

AC 2008-338: ASSESSMENT OF STUDENTS' ORAL COMMUNICATION SKILLS: DO STUDENTS AND WORKPLACE SUPERVISORS RELY ON GENERAL RESPONSE PATTERNS?

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Assessment of Students' Oral Communication Skills: Do Students and Workplace Supervisors Rely on General Response Patterns?

Abstract

This paper reports a test of the hypothesis that students and supervisors rely on a general response pattern when assessing various aspects of oral communication skills. The study is a follow-up to our pilot conducted in 2006; both studies were partially funded by the Engineering Information Foundation. It is important to know whether students and supervisors evaluate each single aspect of oral communication skills individually or that they rely on a general answer pattern. This paper shows that supervisors do not seem to evaluate the various aspects but rather rely on their general impression of the students' oral communication abilities, while students distinguish between different aspects of oral communication skills when they evaluate their own skills. This is important information, because students will not be able to glean from the supervisors' assessments which aspects they will need to improve to become better communicators.

Introduction

This paper reports a test of the hypothesis that students and supervisors rely on a general response pattern when assessing various aspects of oral communication skills. The study is a follow-up to our pilot conducted in 2006; both studies were partially funded by the Engineering Information Foundation. It is important to know whether students and supervisors take the individual items of an instrument seriously when they assess oral communication skills. If they rely on a general answer pattern instead of evaluating the various aspects of oral communication, then students will not be able to glean from the answers which aspects they will need to improve to become better communicators. In other words, then the administering of the instrument will not add much pedagogical value.

As part of a larger project that aims to address the need for improved communication skills for engineering undergraduates, the authors of this paper piloted an oral communication skills instrument with co-op and intern students and their supervisors at the employer site in the summer of 2006. This pilot was reported at the 2007 ASEE national conference.¹

Engineering students at Pennsylvania State University take a speech course as part of their general education requirements. As explained in last year's publication, this course was not very effective in that co-op employers did not give students higher scores on the ability to communicate effectively if they had completed the speech course compared to students who did not complete the course yet. The Engineering Cooperative Education and Professional Internship Program, the Department of Mechanical and Nuclear Engineering and the Department of Communication Arts and Sciences have collaborated to develop a speech course geared toward engineering. Results of a pilot with this course will be presented elsewhere in the ASEE proceedings.²

One of the first steps of the project was to identify a validated instrument to assess oral communication skills. We piloted an 11-item survey concerning the following aspects of oral communication: listening, audience analysis, delivery, and confidence. The survey built on existing work (Professional Developer^{3,4}; Iowa State University's ABET-aligned Work Place Competencies⁵). The items were included in the final evaluation that co-op students and their workplace supervisors completed during summer 2006.

The major findings of the pilot were as follows:

- The items measured oral communication skills reliably for both students and supervisors; Cronbach's alphas were .82 and .77, respectively.
- Factor analysis served to reveal groupings of items that tapped similar concepts. Items that were phrased positively grouped under one factor, and the negatively phrased items under another factor. Also, the negatively phrased items had higher standard deviations than the positively framed items. The authors argued that the factor structures and the higher standard deviations indicated reliance on a general answer pattern, meaning that students and supervisors tended to give answers in a certain range (for example, mostly choosing mostly the '4' and '5' answer options) rather than distinguishing between the various aspects of oral communication and evaluating each aspect individually.
- The results showed only weak correlations between student and supervisor evaluations.

The purposes of this follow-up study was to assess the reliability of the revised instrument and secondly to provide more insight in the factor structures. To this end, we phrased all questions positively. Following the authors' earlier reasoning, lower standard deviations for the rephrased items and fewer factors would be evidence of a general response pattern. In particular, the follow-up study focused on the following four research questions: (1) How reliable was the revised oral communication skills assessment instrument? (2) Did the revised instrument reveal a different factor structure? (3) Did students continue to rate their own oral communication skills differently from their supervisors? (4) Did supervisors evaluate students' skills more consistently than students?

