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Chapter 16: Technical Presentations

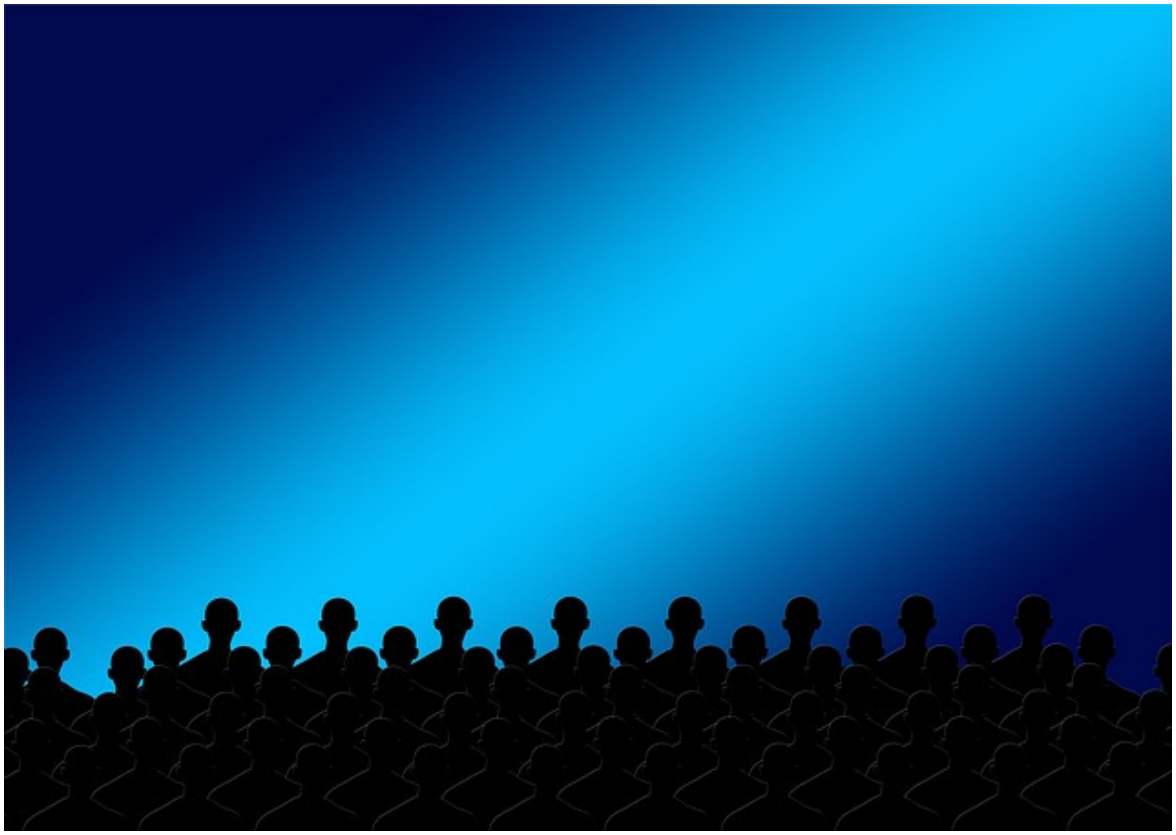

Figure 16.1: It can be scary looking at a large audience, even for us who do it a lot.

One important, but often overlooked, skill in engineering is presenting. From talking with students, I have noticed that a lot of engineering students are intimidated by public speaking. In fact, although I have almost a decade of experience lecturing, I still am a little scared standing in front of a large classroom! It is OK to be a little nervous. I tell students being *a little* nervous means that you care, and caring is part of successful presentations. This chapter aims to reduce your presentation anxiety by teaching you the skills you need. The main key is to practice, know the format, and be prepared.

LEARNING GOALS

In this chapter we will learn:

- Why it is important to practice and get comfortable presenting technical information.
- What your presentation should entail for the main type of engineering presentations.
- How to present technical information in a professional and engaging way.
- What "audience" means and how to use what you know about your audience to your advantage.
- The art of PowerPoint and how to use the features in a non-distracting way.
- What should (and should not) be included in a technical presentation.

Why Learning How to Present Is Important

It is one thing to have a good idea, invent something cool, or develop a new technology, but it is a whole other thing to successfully disseminate that information. A lot of people don't realize that presenting is a *skill* and like all skills requires practice and study to perfect. It seems like it is easy to slap together a PowerPoint and talk about your project, but if you do not put the time and effort into the presentation to ensure that it impacts your audience, you work will be wasted.

