Communication as Professional Practice: Designing Assignments to Develop Engineering Professionals

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Abstract – This paper focuses on two specific developments in writing pedagogy – discourse communities and genre knowledge – to guide engineering faculty in developing assignments that effectively foster the communication abilities needed in today’s engineering workplace. It outlines current research in these areas, defines critical concepts, and provides examples of how faculty might design assignments to best take advantage of the current state of knowledge about workplace communication.

Keywords: Technical communication, writing, speaking, assignments, engineering education.

TECHNICAL COMMUNICATION IN THE CLASSROOM

Engineering faculty incorporate writing (and speaking, and visual communication) into their courses for a range of reasons: to assess student knowledge, to enhance student learning, to prepare students effectively for professional practice. When, in particular, ABET requirements refer to students’ “ability to communicate effectively,” and the National Academy of Engineers (NAE) characterize the engineer of 2020 as one with strong communication skills, those discussions point specifically to the professional dimension. As NAE explains, in practice engineers face a wide range of audiences around the globe, and communication grows increasingly critical to not only individual success, but to the profession as a whole: “The increasing imperative for accountability will necessitate an ability to communicate convincingly and to shape the opinions and attitudes of other engineers and the public” [NAE, 10].

In light of such claims, this paper focuses on assignments designed specifically to help students communicate more effectively as professionals. While assignments geared toward professional practice often also enhance student learning, “writing and learning” is a substantial field of inquiry in itself, and much has already been written about developing assignments to promote learning and critical thinking. Similarly, assessing student outcomes is currently a critical point of inquiry for engineering education researchers, and literature in the field is growing rapidly. Consequently, I am excluding those discussions and addressing only those dimensions of classroom practice considered technical communication (though I refer to “writing” throughout, the arguments apply equally to oral and visual communication).

In considering the state of college writing in 1965, W. Earl Britton, in “What is Technical Writing?” decried the kinds of assignments found in college classrooms:

...in all too many instances, at least in college, the student writes the wrong thing, for the wrong reason, to the wrong person, who evaluates it on the wrong basis. That is, he writes about a subject he is not thoroughly informed upon, in order to exhibit his knowledge rather than explain something the reader does not understand, and he writes to a professor who already knows more than he does about the matter and who evaluates the papers not in terms of what he has derived, but in terms of what he thinks the writer knows. In every respect, this is the converse of what happens in professional life, where the writer is the authority; he writes to transmit new or unfamiliar information to someone who does not know but needs to, and who evaluates the paper in terms of what he derives and understands. [Britton, 3]

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Britton’s critique illuminates one of the central tensions in many university writing assignments: students write to faculty who not only know more than they do, but who do not need the information for any reason other than to grade student performance; similarly, students’ goals are primarily grade-based. The context, motivation, desired outcome (for both parties), and dynamic all differ, sometimes radically, from professional life. And the tension is not easily resolved because faculty do know more than their students and they do need to evaluate student learning.

Thus despite four intervening decades of extensive research in composition, rhetoric, and technical communication, Britton’s criticism often remains true, though perhaps no longer as universally as in 1965. As David Russell points out in Writing in the Academic Disciplines, the past 25 years or so have seen a dramatic growth in Writing Across the Curriculum (WAC) and Writing in the Discipline (WID) programs that provide copious resources for faculty who want or are compelled to incorporate writing into their classrooms. A simple Google search on “writing assignment design,” for example, yields over 2.7 million hits and leads quickly to Writing Centers and WAC programs at the University of Maryland, Surry Community College, the University of Kansas, the University of Toronto, and many other excellent centers. For a decade or more, writing specialists have sought to help faculty develop assignments with clearly defined goals, explicit evaluation criteria, carefully sequenced phases, and more. More recently, engineering education conferences such as Frontiers in Engineering (FIE) and the American Society for Engineering Education, as well as the Journal of Engineering Education and IEEE Transactions on Professional Communication have seen a number of papers on effective assignments specifically for engineering courses.

