

From Page to Stage: How Theories of Genre and Situated Learning Help Introduce Engineering Students to Discipline-Specific Communication

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This article describes a discipline-specific communication course for engineering students offered by a Canadian university. The pedagogy of this course is based on North American theories of genre and theories of situated learning. In keeping with these theories, the course provides a context in which students acquire rhetorical skills and strategies necessary to integrate into a discipline-specific discourse community. The authors argue that such a pedagogical approach can be used to design communication courses tailored to the needs of any discipline if the following three key conditions are met: assignments are connected to subject matter courses, a dialogic environment is provided, and the nature of assignments allows students to build on their learning experiences in the course.

What constitutes effective communication differs from discipline to discipline and from profession to profession. In other words, what makes a good presentation for a group of physicists would not necessarily make a good presentation for an audience of engineers. Recognizing that the engineering discipline has specific communication requirements, some Canadian universities are moving from general technical communication service courses to discipline-

specific courses designed for engineering students. Carleton University responded to this trend by introducing, in the fall of 1997, a mandatory communication skills course for first- and second-year engineering students. The major goals of this course are to facilitate the acquisition of rhetorical skills and strategies necessary for students to successfully integrate into their engineering school environment and to facilitate their transition to the workplace. These skills and strategies are acquired through typified writing practices in situated contexts of the engineering discipline, interactions with existing texts, and interactions with relatively experienced writers (engineering students from upper years, teaching assistants, and instructors).

Our course design is based on modern North American theories of genre (Freedman and Medway, *Genre*; Freedman and Medway, *Learning*; Russel) and situated learning (Lave and Wenger; Rogoff). It is our belief that a pedagogical approach grounded in these theories can be applied to the design of other discipline-specific communication courses providing a means for contextualizing such courses within a discipline.

This paper discusses our communication skills course for engineering students from a pedagogical point of view. It presents theories of genre and situated learning on which the pedagogy is based and explains how these theories are used in the course design and reflected in the course components. The paper explains how the course attempts to facilitate the transition of engineering students from an academic to a workplace environment by "cultivating the art of thinking and communicating clearly" (Vemuri 109). Finally, the paper suggests that the approach used in the design of the engineering communication course can be applied to the development of communication courses specifically tailored to the needs of any discipline.

The Pedagogical Perspective

The rationale behind the course design was to establish a discipline-specific context in which engineering students could acquire linguistic and rhetorical strategies that would provide an initial site of professionalization (Selber 269) for them and would facilitate their transition to the workplace. In recent publications on technical communication studies (Winsor; Selber; Vemuri; Beer), it has been noted that conventional pedagogical discussions of technical communication often overlook the social forces that affect the engineers' and engineering students' views of rhetoric in technical communication. We attempted to develop a course that would allow our students to acquire a rhetorical understanding of engineering communication that not only requires a social view of disciplinary genres that "moves beyond formats and templates" (Selber 270), but also leads to the development of a particular perspective on audience. This perspective

is grounded in disciplinary knowledge as “negotiated between people rather than passed from one to another” (Winsor 45). We designed the course components so that they allow students to develop an understanding of audience and purpose through the exchange of written and oral feedback, the analysis of existing documents, and audience proximity (Winsor). By basing our communication skills course design on these premises, we have attempted to overcome challenges that teaching writing to engineering students presents.

The first challenge is to recognize that these students usually bring with them a resistance to the notion of engineering as a profession that requires literacy. By situating the course within the engineering curriculum, we are trying to dispel this attitude that communication skills are not necessary to their success as engineers. Specifically, we ask our students to select an aspect of an engineering course to be the focus for their assignments in the communication course. As our course becomes part of their engineering learning experience, we hope they will begin to perceive communication skills as integral to the engineering profession.

The second challenge is to provide an environment that will facilitate integration into the community of engineering students. To become members of such a community, students need to experience genuine discursive contexts (Freedman and Artemeva) so that they may be guided towards a mastery of genres appropriate to their discipline. We met this challenge by

- basing the assignments for our course on one of the engineering courses;
- introducing an electronic course newsgroup; and
- providing a dialogic environment in our classroom.

Exposure to linguistic and rhetorical strategies that enable students to respond appropriately to the rhetorical exigencies (Miller) of their situations should facilitate integration into the disciplinary discourse.

