

Pre-post Assessment in a Speaking Communications Course and the Importance of Reflection in Student Development of Speaking Skills

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Motivation

In a 2015 survey by Chapman on fears, 28% of Americans reported being afraid or very afraid of public speaking, falling just below “Robots Replacing Workforce” and just above “Property Damage due to Natural Disasters” [1]. So, why is it that we are so afraid of public speaking? Some cite the lack of practice in ‘safe’ environments with feedback [2] and the fact that public speaking is not taught until near adulthood [3].

Engineers are often responsible for communicating technical information across multiple audiences and speaking clearly. Three recent engineering disasters that were the direct result of poor communication were the Mars Climate Orbiter disaster, Challenger and Columbia Space Shuttles, and the Hyatt Regency Disaster [4]. Further, engineering graduates are often not prepared for industry’s high expectations for communication skills [5]. In a 2015 survey by AAC&U, 613 graduating seniors at private and public institutions and 400 employers participated. The divide between student perception and employer expectations around professional skills was drastic [8]. When employers were asked to rate ‘how important it is that recent college graduates demonstrate proficiency’ in 17 key knowledge and skill areas, 85% of employers surveyed rated oral communication skills as very important, outscoring importance of teamwork, decision-making, and analytical skills [8]. When students were asked to rank those same categories, 79% of students ranked oral communication skills as highly important, below analytical skills and solving real-world problems. When it comes to the types of skills and knowledge that employers feel are most important to workplace success, large majorities of employers feel that recent college graduates are not well prepared, particularly in oral communication skills and other professional skills [8]. Employers rated 28% of recent graduates as well prepared in oral communication while 62% of students rated themselves as well prepared. This discrepancy could be because students do not have an opportunity to experience ‘good’ presentations often and do not know the body of theory behind construction of a ‘good’ presentation. They also are not shown the connection between education and practice [9] where they need to present to technical and non-technical audiences. In addition, studies have shown that estimates of the time that engineers in practice spend on communication ranges from 40% to 75%, with the majority of estimates around 60% [10]. In addition, many students interpret communication skills as a means of transferring information from engineer to client, rather than other audiences and the importance of teaching others [11].

It is clear that engineers can no longer succeed on technical skills alone and that they must understand how to collaborate, communicate, and give and receive feedback in order to thrive in their careers [6]. In order to support engineering graduates to meet this goal, a network of schools has created the Engineering Ambassadors (EA) Program. Each school has a program that trains students to achieve excellence in communication as well as to appreciate both giving and receiving critique. This paper outlines the approach at one of the EA-affiliated schools to create a course where these skills are taught, not only to EAs, but also to any student who wants to learn better communication skills.

Course Structure and Content

The authors decided to create an intensive 8-week course to change student perceptions on communication and train students to give impactful presentations to any audience. Inspired by the EA training provided by the National EA Network, the course focuses on the assertion-evidence approach for presentations. The assertion-evidence approach emphasizes three principles: build the talk on messages, not topics; support those messages with visual evidence, not bullet lists; and explain that evidence by speaking in the moment [12]. The course is delivered across three modules: content, visual aids, delivery (see Table 1). The content section encompasses structure and story. From a structural point of view, students are guided to think about questions like “where do you start?”, “how much depth should you give?” etc. The visual aids section teaches the assertion-evidence approach. This approach is more difficult than following PowerPoint’s defaults; however, this approach is much more effective at communicating technical information [12]. In the delivery section, students learn how to achieve confidence through body language, poise, and elocution. Students present three times in pairs during the class. There are four main learning outcomes of this class: 1) Identify content for audience for a given presentation setting, 2) Critique presentations on the basis of content, delivery, and visual aids, 3) Design slides that increase effectiveness of communication and delivery of content, 4) Interact in teams to design slides and present topics.

WEEK	LECTURES	DISCUSSION	ASSIGNMENT
Week 1	Changing the Conversation		Journal on Changing the Conversation
	Pair up and make 4-5 slides on theme (no guidance) prep 4 min team presentation		
Week 2	Presentation Planning and Rubric Review – Feedback & help on slides	PRESENT 1	Presentation Journal
	Communication topics - writing skills, other speaking styles		
Week 3	The problem with Power Point...	EA sample talk. Critique Session	Reflective Journal
	EA Purpose - TED Talks- Audiences		
Week 4	Training-Content: Story & Engaging the Audience	Practice (Workshop)	Reflective Journal
	Organization & Analogies		
Week 5	Training-Visual Aids: Assertions Supporting Evidence	Practice - Slides Feedback	Reflective Journal
Week 6	Training-Elocution: Poise & Elocution	PRESENT 2	Presentation Journal
	Training-Elocution: Passion		
Break	Thanksgiving	Thanksgiving	Relax
Week 7	Purpose of Talk – Creating a memorable experience	Practice - Slides Feedback	Reflective Journal
	Partner Dynamics		
Week 8	Training – Conclusion	PRESENT 3	LAST Presentation Journal
	Practice-Office Hours		

