Practicing Engineers Talk about the Importance of Talk: A Report on the Role of Oral Communication in the Workplace

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In the last decade engineering education and industry have requested assistance from communication educators. Responding to increased attention on the changing expectations for practicing engineers and an attendant need for better communication skills, these teams of engineering and communication educators have been working to incorporate speaking and writing in engineering education. Despite a great deal of anecdotal evidence that communication is important to working engineers, relatively little data based information is available to help us understand better the specifics of how and why communication is important for these particular professionals. This paper reports the results of practicing engineers’ descriptions of the importance of oral communication. These data suggest that engineering practice takes place in an intensely oral culture and while formal presentations are important to practicing engineers, daily work is characterized more by interpersonal and small group experiences. Communication skills such as translation, clarity, negotiation, and listening are vital.

Keywords: communication in the professions, workplace teams, engineering education, oral presentations

Increasingly, oral communication is recognized as an essential element of the curriculum in technical disciplines (Beaufait, 1991; Bjorklund & Colbeck, 2001; Denton, 1998; Yu & Liaw, 1998). Disciplines such as biology, chemistry, engineering, and mathematics, with a long curricular tradition focused on technical knowledge, have begun to explore the role of oral performance as both a learning tool (e.g., use of cooperative learning groups) and outcome (i.e., students in these disciplines are expected to be proficient both technically and communicatively).

Engineering is one such discipline experiencing a shift toward incorporating oral communication instruction within a highly technical curriculum (Beaufait, 1991). The 1995 report from the National Board of Engineering Education includes recommendations for a redesign of the engineering curriculum toward a more professional focus with specific attention on instruction in communication. Additionally, the Accreditation Board for Engineering and Technology (ABET) has developed new standards for accreditation to evaluate departments and colleges of engineering around the country. Specifically, ABET assessment procedures are driven by 11 student outcome measures, one of which states that students should...
graduate with an ability to communicate effectively and work productively on teams (see www.abet.org).

External accreditation agencies are not the only voices calling for attention to oral communication. Businesses and industries nationwide are also recognizing the centrality of communication skills in professional engineering practices. In fact, researchers suggest that for practicing engineers a majority of time is spent communicating in written or oral form (Baren, 1993; Dunn, 1998; Paradis, Dobrin, & Miller, 1985; Piirto, 2000). According to a survey of industry representatives, engineers say they spend over half of their day communicating, either with other employees working on the same project or with individuals outside the organization (Vest, Long, & Anderson, 1996).

Not only are engineers spending more and more time on communication tasks, those tasks are increasingly being identified as critical parts of their professional life. An Engineering Curriculum Task Force study rated effectiveness in communicating ideas as second in importance only to problem recognition and solution skills. Communication skills were rated as more important than mathematics, science, and technical skills (Evans, Bealkeley, Crouch, & Yamaguchi, 1993). One particular study of industry practices noted the centrality of oral events in professional practice in the following way: “the joint interpretation of instrument traces through oral discussion is one of the chief ways these engineers built consensus among themselves and thus created what was accepted as engineering knowledge” (Winsor, 1998, p. 355).

Another article examining engineering design teams found that many of the decisions that were most closely tied to claims about knowledge in engineering were made in oral discussions (Winsor, 1999). Winsor’s article illustrates the importance of communication in relation to professional activities, “writing, speaking, and drawing can be seen as tools with which to analyze and generate knowledge, not just pass it along” (1999, p. 23).

Although evidence suggests that communication skills are critical to engineering practices, other studies report that these skills are being inadequately developed in engineering courses and curricula nationwide (Black, 1994; Evans, et al., 1993; Goldberg, 1996; Lumsdaine & Lumsdaine, 1995; Rogers, Stratton, & King, 1999; Sageev, Prieto, & Smaczniak, 1992). For example, Katz (1993) interviewed professionals in industry who described the lack of communication skills: “Their communication skills are not good, they’re less than not good, they’re really bad. In most cases, they’re not strong communicators and that is a problem because we are trying to get some of our technical people to participate in client presentations” (p. 172).

As this research illustrates, there is a disparity between the perceived importance of communication and the respective preparation students receive on communication related tasks. Communication across the curriculum (CXC) scholars and practitioners, in collaboration with engineering departments, are responding to this disparity in a variety of theoretical, curricular, and pedagogical ways. A recent framework for CXC scholarship—communication in the disciplines (CID)—provides a theoretically-grounded rationale for a discipline-specific perspective on communication instruction. Using written genre scholarship as a springboard (e.g., Bazerman, 1988; Miller, 1984; Winsor, 1999), the CID framework suggests that oral genres are places where students learn what it means to communicate as a member of and expert in their own discipline (Dannels, 2001a).