Despite these resources, many engineering faculty still fail to see the desired. They (along with employers and advisory boards and alumni) still bemoan students’ ability to communicate; those who recognize the value of communication in teaching and learning still seek ways to better develop student writers. The complaints are not new; faculty have decried students’ writing ability almost since writing became part of the university curriculum in the late nineteenth century. The constant critique sends faculty inside and outside writing programs on an eternal quest to locate the one place (freshman composition? high school? grammar school?) they can turn to fix the problem. Still, each year enough students graduate with the ability to communicate effectively that industrialized civilization has continued to thrive and develop technology with increasing speed. [Russell, 11]

As the engineering workplace evolves, though, such “accidental” success is not enough. The NAE, along with other engineering leaders, see communication skills as increasingly critical to students’ success; as a result, faculty seeking to improve students’ abilities in this area look for new guidelines, new strategies. While the resources currently available are valuable, many are limited in the same way many writing assignments are limited; they present guidelines or formulas, but rarely educate faculty about the research underlying those heuristics. In part, of course, that approach reflects the fact that faculty, like students, are pressed for time and want to know “how” without worrying about “why.” But as all engineering faculty recognize, a formula is most useful when one understands its derivation, and thus its appropriate and inappropriate applications as well as how to modify it as needed.

To that end, this essay focuses on two developments in writing research, particularly in technical communication, to help faculty understand not only how to design effective assignments, but why these assignments are effective and thus how to adapt them as the professions, modes of communication, and global workplace change. This paper is by no means a comprehensive review of technical communications research, or even engineering communications research. Rather, it highlights two relevant areas of inquiry for faculty integrating writing into their courses – discourse communities and genre knowledge – and makes those areas relevant to classroom practice.

**DISCOURSE COMMUNITIES AND THE MYTH OF “GOOD WRITING”**

**What Makes Writing Good?**

One of the first stumbling blocks to effective assignment design is the myth of good writing – the belief that “good writing” is a universally agreed upon, discipline-independent ideal, something everyone can clearly identify regardless of academic backgrounds or the context of the situation. This myth, in fact, is often at the heart of debates over who should teach writing, when, and through what kinds of assignments, as reflected in a recent exchange with a colleague. Why, this colleague wanted to know, should we bother to teach “technical” writing at all; if we could just help students learn to write well, then shouldn’t they be able to pick up the “technical” part on the job?
Embedded in this question is the firm belief that “good writing” is an abstract that, once mastered in one context – be it the research paper or the laboratory report – can be reproduced everywhere.

In most professional practice, a limited number of basics are nearly universal. “Good writing” follows the rules of standard written English, for example. Commas go where they belong; periods end sentences; semicolons do whatever semicolons are supposed to do. Work by Aviva Freedman suggest that, in fact, these rules are one of the few elements of writing we can teach independent of context [Freedman, 5]. But when faculty and employers bemoan students’ writing skills, they typically mean far more than simple mechanics (though in many cases that is the first stumbling block and, though outside the realm of this discussion, a non-trivial one for many students).

Students and teachers often turn to the idea of “flow” – “the paper doesn’t flow well.” This elusive “flow” generally reflects both the appropriateness of the content and its organizational logic – relevant ideas structured into recognizable patterns across a document, with clear transitions between sentences and paragraphs and sections. Here, too, faculty can address general strategies such as using topic sentences to create coherence in paragraphs, using conjunctive phrases to provide logical connections, repeating key words to link ideas. But in the absence of meaningful contexts for communicating, it is often extremely difficult for students to first adequately determine relevant ideas, second develop a clear internal logic for orchestrating those ideas, and third make that logic explicit to the highly abstract “general reader” (or even “the technical reader” or “the manager”). Rather than serving as tools to enhance “basic skills,” assignments without context instead represent the most difficult of writing tasks.