Data Collection

To answer the first three research questions, we administered the oral communication skills instrument to 146 co-op and intern students and their supervisors at the employer sites during the summer of 2007. We included only students who made at least one presentation during the co-op work experience; therefore, all supervisors had the opportunity to evaluate their students' communication skills. All participants agreed to make their answers available for this research study. Note that sample numbers reported below may be lower given the students and employers who responded to particular items as "Not Applicable."

The oral communication skills assessment instrument was part of the online final evaluation form that co-op students and their employers are required to complete at the end of the work term. See Table 1 below for the individual items of the oral communication skills instrument. As indicated in the introduction, all items were formulated positively in this version of the instrument.

For the fourth research question, we used another question from the final evaluation form. Students and supervisors were to indicate how well the student demonstrated the ability to communicate effectively through interpersonal skills, formal presentations, and technical writing (ABET criterion 3g). The options ranged from “very poorly” to “very well” on a 5-point scale in the Likert format. We compared the oral communication scores of both the students and employers with their answers to this ABET criterion 3g question.

Results

In answering Research Question 1, whether the instrument measured students' oral communication skills reliably for both students and employers, we conducted reliability analyses with student answers and with employer answers separately. The Cronbach's alphas for students and employers were .83 ($N = 140$) and .92 ($N = 117$), respectively, which shows a high degree of internal consistency for the item set. This means that participants answered the items consistently; in other words, each student's answers to the various items correlated highly. The more consistent individuals answer the items, the easier it will be to find for example differences between groups.

*Table 1: Factor Loadings Oral Communication Assessment Items **

Oral Communication Items **	Factors			
	Student Responses			Employer Responses
	1	2	3	1
1) listens carefully to communication from others			.7	.6
2) shows appreciation of importance of oral communication in ones professional career			.6	.7
3) understands questions from others well			.7	.6
4) shows confidence when presenting orally	.8			.7
5) delivers a well-organized oral presentation	.7			.8
6) uses appropriate presentation techniques (correct eye contact, use of voice, etc.)	.8			.8
7) keeps audience engaged when presenting orally	.7	.4		.8
8) is able to interpret results for various audiences		.7		.8
9) adjusts presentation to each audience and purpose		.8		.8
10) displays sufficient general knowledge		.7	.4	.7
11) concludes oral presentations by paraphrasing or summarizing the information covered			.4	.7

* Factor loadings < .4 are not displayed.

** Answer categories ranged from 1 (strongly disagree) to 6 (strongly agree)

In regard to Research Question 2, whether the revised instrument revealed a different factor structure, we conducted factor analyses with the student answers and with the employer answers—this analysis looks into grouping items that measure a similar concept based on the answer patterns. For example, items 4, 5, 6, and 11 (see Table 1) referred to the delivery of a speech. If these four items indeed measured just this aspect of oral communications, and the

other items measured other aspects of oral communications, one would expect that these four items would correlate highly among themselves (i.e. load high on one factor), but show weak correlations with the other items (i.e. load low on the other factors). In that case, we would consider reducing the number of items, since all four items would measure the same aspect of oral communications.

Our previous study with the pilot data from 2006 revealed that items 4, 7, and 10—the negatively phrased items—grouped under one factor for students, and the other items under a second factor. For employers, items 1, 2, and 3 were grouped into a first factor, items 4, 7, and 10 into a second factor, and the remaining items into a third factor.

In the current study, the students' responses loaded on three separate factors (compared to two factors in the previous study) with Eigenvalues greater than 1; the three factors accounted for 58% of the variance in the responses; factor 1 explained 37% of the variance, factor 2 an additional 12%, and factor 3 9% more. To illuminate these factors further, we examined the Varimax rotated component matrix. This matrix showed for each item how strongly it was associated with each of the factors (factor loadings); the correlations of each of the items with the factors appear in Table 1 in the "Student Responses" columns if they were .4 or higher. Table 1 shows that for student responses, there did not seem to be clear constructs underlying each of the three factors. However, some common themes emerged from the items in the current factor structure. The first factor mainly included items relating to delivery (4 – 7); the second factor included items primarily involving audience variables (7 – 9); and the third factor showed a mix: interaction with others (1, 3), a more general professional awareness related to communication skills (2, 10), and delivery (11). Items 7 and 10 as apparently were more ambiguous, in that they loaded on two factors instead of one.