Based on this theoretical grounding, the CID framework suggests specific curricu-
lar and pedagogical implementations. Specifically, this framework suggests that communication instruction across the curriculum should focus on the oral genres, standards of effectiveness, and evaluation practices of the target discipline (Dannels, 2001b). This pedagogical move represents a departure from (but not negation of) a single, generic basic course in public speaking. The CID framework “assumes that students’ learning that occurs in general, basic courses can be enhanced in the disciplines with instruction that is situated within practices that are salient to the discipline” (Dannels, 2001a, p.147). This pedagogical move is not new to cross-curricular scholarship or practice, as scholars in composition have explored writing-in-the-disciplines (e.g., Bazerman, 1988; Herrington & Moran, 1992) and practitioners in various writing across the curriculum (WAC) and CXC programs have administered various writing and/or speaking-intensive courses specific to their disciplinary needs (e.g., University of Hawaii; Rensselaer Polytechnic Institute; Mary Washington College).

Concurrent with this move toward discipline-specific instruction in WAC and CXC programs are numerous curricular changes in engineering education nationwide (Brennan, 1997; Burke, 1991; Hunkeler & Sharp, 1997; Olds & Miller, 1998; Vest, Long, & Anderson, 1996; Yu & Liaw, 1998). Some programs have engaged in comprehensive curricular change that places communication at the forefront of targeted or designated speaking intensive courses (Quinn, 1993). Other programs have designed new communication courses for engineers. Many of these communication intensive courses target technical communication as a critical skill to learn, sometimes to the exclusion of other communication skills (Knox et al., 1995). In these courses, public speaking skills are integrated with the use of technical information and called “technical communication.” Although not as frequent, some communication courses for engineers and/or communication intensive courses focus on other communication skills such as listening, visual aids, group creativity, and audience analysis (Gunn, 1997; Lonsdale, Mylrea & Ostheimer, 1995).

One of the most common places communication instruction occurs in engineering curricula is the senior capstone course (such as a design course). In these cases, targeted communication skills are most typically focused on public presentations (Beaufait, 1991; Chalifoux & Vinet, 1988; Knox et al., 1995). Additionally, many of these senior level courses include assignments that require communication skills such as team design projects, team brainstorming sessions, or student team portfolios (Chalifoux & Vinet, 1988). Driving many of senior capstone curricular models in engineering is the attempt to align communication instruction with industry needs (Anderson-Rowland, Reyes, & McCartney, 1997; Mirel, Olsen, Prakash, & Soloway, 1997; Sageev, Ortiz, Grunert & Smaczniak, 1994). Such courses often provide an opportunity to engage in activities that might occur in industry as well as getting feedback from industry representatives on students’ engineering communication skills.

Unfortunately, though, there has been little systematic research from industry representatives that provides descriptions of the types of communication skills that might be consistent with industry needs. Although there is a wealth of research that supports the claim that communication skill training is important and necessary (Bjorklund & Colbeck, 2001; McMasters & Matsch, 1996; Gaboury, 1999; Koehn, 1995; Lang, Cruse, McVey, & McMasters, 1999), there is minimal research that details the types of oral performance events (genres) or communication skills that
might be most appropriately incorporated in the engineering curriculum, given the identified workplace practices. In other words, while previous job analyses have identified that communication is important to the workplace, we really do not know much about what kinds of speaking tasks practicing engineers face (e.g., team presentations, one-on-one meetings with employees, formal PowerPoint presentations), the typical audiences for whom those speaking tasks occur (e.g., clients, employees, public forums, the government), and the perceived consequences of these speaking tasks to workplace success.

Additionally, with the resurgence of integrated writing and speaking programs and instruction (Dunn, 1998; George & Trimbur, 1999; MacLennan & Sheckels, 1995), CXC programs would benefit from more systematic explorations of the extent to which writing and speaking are equally important and function similarly in the disciplines. New innovations in integrated writing and speaking programs testify to the importance of exploring both writing and speaking within particular disciplines. Yet even with these new innovations, we are unclear as to how various communication media (writing and speaking, specifically) function within particular disciplines. Although we know from many industry surveys that speaking and writing competencies are both important to the engineering workplace (Piirto, 2000), we have only minimal information about how practicing engineers perceive speaking and writing in relationship to each other. One such article reports results of an industry survey that claims engineers spend 32% of their time writing, 10% on oral presentations, and 22% in other oral discussions (Sageev & Romanowski, 2001). Without additional information from practicing engineers in this area, we are in a position of knowing very little about how to appropriately proceed with curricular redesign that includes both writing and speaking within particular disciplines.