Even more problematic than the decontextualization of assignments, however, is the fact that, as almost three decades of research in disciplinary communication have shown, what counts as “logic” and what constitutes “recognizable patterns” varies (sometimes greatly) from discipline to discipline. As David Russell points out, one of the most persistent myths of the modern university is that we all speak one language – and thus that we all define “good writing” in the same way. As Russell explains:

…the term academic community has powerful spiritual and political connotations, but today academia is a discourse community only in a context so broad as to have little meaning in terms of shared linguistic forms, either for the advancement of knowledge (which now goes on in disciplinary communities and subcommunities) or for the initiation of new members (who are initiated into a specific community’s discourse). Thus, to speak of the academic community as if its members shared a single set of linguistic conventions and traditions of inquiry is to make a categorical mistake. [Russell, 11]

Though the term has an array of nuances within technical communication, a discourse community, broadly defined, is a group of people who share a common language – marked not only by shared technical terms, but by shared assumptions about acceptable subjects of investigation or inquiry, criteria for reliable or valid proof, standard patterns for organizing arguments, and related communicative issues. Hence, for example, while educational researchers consider ethnography a methodologically rigorous approach to understanding classroom dynamics, engineering faculty, operating under the scientific method, might consider such approaches “merely” anecdotal, and therefore less valid. The work of scholars like Charles Bazerman, Greg Meyers, Donald McCloskey, JoAnne Yates, Dorothy Winsor, and others have begun to outline the conventions, logics, and structures (implicit and explicit) that define knowledge-making in disciplines from biology to history to economics to engineering, and their work provides an important backdrop for discussions of communication practices inside and outside the classroom.

As Winsor’s work in engineering communication shows, the divisions proliferate when we compare discourse in a specific academic discipline to workplace practices. Consider, for example, the difference between an abstract and an executive summary. In the logic of an engineering research journal, while the abstract may sketch out key conclusions, the real results appear in detail in the final section of the article – the conclusion of a narrative built on the scientific method, in which authors lead readers through a careful argument that validates the conclusions in terms of the relevance of the theory, the rigor and soundness of the method, and the reliability of the data. In the workplace, in contrast, many engineering managers (and perhaps even more clients) want the results first, so that the executive summary presents the “bottom line up front” as technical writing textbooks say. The conclusions are what matter to the executive; the details of the report remain for others. The organizational logic is inverted, and the two contexts demand very different “flows” from their respective authors.

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Implications for the Classroom: Initiating Student Writers into the Community

For most professionals, as Russell notes, these discourse conventions remain largely invisible. As case studies have shown, members of a community often learn the community’s language not through careful, explicit instruction but through trial and error and tacit (often painful) apprenticeships [e.g. Berkenkotter, 2; Freedman, 6; McCarthy, 8; Winsor, 13]. Faculty, for example, earn membership in professional discourse communities through writing theses, dissertations, journal articles, and proposals. The implicit, unacknowledged apprenticeships that promote such learning have significant consequences for subsequent teaching. Because faculty do not name the conventions of their own communities, they cannot readily teach them to others. Thus they mark what seems “wrong,” and suggest “right” alternatives, but may not be able to explain how to differentiate the two beyond simple grammatical correctness. Students who succeed are often those most adept at reading the nuances without explicit direction.

Moreover, this process of entering a new discourse community is complex and often frustrating, and more often than not results in a decline of skills the writer may have mastered in other courses. As McCarthy notes in her study of a student moving through several university writing courses: “In each new classroom community, Dave in many ways resembled a beginning language user” as he learned the conventions of the new environment. He even insisted to those observing his work that “skills mastered in one situation, such as the thesis subpoint organization of Freshman Composition did not . . . automatically transfer to new contexts” [McCarthy, 8]. Because Dave, and many other students like him, come to each context as “a beginning language user,” which manifests itself in everything from faulty grammar to convoluted logic to inappropriate tone, faculty decry the “failure” of freshman composition and wonder why “those English people” cannot teach students to write. Russell explains the issue as follows:

Because the development of discipline-specific writing skill is gradual and subtle, bound up with the activity of the discipline, faculty have tended to mistake the inevitable struggles of students to acquire the rhetorical conventions of a discipline for poor writing or sheer ignorance. [Russell, 11]

The truth, though, is that writing is not a skill learned once and then repeated forever, like scales on a piano. Rather, while certain rules of grammar, along with techniques such as transition words, remain relatively constant, every act of communication is like a new musical piece – it employs some of the familiar scales, but in new and complex ways that demand careful analysis of the task at hand, attention to the nuances of the composition, and practice.