> *You have to learn how to present in a compelling manner in order to get people to pay attention to your product/idea/report/etc.*

For example, I have been an instructor and advisor for several senior design teams. I have seen team projects range from truly impressive to mediocre. I have also seem the impressive teams be dismissed at competitions and the mediocre teams **win awards** at competitions because of presentation skills alone. What I am trying to convey to you is that presenting can be the make or break for a project. No matter how good your project is, if you can't describe to people how good your idea is, no one will care. That being said, the moral of this story is not to do a mediocre project and coast on your presentation skills. Combining a good project with a good presentation should be your goal.

Finally, it should be noted, that engineers have to present *a lot*. In fact, engineers have to do presentations a lot more than you might think. You might have to present your design idea to your research and development team. You might have to present to the entire company describing how you optimized a system process for efficiency. You might have to present to shareholders the newest technologies your team is working on. You might have to present to future customers on how your technology can improve their productivity. The point is, engineers are expected to be good presenters and historically, University educations in engineering do not explicitly address this skill. Hopefully, this chapter and your subsequent education reverses this.

Presentation Anxiety

Before we jump into some examples and tips, I wanted to take a quick note on presentation anxiety. As I mentioned before, there is no getting around it, you will probably be a little nervous when you present. That is ok! Almost everyone feels a little nervous. However, there are tactics that you can use to reduce your anxiety when stepping up in front of an audience.

Figure 16.2: The Key is to Not Panic! (https://pixabay.com/illustrations/keyboard-button-panic-fear-anxiety-114439/)

One of the biggest keys to reducing your anxiety is **preparation.** In fact, there is no such thing as "over preparing". The more you prepare for your presentation the better you will feel because you will be more confident about what you are speaking on.

Here are three tips that should help when it comes to preparation and alleviating anxiety:

Anxiety Reduction Mechanism 1) Rehearse, Rehearse, Rehearse...

Although it might seem self explanatory or obvious, rehearsing is the most important step in reducing presentation anxiety. In my experience, this is the step that most students spend the least amount of time on even though it is the most important.

> *Out of all of the time you budget to create your presentation, the majority of time needs to be spent rehearsing.*

The more you rehearse, the smoother your delivery will become and the more confident you will feel. Rehearse in front of your roommates. Rehearse in front of your classmates. Rehearse in front of a mirror. Rehearse to your parents (this is a great idea as it will probably impress them about how far you have come in your education and maybe get a few more bucks thrown on your campus cash card!). Rehearse in front of your grandparents (I am sure grandma would love to hear from you anyway). I think you get the idea. Rehearsing is

key and the more that you practice your presentation, the more comfortable you will feel. Rehearsing in front of people that aren't familiar with the course is even better. It will generate questions and make sure that you are explaining things in an optimal manner.

What I suggest to students is, they time each of their rehearsals of their presentation. The key is to continue to practice rehearsing and practicing until the group can finish the presentation *without making any mistakes and when they can finish within +/- 5 seconds of the same time* (if it is a 10 minute limit presentation, the team can finish each practice session in 9:50 seconds to 9:55 seconds *every time*). As you can imagine, this takes a ton of practice but does reflect the level of polish necessary to feel confident about your presentation.

Anxiety Reduction Mechanism 2) Anticipate questions.

The next key to preparation for your presentation is to anticipate the questions you think the audience will ask, and be prepared with answers to those questions. Obviously, you can't anticipate every single question that you may get asked, but you can probably think of a few avenues that your audience members minds might wander.

For example, lets imagine that you are giving a presentation on the efficacy of a vaccine. Depending on your audience, you should be prepared to answer the following questions:

- What is a vaccine?
- Specifically, how do vaccines work?
- Do vaccines cause autism? (Spoiler: NO)
- What types of adverse reactions might there be to the vaccine?
- How long will it take to produce 100 million doses of the vaccine?
- Are there specific storage requirements for this vaccine?
- Etc. Etc.

Preparing detailed answers to these questions will strengthen your knowledge of your presentation topic and alleviate your anxiety. Since you anticipated the questions your audience will ask, you don't have to worry as much about looking like a fool on stage. This is also where rehearsing in front of someone who is not familiar with the course or topic can be very beneficial since it will generate a lot of these types of questions that you may have not considered.

