AC 2011-1373: GETTING STUDENTS PREPARED TO PRESENT WELL

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Getting Students Prepared to Present Well

Although engineering students become aware of what a good presentation entails early in their college careers, they often fail at delivering an effective presentation themselves. The disparity can often be explained by the students relying overwhelmingly on the quick-fix-tips they have gained to mend their presentation rather than spending their efforts to diligently practice their delivery before the final presentation. Rehearsals allow the students to identify discontinuities in their flow, avoid awkward pauses, gain confidence with their delivery, reduce reliance on the slide text and better manage the allocated time - all common shortfalls evident during student presentations. Rehearsing is often the least favored presentation tip because it requires the greatest effort and its importance is least apparent to the students. In fact, there is a tendency for the students to associate a good presentation with a "naturally" gifted presenter, even though it is a strong sign of a well rehearsed talk. On the other hand, without the correct technique even rehearsing is not sufficient to deliver powerful presentation. Therefore, a senior elective course was tailored to reinforce our future professionals with the necessary steps to yield a compelling technical talk via judicious practice. Beyond exposing students to the topic, the 'Introduction to Nanotechnology' course was designed with an additional skill-building objective: to teach students to present well. This paper discusses how this objective was attained via several class activities, resources and assignments that culminated into a final project presentation. An important strategy to enforce rehearsing involved pairing students to peer-evaluate their presentations prior to final delivery. This was in addition to a short animated video 'Get Prepared to Present Well' produced specifically for the course, along with a check list, to emphasize the key techniques. A pre- and post-survey was conducted to benchmark presentation skills and determine how regimented rehearsing affected their delivery. When rehearsed, the students clearly saw an improvement in their performances and as a result developed a strong appreciation for the importance of practicing. However, the study also identified that when the assignment is demanding and time is limited, practice is first to be sacrificed.

Introduction

ABET identifies the ability to communicate effectively as a key student outcome for an accredited engineering program.[1] The requirement includes the ability to orally communicate information specifically as a technical presentation. To meet this criterion programs typically utilize a public speaking course as part of their curriculum. This is followed by opportunities for the students to apply their acquired skills usually in the form of senior project presentations or course project talks.

At Rowan University, engineering undergraduates as part of their engineering clinic series are exposed to good public speaking practices in their sophomore years. Nevertheless, the students fail to deliver compelling presentations during the junior and senior engineering clinic projects when they routinely present their progress on projects and the final outcomes during the term. One of the possibilities for poor presentations is that students put too much emphasis on preparing their slides with content that they relegate rehearsals to the very last minute which in

turn fall by the wayside as the deadline fast approaches. In terms of effective presentation techniques, the students feel that the typical quick-fixes (title page, outlines, bullets, visuals, notes, dress style, etc) will be sufficient to produce a compelling presentation. Students rarely recognize the importance of practicing the delivery to improve the flow and comfort in front of their audience.

Rehearsing is the least conspicuous of presentation techniques because a well-rehearsed presentation often makes the presenter seem like a 'natural' orator. As a result, there is rarely a positive reinforcement for the students when they see a good presenter, as good visuals, amplifying voice or a professional dress style is. Therefore, an extra effort is required to prompt students to practice in order to present well. In addition, it is equally important to impart correct presentation techniques to the students that can strengthen their public speaking skills.

Several approaches have been identified that attempt to teach this critical skill but few focus specifically on the importance of rehearsing in addition to the effective presentation techniques and slide design.[2-9] As a result, for the senior mechanical engineering elective course, *Introduction to Nanotechnology*, activities and exercises were designed to gradually introduce effective presentation techniques along with an enforced rehearsal component to teach students how to prepare to present well. This paper describes how practicing with effective presentation techniques was emphasized using the various exercises within the course. The outcomes are presented from the perspective of instructor's evaluation and conclusions based on student surveys.

