Making the Grade:

An Assessment Protocol for Communication Across the Curriculum

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A paper presented at the National Communication Association Convention
Atlanta, Georgia
November, 2001

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This study emerged from a larger NSF funded project “Establishing New Multidisciplinary Curricular Paradigms: Biotechnology and Chemical Engineering” of which I am a co-principle investigator. Specific acknowledgements should be given to the entire NSF team for contributing to the overall processes that made this project possible: Dr. Steve Peretti, Department of Chemical Engineering; Dr. Chris Anson, Campus Writing and Speaking Program; Dr. Richard Spontak, Department of Materials Engineering; Dr. Christopher Daubert, Department of Food Science; Dr. Lisa Bullard, Department of Chemical Engineering, Ms. Margaret Heil, Department of Computer Science, Ms. Paula Berardinelli, Assessment Coordinator, and Ms. Amanda Granrud, Coordinator of Undergraduate Tutorial Services in Writing and Speaking. As a team, we have worked in a truly collaborative way and each of our research interests and endeavors have benefited from this collaboration.
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In higher education, it is no longer adequate to make claims about teaching effectiveness based solely on curricular content. Assessment of programs, departments, and colleges nationwide now involves evaluating whether students have achieved desired learning outcomes in their respective disciplines (Astin, 1991). One of these learning outcomes increasingly being discussed across the curriculum is communication. The issue of oral communication has become more and more relevant to a variety of national conversations. First, among its sweeping recommendations, the 1998 Boyer report identifies “linking communication skills in course work” as a key for improving undergraduate education. A recent article in the Chronicle of Higher Education (Schneider, 1999) advocates “taking aim at student incoherence” through the use of speaking activities in coursework. Public reportage, such as the LA Times’ (Mehren, 1999) article “Colleges, Like, Focus on Speech” and the Boston Globe’s (Zernike, 1999) commentary “Talk is, Like, You Know, Cheapened,” have documented the increased concern on many campuses about poor communication skills.

Calls from business and industry also echo the relevance of effective communication instruction. Business leaders and social critics alike are recognizing the need for students to be able to present themselves effectively, and to use strong communication skills in small-group settings and less formal contexts. In response to this, disciplines with a traditionally strong curriculum focused on content knowledges have begun to recognize that their graduates are expected to “speak” the discipline as proficiently as they are able to enact the discipline in more content-oriented ways.

The need for communication instruction is apparent, and numerous universities
nationwide are responding to that need by instituting CXC\(^1\) programs (see Dannels, in press, for a review of new CXC programs nationwide). Ultimately, though, the question of assessment emerges. Are students becoming better, more proficient communicators in their disciplines as a result of CXC efforts? To what extent are students learning to communicate in ways important to their disciplinary paths? Research emerging from CXC programs has made important contributions to the overall movement, yet is behind in reflecting the discipline-specific calls that are increasingly characterizing CXC requests. Intermittent research has emerged about the general state of the CXC movement (Cronin & Glenn, 1991; Cronin, Grice, & Palmerton, 2000; Dannels, in press; Steinfatt, 1986); particular CXC programs (Morreale, Shockley-Zalabak, & Whitney, 1991; Powell & Janovick, 1997); faculty and students’ relative confidence, success, and affect toward communication instruction (Cronin, 1993; Cronin & Grice, 1997); and various models of cross-curricular work (Cronin & Grice, 1993). Yet amidst this research, we have minimal evidence as to whether or not students’ communication skills are indeed improving in ways that are required of them to graduate and enter discipline-specific, professional workplaces.

The overarching objective of this paper is to provide a protocol for outcome-based assessment of oral communication that will allow faculty and administrators to explore the extent to which students’ communication competencies meet the desired outcomes of their respective disciplines. This protocol is rich in two ways: first, it has the potential of producing sophisticated, triangulated results that contribute to communication theory and scholarship. Second, it has the potential of producing results that inform CXC programmatic change and reform in ways that are relevant and useful for the disciplines with whom CXC practitioners work. This paper will first describe this protocol for discipline-specific outcomes-based assessment. The second portion of this paper will describe the ways in which this protocol was
put into practice in one particular department of chemical engineering. The final section of this paper will provide preliminary analyses of selected data from chemical engineering to illustrate the potential for this protocol to contribute to interesting, sophisticated scholarship about orality that feeds CXC programmatic reform.