The final challenge in designing the engineering communication course is to overcome the problems associated with simulations, in particular, “rhetorical confusion and thinness of discursive context” (Freedman and Artemeva 12). The tasks our students perform play an important role in their motivation. Rather than viewing their course work as dummy runs or simulations, students need to perceive what they are doing as being real and having consequences. Russell Hunt (“Texts”) writes that “the way to create a context in which students are writing and reading for meaning is to put the writing and reading into situations where they serve purposes which the students can see as real and which they can adopt as their own.” Our students see the communication skills course assignments as facilitating learning in their engineering courses and, therefore, serving their needs. The following student comment reflects this perception:

I'm just in the middle of preparing for my oral [presentation] and I realized that . . . I've learned a lot about Assembly Language!

Man! It feels weird to actually know what's going on in a computer course! . . . When we first were given the choice of course to focus on, I took what I thought to be my hardest course this year . . . I was right . . . the thing is, because of the extra time I've spent on it, I've solidified my grasp of stuff that much more! It's kinda cool how, if you look at something from a different perspective, you're liable to benefit from it. . . . I find that knowing how computers think has helped me understand my Java course better too. (from the course newsgroup)

As this comment suggests, by asking students to explore and respond to the rhetorical situations (Bitzer) in which they function as engineering students, we enable them to set their own learning objectives within the engineering academic context. Because they are setting their own goals within the engineering course of their choice, their motivation is genuine (Beer). In this context, students acquire strategies that allow them to respond appropriately to the exigencies that arise in their engineering courses.

Theoretical Background

When faced with the task of designing this course, we turned to recent theories of learning and writing. In our search, we found that the notions of situated learning, set within the context of social-constructionist genre theory, provided a useful framework for the development of discipline-specific communication courses. This theoretical approach helped us to develop communication course assignments situated within the context of engineering courses, thus providing students with an opportunity to acquire discipline-specific rhetorical skills. The following discussion briefly reviews these theories.

Social-Constructionist Genre Theory

Social-constructionist genre theory based on the works of Mikhail Bakhtin and Carolyn Miller enables us to approach the problem of teaching engineering writing from a new perspective. Miller's definition of genre as social action in response to recurrent rhetorical situations has made it possible to consider genre as extending beyond regularities in textual features and to broaden our understanding of genre so that it encompasses regularities across composing practices in response to rhetorical exigencies (Paré and Smart; Freedman and Artemeva).

We have based the pedagogy of our course on the analytical category of genre as understood by the North American genre school. David Russel describes the North American genre school approach by saying that it "tends to keep its analytical lens . . . on the interactions of people with texts and other mediational means" (226). This approach allows us to see the textual regularities of texts as traces of typified social actions, which actors are undertaking through language in response to recurring situations (Freedman and Artemeva). So what does this mean for an engineering communication course? It means that we as instructors need to direct our students to real, recurrent, discipline-specific rhetorical situations which give them the opportunity to "do things with words" (Austin). Our course assignments allow students to experience recurring rhetorical situations within the context of their engineering courses, thus providing them with an opportunity to acquire rhetorical skills necessary to accomplish engineering-related tasks.

John Swales defines genre as a class of communicative events that share a common communicative purpose. He locates genres within discourse communities (that is, groups of people who share certain language-using practices) that develop, use, and modify written genres in response to the recurrent rhetorical situations they face. This perspective provides a useful means for looking at how genres work in educational settings (Adam and Artemeva). In our course, the common communicative purpose for the students is to share experiences in their engineering courses and exchange knowledge. We facilitate this process by introducing an electronic course newsgroup that provides a forum for this sharing of ideas and experiences. The newsgroup environment allows students to create and participate in a discourse community—in this case, a discourse community of engineering students at Carleton University.

In addition to locating genres within discourse communities, the North American genre school highlights the role of the rhetor and her ability to reshape and manipulate genres to suit certain purposes. Learning how to understand and manipulate the genres of written communication in one's field is essential to professional success (Huckin and Berkenkotter). The most powerful model for explaining professional genre knowledge and learning is found in the field of psychology referred to as situated learning (Freedman and Adam). By situating the communication course assignments within the context of engineering courses, we facilitate student integration into the discourse community.

Situated Learning

A theory of situated learning originates from the pragmatic school of thought and its notion that knowledge is not absolute and can only be defined in relation to a specific situation or context (Tyre and von

Hippel). This theory interprets learning as a social process during which learners first observe and then gradually learn through carefully orchestrated processes of co-participation—what Jean Lave and Etienne Wenger refer to as Legitimate Peripheral Participation (LPP). The design of our communication course acknowledges the importance of these notions by providing an environment where students become engaged in collaborative learning situated within the context of the engineering discipline. The learning is collaborative because students and the instructor co-participate in the production of assignments. This collaboration is accomplished through continuous peer review and feedback from the instructor.

