

TEACHING EFFECTIVE ORAL PRESENTATIONS AS PART OF THE SENIOR DESIGN COURSE

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Heavy emphasis on the technical aspects of their education encourages many engineering students to believe that once they graduate, their jobs will be principally involved with collecting and analyzing information. But, as practicing engineers know, technical expertise means little if an engineer cannot effectively *communicate* it. Engineers must be effective communicators in order to discuss their work, present their findings, and propose a course of action. Essentially, if engineers cannot inform others of what they have done, they might as well not have done it.

Engineering faculty recognize the engineer's need for effective communication skills. In the senior design and economics course, students traditionally are asked to prepare a major paper and to present their findings orally. However, due to time constraints (or perhaps to the instructors' lack of prepared ma-

terial), students are often told to give a presentation but are given little or no guidance on how to do so effectively. Comments received from students indicate that, in addition to natural nervousness when speaking publicly, they are not even sure what criteria define a good presentation.

But even though engineering faculty recognize the need for training in communications, the argument is frequently put forth that there is already too much technical material to be covered in the curriculum. The pervasive feeling is that these "softer" areas are better left to the English department (for writing courses) and to the communications department (for public speaking courses).

While freshman composition is normally mandatory for all students, speech class is usually elective for engineering students, and we find that students readily avoid taking it. Furthermore, the kind of oral presentation a practicing engineer is likely to be called upon to make is somewhat different from a typical public speech. We certainly encourage students to make room in their schedules for speech class, but we just as firmly believe the engineering curriculum needs to provide opportunity for students to learn, practice, and master effective communication skills.

Indeed, we suggest that it is possible within the context of the senior design and economics course to include, with little additional time, a brief lecture on oral presentations accompanied by written guidelines. The discussion that follows sets forth suggestions on how to organize a presentation, deliver it, and prepare graphic aids to accompany it. In addition, we have condensed the discussion and presented the same suggestions in Table 1 as second-person lecture notes to facilitate faculty who might wish to incorporate them into their own lecture notes or to copy them and use them directly as a handout in their class.

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Equally important, we provide rating sheets to students after their presentations, with a quantitative score in each of several categories, as well as qualitative notes and suggestions. Students seem to appreciate these guidelines and the feedback. A sample of the rating sheet is shown in Table 2.

SUGGESTIONS FOR ORGANIZING AND DELIVERING A SUCCESSFUL PRESENTATION

Organizing a Talk

A successful presentation is almost always a carefully-organized presentation. Organization is the process of designing an intelligent, useful, coherent, engaging program, whether it is ten minutes long or five days long. Out students are advised to think in terms of what they can reasonable do in their allotted time and adapt their material to suit the assignment.

A common mistake that inexperienced presenters make is failure to control the time. Typically, the poorest talks are not the ones that are too short, but the ones that are too long. These are the talks that seem to digress and wander at will, that seem disconnected and endless. The old axiom still holds: tell us what you are going to tell us, tell us, tell us what you have told us, and sit down.

We advise our students to ensure that their talks answer three main questions:

- What was done or is to be done?
- How was it done or how will it be done?
- What was or will be the significance?

An essential part of organizing a successful talk is composing an outline. Since students will only be able to cover the highlights of their written papers, we advise them to think in terms of a summary. The same factors, conclusions, and recommendations that they use in a summary usually work in a presentation or briefing. Students are urged to start off with the big picture (overall concepts) and to then discuss the points most critical to understanding their message.

A presentation needs to stand alone. That is, it needs to be self-contained and make sense in and of itself. We urge students not to reference their report (not to report on their report) any more than necessary. We urge them to resist the temptation to turn us into secondhand listeners. For example, we coach them to avoid sentences that begin, "In my report, I..." or, "As I mention in chapter two..." Students

are urged to use "you" in their presentations and to talk to those who are sitting before them right then and there.

Targeting and Involving the Audience

Presenters know more about their topic than anyone else in the audience. What is obvious to them might not be obvious to others. We advise students that targeting their audience means tailoring their remarks to their immediate listeners. Presenters should think about an audience's technical background (gained through both formal means and experience), its familiarity with the subject, its attitudes, and its informational needs.

An audience will be swiftly bored by a one-way conversation. To have a two-way conversation, presenters must *personally* connect with the audience. They should try to involve the audience in their performance. We coach students to look at, talk to, and give the audience something to examine. State conclusions and action items explicitly. Don't assume that any aspects are obvious, and don't force the audience to guess them.