**Rationale for Outcomes-Based Assessment within a CID Framework**

Increasingly, many disciplines such as business, accounting, engineering, medical school, and mathematics (to name a few) are increasingly facing calls from the public, industry, and alumni to prepare students for the specific kinds of communication tasks they will face in the work place (Brennan, 1997; Burke, 1998; Clyne, 1996; Kovacs, 1993; Machlis & Colucci, 1996; Pabbati & Rathod, 1995). These communication tasks are rarely the generic public speaking events taught in our basic courses, and therefore, CXC programs are being faced with increased calls for discipline-specific materials, resources, and instruction (Dannels, in press). Disciplines such as engineering are particularly interested in a discipline-specific approach, as their ABET requirements for external accreditation specifically indicate a need for communication competence in engineering (Black, 1994; Evans, Beakley, Crouch, & Yamaguchi, 1993; Goldberg, 1996; Lumsdaine & Lumsdaine, 1995; Olds & Miller, 1998; Pattabi & Rathod, 1995; Vest, Long, & Anderson, 1996).

The call for discipline specific instruction also echoes a call for discipline specific assessment. CXC scholarship has not programmatically illustrated an assessment model for CXC that is grounded in discipline specificity. Dannels (2001) argues for such an exploration by proposing a new theoretical framework for CXC—“communication in the disciplines” (CID). The CID framework assumes that oral genres are sites for disciplinary learning, oral argument is situated practice, communication competence is locally negotiated, and learning to communicate
is a context-driven activity. One implication of this theoretical framework is to create discipline specific assessment tools that reflect theories of situated learning and disciplinary knowledge construction (Bazerman, 1997; Berkenkotter & Huckin, 1995; Brown, Collins & Duguid, 1989; Freedman & Adams, 1986; Lave, 1991; Lave & Wenger, 1991; Miller, 1984).

Discipline-specific CID scholarship is becoming more relevant, timely, and important to the cross-curricular movement. Although the basic courses serve an important role in providing generic instruction, assessment within a CID framework means exploring the extent to which students are meeting disciplinary outcomes. The limited attention given to strong outcome based assessment remains a weakness of many current CXC programs. Given the relative absence of strong outcome-based assessment data, we are left without clear evidence about whether or not student performances have improved as a result of instruction. Furthermore, we are left without information about how to develop and use outcome-based assessment of oral communication practice in interdisciplinary learning environments such as a CXC program.

Although outcomes-based assessment is important, efforts to conduct outcome-based assessment of oral communication practices in non-communication classrooms present a unique set of challenges. First, when assessing students, issues of validity and reliability arise. For example, perception exists that evaluation of oral practice is riddled with unavoidable subjective judgments (Darling & Dewey, 1989). Over time, public speaking teachers have developed responses to these problems; there exists a wide array of critique sheets used to establish a degree of objectivity and responsibility in grading. However, especially at the level of student assessment, there is a tendency to try to export generic communication principles to other disciplines with little if any substantive exploration as to the potential relevance of or values for those principles within a particular discipline. CXC programs tend to assume, in other words,
that an oral presentation in History is the same as an oral presentation in Chemistry and both are best when supported by generic principles of public speaking. If oral genres are sites for disciplinary learning and competence is locally negotiated (Dannels, 2001) then this generic framework may be inadequate for assessment of oral practice in disciplinary settings other than communication.

No only are discipline-specific student assessment protocols limited, but there are also limited protocols for disciplinary CXC programmatic assessment. When assessing CXC programs, self-report data provides limited understanding of the extent to which CXC efforts are contributing to competent communication behaviors in the disciplines. Even ignoring the reliability problems with self-report measures, these forms of data do not increase understanding about the ways in which students actually learn communication practices—their processes, struggles, obstacles, and strategies for learning to speak in disciplinary settings. For example, a student may report that he/she liked the communication instruction and feels “moderately sure” that he/she improved. Yet that student might have faced particular struggles trying to learn strategies for using evidence that is appropriate for a technical audience. And that student might have also continued having those struggles with the help of a CXC practitioner. When this student actually speaks in front of the audience, the performance may reflect clear professionalism in the particular discipline but because of these struggles, the student does not feel confident. Therefore, the self-report measures do not provide information about the extent to which the CXC program was successful.