In summary, we know oral communication is an important part of engineering practice, we know CXC practitioners and engineering faculty are committed to curricular revision, and we know that this curricular revision should be sensitive to the situated oral genres and skills that exist in engineering industry. Based on the CID framework, this study focuses on gaining a more in-depth understanding of the discipline-specific oral communication genres, skills, purposes, and audiences that characterize the engineering workplace from the perspective of practicing engineers. Additionally, in response to new educational trends that advocate combined speaking and writing programs, this study focuses on gathering information about practicing engineers’ perceptions of writing and speaking activities in the workplace. These specific foci represent areas of scholarship and pedagogy that, as illustrated earlier, are underdeveloped and could provide useful information for curricular design. Therefore, the following questions guided our exploration:

1. What oral communication genres and skills are important in the engineering workplace?
2. What are perceived audiences and consequences of oral communication in the engineering workplace?
3. What is the relative importance of oral communication as it relates to writing in the engineering workplace?

This project, then, describes observations about oral communication from the perspective of alumni of a Department of Mechanical Engineering at a large state university located in the West. First, we report results that detail the types of oral communication practices and skills that are important to the engineering workplace,
the audiences and consequences of oral communication in engineering practice, and the relative importance of oral communication in relation to writing skills for practicing engineers. Second, we discuss these results in terms of their implications for communication across the curriculum scholarship, research and practice.

Methods

We used qualitative techniques to analyze data that emerged from a larger research project (Glaser & Straus, 1967; Strauss & Corbin, 1990; Miles & Huberman, 1994). We were members of a communication team that engaged in research, instruction, consultation, and curricular revision incorporating communication into the curriculum of the Department of Mechanical Engineering. The larger body of our empirical work has focused on discovering and describing the types of oral communication skills and performances that were important to mechanical engineering teachers and students. As a part of that effort, we were presented with an opportunity to begin to discover and describe the role that talk played for alumni of that department who were practicing mechanical engineers. The data reported here emerged from our administrative efforts to attract funding to support this growing operation.

Data Sources

As part of an on-going College of Engineering development effort, two members of the research team prepared a white paper describing the speaking and writing program and mailed it to alumni of the department who were, or had been, practicing engineers. Within the white paper we included a written interview protocol inviting alumni to comment and provide insights about the program. The purpose of the protocol was primarily administrative; we were seeking to generate information about how practicing engineers experienced the need for and types of speaking and writing tasks expected of them in their work. The written interview was designed specifically to elicit descriptive answers to questions related to the importance of speaking and writing to industry practices in engineering. Sample questions from the written interview included: “What kinds of speaking do you routinely do (i.e., presentations, business meetings, group facilitation)?”, “How much of your job requires formal speaking? If retired, how important was effective public speaking to your business success?”, and “What are the two most important communication skills that we can teach mechanical engineering students?” Our initial inspection of the written interview suggested that while our original intention was administrative and pedagogical, data could be gleaned and observations articulated using content analytic tools. Such a move is well within the accepted methodological practices of qualitative research. For example, Lincoln and Guba (1985) have persuasively argued that data, especially qualitative data, can be responsibly garnered in a variety of ways including from documents intended for other than empirical purposes.

The white paper, with the written interview protocol as an insert, was mailed to 1600 alumni of the Department of Mechanical Engineering. One hundred and twenty three protocols were returned to the College Development Office. Most respondents were working (71%) rather than retired (29%) and had been employed for an average number of 15 years (the range of years working was 1-40). Just over half of the respondents worked in a large company (52%) having an average of 37,000 employees. The remaining 48% worked in smaller settings ranging from self employment to 500 people (the average was 105). Therefore, given the range of time on the job and type of employment settings, we have a diverse group of respondents.
The protocols were treated as naturalistic data (Lincoln and Guba, 1985) and subjected to content and topical analysis (Strauss & Corbin, 1990; Miles & Huberman, 1994). As with any qualitative interview data, our analysis focused on repeated words and phrases with the goal of providing descriptive detail about the role of oral communication for practicing engineers.