Traditionally, audio-visual aids (charts, over-

TABLE 2
Presentation Feedback Form

TABLE 2 Presentation Feedback Form		
<i>Name of Presenter</i>		
<i>Title of Presentation</i>		
<i>Date of Presentation</i>		
<i>My Name</i>		
Content & Organization	Noteworthy	Can be
Improved Core message Clear objectives Overall structure Visible logic Targeted at audience Audience motivation and involvement		
Presentation Confidence, enthusiasm, forcefulness, conviction Controlled pace Natural finish Voice quality (clear, calm, and understandable) Gestures (natural, intuitive, relaxed) Body/facial signals Frequent eye contact		
Visual Aids Interesting Relevant Easy to read		

TABLE 1
Suggestions for a Successful Presentation

ORGANIZING YOUR TALK

- ▣ **Plan your presentation carefully.**
 - Set an agenda and stick to it. A common mistake inexperienced presenters make is failure to control the time. Organization is the process of designing an intelligent, useful, coherent, engaging program, whether it's ten minutes long or five days long. Think in terms of what you can reasonably do in your allotted time, and adapt your material to suit your assignment.
 - Typically, the poorest talks are not the ones that are too short, but the ones that are too long. These are the talks that seem to digress and wander at will, that seem disconnected and endless. The old axiom still holds: Tell us what you are going to tell us, tell us, then tell us what you have told us. Then sit down.
- ▣ **Ensure that your talk answers three main questions:**
 - What was done or is to be done?
 - How was it done or how will it be done?
 - What was or will be the significance.
- ▣ **Compose an outline.**
 - Since you will only be able to cover the highlights of your written paper, it is useful to think in terms of a summary. The same factors, conclusions, and recommendations that you use in a summary usually work in a presentation or briefing. Start off with the big picture (overall concepts) and then discuss the points most critical to understanding your message.
 - Remember, a presentation needs to stand alone. That is, it needs to be self-contained and to make sense in and of itself. Don't reference your report any more than necessary. Don't report on your report. Resist the temptation to turn us into secondhand listeners. For example, avoid sentences that begin, "In my report, I . . .," or, "As I mention in chapter two . . ." Use "you" in your presentation—talk to us who are sitting before you here and now.
- ▣ **Target and involve your audience.**
 - You know more about your topic than anyone else in the audience. Remember, what is obvious to you might not be obvious to others.
 - Targeting your audience means tailoring your remarks to us. Think about our technical backgrounds (gained both through formal means and through experience), our familiarity with your subject, our attitudes, and our information needs.
 - Likewise, we listeners are going to be swiftly bored by one-way conversations. To have a two-way conversation you must *personally* connect with us. Involve us in your performance: look at us, talk to us, give us something to examine.
 - Traditionally, audio-visual aids (charts, overheads, slides) have been the most common means of involving us in your talk and helping us take in your message. Make sure your graphic aids are interesting, relevant, and easy to read (see last section). Above all, however, don't expect graphics to carry your talk and automatically turn it into a scintillating two-way conversation.
- ▣ **Give extra thought to your opening and closing sentences.**
 - Openings and closings are the most remembered portions of your presentation.
 - The opening should clearly demonstrate your command of the topic and the situation, your purpose, and your organizational plan.
 - The closing should be fitting and final. Never end with a shrug or with a weak statement like, "This ends my talk." Think of a snappy closing sentence so that there is no doubt in our minds that you have finished.
- ▣ **State conclusions and action items explicitly.** Don't assume these aspects are obvious, and don't force us to guess them.
- ▣ **Remember above all while you are organizing, your purpose is to inform, to request, or to persuade—never just to impress.**

PRESENTING YOUR TALK

- ▣ **Dress for the part** of speaker or invited guest. Make sure you will be comfortable in and confident of the clothes you have selected.
- ▣ **You may use light notes or an outline**, but don't read your talk (never bring the full text of your talk with you to the lectern).
- ▣ **Walk briskly to the lectern:** stand quietly for a few seconds before beginning, take a deep breath, make eye contact with us, then begin on a firm clear note.
- ▣ **Have your opening sentences committed to memory.** Presenters normally find that once they get started their initial nervousness wears off and they lose self-consciousness. By knowing your opening comments cold, you can guard against drawing a blank or getting off to a weak start.
- ▣ **Accept a certain degree of nervousness** as an inevitable part of being in front of people.
 - Rather than fighting the nervousness or despairing over it, use it as a stimulant. Some nervousness means you're keyed up, excited, ready to connect with five, ten, or a thousand people.
 - Remember, your audience is made up of real human beings, much like yourself. We have come to see and to hear you. Lift your face to us and speak clearly, decisively, feeling your voice carry to the far corners of the room. Your voice is your greatest tool and your greatest ally. As you gain confidence, it will deepen and steady and come from a quiet center of power within you.
- ▣ **If your nervousness is chronic** and seriously threatens the success of your talk, then you need to take specific steps to control it.
 - First, analyze your nervousness. Pinpoint what's producing it. Are you inadequately prepared (rarely, overprepared)? Are you not in touch with your central message? Are you unhappy with your personal appearance?
 - Once you have established the root cause of your nervousness, you can begin to work on neutralizing it. You may find extra practice or deep-breathing exercises help. It may be that all you need is more experience in front of groups. Whatever the cause of your extreme nervousness, if you sincerely want to overcome it, you almost assuredly can.
- ▣ **Last, but not least: SMILE!** Along with a confident voice, a sincere smile calms and cheers us.