In short, generic models of student and program assessment, although important pieces of the assessment puzzle, provide limited information. Other protocols are necessary to address issues of discipline-specificity in student learning, instructional strategies, and competence. The
A Discipline-Specific Protocol for Outcomes-Based Assessment

Although there is a large amount of discussion about outcomes-based assessment and its application to CXC, very few (if any) protocols have been developed to illustrate just how this process would work. The following protocol is grounded in the theoretical and methodological commitment to discipline specificity. The protocol can be expanded or collapsed, depending on the unit within which a CXC program is working (course, department, college, etc.). Additionally, although this protocol is presented in three distinct phases, it is critical to understand this is a cycle—with the final stage (assessment) feeding back into the original stage (outcomes articulation).²

Articulation of communication outcomes by department, discipline, or course. With the help of a CXC program, this initial step is a process where the course instructor, department, or college creates an outcomes statement for graduating seniors in the area of communication. Outcomes could, and most likely will include various media of communication depending on the discipline: oral, written, visual, technological, etc. It is critical that the CXC program allow the discipline to use language appropriate to their own context to define their outcomes. For example, in a department of textiles engineering, faculty identified the outcome “to be able to sell a product to a lay audience.” Essentially this outcome is about persuasion and evidence, yet when asked whether this means “to persuade” the department said they were committed to the language “sell” because of the specific industry-based connotations that were important to imply. Replacing “sell” with “persuade” may seem innocent to communication faculty, but it also may not represent what the engineer’s see and value as important. Therefore, in order to encourage
departments to take responsibility for their outcomes, it is important for CXC programs to be sensitive to the language that emerges from the department and to clarify the use of terms that might be interchangeable with our own in communication.

**Implementation of communication instruction into courses and curricula.** After the outcomes have been articulated and recorded, departments (ideally with the help of a CXC program or person) work out an individualized plan for achieving the outcomes. Plans could include a saturation model, an intensive model, a focus on senior courses, etc. In the math department at NC State, for example, there are three core upper division courses that exist as a hierarchy. Faculty in that department identified these courses as the most appropriate places to implement communication instruction. In a business school, faculty pointed to the applied courses in the curriculum as the best place for some instruction, with heavy instruction occurring during the internship experience. In a chemistry department, faculty who were concerned with time identified four key lab courses as the best place for instruction on lab reports and informal progress presentations. These implementation plans should be tailored to the discipline and should take into account the parameters, needs, and realities of that discipline’s curriculum.

**Assessment of discipline-specific outcomes.** Just as outcomes development and implementation is discipline-specific, so is the final stage of the cycle—assessment. With the assistance of a CXC program, departments of colleges work out one or more methods to gauge how well they have achieved or are achieving their outcomes. Assessment plans could include student surveys, alumni focus groups, employer surveys, faculty evaluations, portfolio evaluations, pre/post measures, and academic data (to name a few). For example, in the chemical engineering department at NC State, many students get jobs at local research and development companies. Therefore, it is important that assessment of disciplinary outcomes
includes input from those employers. The history department, on the other hand, is focused on how students achieve a process of inquiry throughout the career in college—therefore a portfolio that is kept from freshman to senior year is being considered as an assessment tool. The critical point of the assessment phase is a focus on the extent to which students achieve outcomes, not on our effort to add more courses (for example) to be able to make the claim that outcomes are addressed.

Assessment data ultimately should feed back into the outcomes development and implementation phase. In some cases, departments will recognize that the outcomes are far too broad and/or students may be achieving different, yet still valued outcomes. In this case, the outcomes would be revised to account for this data. In other cases, departments may realize that the plan for implementation just doesn’t allow students the exposure necessary to achieve outcomes. Therefore, curricular revision would occur. Finally, it might be the case that students are getting fairly close to the outcomes, and small changes in assessment practices or implementation provide more valuable information about student performance. In any case, assessment is not the end of the cycle, but valuable information to continually fuel the process.