Theories of situated learning focus on the relationship between learning and the social situations in which learning occurs; learning is seen as distributed among co-participants (Lave and Wenger). These notions become especially important for educators under the modern conditions of the workplace, where “fluid” forms of professional activities are emerging: groups form and function as a whole while working on a particular project and then dissipate, and their members become parts of new groups and projects. In other words, what becomes more and more important in the achievement of professional goals is the ability to adapt to changing work environments, requirements, participants, and audiences (Gee). In line with this view, Jack Selzer suggests that “technical students can know how to use language most effectively . . . only if they are flexible enough and rhetorically savvy enough to change when new circumstances call for change” (190).

By asking students to address a specific engineering context—by choosing an engineering course and following it in their communication assignments—and to set goals within this context, we encourage them to find appropriate rhetorical means to respond to their unique discipline-specific rhetorical situations. By exposing our students to different audiences (their peers and/or the instructor as reviewers of and respondents to their written and oral assignments and as interlocutors in the electronic discussion group dialogue, etc.), we promote student sensitivity to the needs of differing audiences.

In summary, we considered theories of genre and situated learning as the theoretical basis for our communication course because they foreground the role of context—especially the tacitly understood and richly complicated context within which rhetorical transactions and social actions take place (Medway). While school assignments have often been criticized as decontextualized (Sloat; Artemeva and Fox; Meyer; Winsor), the reality is, as Lave and Wenger point out, that “schools themselves as social institutions and as places of learning constitute very specific contexts” (40). We have addressed these important issues by situating the communication course for engineering students within the academic engineering program at Carleton University.

Course Components

So, how do we translate these theories into classroom actions? The following sections illustrate this transition from theory to action.

Assignments

The nature of the course assignments allows students to continuously acquire and improve their rhetorical strategies in a dialogue with the instructor and their peers. First, we ask our students to select one of their engineering courses and use this course as the basis for their work in the communication course. The goal is for students to become familiar with disciplinary genres elicited in their engineering courses and to allow them to become more aware of their learning processes as well as of communicative and rhetorical strategies appropriate within the discipline. All assignments—a formal business letter, proposal, progress report, and completion report—feed into one major course project (Figure 1). The goals of this project are to enhance students' learning in the selected engineering course by providing opportunities for collaborative discussion and feedback and to offer an environment in which students gradually become members of the discourse community of first- and second-year engineering students.

At the beginning of the course, students receive a letter from the instructor requesting that they choose an engineering course on which to base their project for the communication course. Students respond to this request by writing a letter justifying their choice and providing details of the engineering course (see Figure 1) (for example, a student may choose the *Introduction to Engineering Materials* course as the basis for her project). Before submitting the final version of the letter, the student is required to obtain peer feedback on drafts and revise accordingly. All drafts and feedback must be included in the final submission. The instructor then provides comments on the content of the letter and its rhetorical appropriateness and on the revision process the letter has gone through. This interaction is the beginning of an evolving dialogue—written and oral—that develops over the term between students and the instructor. The assignment helps students to contextualize their work for the communication course within the engineering curriculum and to become aware of the instructor's needs as a reader of their assignments. In other words, it serves as an initiation to the discourse community and genres it creates, uses, and modifies through negotiation.

The second assignment, the proposal, is written in response to the instructor's Request for Proposal (RFP) (Figure 1). The RFP asks students to identify a specific topic within their selected engineering course that they would like to explore and develop in their work for our course (for example, the student taking the *Introduction to Engineering Materials* course may choose to explore methods of corrosion