PREPARING VISUAL AIDS

- ▣ **Plan on using graphics** (overheads or slides) to accompany your talk. As a rule of thumb, don't plan to stay on any particular graphic more than two to three minutes. If you do, your audience will grow bored.
- ▣ **If you have finished discussing a graphic** but don't have another to immediately replace it, turn the overhead projector off. That will bring our focus back to you—where it belongs.
- ▣ **Never photocopy books or typewritten material.** They are illegible to most of the audience and give the impression you quickly threw the material together.
- ▣ **Plan on a maximum of 6-10 lines per overhead.** An outline form with bullets is best. Remember, a graphic should present a distilled form of your comments (in the same way the oral presentation is a distillation of your written report).
- ▣ **Plan your graphics as a harmonious suite.** Design a format that presents your information attractively, and stick to that format throughout all your graphics.
- ▣ **Use numbers sparingly.** We will remember two or three key numbers, but if you give us too many we will end up remembering few, if any.
- ▣ **Other props are optional** (samples, models, etc.). They can be good if they are interesting and relevant, but too many will distract from the talk.

We recommend that students learn to accept a certain degree of nervousness as an inevitable part of being in front of people. Rather than fight the nervousness or despair over it, we suggest that they use it as a stimulant. Some nervousness means a presenter is keyed up, excited, ready to connect with the audience.

heads, slides) have been the most common means to involve an audience in a talk and help them understand the presenter's message. Students should make sure their graphic aids are interesting, relevant, and easy to read. However, students should not expect graphics to carry their talk and automatically turn it into a scintillating two-way conversation. That must come from the presenter.

Openings and Closings

Presenters should give extra thought to their opening and closing sentences. Openings and closings are the most remembered parts of a presentation. They are also the most critical time for both presenter and audience. Openings should clearly demonstrate the presenters' command of the topic, their purpose, and their organizational plan. Closings should be fitting and final. We counsel students never to end with a shrug or with a weak statement such as, "This ends my talk." They are urged to think of a snappy closing sentence so that there is no doubt that they have finished.

Presenting the Talk

Students may use light notes or an outline, but we do not permit them to read their talks. In fact, we advise them to never bring the full text of their talk to the lectern. We coach students to walk briskly to the lectern and stand quietly for a few seconds before beginning, then take a deep breath, make eye contact with the audience, and begin on a firm clear note.

Presenters should dress for the part of speaker or invited guest. We advise students to make sure they will be comfortable in and confident of the clothes they have selected.

Overcoming Nervousness

Presenters normally find that once they get started, their initial nervousness wears off and they lose self-consciousness. By knowing their opening comments cold, students can guard against drawing a blank or getting off on a weak start.

We recommend that students learn to accept a certain degree of nervousness as an inevitable part of being in front of people. Rather than fight the nervousness or despair over it, we suggest that they

use it as a stimulant. Some nervousness means a presenter is keyed up, excited, ready to connect with the audience. We tell students to remember that the audience is made of real human beings, much like themselves, who have come to see and hear the presentation. We urge them to speak clearly and decisively, feeling their voice carry to the far corners of the room. We encourage our students to believe that as they gain confidence, their voices will deepen and steady.

If a student's nervousness is chronic and seriously threatens the success of the talk, then the student needs to take specific steps to overcome it. We counsel such a student to analyze the nervousness in order to pinpoint the cause: perhaps the student is inadequately prepared; perhaps the student is not in touch with the audience; perhaps the student does not fully understand the central message or does not wholly believe in it.

Once a student has established the root-cause of the nervousness, he or she can begin to neutralize it. Students may find that extra practice or deep-breathing exercises help. Or it may be that all the student needs is more experience in front of a group.

Last, but not least—we tell our students to smile. Along with a confident voice, a sincere smile calms and cheers the audience.