Assessment Framework

Social competencies such as presentation skills require affective dispositions such as internal motivation, and the ability to self-reflect and self-evaluate [13]. Assessment of these skills must go beyond reproduction of knowledge measured in exams, but must be measured as a developing skill over time. One way to capture the affective domain is through reflection or journaling [14]. Journaling can encourage self-evaluation, but even experts struggle to capture accurate self-assessments [15]. In addition to the task of self-assessment, peer-assessment tools are effective because learners have had a chance to observe others throughout the learning process and therefore, can be more fair and accurate with judgements compared to teachers or experts [13]. In addition, learners have the perception that peer-assessment processes are fairer than instructor assessment alone [13]. When self and peer assessments are combined, they can foster reflection on a student's own learning in the context of their peers, further enhancing the learning environment through increased awareness of quality of a student's own work, increased student performance, and increased student satisfaction with the learning environment [13, 14].

This paper presents assessment tools to measure effectiveness of the aforementioned teaching approach for communication skills. A 4-point-scale rubric was created to assess speaking across verbal and non-verbal traits [16] (see Table 2). Traits chosen were organization, elocution [17], poise, body language [18], enthusiasm [19], and creativity [20] along with check boxes to assess several assertion-evidence specific techniques. These categories were chosen to reflect the training given in the course, which is more focused on delivery than on topic. Students were tasked to present a talk on an engineering topic as if they were presenting to a middle-school audience. Three assessments were performed of each student in the course: a pre-assessment before the training, a mid-semester assessment, and a final assessment.

Table 2: Rubric for assessment of presentations

TRAIT	Superior	Adequate	Developing	Inadequate
ORGANIZATION	Student presents information in logical, interesting sequence which audience can follow.	Student presents information in logical sequence which audience can follow.	Audience has difficulty following presentation because student jumps around.	Audience cannot understand presentation because there is no sequence of information.
ELOCUTION	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student mumbles, incorrectly pronounces terms, and speaks too quietly for a majority of students to hear.
POISE	Student displays relaxed, self-confident nature about self, with no mistakes.	Makes minor mistakes, but quickly recovers from them; displays little or no tension.	Displays mild tension; has trouble recovering from mistakes.	Tension and nervousness is obvious; has trouble recovering from mistakes.

BODY LANGUAGE	Movements seem fluid and help the audience visualize.	Made movements or gestures that enhance articulation.	Very little movement or descriptive gestures.	No movement or descriptive gestures.
ENTHUSIASM	Demonstrates a strong, positive feeling about topic during entire presentation.	Occasionally shows positive feelings about topic.	Shows some negativity toward topic presented.	Shows absolutely no interest in topic presented.
CREATIVITY	Very original presentation of material; captures the audience's attention.	Some originality apparent; good variety and blending of materials / media.	Little or no variation; material presented with little originality or interpretation.	Repetitive with little or no variety; insufficient use of materials / media.

During class presentations, all students in the class, instructors, and invited Engineering

3. For the team presenting; check all items that apply below

- Image map is used to introduce presentation
- Assertions are concise, informative, and relate to slide content
- Text is minimal on slides
- A cool technology is introduced that also relates back to fundamental science found in the classroom

Rank all traits below (see the [Rubric](#) for a list of the criteria and all details for each score)

	(4) Superior (First Speaker)	(3) Adequate (First Speaker)	(2) Developing (First Speaker)	(1) Inadequate (First Speaker)
4. Organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Elocution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Poise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Body Language	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Enthusiasm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Creativity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	(4) Superior (Second Speaker)	(3) Adequate (Second Speaker)	(2) Developing (Second Speaker)	(1) Inadequate (Second Speaker)
10. Organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Elocution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Poise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Body Language	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Enthusiasm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Creativity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Write any comment and feedback regarding the overall presentation (for BOTH presenters)

17. Write any comment and feedback to give to the First presenter

18. Write any comment and feedback to give to the Second presenter

Figure 1: Online Rubric Rating Form

Ambassadors fill out an online form rating each of the six rubrics for each presenter (Figure 1). They may provide open-ended feedback for each and/or both presenters. The class teaching assistant collects all forms and emails a report to each presenter within a few days of the presentation. The report includes an average score for each rubric, as well as comments. Presenters do not receive comments directed to their partner, only comments for them and/or for the team.