Outcomes-Based Assessment in Practice: A Pilot Study in Chemical Engineering

The remainder of this paper will describe one CXC research program incorporating outcomes-based assessment. Results reflect the first semester of a three-year project, funded by the National Science Foundation. North Carolina State University was funded by the NSF to implement teaming, writing, and speaking into targeted, appropriate courses in the curriculum. Two courses were targeted for this implementation. The first course was a junior level lab course within which students participate in lab-driven teams to complete four sets of lab projects. Each project involves a written document, with two oral presentations throughout the semester.
The second course identified for this project, and the course from which data for this study emerge, is a senior level design course. The design course was structured as the culminating engineering experience for students, where students put theoretical and technical skills into practice by designing and manufacturing a product for a customer—in essence, this design sequence served as the primary context where students learned to be professional engineers. The design course was also structured to incorporate students from other disciplines involved in similar capstone experiences.4

This curricular innovation includes active involvement and participation of faculty and students from 9 departments and 3 colleges at NC State; in-depth integration of writing, speaking, and teaming in sequenced courses; and active participation by local pharmaceutical and bioprocessing companies in structuring, designing, and providing feedback to student work. The protocols adopted for implementation and assessment can be used by faculty, administrators, and departments interested in integrating teaming, writing, and/or speaking into engineering curricula. The remainder of this paper details a protocol for student and program assessment and provides initial analysis of targeted data in order to discuss the possibilities this protocol affords.

Chemical Engineering Communication Outcomes

The following communication outcomes were created through collaboration between the Campus Writing and Speaking Program and the Department of Chemical Engineering. The outcomes were modified for the two courses targeted in this NSF project (lab and design), and those modifications are illustrated in brackets:

1. To demonstrate that graduates are able to identify and solve a range of [lab/design] problems (from well-defined to open-ended) in a clear, logical, and systematic way, they should:
   - show that they can identify and analyze problems, that is, to isolate and describe the important components of a problem: what is given (design specifications, availability of
materials, performance requirements, testing standards, etc.); what is known from previous experience that is relevant to the problem; and what the unknowns are. Problem analysis often means breaking down a verbal statement of a problem into its components.

- show that they can represent a problem in a form that makes finding solutions more efficient and effective. Such representations are typically visual, such as a model, flow chart, diagram, table, or mental picture. This visualization should represent the components of the problem in a way that leads to the construction of a solution.

- show that they can apply chemical engineering principles and mathematics to find the unknowns and arrive at possible solutions to a problem. Such application entails an understanding of chemical engineering process technologies.

2. To demonstrate that graduates can summarize technical material in way that is appropriate to the [lab/ multidisciplinary] audience, they should:

- show that they can synthesize their own work and the work of others. Students should demonstrate their ability to do such synthesizing in abstracts, executive summaries, and literature surveys written for different audiences, such as technical peers and management.

3. To demonstrate that graduates can work effectively in teams to solve [lab/ design] problems, they should:

- show that they have a conceptual understanding of group dynamics and, more importantly, should exhibit the kinds of behaviors that mark an effective team member: working cooperatively with others, accepting divergent views, encouraging active participation of others, dealing productively with conflict, and taking leadership roles as the need arises to accomplish the group's objective.

4. To demonstrate that graduates can communicate effectively [regarding senior design projects] as a professional engineer:

- show that they can write competent memos, letters, e-mail messages, proposals, and various reports (progress, personnel, maintenance, sales, trip, etc.) and give effective oral presentations to a variety of audiences.

Although the NSF project addresses all of these outcomes, this particular study illustrates the ways in which the second and forth outcomes—summarizing technical material in a way that is appropriate to the audience, and communicating effectively for obtaining and maintaining productive employment—could be assessed from a discipline-specific perspective.
**Course Implementation and Research Questions**

The course from which data for this study emerge is the senior level design course in which teaming, writing, and speaking were integrated into a multidisciplinary design project. In this course, three different types of teams were established:

- **C₁**: Control team composed of all chemical engineering students receiving no communication instruction (10 teams, 5-7 students per team);
- **C₂**: Control team composed of multidisciplinary team members receiving no communication instruction (3 teams, 7-8 students per team);
- **E₁**: Experimental team composed of multidisciplinary team members receiving communication instruction in a teaming, writing, and speaking module (3 teams, 7-8 students per team).

Teams were selected through a purposeful selection strategy following the initial survey collection—assuring for random distribution of grades, strengths, and backgrounds on all teams.

The **C₂** and **E₁** subset of students were assigned to multidisciplinary teams (with students in similar capstone courses in industrial engineering, food science, computer science, and economics) to complete a project for an industrial sponsor. Students involved in both groups participated in a four-phase design project. At the end of each phase, students turned in a phase report and gave a progress presentation. Midway through the project, students also gave a more formal progress update presentation to their industrial sponsors and at the end of the project, they gave a final presentation to their sponsors and other faculty. These progress presentations were designed so that students had to learn the competencies of translating technical material for an audience and communicating in a professional manner (CHE outcomes 2,4). Student teams involved in the **E₁** multidisciplinary group were required to take part of their lab time to enroll in
a TWS module (teaming, writing, and speaking). This module was taught by a member of the Campus Writing and Speaking Program team, and was designed to support the writing, speaking, and teaming processes occurring through each of the four phases.