Anxiety Reduction Mechanism 3) No one in the audience cares about you.

Sometimes students interpret this incorrectly. I am not saying that no one cares about you. Lots of people do. Your professor does, you have friends in the class, etc. What I mean by this is that it is important to remember that when you give class presentations, often, your classmates and peers have to give presentations as well.

Think back to the last class you were in where you had to present. Think about sitting in your chair, while another team is presenting, waiting for your turn. Be honest. Were you even listening to them? Or were you anxiously awaiting *your* turn at the presentation. Well, the reality is, *everyone else is only thinking about themselves and their presentation while you are presenting*. When you make a tiny mistake, no one notices. The only thing they will notice is if you totally bomb the presentation (which you won't because you rehearsed so much).

So as part of your preparation, *relax*. The selfish and narcissistic tendencies of your classmates ensure that they won't be paying as much attention to you as you think they might. Hopefully that relives a little bit of the pressure.

Discussion 16.1: How do you feel about presentation anxiety?

How do you personally feel about presenting in front of your class? Does it feel you with dread or do you look forward to it? Do you have any tips or tricks you would like to share with your classmates that you do to alleviate anxiety? This is an open discussion so you will be able to see each others responses and see who said what.

Responses

Reply

Ordered by Newest Responses

What Your Presentation Should Entail

As an engineer you will typically be presenting on projects you are proposing or presenting data from projects that you have already completed. All of the advice from this chapter (no such thing as over preparing, etc) will be helpful in reducing stage anxiety but to make sure that your presentation is well received, you need to make sure that the presentation contains the appropriate material.

You will expected to have the following sections: title, introduction, materials and methods, results, discussion, and conclusion. The following example presentation will highlight the most important and standard slides that your presentation should (probably) entail.

To describe each of the required *sections* (keep in mind that I am showing only one slide for each section but it is likely that you will need multiple slides) I included example slides from a presentation I gave at an American Society for Engineering Education conference in 2019 in which I won the "Best Presentation" award. Note, the slides shown below are only a subset of the slides that I actually presented at the conference. For the full slide deck, you can click here.

Title Slide

The title slide is just a place to include the names of all the people that worked on the project and their affiliations. And the title. Duh.

- Keep it simple.

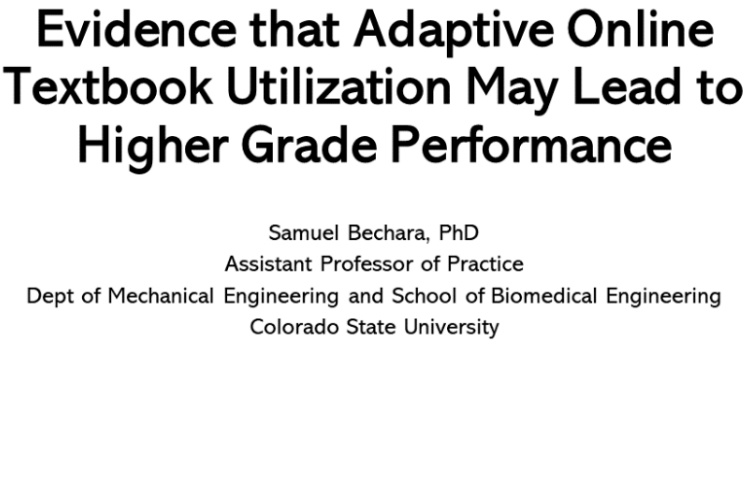

Figure 16.3: A Title Slide. This specific presentation talked about how forcing students to read via textbooks like this one where there are homework points associated with reading, actually improves educational outcomes.

Introduction / Background Slide(s)

The purpose of the introduction slide it to outline your current understanding of the subject. You need to include specific examples to previous work / research.

- Clearly explain the importance for the current project and what the significance of the project will be.
- Justify the merit of your project by presenting significant information.
- End with a specific, clear, and explicit purpose for the project. Some of the projects that you complete during your undergraduate career will be chosen for you. It does not mean that the purpose of the project is "because the professor told me to do it". Spend some time thinking about the project and what learning outcomes your are expected to gain from it.