Of course, many students do eventually learn to communicate through tacit apprenticeships. It is the path most faculty take as they develop professionally. Like children learning language, members of a disciplinary community do not approach it systematically; they unconsciously absorb the words around them, try, are corrected, absorb more, and eventually master the native tongues. But for faculty who want to help students communicate professionally, this approach, while sporadically successfully, is not the most efficient or effective for all students. It is like asking students to play a game without telling them the rules.

The implications for the classroom, then, are two-fold. First, in classroom discussions and in written assignments, faculty should explicitly acknowledge, particularly for students at the sophomore and even junior level, that there is no universal “good writing” and that writing assignments within their majors ask them to communicate in new ways: to grapple with new and unfamiliar content, to use new language, to apply new kinds of logic, and to employ new formats and organizational structures. Students who have written college essays and research papers will find laboratory reports a new, often uncomfortable task; students who have mastered the lab report may still not produce a successful progress report. By recognizing that many student struggles are not simply a failure to have learned basic grammar in 7th grade and transitions in 9th, but rather result from the process of learning a new language, faculty may not only lessen their frustration with “poor writing,” but may also learn to respond more effectively to student work. Laboratory reports for freshman chemistry may legitimately have different “rules” than one for the mechanics of deformable bodies because the disciplines, the subjects of inquiry, and the methods of testing are different. By openly acknowledging such differences to students, faculty can not only better prepare students for the work involved in the task at hand, but also reinforce the contextual analysis demanded by any communication task.

Second, in designing assignments, again especially for lower-level classes, faculty should be as explicit as possible about the criteria for success. Consider, for example, selections from two sets of grading criteria; the first is for a sophomore-level laboratory report, the second for a sophomore-level design report:

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Selected Laboratory Report Grading Guidelines

Results (specific description of findings relating to goal) (3 points)
Discussion (analyses of results and building of logic for conclusion) (3 points)
Conclusion (summary of most important findings relating to goal) (3 points)

Selected Design Report Grading Guidelines
- The report contains a Gantt Chart based on the textbook, which shows the timing of each task (10 points)
- The figure is properly labeled (3 points)
- A clear and concise description of the figure is presented. The text points out the major conclusions one can draw about this specific design project based on the figure (6 points)

Both sets of criteria present the same dilemma for students – a set of undefined terms such as “analyses,” “logic,” “most important,” “properly,” “major.” What kind of “logic” is appropriate for a laboratory report? How does a researcher “lead” readers from data to conclusions? What are the “major conclusions” draws from a Gantt chart?

More effective criteria, by contrast, teach students “what counts” in the community by articulating its conventions:

Selected Laboratory Report Grading Guidelines
Results (describe the experimental results by including graphs similar to those in your manual and highlighting trends shown by those graphs that do or do not support the theory you are trying to prove) (3 points)
Discussion (analyze your results by using the theory given for the lab and the intended results of the method to explain why your results do or do not support the theory) (3 points)
Conclusion (summarize the theories and/or anomalies demonstrated by the results, briefly noting the relevant supporting evidence from the data) (3 points)

Selected Design Report Grading Guidelines
- The report contains a Gantt Chart based on the textbook example, which shows start date and end date of each task to help manage the schedule (10 points)
- The figure is labeled so that your manager can immediately identify the name of the project, the time frame, and the major project phases (3 points)
- The description of the Gantt chart clearly and concisely summarizes the information most needed by someone managing resources and deadlines, including start and end dates, critical paths, potential problems or sources of delay, and interdependent tasks that might affect final delivery (6 points)

The clarifications seem patently obvious to most faculty; they are part of the conventions of the discourse communities in which engineers work and are, as noted earlier, virtually invisible to practitioners. To the student, however, they are certainly invisible, but unfortunately not particularly obvious.