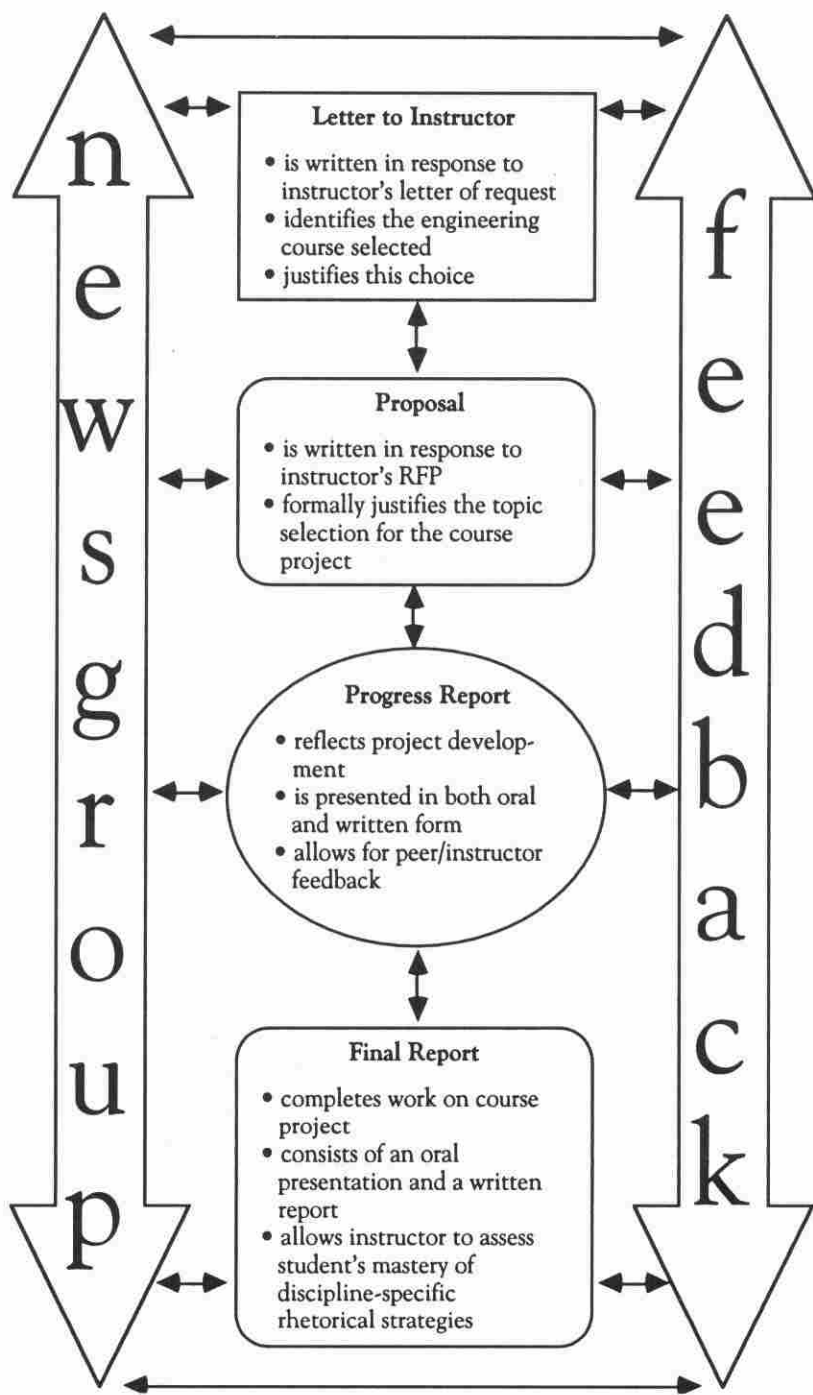


Figure 1. Components of the communication course for engineering students.

prevention in metals). The selection of the topic is the result of dialogic negotiation (Bakhtin) that takes place in discussion with peers and the instructor. Through this dialogue the student realizes the necessity of clearly defining the problem that she will study so that her own learning goals and the needs of her audience can be addressed. This process leads to a growing student awareness of discourse community: its membership, dynamics, knowledge, and genres.

The third assignment is a progress report (Figure 1) that describes the status of the students' project work in the middle of the term. In this report, students state the objectives of their projects and discuss their progress, including any problems they have encountered. The assignment is comprised of an oral presentation and a written report. The oral component allows for peer/instructor feedback in the form of questions, which enables the presenter to re-negotiate the meaning, goals, and interpretation of her work. For example, the student who is exploring methods of corrosion prevention may realize that the scope of her project is too broad and may have to narrow it down to one or two metals only. This discussion also leads to a better understanding of the needs of the audience. The written component provides the student with an opportunity to obtain guidance from the instructor. In her feedback, the instructor focuses on the clarity and feasibility of the project objectives, the student's mastery of rhetorical strategies, the student's audience awareness, and the appropriateness and accuracy of the language used.

Like the third assignment, the last assignment (Figure 1) also consists of an oral presentation and a written report. Because all the preceding assignments have fed into this final component of the course, the students have had an opportunity to perfect their understanding of the selected topic, to adapt their message to the needs of their audience, and to become members of the discourse community of first- and second-year engineering students at Carleton University. The recursive nature of the course assignments allows students to develop the necessary rhetorical strategies of the discipline in the process of the continuous dialogue with peers and the instructor.