**Data Analysis**

Given the open, generative and descriptive nature of the written interview, a variety of qualitative analysis tools lent themselves to examining these data. As an overall perspective, we worked from an inductive analytical framework committed to three general types of activity: reducing the data, creating thematic categories, and drawing conclusions based on all categories (Miles & Huberman, 1994). In the first phase of analysis, we reviewed responses to each survey question and looked for any complete phrase, sentence, or paragraph that represented a distinct statement about oral communication (or other similar terms used by the engineers—speaking, presenting, talking in front of an audience, etc.).

In the second phase of analysis, we coded all the textual data according to descriptive regularities and thematic patterns (Miles & Huberman, 1994; Strauss & Corbin, 1990). For example, responses to a question focused on the important types of oral communication in the workplace included items such as, *chairing a meeting*, *running meetings*, and *group meetings*. These were grouped into a category and labeled *meetings*. Similarly, responses to a question about important audiences identified groups such as *non-technical audiences*, *people outside the company*, and *other agencies*. These were placed in a category and labeled *non-technical audiences outside the company*. In another example, responses that indicated the importance of communication skills such as *confidence*, *eye contact*, and *overcoming stage fright* were organized in a category entitled *delivery skills*.

We first worked individually to code data into these emergent categories and then worked jointly to review our separate categories for similar groupings. We then discussed each response in terms of the agreed upon thematic labels. If we disagreed on where a particular response fit, further discussion occurred until agreement was reached. This process resulted in several categories for each topic on the questionnaire. Table 1 reflects these categories.

In the final phase of analysis, we explored more fully the specific ways in which these thematic categories functioned together in the larger engineering context. In this phase, we looked for common themes within and among the emergent categories that provided additional insight into our guiding questions about types, audiences, purposes, and consequences of oral communication, as well as the relationship between oral and written communication in the professional engineering workplace.

**Results**

This study provides empirical support for the claim that practicing engineers do a lot with talk. In both the types of talk that they do and the audiences with whom they interact, speech (oral communication) matters greatly in this working environment. Our data allow us to begin to describe the specific types of oral communication genres, skills, audiences, and consequences that matter in the engineering workplace.
Important Oral Communication Genres

Our first question focused on the oral communication genres and skills that are important for practicing engineers. Table 2 presents a summary of these observations. Fifty percent of the responses named some form of public speaking as important in their work (terms similar to public speaking, such as presentations, formal speaking, public seminars, and technical presentations were placed in this category as well). Sample statements include: “public speaking is critical, one of the most important skills,” “formal speaking is very important if you want to be more than just an engineer, to move up the ladder, speaking becomes # uno,” and “making presentations of new products was very important.”

A closer examination of how these individuals wrote about public speaking.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>EMERGENT CATEGORIES IN DATA ANALYSIS</th>
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<tbody>
<tr>
<td>Survey Topic</td>
<td>Number of Emergent Thematic Categories</td>
</tr>
<tr>
<td>Types of important oral communication genres</td>
<td>5</td>
</tr>
<tr>
<td>Frequency of formal speaking in the workplace</td>
<td>3</td>
</tr>
<tr>
<td>Types of important oral communication skills</td>
<td>5</td>
</tr>
<tr>
<td>Audiences of oral communication events</td>
<td>6</td>
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<tr>
<td>Consequences of oral communication events</td>
<td>3</td>
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<tr>
<th>TABLE 2</th>
<th>TYPES OF ORAL COMMUNICATION GENRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genre</td>
<td>Percentage of Responses Indicating Importance of Genre</td>
</tr>
<tr>
<td>Public speaking</td>
<td>50</td>
</tr>
<tr>
<td>Meetings</td>
<td>32</td>
</tr>
<tr>
<td>Interpersonal/informal speaking</td>
<td>9</td>
</tr>
<tr>
<td>Training</td>
<td>8</td>
</tr>
<tr>
<td>Selling</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>Less than 1</td>
</tr>
</tbody>
</table>
indicated that public speaking is important and the time spent preparing for such an event is sometimes more demanding and important than the event itself. One of our respondents captured the essence of this relationship between time and importance in the following comment: “Formal or informal presentations are vital, actual presentations are a small percentage of my time, less than 2% is spent making presentations, but preparation is much higher and importance is vital.” Another respondent claimed that public speaking was “5–10% of time, however one needs to master this art. A good speaker gets ahead.” In other words, our respondents told us that public speaking is important, even essential, but it is not the type of communication activity that commands a lot of their daily time at work.