Constructing such explanations does not require engineering faculty who incorporate writing and speaking to read all the scholarship on discourse communities, or even on engineering discourse communities, though certainly brief texts such as Dorothy Winsor’s Writing Like an Engineer: A Rhetorical Education offer valuable insights. Most faculty can, with some thought, locate and then illuminate many of the unwritten conventions that dominate textual practices in their fields, and expand both in-class discussions and supplementary written material appropriately.

A Corollary: The Limits of Objectivity

The myth of good writing is also, as Russell and Winsor both note, bound up in the myth of objectivity – the idea that writing is “an objective rendering of reality” [Russell, 11, Winsor 13]. Engineering research journals, for instance, clearly have a persuasive element; authors describe their methods in part to demonstrate the validity of their results to other researchers, and they interpret those results in detail rather than merely displaying graphs to argue for the meaning and significance of their findings. Yet despite the professional persuasion faculty routinely engage in, the ethos of the scientific method and, more broadly, the academic enterprise itself, implies mythical objectivity that (unconsciously) blinds researchers to the rhetorical dimension of having work accepted for publication and validated by peers. Winsor foregrounds the problems this myth poses for students.

…our cultural beliefs about technology tend to treat it as object-bound and data-determined. We tend to believe that, in technical practice, objects and data speak for themselves. Indeed, despite the frequency of the kind of
[events that prove otherwise], engineers themselves sometimes hold this belief quite tenaciously. [Such events],
however, suggest that rather than speaking for themselves, objects and data need a spokesperson who will stand
between us and them to tell us what we see. Moreover, they also suggest that different people can vie for the
role of spokesperson for the same object or data because different people will produce different data or interpret
the same data differently. [Winsor, 13]

Winsor uses the Challenger shuttle explosion as one of the most public examples. Part of the problem, she argues,
ocurred because management did not interpret the data through the same lens the engineers used [Winsor, 12]; the
two groups belong to different discourse communities, and both failed to understand the conventions of the other.
The engineers believed that the data clearly argued against launch, but the managers saw a different interpretation.

Dispelling the myth of objectivity also has implications for student writing. By moving beyond the illusion of
objectivity and framing laboratory write-ups, design reports, and technical papers as persuasive, faculty can help
students learn that in practice engineers must not only present their results, but argue – in terms that the audience
understands – for the value and significance of those results. Thus, rather than framing laboratory reports as
objective statements about findings and results, faculty can foreground how laboratory reports, like the academic
journal articles they prefigure, are not merely tests of whether one conducted the experiment correctly, but sites to
argue for the validity of the procedure and the significance of the results. By articulating, in both assignment
handouts and classroom discussions, the elements of persuasion embedded in most communication, faculty can
more effectively prepare students for the roles they will face as practicing professionals in presenting their work to
colleagues, managers, and clients.

The nature of that persuasion, of course, is also always tied to the conventions of the discourse community one is
trying to persuade. Sometimes, as in academic journal articles, author and audience share the same discourse
community; at other times, when engineers present results to managers or clients, the two communities are different.
In addition to helping students recognize the rules of one particular discourse community, then, assignments that
stress persuasion to external audiences can, through explicit criteria, help students recognize alternate communities,
much like the revised criterion for the Gantt chart description cited earlier emphasizes the needs of the manager.

GENRE KNOWLEDGE AND THE POWER OF FORMATS: TEXTS AS FUNCTIONAL AND FLEXIBLE

The Transactional Nature of Professional Communication

The role of persuasion not only reflects the mythical nature of objectivity, but also points more broadly to the
functionality of texts in professional practice. This functionality is at the heart of Britton’s differentiation between
classroom (students writing for faculty who already know and/or do not need the information) and workplace
(professionals writing for those who do need information they do not have in order to act). In the workplace, that is,
communication is transactional; it is a vehicle for action. One could argue, of course, that writing is functional in
the classroom as well – faculty need to grade students and they use papers to do so. But that function is very
different from a manager who needs to allocate resource decisions based on weekly progress reports from her
design groups, or a corporation that uses proposals to evaluate which vendor will best meet their needs.