The employers' responses showed only one factor (compared to three in the previous study) with an Eigenvalue greater than one; this factor explained 55% of the variance. This means that they did not differentiate between different aspects of speech communication.

To answer Research Question 3, whether student evaluations of their own oral communication skills differed from the employer evaluations, we examined whether the average scores overall (for all eleven items combined). Each of the individual items was significantly different from the others.

A comparison of the average evaluation of students' oral communication skills by students and by their supervisors (paired *t*-tests) in our previous study revealed that students rated their oral communication skills overall as less effective than did their employers. Comparisons of the individual items showed this difference to be statistically significant for five of the eleven items, namely items 1, 3, 5, 6, and 8.

In the current study, we compared the average of all eleven student and employer answers and each of the items individually again by means of paired *t*-tests. We applied a Bonferroni correction to adjust for the increased probability of Type I errors resulting from multiple independent tests. We set the probability level to 5% ($p = .05$) for a single analysis; therefore, we tested at the level of confidence of $p = .0042$ ($.05 / 12$) for the multiple analyses with the

individual items. The paired *t*-tests showed that students rated their oral communication skills as significantly less effective than did their employers. Analyses of the individual items showed this to be the case for nine of the eleven items. See Table 2 for the averages. Note that the items that were negatively phrased in the pilot version of the instrument—items 4, 7, and 10—do now have a standard deviation comparable to the other items; they are now all in the 0.6 – 0.9 range. As we suggested in the discussion of the pilot study, this could indicate that both students and supervisors rely on a general answer pattern.

Table 2: Paired t-tests of Student and Employer Evaluations of Students’ Oral Communication Skills

Oral Communication Items *	Student Mean (St. Dev)	Employer Mean (St. Dev)	N	T	p
All oral communication items combined (sum of all eleven answers divided by 11)	5.0 (0.4)	5.3 (0.5)	113	-6.0	.000
1) listens carefully to communication from others	5.3 (0.7)	5.5 (0.6)	146	-3.1	.002
2) shows appreciation of importance of oral communication in ones professional career	5.5 (0.6)	5.5 (0.6)	146	0.4	N.S.
3) understands questions from others well	5.0 (0.6)	5.5 (0.6)	146	-5.6	.000
4) shows confidence when presenting orally	4.7 (0.9)	5.3 (0.8)	142	-6.9	.000
5) delivers a well-organized oral presentation	4.9 (0.8)	5.4 (0.7)	141	-5.1	.000
6) uses appropriate presentation techniques (correct eye contact, use of voice, etc.)	5.0 (0.7)	5.3 (0.8)	141	-3.6	.000
7) keeps audience engaged when presenting orally	4.7 (0.7)	5.3 (0.7)	140	-7.8	.000
8) is able to interpret results for various audiences	4.8 (0.7)	5.2 (0.8)	131	-4.5	.000
9) adjusts presentation to each audience and purpose	4.9 (0.7)	5.2 (0.7)	119	-3.1	.003
10) displays sufficient general knowledge	5.3 (0.6)	5.3 (0.7)	144	-2.4	N.S.
11) concludes oral presentations by paraphrasing or summarizing the information covered	4.8 (0.9)	5.2 (0.8)	133	-3.4	.001

* Answer categories ranged from 1 (strongly disagree) to 6 (strongly agree)

In addressing Research Question 4, we examined how strongly the oral communication scores (the average of all eleven items) correlated with another item on the final co-op and internship evaluation survey. Students and supervisors indicated how well the students demonstrated the ability to communicate effectively through interpersonal skills, formal presentations, and technical writing (ABET criterion 3g). The answer options ranged from “very poorly” to “very well” on a 5-point scale in the Likert format. We compared the oral communication scores of both the students and employers with their answers to this ABET criterion 3g question. The correlations between these two measures were statistically significant for both students and employers, with $r = .37$ ($N = 139$, 14% of the variance explained) and $r = .67$ ($N = 116$, 45% of the variance explained), respectively, and $p = .000$. Consistent with the findings of the pilot study, supervisors seem more consistent in their evaluations of the students than students, since their correlation between the oral communication skills and the ABET criterion 3-g item was much higher.