Further information about how time and oral communication interact in this setting was available through an exploration of a question about engineers’ use of time. We specifically asked participants to indicate how much of their time was spent in formal presentations. We grouped their responses into three categories. Sixty percent of the responses described spending 25% or less of their time engaged in formal presentations, 20% reported spending 25–75% of their time engaged in formal public speaking, and only 20% of the responses reported that 75% of their time or greater was spent in public speaking situations. Thus, Table 2 supports the claim that formal presentations are experienced as the most important type of oral communication event but further analysis indicates that they are not the most time consuming type of communication event.

While public speaking is clearly an essential oral communication task for these practicing engineers, it is not the only one. As Table 2 illustrates, 32% of the responses indicated that meetings were the most important type of oral communication event and 9% suggested that informal or interpersonal situations were essential. Combining these two categories creates a set of responses (41%) nearly equal to that of public speaking. In contrast to public speaking events which are reported as requiring little formal time (though requiring large amounts of preparation time), the informal, face-to-face events are described as consuming a great deal of the practicing engineers’ work-day. The following are sample statements that were included in the category of meetings: “Formal presentations are few but on a weekly basis I am heading meetings that require speaking in front of small groups,” “I speak in front of groups on an average of once a week, formal presentations are made about once a month,” “This can be broken down into two categories, public speaking and peer speaking as in routine meetings. I do about 5% public speaking and 50–75% peer speaking and interacting.” Other statements illustrate the reliance on interpersonal communication: “with skills in interpersonal relations, public speaking is critical,” and “speech is important on a non-formal basis.” Taken together, these data suggest that meetings and informal interpersonal situations are the places where a significant amount of engineering work gets done and provides the context for creating and sustaining productivity in daily practice.

One category of responses was not predicted given the current literature on communication and engineering education. Eight percent of the responses indicated that some form of instructional skills were important in the workplace. This category of responses captured almost as many statements as those suggesting interpersonal/informal communication events (9%). These practicing engineers described having to lead training sessions and run seminars as well as teach peers how to execute a technique or work with a machine. While these reports have obvious credibility on
the face, our review of the literature uncovered no reference to the extent to which practicing engineers must be prepared to use oral communication to teach.

Finally, with regard to the types of genres of oral communication that are important for practicing engineers, only 3% of the responses described some form of sales presentation or project proposals. As a unique category, this finding was also not predicted. Existing literature has suggested that practicing engineers do, in fact, value persuasive speaking skills (Dannels, 2002). Engineers must be able to sell a client on a particular approach to an engineering problem and/or prove to a funding agency that a project warrants continued attention. Given this context, we were surprised to identify only 3% of our responses as falling into this category. It could be that some of the presentations described and categorized as public speaking were, in fact, persuasive in intent and in form. However, because we used their written responses as written as a means to categorize, we cannot with these data be certain about those possibilities.

### Important Oral Communication Skills

In addition to types of communication events, we analyzed the data looking specifically for information about the types of oral communication skills that were reported as important. Five distinct categories of skills emerged from this analysis. These observations are summarized in Table 3. In the most robust category, 37% of the responses described some aspect of message construction skill. Included in this category were statements like, “being concise,” “being clear,” “being logical,” and “specific communication.” The responses from these practicing engineers suggest that they are concerned about the quality with which messages are formed. This pattern seems especially important and revealing for this particular workplace. We view these findings as suggesting that the discourse community places high value on message construction and, like the construction of a good car or washing machine, the message is like a prototype that can and should be built effectively. In this case, good prototypes are clear, concise and logical.

A second category of skills described various aspects of interaction processes. Twenty-seven percent of the responses referred to skills like teamwork, negotiation, and asking and responding to questions. Looking back at Table 2, recall, that these...
engineers reported spending a lot of time running or participating in meetings. In addition, literature that reports on the types of communication needs in the engineering curriculum is replete with references to teamwork and ABET has identified the ability to participate effectively on teams as an important criterion for accreditation (see www.abet.org; Sageev & Romanowski, 2001; Seat, Parsons, & Poppen, 2001). Thus, our findings lend support to the anecdotal descriptions currently available and they provide additional ideas about what specific kinds of communication skills are perceived to be important within the context of engineering teams. On engineering teams, according to these data, it is important to be able to negotiate, to ask clear questions and to provide useful answers. On the other hand, only 7% of the responses suggested receiver oriented skills, specifically, listening, as important aspects of oral communication. This ability to listen is also consistent with the overall context of needing to operate well on teams, and the disparity between speaker and listener oriented skills in this setting might warrant further exploration.