In recent years, scholars in technical communication have focused specifically on this functional dimension of
workplace communication. Articles such as Carolyn Miller’s “Genre as Social Action” examine the ways in which
common workplace documents are not simply “formats” or conventions, but have particular functions bound up in
the needs, interests, and activities of groups and organizations. Formats such as technical reports, proposals, and
even résumés, represent workplace genres with recognizable features that differentiate them from one another. Yet
as Miller argues, if the term genres “is to mean anything theoretically useful, it cannot refer to just any category or
kind of discourse” [Miller, 9]. Miller’s work, building on earlier formulations by Kenneth Burke, Lloyd Bitzer, and
others, situates workplace genres amid social human activity: a genre, in her formulation, is not merely a set of rules
for structuring a document, but a pattern of communication that responds to a recurrent situation (e.g. managers
always need to track project progress), and has particular use value(s) within that context that meet specific needs.
Thus a progress report is not simply a document that has an introduction summarizing the status of the project, an
explanation of work completed, and an outline of future work; it is a tool managers use to evaluate productivity,
allocate resources, interact with clients, argue for more funding from their supervisors, and related business tasks. More importantly, the content and structure of the report have evolved specifically to facilitate those tasks.

Building on Miller’s work, Carol Berkenkotter and Thomas N. Huckin emphasize the flexibility of genres – that is, while all proposals certain commonalities in terms of content and structure, individual authors are often most successful when they learn to manipulate the genre to accomplish their own goals effectively. Berkenkotter and Huckin describe genres as “inherently dynamic rhetorical structures that can be manipulated according to the conditions of use” [Berkenkotter, 2]. In other words, while NSF proposals (a sub-genre of proposals) have specific sections and clear evaluation criteria, researchers who are often most successful are those who can adapt or manipulate the NSF guidelines to best sell the features of their particular project to the agency. Similarly, while the “textbook” progress report may include a section for work completed and a section for work remaining, a manager overseeing a project with multiple concurrent phases may need a report organized by phase, while one most concerned with tracking expenditures may need still another structure.

Thus while learning genre conventions is critical to engaging meaningfully with colleagues in the workplace, manipulating those genres is integral to accomplishing one’s own goals. In Berkenkotter and Huckin’s terms, “Fully invested disciplinary actors are typically well aware of the textual patterns and epistemological norms of their discourse, but are also aware of the need to be at the cutting edge . . . [a]s the intellectual content of the field changes over time” [Berkenkotter, 2]. Put differently, successful communicators not only know the typical forms, but also recognize when circumstances necessitate altering the “formula.” Winsor’s most recent book, *Writing Power: Communication in an Engineering Center*, addresses such issues. Winsor not only examines the function of various workplace genres in an engineering organization, but examines how those genres orchestrate internal power relations and how members of the community use those genres to secure their own interests [Winsor, 14].

The failure to understand how documents are used in the workplace, and thus how to adapt even time-tested formulas, clearly hinders successful communication, as even a simple example illustrates. Recently I worked with a consulting company whose job involved observing and analyzing certain practices in their clients’ workplace (normally a lengthy and expensive process) and then providing a report summarizing their findings. Early in my workshop, the consultants mentioned that their clients often did not follow their recommendations. As we discussed the report – one that followed a pattern created more than a decade ago, one that everyone, including the clients, validated – it became clear that although everyone liked the report and had approved its format, the document left out several sections critical to persuading managers to follow the recommendations. The writers all followed the formula, but the formula no longer matched the function.