In order to address the clear need for outcomes-driven assessment of CXC, I focused this study on the processes by which students involved in this study became competence pre-professional speakers. Therefore, the following research questions guided this study:

RQ1: To what extent did students in multidisciplinary teams achieve competence (as defined CHE outcomes #2, #4) in the pre-professional speaking?

RQ1a: What were the differences in competence between multidisciplinary groups receiving communication instruction (E₁) and groups that did not receive communication instruction (C₁)?

RQ1b: To what extent are similar standards utilized by the different audiences (students, engineering faculty, and industrial sponsors) to judge speaking competence?

RQ2: What were the typical kinds of struggles students’ faced in their process of learning to speak in this situated setting?

RQ2a: To what extent did multidisciplinary teaming processes influence learning to speak in this setting?

This paper addresses RQ1, RQ1a and RQ2 and provides a preliminary analysis of pilot data for these questions.

Methodological Framework

I used a qualitative, case study methodology to explore the research questions in this study (Lincoln and Guba, 1985; Miles and Huberman, 1984). Case study research focuses on one identifiable group of participants as they interact in their own context. The case study approach “is suited to demonstrating the variety of mutually shaping influences present; and can picture the value positions of investigator, substantive theory, methodological paradigm and
local contextual values” (Lincoln & Guba, 1985, p. 42). Given the multiple influences in this study (communication instruction, industrial sponsors, multidisciplinary teams, etc.) the case study approach was appropriate.

**Data Sources**

Data for this study emerge from the first semester of CXC involvement with this senior design course and represent a case study of initial results from such involvement. Additionally, data used for this study were those focused primarily on the speaking aspect of this senior course. Table 1 illustrates the data sources for each of the research questions.

**Table 1**

**Research Questions and Data Sources**

<table>
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<tr>
<th>Research Question</th>
<th>Data Source</th>
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<tr>
<td>RQ1: To what extent did students in multidisciplinary teams achieve competence (as defined CHE outcomes #2, #4) in the pre-professional speaking?</td>
<td>Pre/post Student Survey</td>
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<td>Faculty Critique Sheets</td>
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<td>Industry Critique Sheets</td>
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<td>Portfolio Evaluations</td>
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<td>RQ1a: What were the differences in competence between groups receiving communication instruction (E₁) and groups that did not receive communication instruction (C₁)?</td>
<td>Same as RQ1</td>
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<tr>
<td>RQ1b: To what extent are similar standards utilized by students, engineering faculty, industrial sponsors, and communication professionals to judge speaking competence?</td>
<td>Course evaluations</td>
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<td>Student Reflection Logs</td>
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<td>Team Minutes and Logs</td>
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<td>Student Focus Groups</td>
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<td>RQ2: What were the typical kinds of struggles students’ faced in their process of learning to speak in this situated setting?</td>
<td>Same as RQ2</td>
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<tr>
<td>RQ2a: To what extent did multidisciplinary teaming processes influence learning to speak in this setting?</td>
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Data Analysis

For this study, a subset of data were analyzed to illustrate the potential of outcomes-based assessment of CXC in providing important information about speaking competence and programmatic effectiveness. Preliminary results from this study emerged from the following data sets: faculty and industry evaluations of midterm and final oral presentations (RQ1, RQ1a.) and student reflection logs (RQ2). A more extensive analysis will be completed on the full set of data presented here at a later date.

A variety of quantitative and qualitative data analysis tools lend themselves to examining this type of data. For RQ1 and RQ1a, oral presentations were evaluated by faculty and industry sponsors using a discipline-specific critique sheet created by members of the NSF team from communication, chemical engineering, computer science, and food science. Critique sheets were designed to further operationalize the two CHE outcomes of translating technical material for an audience and communicating effectively like a professional. Critique sheets included the following four sections: technical content (appropriate level of detail for audience, topic mastery, completeness of analysis); organization (purpose, logical structure, summary, appropriateness of introduction/conclusion for audience, and logical transitions); presentation (professional dress, style and language, vocal quality, pace, and volume); and layout/visuals (clarity, consistency, logical). Critique sheets also had room for comments on each topic and overall comments at the end. Critique sheets were used to grade all three groups (C1, C2, and E1). Critique sheets provided numerical data on the extent to which students achieved competence, but also qualitative, descriptive data in the “comments” section.