Course Organization

The *Introduction to Nanotechnology* course was offered in Fall 2010 with eleven physics, mechanical and electrical engineering undergraduate seniors and graduate students enrolled. The 16 week long course was divided into two parts[10,11]: the first part, taking two-thirds of the course, involved instructor lectures primarily utilizing presentation slides; while the second part was dedicated to the student presentations ('AppTalks'). The course content for the first part was developed using several excellent textbooks that are currently available on the general topic of nanotechnology.[12-13] At the end of each part, a knowledge test composed of factual multiple choice and true/false questions, was administered to test their basic knowledge on the content covered. Figure 1 provides a timeline depicting the weekly organization by content. The activities designed to provide effective presentation skills for the final presentations were mostly distributed throughout the first part before the last third of the course dedicated to AppTalks began.
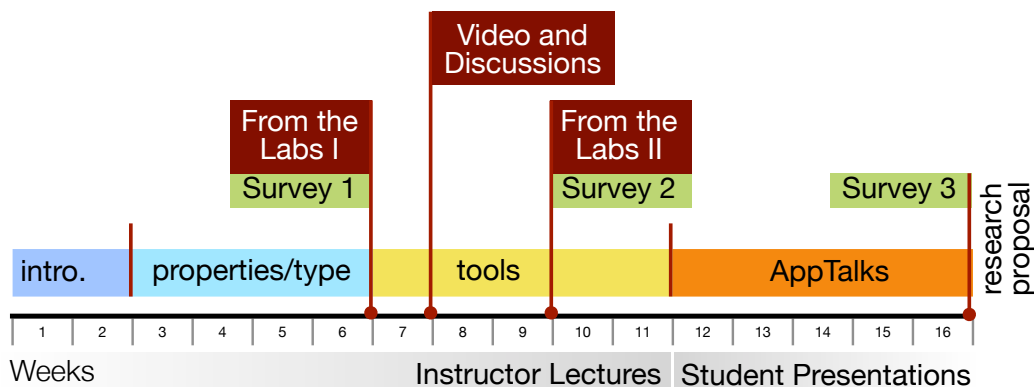
Figure 1: Timeline representing *Introduction to Nanotechnology* course content organization.

For the 'AppTalks' the students prepared a 30 min presentation to discuss a particular topic within nanotechnology. The topics were also gradually introduced via mini assignments which the students eventually selected for the course project (which included the AppTalks and the Research Proposal). For the presentations, the students were required to introduce the topic, discuss background, synthesis and characterization methods followed by a survey of applications they encountered while researching the nanotechnology journals. The students were evaluated on their content as well as their delivery and presentation layout. Performance was evaluated based on the instructor's and peer's assessment of the presentation. The evaluation criteria were shared with the students when the course project was assigned.

Activities to Teach Effective Presentation Approaches

Since AppTalk represented the first opportunity for the student to prepare for a 30-minute long presentation independently, activities to develop their comfort level with the class and content were organized. The exercises also emphasized key public speaking practices to deliver compelling presentations. The three activities are briefly described here.

