/~outcomes/>.

[3] There are, of course, reasons other than epistemology for engineering faculty to hire graders to do the "English" part of their grading, reasons having to do with the institutional expectations that engineering faculty can and should spend their time generating and managing funded research.

[4] Sharon Crowley has recently offered a convincing critique of the appeals to skills and to general humanist culture as rationales for the composition requirement; I am afraid that we make similar claims for the more expressivist WAC practices.