To address RQ2, student reflection logs were analyzed using a qualitative inductive framework committed to three general flows of activity: reducing the data and identifying its
source, creating thematic categories, and drawing conclusions (Miles & Huberman, 1984). In analyzing these data, I coded all the textual data according to descriptive regularities (Glaser & Strauss, 1967; Miles & Huberman, 1984) and also coded for the origination of the data (students, faculty, industrial sponsors). Patterns of responses were grouped together in thematic categories and those categories were then reviewed for larger patterns of connection.

**Preliminary Results**

Preliminary results of this study reflect the extent to which multidisciplinary teams achieved the discipline-specific outcomes identified by the faculty. Additionally, results suggest areas where teams had difficulties meeting those outcomes, and the extent to which the communication instruction influenced the achievement of communication competence. Finally, results suggest a variety of struggles students faced in learning to speak within this disciplinary setting.

**Competence in Pre-Professional Speaking (RQ1/ RQ1a)**

Preliminary data on students’ competence in their pre-professional speaking was taken from faculty and industry evaluation sheets of two oral presentations (midterm and final). For the purpose of this study, only the multidisciplinary groups were examined (C₂ and E₁).

**Multidisciplinary teams without instruction (C₂).** The multidisciplinary teams that did not have TWS instruction received an average grade (averaged between industry and faculty evaluations) of 91.1% on their midterm oral presentation. Faculty and industry evaluations indicated these teams demonstrated noticeable competence in topic mastery and organization of material in a logical format. These teams were weak in their ability to use an appropriate level of detail and their design of clear, succinct visuals. Comments included: “you really know this
chemical engineering technical material,” “nice job—this presentation flowed well,” and “your visuals were difficult to read and they needed to be better organized.” On their final presentations, teams in the C₂ group received an average grade of 94.5%. Therefore, the range of improvement was 3.4%). Evaluations indicated competence in introductions and conclusions and continued competence in topic mastery. C₂ teams continued to be weak in their ability to use appropriate levels of detail and their use of visuals. Critique sheet comments included “not enough detail to help us know you know the engineering,” “the visuals didn’t add anything to the content of your presentation,” and “you really did a nice job setting up the presentation at the beginning.”

Multidisciplinary teams with instruction (E₁). Multidisciplinary teams in the E₁ group (who received TWS instruction) received an average grade of 85.5% on their midterm oral presentations. Evaluations indicated strengths in the use of visuals and in thoroughness of requested deliverables. Evaluations indicated weaknesses in students’ abilities to use appropriate levels of detail for the audience, topic mastery, and logical organization. Comments included “you need to balance the information from each discipline so the audience has the right amount of detail,” “it seems like you are unclear on how everything fits together,” and “this felt like two different presentations—one chemical engineering and one computer science.” On their final presentations, E₁ teams received an average grade of 92.3%. The range of improvement, then, was 6.8%. Their strengths were in their logical organization, use of appropriate visuals, and their completeness of analysis and their weaknesses were in their use of appropriate detail and presentation style. Comments on the critique sheets included: “you have a much better grasp of how everything connects,” “you still need to address the level of detail—you simply don’t present enough,” and “the visuals were better, but still not a vital part of your presentation.”
Challenges in Learning to Speak (RQ2)

Initial data on students’ challenges in learning to speak in this situated setting emerge from the E1 teams’ reflection assignments that were completed in the TWS module. As part of the module, each individual student completed 10 reflection assignments on various aspects of their writing, speaking, teaming that ranged from 1-2 pages each.

Integrating multidisciplinary information. The difficulty the students most frequently mentioned in working on their speaking assignments was integrating disciplinary information from each of the disciplines into a coherent statement or presentation. On student writes: “we need to improve on transitions… I didn’t know anything about the food science content so I couldn’t really do a good job passing the baton.” Other comments include: “we needed to talk together about the technical content.. it didn’t flow well and we didn’t’ have any idea about what the others were saying,” “the IEs just presented their work and we presented ours… like two different presentations,” and “we just had too much preliminary work to do so they could get on the same page with us.”