Preparing Visual Aids

We tell students to use graphics (overheads or slides). A rule-of-thumb we share with them is to change the graphic every two to three minutes. This forces the presenter to break down complex textual graphics into simpler ones and keeps the audience from growing bored. If students have finished discussing a graphic but don't have another to immediately replace it, we advise them to turn off the overhead projector. This brings the audience's focus back to the presenter, where it belongs.

We recommend that students plan on a maximum of six to ten lines per overhead. An outline form with bullets is best. A graphic should present a distilled form of their comments (in the same way the oral presentation is a distillation of the written report). Presenters should never photocopy books or typewritten material. It is generally illegible to most of the audience and gives the impression that the

presenter threw the material together quickly. Presenters should use numbers sparingly. The audience will remember two or three key numbers, but when too many are given they will be forgotten.

In addition, we urge students to plan their graphics as a harmonious suite. They should design a format that presents their information attractively, and then stick to that format throughout all the graphics.

Other props (samples, models, *etc.*) are optional. They can be good if they are interesting and relevant. But too many will distract from the talk itself.

GRADING AND OFFERING FEEDBACK

Giving the students feedback soon after their presentation is equally important to giving advice and pointers beforehand. The oral presentation is worth ten percent of the semester grade, so students must take it seriously. The talks are graded in four categories: organization, presentation, visual aids, and answering questions. Each category is graded on a numerical scale, and handwritten comments, explanations, or suggestions are written in the margins (see Table 2).

Organization (fifty percent) includes: does the talk start with an outline and end with a summary; is there a logical flow of ideas or a rambling monologue; has thought been given to the level of understanding of the audience; is the talk aimed at informing, or merely at trying to impress?

Presentation (forty percent) includes: is the speaker enthused about the topic, or merely droning through it; is the speaking clear or mumbled; has the speaker practiced enough to give the talk from the vuegraphs or light reference to notes, as opposed to reading most of it; is the talk too long (past the target time)?

Visual aids (ten percent) includes: were the vuegraphs done with some care, or thrown together at the last minute; do they contain a reasonable level of detail; are they legible?

Questions are asked by the instructor and other students after the talk, and the speaker must give evidence of having done enough research on the chosen topic to expand on specific points mentioned in the talk or related to the subject. Often the instructor asks questions aimed at forcing the speaker to think about and summarize the main point of the talk, or to recognize how this topic fits into a

broader context.

Most students are not especially happy when this assignment is given to them in class. As the day of their presentation nears, many of them become apprehensive and nervous. However, unsolicited comments after the talks are over or after the semester is completed, are almost universally positive. Discussions with students after they have completed the course or (especially) after they have been working in industry for a while indicate that they realize (sometimes enthusiastically, sometimes grudgingly) that training in oral technical presentations is a valuable tool for a new engineer.

REFERENCES

1. Campbell, John A., "An Overview of Speech Preparation." Part of the Series MODCOM: Modules in Speech Communication. Chicago Science Research Associates, Inc., Chicago, IL (1976)
2. Detz, Joan, *How to Write and Give a Speech*, St. Martin's Press, New York (1984)
3. McCroskey, James C., *An Introduction to Rhetorical Communication*, Prentice-Hall Book Company, Englewood Cliffs, NJ (1972)
4. Osborn, Michael, *Speaking in Public*, Houghton Mifflin Company, Boston, MA (1982)
5. Morrissey, George L., and Thomas L. Sechrest, *Effective Business and Technical Presentations*, Addison-Wesley Publishing Company, Reading, MA (1987)
6. Peoples, David, *Presentations Plus*, John Wiley & Sons, New York (1988)
7. Smith, Terry C., *Making Successful Presentations: A Self-Teaching Guide*, John Wiley & Sons, New York (1984)
8. Wydro, Kenneth, *Think on Your Feet*, Prentice-Hall Press, Englewood Cliff, NJ (1988) 7

USER-FRIENDLY PROGRAM

Continued from page 27.

Some examples of the conclusions obtained by simple exercises are:

- Results obtained with different cubic EOS do not vary significantly with one another. This can be observed by giving a student a multicomponent mixture—for example, a hydrocarbon condensate of known bubble point pressure—and letting him arrange the equations in order from best to worst. A comparison of the errors of each equation leads rapidly to the conclusion.
- The use of kij can radically modify equilibrium properties and the shapes and curvatures of the various diagrams. A very nice example is observed with CO₂-hydrocarbon systems. The use of a kij equal to zero will usually produce a poor fit. We encourage the students to randomly try to find the best kij and observe the changes in the diagrams. Later they may use the program to calculate the optimum parameter and compare their results.