Briefs from the Labs

For the 'Briefs from the Labs' activities the students selected a single paper within their selected AppTalk topic to summarize in the specified format and present it within 3 minutes. The presenter was required to identify a single figure from the paper to discuss the key findings. Figure 2 provides an example of a slide that the students were asked to prepare and present their 'Briefs from the Labs'. The slide format and content was specified in order to focus on evaluating content delivery. 'From the Labs' is a feature of MIT's Technology Review[14] magazine which briefly discusses 1. Results 2. Why it matters 3. Methods 4. Next Steps for particular scientific papers. This way students were able to efficiently summarize and draw critical information from scientific papers.
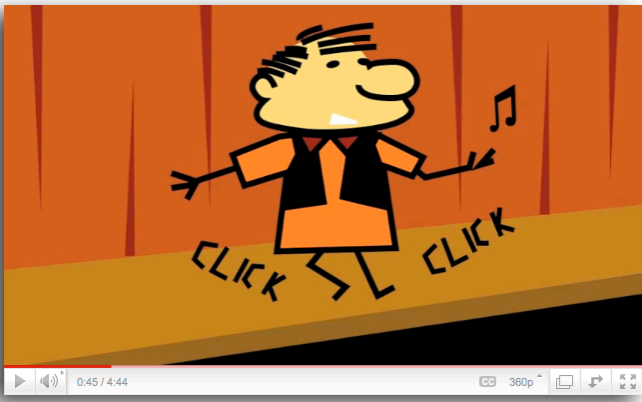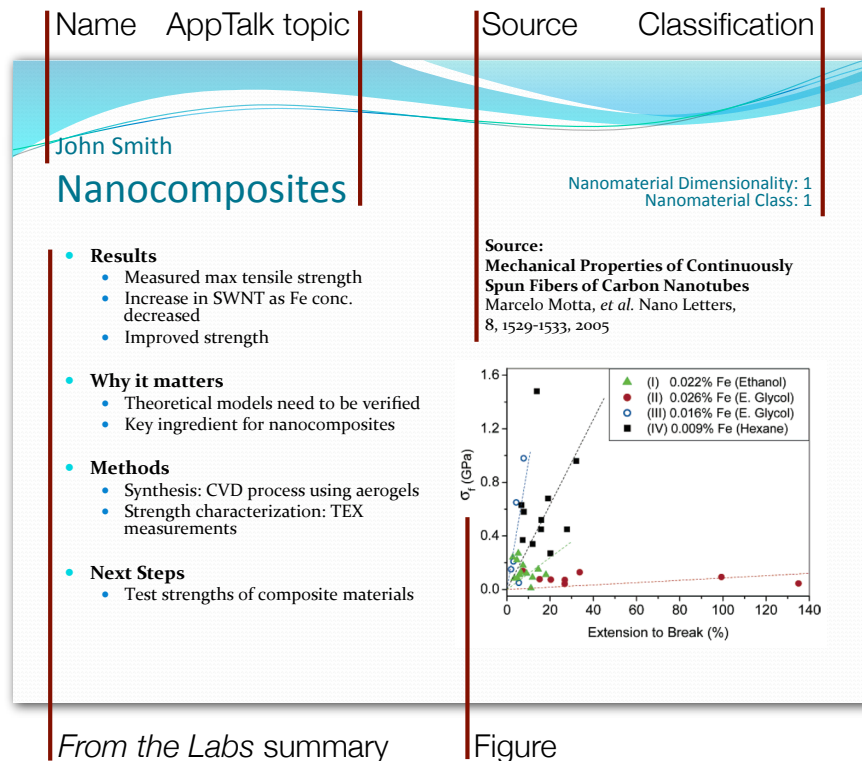
Figure 2: A sample slide showing the 'Briefs from the Labs' activity formatting requirement. The students were asked to present a single paper under the assigned course project topic within 3 minutes.

Two such activities were organized, first one at Week 6 ('From the Labs I') and second at Week 9 ('From the Labs II'). The aim for the first 'From the Labs' assignment was to emphasize the need to practice delivery by giving each student only 3 minutes to discuss the key points. Even though the students were aware of the 3 minute limit, the instructor deliberately avoided stressing on the need to practice. Considering, 3 minutes is a relatively short time to go through such technical content, it was expected that a significant number of students would fail to go through their content without preparing ahead of time. This presented a good teaching opportunity by demonstrating the need for practice, at least to manage time.

As a result, following From the Labs I, an informative video on effective presentation techniques and a guide on slide layout was shared to emphasize the importance of preparing the delivery of the information in addition to the content itself. Further details on the video and communication guide is provided later. From the Labs II, therefore, allowed the students to implement what they had gained about preparing effective presentations, including the need to practice. To ensure the students practiced, they were paired with other classmates and the partners were asked to practice their briefs with each other. The partners in turn evaluated their delivery using the checklist provided in Fig. 3.