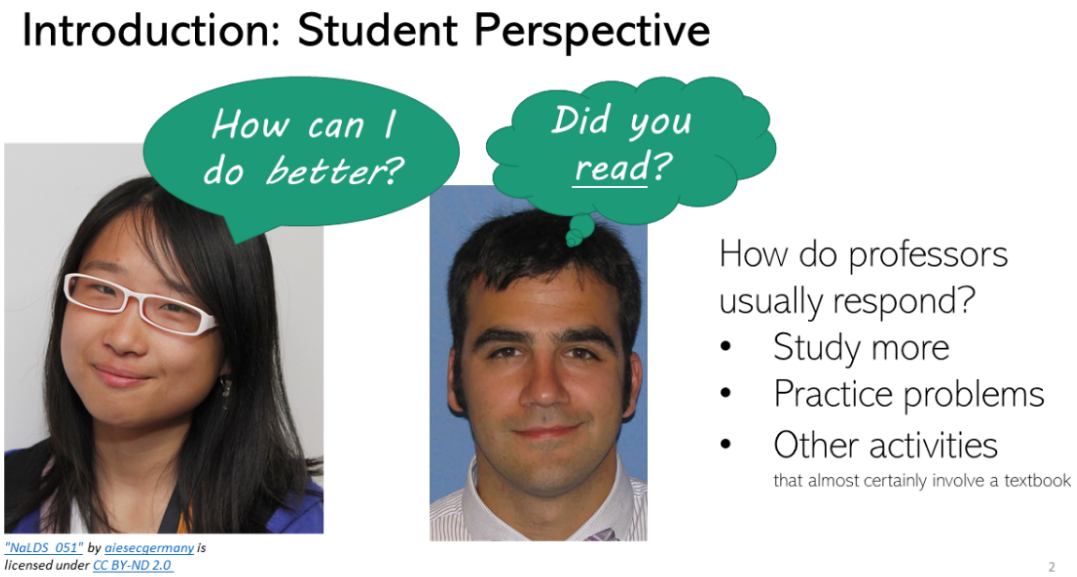

Figure 16.4: An example introduction slide. In this slide I talked about the motivation for the project. Specifically, why don't students just read the textbook?

Materials and Methods

The purpose of the materials and methods slide is to list the necessary steps for your audience to interpret the results.

- You should include: sample sizes, how the data will be processed, everything that was used in the project, and what statistical tests if any will be used.
- It should be clear how the materials and methods relate to the purpose of the project.
- The audience should feel that presenters fully understand the scope and details of the work (especially if it is a proposal).

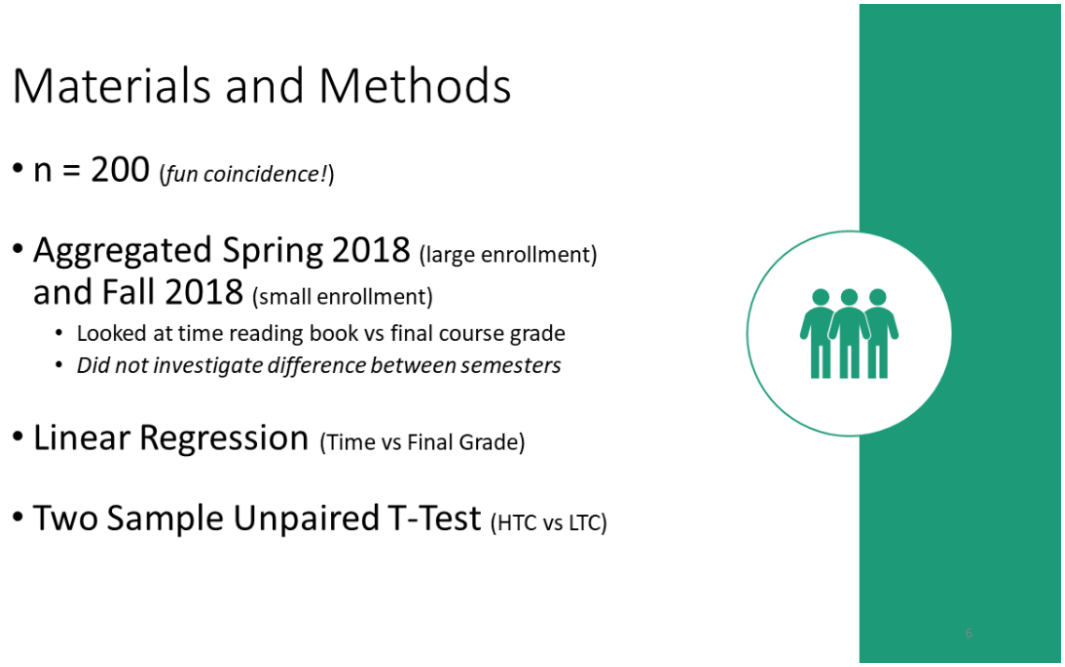

Figure 16.5: An example materials and methods slide. In this slide I talked about how I setup the research project in specific details.