Finally, in relation to communication skills, 9% of the responses made reference to some type of traditional delivery skills. In this category, we classified comments like the following: “confidence,” “eye contact,” “preparation,” “honesty,” and “overcoming stage fright.” In and of themselves, these are not unusual communication skills to be named. For most people, delivery issues are among the first concerns to surface when faced with a communication situation. Furthermore, as our data reveal, public speaking did emerge as a very important type of oral communication event and public speaking situations almost always bring up concerns about delivery. Given these parameters we were relatively surprised to see so few references made to delivery skills and to skills about individual speakers in general. In keeping with discourse analytic research in this setting (Darling, 2001), we would suggest that the absence of strong concern about delivery is consistent with broader discourse community preferences for eliding attention on the individual or self of the speaker. Here the focus is on the message, not the person.

**Audiences and Consequences of Oral Communication**

The second question in this project focused on understanding more about the reported audiences with whom practicing engineers interact and the perceived consequences of those communication activities. Looking at Table 4 we see that these individuals report being equally likely to speak with those inside the company as outside. That is, when we group the categories of audiences that are within the company (i.e., peers, management and employees) we account for 49% of the responses. When we group categories of audiences that are outside of the company (i.e., non-technical audiences, customers, governmental agencies and other) we account for 51% of the responses. Thus engineers, in the process of accomplishing their work, are as likely to speak with organizational co-workers as they are with individuals who are not affiliated directly with the company.

An additional general distinction among audience types is represented in our data. The types of audiences with whom engineers interact are distinguished along the lines of technical versus non-technical. Technical audiences are those with some technical knowledge or expertise and are generally composed of other engineers, scientists or mathematicians. In our data, for example, peers inside the company were other technical people but employees referred to subordinates and members of the staff. Inside the company relatively few interactions are reported to take place with non-technical audiences (8% of the responses) when compared to the more
technical audiences of peers (26%) and often management (15%). When speaking inside the company, then, an engineer is most likely to be communicating with another engineer. Recalling results reported in relation to the types of communication events, we feel supported in concluding, further, that when communicating inside the company, an engineer is most likely to be participating in a meeting, engaged in a small group discussion or having a dyadic conversation of some sort.

When communicating outside of the company, on the other hand, an engineer is likely to face a wide range of audiences most of whom have very little by way of a technical background. Included in the category of non-technical audiences outside of the company (18%) were groups like architects and airline executives. In addition, however, these respondents described a variety of other audiences like customers (15%) and government agencies (13%). Therefore, when speaking with an audience outside of the company an engineer is likely to need skills in translation and adaptation that are very different from those skills necessary for speaking inside the organization. Prior literature has identified translation as an important communication skill for engineers when speaking to a non-technical audience (Dannels, 2002). Generally speaking, translation in these settings is described as the process by which numbers and drawings are translated into words and/or the process by which engineers adjust the technical aspects of their messages for different types of audiences. These data support this claim and suggest that engineers must be prepared to speak to a wide range of non-technical audiences, for which they need a variety of translation skills that are especially well suited to the public speaking medium.

Although these data suggest that the audiences of oral communication are varied, the perceived consequences of oral communication are not as varied. As summarized in Table 5, the most frequently identified consequence of speech behavior is career advancement. Seventy percent of the responses indicated that effective oral communication was essential for promotion in the organization. The responses include statements like, “communication is vital if you want to get ahead” and “critical for management.” This overwhelming figure suggests that whether speaking inside the company or out, whether speaking informally or formally, when an

<table>
<thead>
<tr>
<th>Audience</th>
<th>Percentage of Responses Identifying this Audience</th>
<th>Sample Audience Descriptions</th>
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<tbody>
<tr>
<td>Peers inside the company</td>
<td>26</td>
<td>Peer groups, within the company, internal audiences, peers in company</td>
</tr>
<tr>
<td>Non-technical audiences</td>
<td>18</td>
<td>Those outside with little knowledge, groups of architects, airline owners</td>
</tr>
<tr>
<td>outside the company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>15</td>
<td>Upper management, management, senior management, managers</td>
</tr>
<tr>
<td>Customers</td>
<td>15</td>
<td>Customers, clients</td>
</tr>
<tr>
<td>Government agencies</td>
<td>13</td>
<td>Congressional committees, government regulators, all levels of government</td>
</tr>
<tr>
<td>Employees</td>
<td>8</td>
<td>Subordinates, employees</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>International representatives</td>
</tr>
</tbody>
</table>

TABLE 4
IDENTIFIED AUDIENCES OF ORAL COMMUNICATION EVENTS IN THE WORKPLACE
engineer speaks effectively she or he is simultaneously advancing her or his career. Recent research also supports this finding and suggests there is a correlation between amount of communication instruction and career advancement (Sageev & Romanowski, 2001).

