

## **2006-405: GEORGIA TECH IE WORKFORCE COMMUNICATION: COMPARING SENIOR DESIGN STUDENTS' AUDIENCE ANALYSES TO THEIR CLIENTS' SELF DESCRIPTIONS**

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# **Georgia Tech IE Workforce Communication: Comparing Senior Design Students' Audience Analyses to their Clients' Self-Descriptions**

## **Abstract**

More engineering colleges and universities are working on enhancing student communication skills, especially since ABET 2000 requirements. At the ASEE 2005 Annual Conference and Exposition; Norback, McNair, and Forehand reported on a workforce-based educational tool for use in Industrial and Systems Engineering (ISyE) Senior Design courses. The tool was designed to help members of student project teams analyze their audience for their project-related communications.

To enhance our understanding of the students' analyses, in this study we investigated how the students' perceptions of characteristics of audience members compare with the self-descriptions of the audience members. During a recent ISyE Senior Design class, we obtained self-descriptions from clients who played significant roles in the projects. In addition, we obtained student perceptions of these same clients at three different stages of the project. In this report we compare the student perceptions with the client self-descriptions. We examine similarities and differences. The variables examined are based on interviews with industrial engineers, supervisors, and senior executives in companies employing industrial engineers. They include the main client contact's role, understanding of the problem, and specific expectations for the student team. In addition we will examine the differences in perspective that give rise to similarities and differences. Then we identify implications for the development of student communication skills and suggest appropriate educational approaches.

## **I. Introduction**

Senior Design courses provide an excellent opportunity for learning audience analysis, since they involve students dealing with real-world clients<sup>1</sup>. And, since ABET requirements have increased, more engineering colleges and universities are focused on enhancing students' communication skills<sup>2</sup>. Norback and colleagues have developed a workforce-based educational tool to help students in Senior Design analyze their audience for their project-related communications<sup>3 4</sup>. The questions included in the audience analysis tools are based on interviews conducted with practicing industrial engineers, supervisors, and senior executives in organizations employing many industrial engineers. Examples of the questions include the main client contact's role, understanding of the problem, and specific expectations for the student team. Pfeiffer advised students working with real-world clients to find out, as part of coming to know their audience, which individuals are the decision-makers<sup>5</sup>. Organizational context is the phrase often used by workforce professionals to refer to the hierarchy of the organization, the interaction with various people in different parts of the organization, and the responsibilities of each person in the organization. Sharp has noted that, often, when first interacting with professionals, students are not sure which questions to ask. Providing

suggested questions can greatly enhance the communication between the students and the workforce professionals<sup>6,7</sup>.

In the past we have looked at the change in students' responses to the Audience Analysis guides at three different points in the semester<sup>8</sup>. In this work we also obtained self-descriptions from the clients who played significant roles in the projects. Our goal was to compare the student perceptions with the client self-descriptions and examine similarities and differences. Then we identify the educational implications for Industrial Engineering Senior Design courses, capstone courses in other engineering departments, and other engineering courses.

## II. Method

As mentioned above, data was gathered from both teams of Industrial Engineering students taking Senior Design teams and from their key client contacts. The Senior Design course is one semester long and involves teams working with real-world organizations on industrial engineering problems. Seven teams, consisting of 42 students, participated. Descriptions of each team's projects appear below.

Table 1. Description of Senior Design Team Projects

Team 1	Client	A large package delivery service
	Project	Help the company improve the use of part-time helpers that are hired for the peak load during the holiday season.
Team 2	Client	A major third-party logistics service
	Project	Improve the efficiency of a regional transportation center focusing on four main aspects of its daily operations: flight tracking, field communications, scripting of phone calls, and work area setup
Team 3	Client	A small variety store that is expanding into the distribution of toys to department stores nationwide
	Project	Design a distribution network including analyzing the different associated costs (transportation, inventory, personnel), recommending the layout of toys on shelves in the department stores, and developing a what-if analysis to find optimal solutions to different scenarios and fluctuations in the demand for toys.
Team 4	Client	A small packager of gifts that companies give to their customers
	Project	Develop a system of inventory control based on concrete data for more accurate ordering procedures.
Team 5	Client	A university campus recreation center
	Project	Develop a web-based application for scheduling lifeguards.

Team 6	Client	A small reseller and recycler of used computer equipment
	Project	Increase the productivity and profitability of the receiving, shipping, auditing, and engineering departments.
Team 7	Client	A small integrator of manufacturing and packaging systems
	Project	Create a document storage system that utilizes the company's intranet and that is easy to use and maintain.

As shown in Table 1, the clients varied from a small variety store to a large package delivery company to a university recreation center. The project deliverables varied as well.

The teams were asked to fill out the audience analysis educational tools described in Norback, McNair and Forehand<sup>9</sup>. This tool was developed based on interviews with professional industrial engineers, their supervisors, and senior executives in companies employing many industrial engineers. The principal questions are:

1. In terms of engineering expertise, is the client contact's background technical or non-technical?
2. What is the role of the client contact?
3. What does this client contact understand the issue or problem to be?
4. What does the client contact expect you to do?
5. What does the client contact value most?

The teams were asked to fill out the forms during class before their first client presentation, their interim client presentation, and their final client presentation.

Seven key client contacts, each identified by the student team, were interviewed by phone with the same questions, both in the beginning of the project and at the end of the project. The interviews were conducted by the Director of Workforce and Academic Communication and lasted 20 to 30 minutes.

### III. Findings

Technical background. Four of the key client contacts identified their backgrounds as technical; three identified their backgrounds as non-technical. The team members identified technical vs. non-technical backgrounds accurately.