Reflection assignments closer to the end of the semester illustrated some improvement in integration, but it was still a challenge that influenced the students’ progress in speaking. One student writes: “we’ve been together longer so at least we know the economics perspective on this, but we still don’t know how to make it fit.” Other comments illustrate this continued struggle: “we need improvement in getting all of the members involved in the project because we can’t talk about their discipline,” and “our difficulties still involve content…we don’t know how to include everything from each discipline without going over time,” and “we don’t give enough detail but we don’t know the detail of the other students’ discipline.”
Managing varied audiences. Another difficulty that students mentioned frequently was in managing the varied audiences of their presentations. They struggled with how to prepare a presentation for a multifaceted audience of faculty, students, and industrial sponsors. Comments in this category include: “we tried doing what Dr. Relli wanted but then we got dinged by the industry sponsor,” “we can’t figure out who our audience is—is it the prof. or our sponsor? Because we will prepare in a different way,” and “it was helpful to see the suggestions from the industrial mentors but I always wondered what Dr. Relli thought of them.”

Not only did students mention the disconnect between faculty and industry audiences, but they also had a difficult time managing the multiple content-area audiences they were faced. Student claimed: “even within the faculty we didn’t know who to talk for—Dr. Relli or the industrial engineering prof.?” and “it was so difficult answering questions form the computer science faculty—I didn’t know what to say and the CS students didn’t speak up,” and finally “I guess we should have just assumed that everyone was our audience—that would have been easier than making sense of specific audiences with different needs.”

Creating productive team structures. Student also mentioned that basic practicalities of the multidisciplinary teams became a challenge in their abilities to learn better speaking strategies. Comments in their reflection logs highlight this: “we couldn’t find a time when we could all meet, so the IEs met separately and the CHEs met separately… it was really frustrating,” and “the other teams get to work in the lab on their design and we have to take time away to do the speaking stuff—it helps but it just seems like the structure is wrong—so part of us just work on the lab and its not really a team.” Other comments claim: “there’s no way we could be successful as a team—we’re not a team,” and “they told us how to do the teaming stuff
but it is all busy work, so when we sit down to prep. a team presentation, we don’t really do it together. One person does it and the rest of us follow along.”

**Discussion and Implications**

Although data in this pilot study are preliminary, results imply several issues worthy of noting here for future work. The two obvious results are as follows: first, on both sets on oral presentations, the teams that did not receive communication instruction actually received better grades than those who did receive communication instruction. Second, though, those groups that did receive instruction had a greater range of grades between midterm and final presentations than those who did not (6.8% increase vs. 3.4%). Yet these grades represent mean scores over the team (from a relatively small sample size of 3 teams per group) and therefore, further analyses need to be completed to be able to explore the extent to which individual team grades/distributions affected the mean scores. It is difficult to make claims about such scores without further, sophisticated analyses.

Even prior to these analyses, though, the question of whether that instruction mattered (given the mean overall lower performance) could be interesting to explore at this stage of the analysis. Regardless of the outcome of the analyses, the results from RQ2 (challenges in learning to speak) shed some light on the reasons that underscore the experimental group performance (even if it ends up that this performance was not actually significantly lower than the group without instruction).

Students in the multidisciplinary teams who did receive instruction were bombarded with numerous “new” tasks—design, multidisciplinary teams, writing, speaking, and teaming instruction—to name a few. Those who did not receive instruction had similar constraints—yet without the TWS module or any discussion of their speaking throughout the semester. As
illustrated in the preliminary results of RQ2, students receiving communication instruction were challenged by the entire concept of integration. Students had a difficult time managing the creation of team structures. Students had a difficult time managing the varied audiences presented to them. The evaluations claim that these students did not perform well in areas of “level of specificity” and “topic mastery” and it makes sense given their difficulties and challenges with team structures and audiences. These students not only had to deal with the complexities of multidisciplinary teaming, but also with the complexities of navigating through this teaming with additional new instruction on communication.