A smaller number of responses indicated that the consequences of oral communication were instrumental support (20%) and job performance (10%). Instrumental support was a category that included statements about how communication helped get funding and or assistance with projects. Job performance, as a consequence of communication, included statements like, “to fulfill the duties of my job” and “helps me perform my job tasks.”

**Relative Importance of Writing and Speaking in the Workplace**

Our final question in this study concerned the relative importance of speaking and writing in this professional environment. Participants reported that speaking skills were more important than writing by a good measure. Seventy-two percent of the responses indicated that speaking skills (i.e., audience analysis, interpersonal communication, persuasion, confidence, teamwork) were important to engineering work. In contrast, only 22% of the responses suggested that skills in writing were vital. Based on these data, we would not suggest that writing is unimportant, rather we are interested in the relatively unequal weights given these two areas of communication skill development for the engineering profession. Clearly engineers, like other professionals, must be able to write and write well. However, these data appear to be suggesting that, for this particular professional discourse community, speaking more than writing is the communicative practice through which work gets done.

**Discussion and Implications**

The purpose of this project was to interpret and describe reports about the types of oral communication practice that typify work for practicing engineers. Bolstered by extensive testimony about the importance of talk, we were specifically interested in identifying types of talk and some of the situational features that distinguish engineering talk. Because the observations reported here were generated from data provided by practicing engineers, individuals who have been working in their trade for a number of years, they provide a unique perspective on the importance of communication to engineering.

A first overall conclusion remarks on the extent to which the engineering workplace is described as an oral culture. In various ways, these respondents indicated that engineering work is conducted orally—although not necessarily in formal speaking events. Engineers communicate interpersonally, in small groups, and on teams almost daily. The most important communication skills to develop are those related to oral performances. For the most part, though, the oral performances that are central in daily practices are conversational and informal. Skills in listening,

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Percentage of Responses Identifying this Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advancement in job</td>
<td>70</td>
</tr>
<tr>
<td>Instrumental support</td>
<td>20</td>
</tr>
<tr>
<td>Job performance</td>
<td>10</td>
</tr>
</tbody>
</table>

TABLE 5

PERCEIVED CONSEQUENCES OF ORAL COMMUNICATION IN THE WORKPLACE
negotiation and questioning that allow small groups of individuals to function effectively on teams and in meetings are the types of communication skills that engineers need and use on a regular basis.

A second conclusion from this study is that formal presentations (or public speaking events) are not as typical for practicing engineers as the informal communication events described above but they are nevertheless vitally important. It is important to recognize that while less daily or weekly time is devoted to formal presentations, when given or expected, formal presentations matter. Many of our respondents indicated that the ability to give formal presentations was critical to the job. Many others wrote about the relationship between formal presentations and advancement. Extrapolating from these data we can conclude that, for the individual interested in career advancement, the ability to give a formal presentation is essential. By extension, in order to be successful in management, an individual must master some basic skills in preparing and giving oral presentations.

A third conclusion emerging from this study is that the audiences with whom engineers engage are many and complex. Engineers speak to other engineers, to clients, to government agencies and to support staff. Some of those audiences have technical backgrounds and others do not. Audiences without technical backgrounds are not homogeneous. In fact, they can be quite diverse ranging from support staff to governmental agencies to small business owners. Thus, skills in perspective taking and translation are especially pronounced in this professional environment. The issue of translation is not only one of identifying ways to verbalize numerical or visual information, or the reverse process, but also one of articulating ideas in ways that are meaningful for someone who might help build the product, another who might sell it, and still another who might buy it. In other words, engineers probably need a dozen different ways to state and clarify any individual idea or piece of technical information.