Importantly, the functional dimensions of genre are also inextricably connected to the discourse community in which they function. As Berkenkotter and Huckin explain, “Genre conventions signal a discourse community’s norms, epistemology, ideology, and social ontology” [Berkenkotter, 2]. Thus the engineering journal article mirrors the scientific method because that method is integral to the epistemology of the academic engineering community. Mastering genres is therefore integral not only to gaining membership in a given community, but to engaging meaningfully with communities outside one’s own. That is, engineers learn to write laboratory reports to communicate with one another; they learn to write executive summaries to communicate with executives.

**Implications for the Classroom: Context, Function, and Beyond**

The lack of functionality Britton decries lies at the heart of many of the decontextualized assignments found in college classrooms. The following assignment from a sophomore-level introductory materials science course demonstrates this problem. Students were told verbally to write a research paper on a topic they found “interesting” that dealt with material science. The written guidelines for the paper began as follows:

- 2,500 word minimum, not including graphics, title page, or references page (~10 pages)
- Must include: title page, abstract, table of contents, introduction, body (organized with appropriate section headings), conclusion, references, appendices
- Use page numbers! (the page that begins your introduction is page 1; it does not receive a number; start numbering on page 2)

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• 10 source minimum – only 2 of which may be Internet sources

• 2-page environmental statement included in appendix and titled appropriately. The purpose of the environmental statement is to assess the impact of the technology, product, material, etc. you are researching on the environment (consider direct and indirect implications as well as the social and economic implications). References related to this statement should be placed at the bottom of the second page of the statement.

The guidelines emphasize the document’s format; nothing is said about who students are writing to or why. Even the sentence beginning “The purpose of the environmental impact statement is……,” which promises context, still omits the use value of this information. In short, the assignment implicitly asks sophomores, new to the discipline and thus the discourse community, to take a topic and, in the absence of clear use value for the text, invent criteria to determine what content to include, how to organize that content, what tone to adopt, and related communication decisions. The task is beyond not only many students, but many faculty as well. Importantly, such assignments can have value apart from teaching communication skills. Students can become familiar with the library its resources for their discipline; they can explore topics in more depth than allowed by class, they can develop lifelong learning skills. But even in these cases, the scholarship on writing and learning provides both theoretical frameworks and specific guidelines for design assignments that best help students accomplish these objectives.

Increasingly, however, such “use-less” assignments have yielded to more practical workplace-oriented documents such as proposals, progress reports, design documents, and technical reports. This shift is important because these assignments more closely initiate students into the practices associated with the discourse communities they are entering. Moreover, each engineering discipline is (or should be) aware of the kinds of presentations, reports, and electronic correspondence most common in their fields. Advisory boards and alumni are excellent sources of such information. Both technical writing textbooks and articles in engineering education journals and conferences also provide valuable models for these assignments [e.g. Hager, 7; Alford, 1; Cordon, 4].

Though such progress is critical, the work of Miller, Berkenkotter and Huckin, Winsor, and others raises another key issue for faculty seeking to prepare students for professional practice: assignments that successfully teach workplace genres must also help students understand the functions and the flexibility of those genres. Mimicking workplace formats is not sufficient to guide students towards effective professional practice; such assignments can still decontextualize texts, overemphasize format, ignore use value, and fail to teach students the why and how.

Again, grading criteria provide a useful marker for evaluating the concepts taught by a given assignment. In the laboratory report grading guidelines cited earlier, fully 24 of 50 points were devoted solely to formatting issues (e.g. type size, equation formats, figure and table labels, title page). While following formatting directions is important, such weighting often binds students to specific conventions in ways that make it difficult to adapt to alternate practices. The authority of the format is reinforced by the criteria cited earlier, in which even points associated with content emphasize the presence of a given section, with minimal discussion of use value. Students thus come to associate these genres with their “rules” rather than their uses.

The solution is not to eliminate format-based criteria, but to reconsider their use. Formatting may be more properly addressed through homework than through written reports, for example. Even more effectively, grading on communication assignments may shift from point-based to holistic, in which faculty acknowledge that the success of any document is always more than (or less than) the sum of its individual parts. The criteria continue to be explicit, but the grade reflects a critical evaluation of the document as a whole rather than a sum of never-quite-right points.