Role. When asked to describe their roles, client contacts responded in three ways. All seven client contacts described their role in the project. They used such phrases as "mentoring", "making sure they understand", "one to whom they will present results", and "helping facilitate data collection". Four of the seven also provided information about their responsibilities in their organizations, for example, "liaison with co-ops, interns and senior design;" and "supervision of the individual responsible for [the task of]

scheduling.” Two client contacts gave their job titles. The student team members responded either in terms of project role or job title. They did not mention the client contact’s responsibilities in the organization. Their communication skills would probably benefit from instruction and practice in learning more about their audience’s responsibilities.

What does this client contact understand the problem to be? What does the client contact expect you to do? These two questions elicit similar information, sometimes expressed in different language. Client contacts provide two general kinds of problem descriptions: technical specifications and business assignments. The client contacts with technical backgrounds provided detailed technical specifications. One client specified four deliverables, requesting alternatives and recommendations regarding four specific areas. Teams were instructed to observe and collect data, identify alternatives and make recommendations. Another asked them to map process flow, look through the process, identify issues and suggest ways to improve efficiency. The non-technically oriented clients on the other hand, described business problems, and asked for recommendations. One client asked teams to design a system of distribution for every step of the supply chain from manufacturer to sales floor. Another asked that teams identify a program to schedule part-time staff-- a program that would save money and allow staff to see further ahead. The project teams explained their understanding of the client’s requirements using industrial engineering terms. In the case of business assignments, this required making a translation. Apparently the translation was effective, because clients in every case expressed satisfaction with the outcomes.

Values. When asked what they value most in the project, four of the seven client contacts mentioned benefit to students. One client contact said it helps to give students a sense of real life. Another said that students learned the value of completing a project from beginning to end, working well in teams, and making valid recommendations. The project helped them become acclimated to industrial engineering in a corporate environment. All of the client representatives who emphasized benefit to students were from technical backgrounds.

Three client contacts emphasized the value of specific project outcomes. For example, 1) the possibility of reducing human error, 2) “getting a better system in place”, and 3) “the final product – a well-produced plan of operations that will act as an outline for the enterprise.” These were the three client contacts with non-technical backgrounds. Two client contacts pointed out that the teams bring to the company the benefit of an outside perspective.

Of these three sources of value ( benefit to students, specific project outcomes, and external perspective), the project teams concentrated completely on the value of specific project outcomes. They were not inaccurate in their perception of the values of client contacts, but were incomplete. During the course of a Senior Design project, team members have an opportunity to learn more about these values if they know how. This component of instruction in communication deserves increased emphasis.

In summary, we were able to learn the following:

- 1) Team members accurately identified the background of the client: whether the client had technical or non-technical background.
- 2) With regard to the client contact's role, team members responded either in terms of project role, such as mentoring, or job title. Clients but not students describe their responsibilities in their organizations.
- 3) Clients described their understanding of the project and expectations of the students either as technical specifications or as business assignments. The student team members needed to translate the latter descriptions into technical specifications in order to start the project.
- 4) When clients were asked about what they valued about the project, they mentioned benefits to the students, specific project outcomes, and getting an external perspective. The student teams' descriptions focused on specific project outcomes, which were accurate as far as they went. However, their descriptions were incomplete compared to the clients' responses—the students did not mention either benefits to them or the value of their input with its external perspective.

Below we discuss the educational implications of these findings.

#### **IV. Educational Implications**

Much of the time, students' descriptions of their audience contacts matched the self-descriptions of their client contacts. But in several areas, students need to become more aware of additional aspects of the workforce context of their projects.

First, students need to learn more about their client contact's responsibilities in their organization. They need to be aware of the organizational context, which, as mentioned above, includes the responsibilities of their contacts in their organizations, the nature of their interaction with other departments, and who they report to. Since other work<sup>10</sup> indicates that sometimes students aren't sure exactly how to ask highly-ranked workforce professionals questions, instruction should include suggested questions to use as the students start to interact with their key contact. When the students have greater knowledge of their client contact's responsibilities they will have a better understanding of the bigger picture. This information will have a positive impact on student communication with their contact throughout their term. For example, they will understand better why their contact is particularly busy at times. For example, this information will help them realize that scheduling meetings with the client may be difficult because of other business the client is handling rather than an attempt to evade. And they will be able to give recommendations in terms of the organizational context, including its impact on other departments, for example, instead of focusing as narrowly on the project and its context.

Second, the cases we studied showed the importance of the differences between technical versus non-technical clients. The students need to know that they must be able to translate the business assignments the non-technical clients give them into technical specifications. This indicates a need for specific instruction in translating non-technical assignments into technical terms.

Third, the student teams will have a greater understanding of their client contacts' perspectives throughout the project if they have a broader awareness of the values of the project to them. For example, many of the client contacts valued not only specific project outcomes, which the students understood, but also the value of the project as it benefited the students, especially with regard to giving them a chance to interact with a real organization. And the clients valued an outside perspective being brought to bear on an internal problem. Again, this expanded understanding on the part of the students would enhance not only communication but also specific project work. Students would have more confidence in their value from the very beginning. Suggested questions provided to the students would be valuable in increasing students' understanding of these issues.

To summarize, we suggest that the following instruction be developed for the Senior Design students:

- 1) Suggested questions for students to ask their client contacts about their role within the organization
- 2) A pointed discussion of the need to translate the business assignments of non-technical clients into technical specifications
- 3) Suggested questions for students to learn more from their client contacts about what they value about the Senior Design project.

Work is currently underway to expand this work to represent more than 42 students and seven clients. And instructional guides are currently being developed to enhance the students' understanding of their client's position.

Giving students the opportunity to interact with real-world clients as part of their formal instruction is of great value to students about to graduate. Expanding their audience analysis skills will help them be even better prepared to enter the corporate or non-profit world.

## V. Bibliography

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