In the TWS module, students were exposed to an entirely new area of content and way of thinking about speaking to assimilate within their team. It is possible that this sudden new area of content could actually have adversely affected their performance in the short term because they were still learning a new way of doing and thinking about speaking. They had to integrate a new protocol within an already difficult team experience (multidisciplinary members) and that took some time. It is possible that as they were doing this, their performance actually got worse because the new protocol was contradictory to their old way of thinking about speaking. Students were told to think about their speaking, and in doing so could have become less confident, more sensitive, and less proficient in their speaking performance. That the students who received instruction had a greater range between midterm and final grades suggests that as the module information became more habitual and less “new,” students were able to translate it into practice. Again, further analysis will need to be completed on the grade distributions to be able to make reliable and valid claims about these two groups, but initial analyses illustrate the possibilities of this assessment model for rich information about disciplinary learning of oral communication.
Making the Grade? A Call for Scholarship

These preliminary results illustrate the potential of a discipline-specific, outcome-based protocol of CXC assessment. First, in terms of communication across the curriculum scholarship—these results suggest that learning to speak in multidisciplinary settings brings with it unique challenges and constraints that have interesting theoretical underpinnings. Further data analysis may reveal that students talk about speaking with different disciplinary languages, from different epistemological paradigms, or with different notions of competence. Bringing these differences together in a coherent presentation forces students to engage in integrated speaking tasks that are completely new to them and that require competencies such as translation, audience-analysis, and collaborative work that they simply have not been taught. Additionally, the multidisciplinary teaming activities are only one set of challenges in this CXC setting. Notions of audience, integration, visual support, an organization also provide interesting windows into learning to communicate in the technical disciplines—the processes, genres, norms, and values involved in that. Further research could explore more in depth the processes involved with learning to speak in technical, multidisciplinary settings and the ways in which those processes inform our theories about communication competence.

Not only do these results illustrate potential for increased CXC scholarship, but they also provide insight for programmatic reform. These results suggest that given the ways students struggle with and learn oral communication, communication instruction in engineering (at least) may need to be provided in multiple, iterative settings—so that students are not simply being hit with a large amount of new information to process. Additionally, these results suggest a possibility that engineering instruction needs to be geared toward issues of integration, translation, team structures, and multidisciplinary audiences. Further research could inform the
ways in which CXC programs design add-on modules of speaking, the structures necessary to
make those modules useful, and the instructional strategies necessary to make the information
relevant to student challenges.

Communication across the curriculum programs and scholars have much to gain from an
increased attention to outcome-based assessment. Ultimately, studies following this protocol
would contribute to a more sophisticated notion of orality, situated learning, and disciplinary
discourse—and in turn speak well for the CXC movement. The CXC movement has been
criticized in the past for perpetuating the belief that communication is atheoretical and
unsophisticated. Protocols such as this one, that result in complex notions of disciplinary forms
of communication and learning processes, offer a response to this criticism. It is clear from the
literature that assessment is critical to the life of the CXC movement. Yet we cannot even begin
“making the grade” in our scholarship and practice without assessment protocols that embrace
the sophisticated, complex, disciplinary processes involved when teaching a student to speak as a
member of a disciplinary community.
References


Endnotes

1 Several acronyms have been used to identify communication across the curriculum programs—including but not limited to CXC, CAC, SAC, and OCXC. For the purposes of consistency, I use the CXC acronym when referring to communication across the curriculum. When other sources, authors, and/or directors use a different acronym, I remain true to their language.

2 This particular protocol for outcomes-based assessment has been adopted and used by NC State’s Campus Writing and Speaking Program—of which I am the assistant director. The protocol represents a collaborative effort among CWSP faculty.

3 The National Science Foundation project: “Establishing New Multidisciplinary Curricular Paradigms: Biotechnology and Chemical Engineering” was a $500,000 grant received from the National Science Foundation, Sept. 2000- May 2003. Co-principle investigators include: Dr. Steve Peretti, Department of Chemical Engineering; Dr. Deanna Dannels, Campus Writing and Speaking Program; Dr. Chris Anson, Campus Writing and Speaking Program; Dr. Richard Spontak, Department of Materials Engineering; Dr. Christopher Daubert, Department of Food Science. Other NSF team members include Dr. Lisa Bullard, Department of Chemical Engineering, Ms. Margaret Heil, Department of Computer Science, Ms. Paula Berardinelli, Assessment Coordinator, and Ms. Amanda Granrud, Coordinator of Undergraduate Tutorial Services in Writing and Speaking.

4 Although only two specific Chemical Engineering courses were proposed for the NSF project, the nature of the senior design multidisciplinary experience means that at least three other senior courses are involved on the periphery of this project. Senior capstone courses from Food Science, Computer Science, Industrial Engineering, and Economics agreed to have selected students from their capstone course participate in multidisciplinary teams, and therefore, they are in constant communication with the NSF team regarding their capstone courses and possible improvements based on this project.