Results

The results slide is the place where you describe what you found from your project.

- Present the data from the project. What did you do? What did you find?
- Do not interpret your results yet! Just show what you gathered.
- Visual descriptions of your data are important. Be sure to include figures and tables as appropriate.

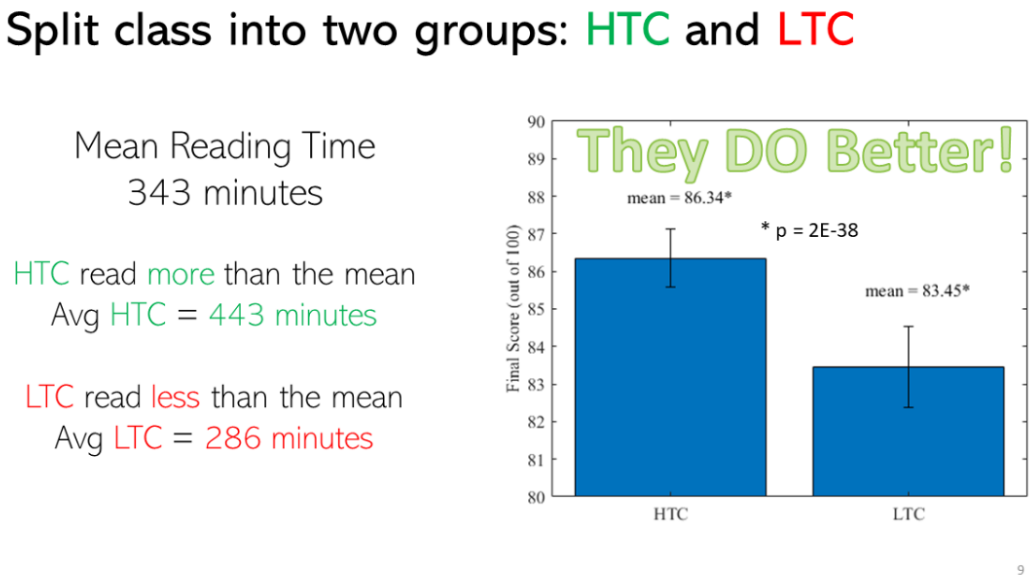

FIgure 16.6: An example results slide. This particular slide shows that students that read more (the "HTC" group) scored statistically significantly higher overall in the course than the students that didn't read as much (the "LTC" group)

Discussion

Although it might seem like your results are the most important slide, I would argue that it is actually your discussion slide. Whereas in your results section you simply tell your audience what you found, in your discussion section, you need to interpret the results for your audience.

- Interpret the data from the results section.
- Answer the "why" of the data.
- Draw conclusions about the project.
- List any limitations of the project.
- Discuss future work.