As previously stated, we designed our course assignments in an attempt to avoid the confusion associated with simulations. We did this by situating the assignments of our course in the context of the engineering curriculum. However, we fully recognize the limitations inherent in any educational setting: even though students may be motivated to use their communication assignments as a means for enhancing learning in their selected engineering course, evaluation provides the ultimate exigency (Freedman and Artemeva). To address these limitations, we introduced an environment where exigencies are established and responded to by students and not the instructor. This environment is the electronic course discussion group in which students discuss (in written form) matters associated with their engineering courses. This environment allows students to enrich and build

on the discursive contexts of their engineering courses without prompting from the instructor.

Electronic Course Newsgroup

Before discussing the use of electronic newsgroups, it is important to briefly outline their setup at Carleton University. The division of Computing Services at Carleton University now automatically creates an electronic course newsgroup (discussion group) for each undergraduate and graduate course. These newsgroups are used in conjunction with common newsreader programs such as Netscape Newsreader or Microsoft Outlook Express, or with an internally set up university network called CHAT (Carleton Hotline for Administration and Teaching).

The communication course newsgroup is not 'moderated'; rather, as with all course newsgroups at Carleton, students are expected to follow 'netiquette' set out by Carleton Computing Services. In other words, it is self-regulating because, although instructors continuously read the newsgroup postings, they do not interfere with discussions unless asked to do so by students. Newsgroup postings are marked for completion only, which means that "students write in a situation where the only response to their text will be instrumental—that is, it will not be a comment on the merits of their writing . . ." (Hunt, "On the Origin" 3). Thus, the communication course newsgroup is an environment in which students are not forced to play roles that are unfamiliar to them (as in simulations).

The newsgroup provides students with ongoing opportunities to collaborate with their peers and give and receive feedback. This feedback enhances the development of students' rhetorical strategies by making them more aware of their readers. As Bakhtin states, "The choice of *all* language means is made by the speaker under varying degrees of influence from the addressee and his anticipated response" (99).

By reading other students' postings, our students are able to see what their peers think about the same courses and maybe discover different perspectives, learning styles, and attitudes. By participating in these electronic conversations, they start seeing themselves as part of the community of engineering students. Barbara Rogoff discusses the role of peer interaction as enhancing, motivating, and channeling the choice of activities. Peer interaction may, therefore, lead to insightful solutions to unforeseen problems. The communications course and its newsgroup give first- and second-year students the opportunity to act as "important cognitive facilitators for one another" (Rogoff 183). Courses that allow for collaboration provide an opportunity for the instructor to observe closely what students "can do, what they actually do, what as Vygotsky insisted—they can almost do, and can do with a little help from their friends" (Hunt, "Traffic" 227).

The newsgroup is a tool that promotes learning that is specific to where each learner is and to where she needs to be in terms of discipline-specific rhetorical skills (what Gillian Fuller and Alison Lee call “pedagogy of here and now”).

In the course of the exchange of the written utterances in this electronic dialogue (in Bakhtinian terms), students gradually learn how to formulate questions and provide answers appropriate to their discourse community. From the perspective of genre studies, the newsgroup enriches the discursive context within which the students operate in their engineering courses and to which they are expected to respond as student writers. The students learn how to recognize, interpret, and then respond to the communicative situation encountered. In the case of the course newsgroup—a relatively unfamiliar communicative context—students must learn to accomplish rhetorical goals through the negotiation of discourse genres. Such negotiations enable students to see the flexibility of genres as they learn to reshape genres to achieve certain rhetorical purposes. For example, in the case of the newsgroup, one of the purposes for posting is to elicit a response from a classmate. As the term progresses, the number of postings on the newsgroup increases and students are free to respond to whomever they wish. In order to elicit responses to postings, many students adjust their writing to ‘attract’ classmates to their messages. There are a number of ways to elicit responses. In some cases, the writers provide significant details related to an engineering course, details that will inform their classmates and perhaps lead to a response. Similarly, some students choose to write an argumentative posting on issues related to engineering courses. Other students will post parts of engineering course assignments and explicitly ask for help. For example, one of the students, Radomir (all student names have been changed), posted a question about his *Circuits and Signals* course:

Today I also had my 3rd lab from 97.251. I found that the TA was a bit harsh today. He wanted a lot and there were quite a few people arguing with him on different topics. However, we draw 6 graphs for prelab and we were to draw 6 more during the lab. The 6 graphs done in the lab were supposed to be accurately copied from the scope.