In addition, students were asked to keep online reflective journals about their progress during the course on a weekly basis. The journals proved critical to helping students reconcile critiques and reflect on their own improvement in the course. To monitor their progress in self-reflection techniques, word counts were analyzed and key words “understand”, “think”, “interesting”, and “learn” were analyzed in the journal entries over the course of the semester to gauge the reflection on active (understand, think) versus passive (learn) acceptance and value of

the course topics [14] and also for areas of student interest (interesting).

Results

All assessments were given during a presentation and were both peer and instructor marked according to the course rubric. To try to ascertain benefit to students, a percent change between the first presentation (before training) and the final presentation (after 2 presentation and feedback cycles) was determined using the formula:

$$\frac{\text{last presentation overall} - \text{first presentation overall}}{\text{first presentation overall}} * 100\% = \text{percent change}$$

Overall, students saw an average improvement in overall performance of 20% ± 9% (N=32) when comparing the first presentation to the final presentation scores. The largest single benefits by rubric category were content, body language and creativity.

Table 3: Summary of Percent Change Across all Rubric Traits

	Organization	Elocution	Poise	Body Language	Enthusiasm	Creativity	Total
Average	22%	19%	20%	28%	15%	21%	20%
Std. Dev	7%	14%	15%	14%	13%	14%	9%

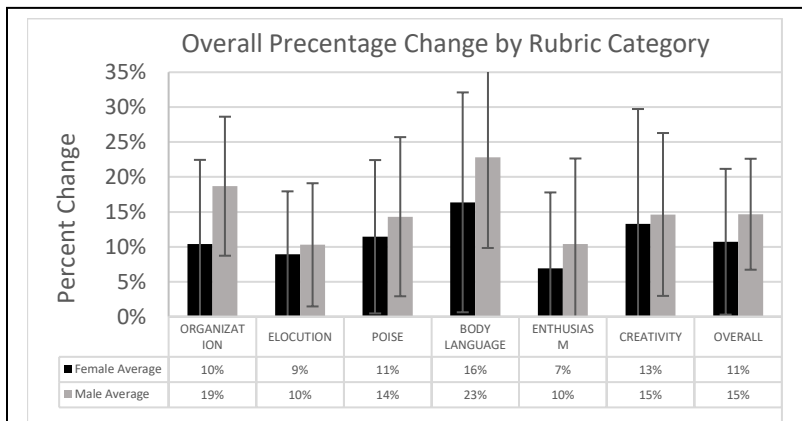


Figure 2: Percent Change between first and Last Presentation by

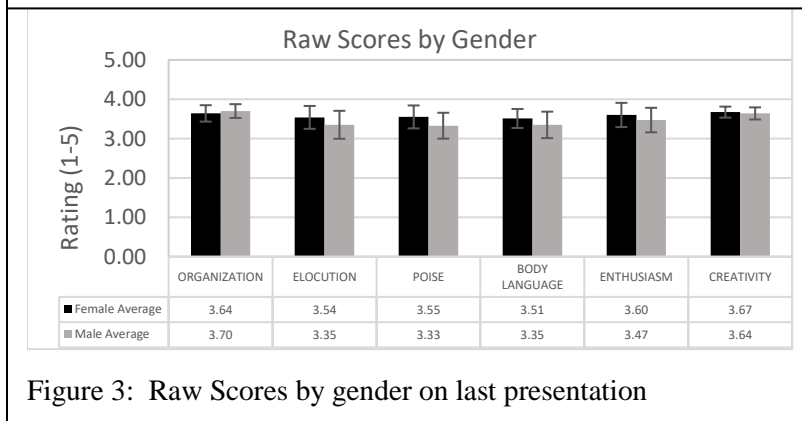


Figure 3: Raw Scores by gender on last presentation

When exploring gender differences, elocution, poise, and body language showed lower percent change for females versus males, but findings show statistically different raw performance data where females score at higher levels versus male students in elocution ($p=0.06$), poise ($p=0.03$), and body language ($p=0.07$) on the final presentation. Comparisons of raw scores and percent change showed no statistical differences between underrepresented minorities and other students populations ($p>0.5$). These data show that the females are higher performing in these traits, thus do not see as much change over the course, where the males are benefitting and developing the skills during the course.