Conclusions and Implications

The analyses reinforced most of the pilot study findings. Cronbach's alphas for students and supervisors were .82 and .92, respectively. A paired *t*-test comparing the mean communication skills scores of students and supervisors revealed a statistically significantly higher score for supervisors. Correlations between these mean communication skills scores and a separate item relating to the students' ability to communicate effectively (ABET criterion 3-g) showed that supervisors' answers were more strongly related than students' answers, meaning that the latter were less consistent in their evaluations.

As explained in the previous study, the authors expected to find fewer underlying factors if students and supervisors relied on a general answer pattern. The factor analyses in the current study indeed revealed different factor structures for students and supervisors than reported in our previous study.

Supervisor responses showed only one underlying factor—accounting for 55% of the variance—instead of three. The high correlation with ABET criterion 3-g and the fact that we uncovered only one factor for the supervisors leads us to believe that administering the instrument with supervisors does not add much pedagogical value for the students. Most likely, supervisors simply do not have time to focus on detailed evaluations. Therefore, it is probably more realistic to just ask the general question ABET criterion 3-g question, whether supervisors think the students are able to communicate effectively. Supervisors most likely welcome any shortening of an evaluation survey.

Student responses, on the other hand, seemed more discriminating in the current than the previous study: this study revealed three underlying factors—explaining 58% of the variance—compared to two in the previous study. Even though not all factors represented clear underlying constructs, some common themes emerged. Therefore, we feel that students likely did not rely on a general answer pattern.

Students can benefit from completing the instrument by identifying areas they think need most improvement to become better communicators. It will be valuable to triangulate students' own perceptions with those of communication experts. Another valuable application will be to use the instrument to obtain feedback from peers on students' performance. This would show whether students are more critical of themselves. If administered in an upper level course, the instrument could also provide insight in whether students see different issues if they have completed the speech course compared to students who did not complete this course yet.

This study indicated that supervisors rate students' oral communication skills as more positive than students. Because students and employers showed little correspondence in their evaluation of students' oral communication skills, it is important to determine how well students are able to assess their own oral communication abilities.

In a related project, the principal investigator compared student and instructor assessments of students' speech communication skills. However, instead of answering questions about abilities in general, students and instructors were asked to indicate their level of confidence in students'

abilities related to the various aspects of oral communication in a specific situation. According to Bandura^{6, 7, 8}, when trying to assess someone's abilities, more precise judgments of capability based on a specific outcome will result in a better prediction and offer a better explanation of performance outcomes. Therefore, when students and their instructors evaluate students' abilities related to a specific task, the chance is higher that their answers correlate. This related project indeed confirmed this; the authors found no statistical difference between instructor and student ratings².

There are several changes that might result in a more accurate supervisor assessment of the student's oral communication skills. One change might be to ask the supervisor to picture the student in a specific oral communication situation, such as in a weekly group meeting or a design presentation. A way to make supervisors distinguish more among the different aspects of oral communications could be to communicate clearly the various topics with headers instead of putting the items about different topics in random order. This might help supervisors focus more on the topics. Another option would be to reduce the number of questions and simply ask supervisors to evaluate the common topic, for example "delivery," and add examples of what it can entail as a way of illustrating the meaning of various items from the instrument. If a problem area is identified from this more general assessment, a follow-up assessment with more detailed items could be made to help the student identify the specific aspects of his or her communicative behavior that can be improved.

To conclude, administering the instrument with supervisors at employer sites might not add as much value as the authors had hoped. However, we will need to test the various proposed ways to get more valuable feedback from supervisors. Engineering educators, however, can use the instrument as is in the classroom for students' self-assessment of their oral communication skills and for peer assessment.

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