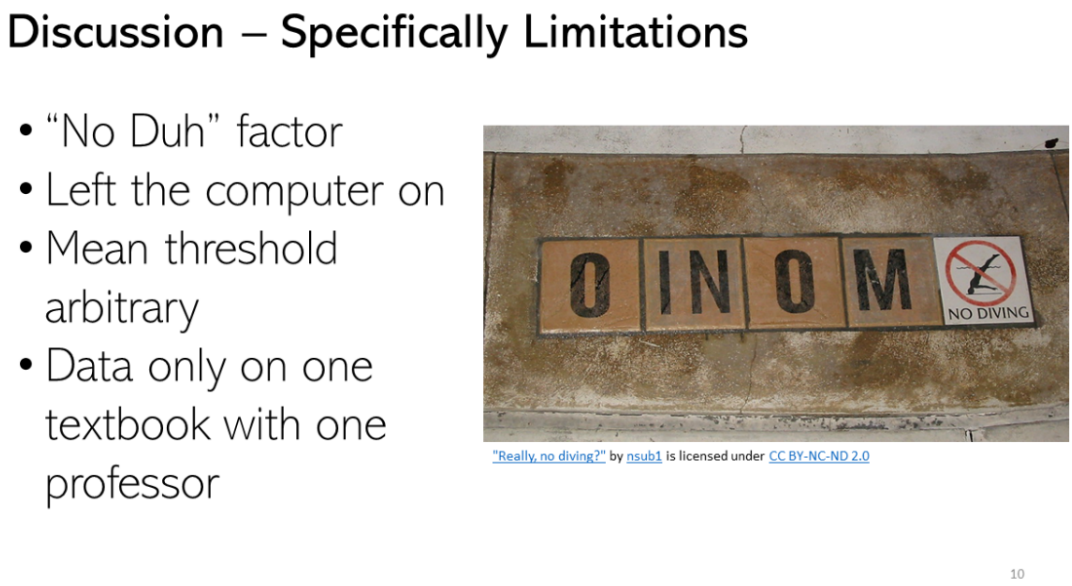

Figure 16.7: An example discussion slide. In this particular slide, I talked about the results and tried to frame them in terms of what I considered to be the limitations of my presentation.

Conclusion / Significance

Finally, we get to the conclusion slide. This is another very important slide as it can be an opportunity to reinforce the takeaway message that you want to give your audience.

- Should be a "natural" conclusion. Your presentation should not end abruptly. The audience should *feel* it coming.
- Summarize the major points from your presentation. Be sure to provide your audience with a take home message.
- Summarize the weaknesses of the project. It shows that you can critically think about your own work and makes your audience more sympathetic with your position. Admitting what you would change actually *strengthens* your position.

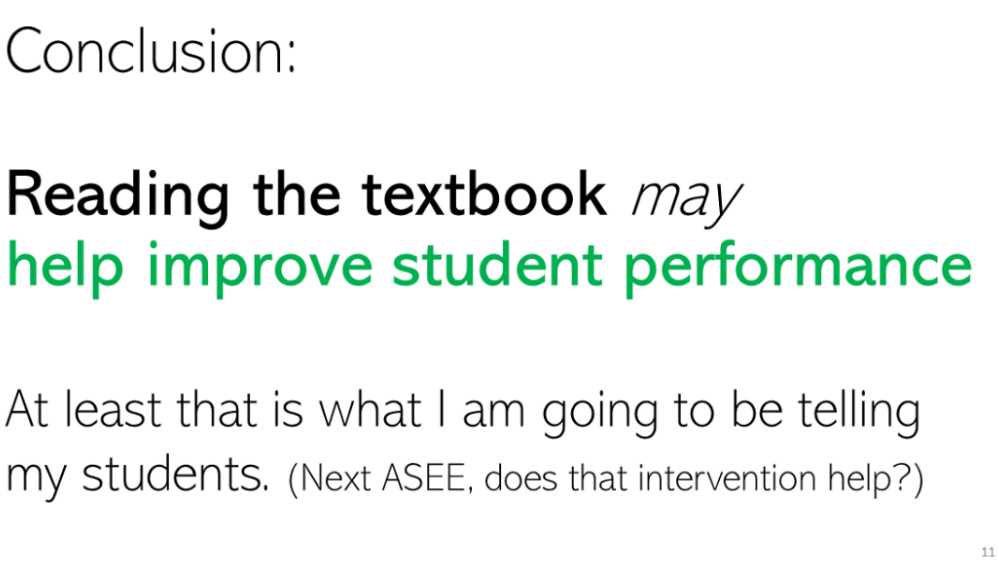

Figure 16.8: An example conclusion slide.

How To Give a Dynamic Engineering Presentation

There are two main things to worry about when presenting engineering information in a dynamic and interesting way; the content and yourself.

In my opinion, one of the best ways to convey what makes for a dynamic and engaging presentation is to have you look at *one of the worst.* What follows is one of the worst presentations I could find on the internet. To set the stage for you, it is from a British show in which people pitch their ideas to a group of investors (it is similar to the American show Shark Tank). I chose this particular clip for a few reasons:

- It is supposed to be entrepreneur's getting the opportunity of a lifetime to get their dream invested. They should be excited and passionate by default!
- The following pitch is *atrocious* but the product is actually kind of an interesting idea. It seems to me that if she had given a more dynamic and engaging pitch, the investors may have been more interested. In fact, one of the investors says as much.