Assignment and criteria definitions also play a key role, as in the design report mentioned earlier. The assignment from which the selected criteria were drawn asks students to deliver a document covering the first phase of a structured design process. After very briefly introducing the document as a means to apply concepts learned in class, the assignment lists the contents of the report (e.g. a Gantt chart plus discussion, a PERT chart plus discussion, a customer survey plus discussion, and so on) and the grading criteria, but provides no information detailing who uses this information and how. An assignment attuned to genre knowledge and use value, in contrast, would explain 1) how managers use preliminary design documents to assess a project’s technical feasibility, evaluate potential return on investment, determine whether the needed resources and personnel can be made available, and weigh project costs and benefits against other potential initiatives, and 2) define the student writer’s
goals in terms of *arguing effectively* for the proposed project. Such information may also be covered in the text, but faculty would do well to reinforce those use values as explicit elements for students to consider when composing documents. The revised grading criteria, delineating what elements of a Gantt chart managers consider important, support this emphasis on functionality. The next step might expand the criterion for the Gantt chart discussion as follows:

- The description of the Gantt chart helps the project manager effectively determine whether the project schedule is viable within current departmental constraints by clearly and concisely summarizes the relevant information including total person-hour required, start and end dates, critical paths, potential problems or sources of delay, and interdependent tasks that might affect final delivery.

Faculty can introduce use value into assignments in multiple ways. Case studies are one tool, though when defining scenarios, specificity is critical. “A technical manager,” though clearer than “a general reader,” provides little insight into audience needs and document value. “An engineering department manager responsible for making sure each project stays on schedule and within the budget, and who reports on her department’s work at monthly management meetings” provides much more useful information. Similarly, faculty can treat themselves as project managers – an approach that has proven useful in senior design courses. In two separate year-long, team-taught capstone courses, for example, students submit several written progress reports. In creating those assignments, my colleagues and I explicitly define how we use (not simply grade) these reports. As project managers, we are invested in their success (particularly since they present their work to the entire faculty at the end of the year); the progress reports help us insure that they will complete the work on time and within budget. At the same time, because these projects are tied to ABET evaluations, we must insure that they effectively reflect an understanding of disciplinary concepts and apply engineering knowledge to problems. Finally, because these are group projects, we assign individual participation grades to each group member. In describing the assignment, then, we are very clear about why we ask for specific sections and how we use the information they provide.

By providing clear statements about how people use specific documents, as well as about the criteria that facilitate those uses, faculty help students move from seeing writing tasks as central to professional practice, and better prepare them to tailor writing to the needs of each situation.

**CONCLUSIONS: ASSIGNMENTS TO FOSTER PROFESSIONAL PRACTICE**

Faculty who seek to foster students’ communication skills can increase their effectiveness by drawing on the scholarship of technical communication when designing and teaching writing and speaking assignments. Two particularly relevant concepts from recent research include discourse communities, which define shared assumptions about content, language, approach, and value among a given group, and genre knowledge, which helps articulate the functional role communication plays in the workplace. Assignments attuned to these developments will:

- Explicitly define the criteria for “good writing” – including the basis for “logical” proofs, the basis for “valid” arguments, and appropriate organizational patterns common within a discipline.

- Provide workplace-oriented assignments that not only describe formats, but also articulate how such documents and presentations function – who reads them, why, what these readers need to do with the information.

- Encourage students to see formats as flexible tools that can be adapted as needed, rather than rigid rules to follow.

- Develop grading rubrics that move beyond checking off correct formats and correct sections and instead emphasize how effectively the various elements fulfill the intended goals.

Teaching communication involves far more than designing effective assignments, of course; faculty must do more than post assignments on web sites and expect students to complete them. Moreover, few students leave the university as expert communicators. But well-designed assignments can introduce students to the questions they need to ask, the analysis they need to apply, and the tools available for designing effective communication. Such assignments can thus form the basis for teaching that helps prepare students for the realities of professional practice.
REFERENCES


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