Finally, not only do engineers need to be able to communicate well with non-technical audiences, but they also report in this study that technical audiences are not immune from communication breakdowns. In fact, our data suggest that engineers, when working on teams, are very likely to be working with other engineers and teamwork, specifically the interpersonal communication dynamics of operating successfully on teams, is the most immediate area of need. While translation is a key area of skill development when working with the number and variety of non-technical audiences, listening, negotiation, and clarity are probably critical skills within the technical discourse audience.

These conclusions have clear implications for future research and scholarship in communication. To take one example—there is limited empirical research about the issue of translation in the technical disciplines. The communication discipline is rich in theoretical discussions of how language is used to represent ideas and processes. Very little applied work that is specific to technical discourses is available to date. We know very little about relationships among numerical and visual systems and how those are accurately and rhetorically reframed as verbal arguments. Furthermore, we know even less about the ways in which technical discourses are heard differently by different audiences. When government agencies listen to a description of how a grease trap functions to create a safe and environmentally sound way to remove excess grease do they hear in the same ways that the potential consumer does? What makes these audience needs similar and different and how do those
needs influence the message construction process? These questions—along with others focused on skills of negotiation, listening, and interpersonal interaction within the technical disciplines—would provide fruitful avenues for exploration and research.

Not only does this study have implications for research, but it also has immediate implications for CXC curricular design. Rather than focus almost exclusively on public speaking skills as is so often the case in CXC work within engineering departments, our efforts should focus on teamwork and other small group oral genres such as running meetings. Instructional materials and interventions should be developed that focus clearly on the kinds of teamwork that are expected of engineers and the types of communication skills that make those teams work effectively. Where CXC and engineering programs focus on public speaking skills, those programs would be well advised to move beyond the traditional content and delivery skills to provide numerous opportunities to develop skills in listening, clarity, and negotiation.

Second, for many disciplines that have similar preprofessional classrooms, a protocol such as this one could provide faculty with critical information about how talk matters in the workplace—from those who are practicing in that workplace. Although the academic context is a place that is (and should remain) different from the professional context—in many capstone classrooms, students are engaging in preprofessional behaviors with real clients and customers for whom the academic/professional line is blurred. This project provides a protocol for gaining feedback from those clients and customers that could inform curricular decisions.

This project also has immediate implications for audiences outside of communication in composition (WAC) and engineering. Increasingly, writing and speaking across the curriculum programs are integrating and approaching disciplines such as engineering with a combined agenda. Results from this project provide all interdisciplinary team members with insight into the ways in which engineering practitioners use both writing and speaking—so that curricular change and revision can be addressed with this knowledge in mind. Additionally, many CXC programs are not fully equipped with resources to support technical disciplines. In instances such as this, this project provides engineering faculty and administrators with resources to support continued work with the discipline of engineering. A recent review of CXC directors nationwide (Dannels, 2001a) illustrates that one of the most frequent requests CXC programs hear from disciplinary clients is for discipline-specific resources. This project provides a beginning for such resources in engineering in an empirically grounded way.

Finally, a replication of this project using standard survey research tools is warranted. The data and findings reported here were extracted from a written interview protocol inserted in a white paper describing a speaking and writing program in the Department of Mechanical Engineering. For this study, such situated and descriptive data provided rich information that was previously unavailable. The placement of this interview protocol, however, might have led our respondents to be sensitive to the issues that were discussed in that white paper. Therefore, multiple methodologies (including standard survey research) should be engaged in order to utilize sophisticated statistical techniques leading to the contribution of more predictive models.
Conclusion

When asked to discuss how much of his/her job requires speaking, one practicing engineer wrote the following: “100%—communication is the life blood.” Researchers, industry representatives, accreditation agencies, and faculty around the country are offering overwhelming agreement to this statement. The need for communication skills is clear—they are the lifeblood of a practicing engineer. Yet CXC programs are lacking in systematic research that describes the communication skills and events that typify the engineering workplace, and therefore are left with anecdotal advice for curricular revision. This study represents a beginning step by providing a sample of practicing engineers’ voices about the importance of talk in the workplace. From this study we know that talk in the engineering workplace is not always the formal speeches we teach in the communication discipline—but it is not perfunctory or peripheral to an engineer’s job either—it does matter. In fact, it not only matters to their daily activities, but to those customers and clients that engineers interact with daily. As practicing engineers continue to talk about the importance of talk in their workplaces, there is a clear opportunity (if not mandate) for educators in the disciplines and communication scholars to not only lend an ear but also to collaborate on the development of sound instruction, scholarship, and curricula that has the potential for making strong contributions to students and faculty for whom talk matters in important ways.

References