With that out of the way, watch the following pitch from Gayle Blanchflower (I couldn't find out if this spelling was correct). Note: the video should automatically start at 30:12 for you. If it doesn't you can skip there. Also, be prepared to answer some questions on what you think went wrong with her pitch.

Video

Please visit the textbook on a web or mobile device to view video content.

Discussion 16.2: An atrocious presentation

There are SO many things that went wrong for her in that presentation. List at least two things (there are plenty more though so don't hold back if you feel compelled) that you think were terrible about that presentation. Some ideas to get you started; body language, defensiveness, excitement...

Responses

Reply

Ordered by Newest Responses

I am truly sorry for putting your through that. However, I hope you agree that it gives you some ideas of what NOT to do when trying to give a dynamic and interesting presentation. Here are some more tips about both the content of your presentations and tips for you.

Content

1. **Know your audience**
   Your audience will dictate what you are presenting. If you are presenting on the efficacy of vaccines to a group of doctors, you can assume that they know what vaccines are and how they work, therefore, you can leave that information out of the presentation. However, if you are giving the same presentation to a group of middle schoolers, it might be a good idea to include that background information. The key is to know your audience and tailor the presentation to their knowledge.
2. **Convey your excitement**
   If you aren't excited about your project, your audience surely will not be. Get excited and make your presentation exciting the best that you can.
3. **Tell a story**
   This chapter gives you the basic framework (you can think about it like the beginning, middle, climax, end or a story) but *you* need to tell it. The more you can make your presentation flow like a story, the better.
4. **Keep it simple (communicate, don't obfuscate)**
   Every field has jargon and acronyms that make people feel smart for knowing. Don't lose your audience in the lingo! This is where knowing your audience is critical but in reality, even scientists and engineers appreciate brief definitions of scientific terminologies and processes.

You

1. **Set the stage.** Clear the podium of distractions. Have whatever tools you need for your presentation ready to go ahead of time.
2. **Get ready to perform**
   Presentations are performances. Know your subject and know your main talking points. Do not memorize a script! Your rehearsing should have been so extensive you don't need one anyway.
3. Stride up to podium / stage / front of room. Be proud! Don't sulk.
4. Stand tall, keep chest lifted, smile. If you aren't confident by nature, learn to fake it. It goes a long way.
5. Pay attention to your teammates when it is their turn to talk. Remember, if you look bored, your audience will interpret that as they should be bored.
6. Speak loudly and project your voice clearly. For some, this is not natural and will take practice. Good thing you rehearsed so much!
7. Take your time. A moment or two of silence is a powerful tool.
8. Talk to the audience, not the screen.
9. Stay on time.
10. Rehearse a lot. Remember, there is no such thing as being over prepared.

PowerPoint Tips

As I stated before for dynamic presentations, I think it is a good idea to look at bad PowerPoint decks to understand what makes the good ones, good. Before moving on, take a look at the slides here: https://www.slideshare.net/Kshivets/lung-cancer-surgery-4936542. When you have finished looking at those slides, participate in the following discussion prompt before moving on.

Discussion 16.3: A really terrible slide deck

For this discussion, write out at least three things (there are more and you can write out as many as you would like) that were terrible in the slide deck linked above, and one thing that you thought the slide deck actually did well. Just to be clear, in my opinion, this is one of the most horrific slide decks I have ever seen so it should be easy to find some faults. There are one or two good points about it though. Try and be critical with an eye on what you wouldn't do if you were to make a slide deck.

Responses

Reply

Ordered by Newest Responses

Well after reviewing that horrible slide deck, you should actually probably have a good idea for what makes for a good slide deck. Here are my tips:

1. Less is more. Less slides, less text. Trim off the fat and concentrate on the coolest most relevant things.
2. Create sections. Title slides to start new sections can help break the presentation into a logical flow. Specifically, you should use the sections that we discussed earlier in the chapter.
3. Avoid clutter. 3-5 bullet points per slide at most! *Bullets should be keywords not sentences*.
4. Make it readable for old people. Sans serif fonts. 28-40 point for headline text, 18-28 point for normal text, and 12-14 point font for references is a good place to start.
5. Ensure that there is a clear contrast between background and all text.
6. Use visuals. Steer clear of videos unless completely necessary or exceptionally cool. In my experience they NEVER work and they take lots of time away from your presentation. Figures are your best bet.
7. Triple check your spelling. A sure fire way to lose credibility is to have typos in your presentation

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