The students wrote journals each week averaging 186 words per journal entry (see Figure 4). Word analysis for “understand”, “think”, “interesting”, and “learn” were analyzed for all journals over the course period (see Figure 5). Area 1 correlates with Week 3 where the “Problem with PowerPoint” lecture occurs. This week shows a peak in the use of the words “think” and “interesting”, showing that students are integrating lessons into their own cognitive experiences.

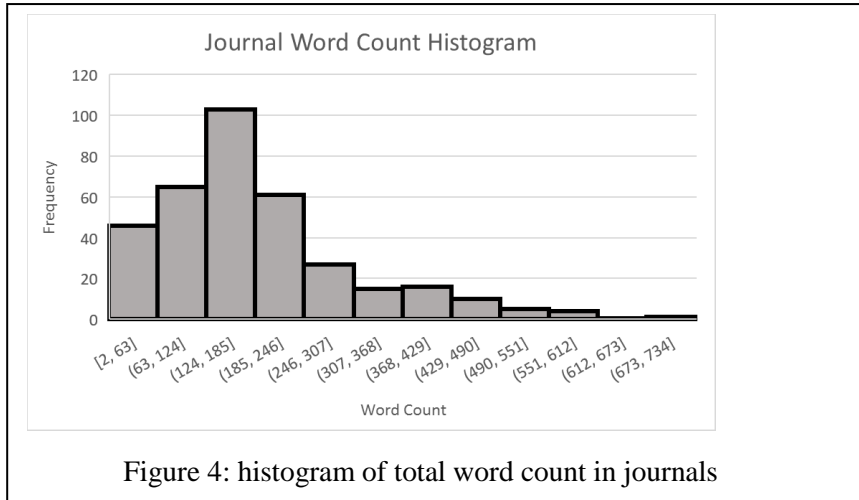


Figure 4: histogram of total word count in journals

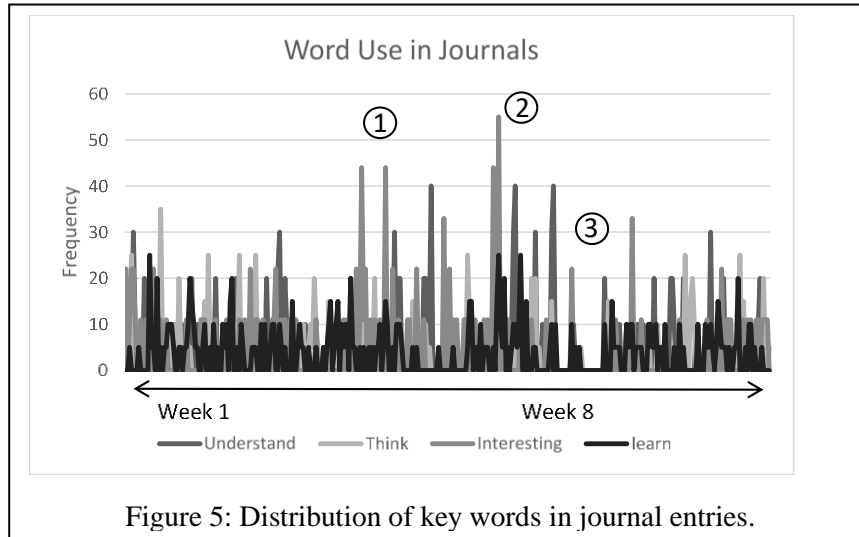


Figure 5: Distribution of key words in journal entries.

Area 2 correlates with Week 5, the visual aids training where the assertion-evidence theory is introduced. This week brought the highest frequency in the word “understand” where students are internalizing lessons. Area 3 is thanksgiving break where students were not journaling, though some still submitted journals, so a noticeable drop in all words is seen due to the lack of journals submitted.

Conclusions

This course serves as a model for instruction of oral communication skills for engineering students. The assessments show that students are indeed improving across multiple traits of strong communication and students are able to reflect and internalize the feedback

into their own practices. In future offerings, the course will be expanded to accommodate a larger body of students, allowing it to serve as an excellent source for assessment of oral communication skills towards attainment of student learning outcomes. This course will also be used in the National Association of Colleges and Employers (NACE) Career Readiness program offered on our campus as part of career preparation education for engineering students [21].

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