Three graphs were for V_r and 3 graphs were for V_c .

- V_r is the voltage over resistor
- V_c is the voltage over capacitor

Three different frequencies were used to obtain values for V_r and V_c . Frequencies used were 500Hz, 5000Hz, and 50,000Hz. There is one thing I still don't understand. Why when you decrease period, voltage decreases?

This message stimulated the following exchange:

Jack:

I think that when you decrease the period (increasing the frequency) you give the capacitor less time to charge, so it cannot achieve the same potential. Correct me if I'm wrong.

Radomir:

I think that you are absolutely right. I'll still have to check on this, but it sounds logical. Since potential is dependent on time, less time, less time to charge the capacitor, and therefore smaller potential. Most probably you are right.

Bill:

Decreasing the period is increasing your frequency. At higher frequencies, the signal oscillates between positive and negative much faster, and gives the capacitor less time to charge. What ends up happening is the cap doesn't charge fully, and the average voltage being measured decreases.

This theory is used *often* in further electronics courses, where capacitors can be used as DC blocks, high-frequency filters, and as elements in RF choke circuitry.

This thread illustrates how Radomir correctly used a rhetorical strategy to obtain information he needed. In addition to achieving this goal, his message provoked a discussion that allowed other students to exchange knowledge. By analyzing the dialogue that takes place on course newsgroups from the perspective of situated learning, we can see that the newsgroup allows for the kind of interaction among "near-peers" that is recognized as such a powerful tool for learning in communities of practice (Lave and Wenger; Freedman and Artemeva).

In describing the course thus far, we have emphasized its focus on the genres of engineering school communication. One of the course goals is, however, to facilitate students' transitions to workplace communication. Because of the necessary distance between the contexts of school and workplace (Freedman, Adam, and Smart), it seems futile to assign writing appropriate for the workplace in the context of the university communication class. As Dorothy Winsor notes: "Classroom instruction alone can never completely prepare a student to write at work. Any such training has to be supplemented by situated practice" (20). The engineering curriculum provides such situated practices in the form of co-op placements and internship programs. The majority of our first- and second-year engineering students, however, enter the communication skills course before they start their first co-op placement. Recently, research has been conducted to elicit certain sets of practices and activities (Freedman and Adam; Russel; Winsor; Dias et al.) that can be legitimately introduced in the classroom and that are necessary for the successful transition to the workplace. In the following section, we illustrate how our commu-

nication course helps to prepare students for the transition from academic to workplace communication.

The Transition from Academic to Workplace Communication

One of the characteristic features of engineering work is that "most engineering writing is . . . done in teams" (Dorman and Pruett 657). By introducing teamwork (that is, group presentations, collaborative writing, and peer and instructor feedback) in the classroom we provide students with the opportunity to generate ideas, accomplish technical work, and produce communal knowledge (Winsor). In other words, teamwork helps to prepare engineering students for their future professional activities. As opposed to most engineering course work, the grade for the team presentation is shared by all participants. This practice is similar to the workplace, where responsibility for the quality of the work produced is shared.

We designed the course to encourage the kind of learning situations common in the workplace. The course assignments reflect activities that take place in the context of both the engineering classroom and workplace. For example, as a prerequisite for graduation, engineering students are required to produce and present a project in the final year of their studies. The communication course assignments prepare students to write proposals, progress reports, and completion reports, all of which are integral parts of this final year project. These documents are also typical of the engineering workplace. By introducing these assignments, we are attempting to equip students with skills and strategies that can be applied to their other engineering courses and that will facilitate their transition to the workplace.

Conclusion

In this paper, we have presented a description of a new Carleton University engineering communication course. The pedagogical approach we used to design the course is based on theories of genre and situated learning. We believe this approach can be easily translated into a communication course tailored to the needs of any discipline. To successfully adapt this approach to another discipline, three key conditions must be met. First, communication course assignments must be connected to the subject matter courses students are taking concurrently with the communication course. This connection allows for authentic exigencies that help students explore and acquire the genres of their disciplines. Second, a dialogic environment, in which students can negotiate meaning and promote learning through this

negotiation, must be created. Third, the communication course assignments should be designed and linked in such a way that they furnish students with the opportunity to build on learning experiences in the course. Under these conditions, the communication course provides a context in which students acquire rhetorical skills and strategies necessary to successfully integrate into the community of university students in a particular discipline and to facilitate their transition to the workplace.

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