Animation Video and Checklist

An animation discussing best practices in business or technical presentations was produced by the instructor and placed on YouTube.com. Figure 3 shows screenshots of the animation video along with the accompanying checklist. Briefly, the video discusses several 'do's and don'ts' of professional presentations. The aim was to concisely and in an entertaining fashion teach key effective presentation techniques so that students or professionals can quickly remind themselves prior to preparing for a presentation. Needless to say, the video specifically points out the need to practice as the key ingredient for preparing to present well. In addition to the video, a checklist based on the items discussed in the video was prepared to aid the students. The students were asked to watch the video for the next class during which the key elements were discussed and checklist shared. This activity took place a week after From the Labs I assignment.

Words
- ○ No reading from slides or notes
- ○ Practiced aloud at least 5 times
- ○ Avoided awkward pauses ("um")
- ○ Delivery flowed like a conversation
- ○ Asked questions

Actions
- ○ Maintained eye-contact
- ○ Avoided being stationary
- ○ Enthusiastic and animated body language
- ○ Did not seem rushed
- ○ Appropriate dress style

Slides
- ○ Avoided excessive text
- ○ Used visuals over text to convey information
- ○ Limited lengths of bullets to only few words
- ○ Clean slide layout (limited distractions)
- ○ Consistent layout throughout

Content
- ○ A powerful beginning
- ○ Logical layout
- ○ Used referenced material
- ○ Good verbal transitions between slides
- ○ A memorable conclusion

Figure 3. (a) and (b) 'Get Prepared to Present Well' animation screenshots from YouTube.com. The 5 minute video can be viewed at http://www.youtube.com/watch?v=3OmOIzgPOqo. (c) A portion of the accompanying checklist shared with the students.

A Presentation on Effective Communication

As an additional perspective, a professor from the department of writing arts at Rowan University who specializes in slides-based public speaking was invited to give a lecture on how to organize the content on the slides for clarity and aesthetics. The presenter reviewed basic slide layout guidelines and general things to consider while preparing content followed by an open session where students can ask questions related to presentations in general. The guest similarly re-emphasized the need to practice numerous times throughout the lecture.

Instructor's Evaluation of Student Performance

As mentioned, From the Labs I exercise gained the much needed attention towards devoting time to prepare a 3 minute delivery due to the limited time permitted to cover the content. Most students briefs were interrupted by the timer indicating their 3 minutes were up. From the Labs II, which followed the effective presentation discussions in the next class session, exhibited a noticeable improvement in the delivery. The students seemed more comfortable, satisfactorily covered all their content and some even completed before the time limit. For this activity, since the partners were asked to evaluate their colleagues, several students indicated within the checklist 'Notes' section how their partners improved with practice. Therefore, this provided a tangible evidence for the positive influence of practicing.

The third and the final opportunity to present came during the AppTalks, where students prepared a 30 minute presentation on their topic of choice. For this presentation however the students were free to select the slide layout and content, as opposed to the restrictive Briefs from the Labs slide format. Surprisingly, the overall performance of all the AppTalks was average both in terms of content and delivery. In other words, the student performance did not meet expectation set by the From the Labs II activity, even though there were some clear signs of students adopting the new ideas on effective presentations shared in the class. The following are a few notable examples of approaches students clearly adopted.

- Presenters had prepared notes and refrained from reading directly from them.
- Began presentations with an attention grabbing slide rather than a title slide.
- Slides used limited text and relied mainly on visuals with verbal descriptions.
- Dressed professionally, made eye content and adopted a conversational speaking style.

However, as mentioned earlier, the presentations fell short of the expectations. The students did not seem prepared for the presentation even though their slides had sufficient content. The following were some key observations that lead to poor AppTalk performances.

- A number of presentations were significantly short (18-20 mins instead of 30 mins).
- Conclusions were insubstantial and lacked interest.
- Poor or lacking verbal transitions between slides and sub-sections.

- A number of presenter had several awkward pauses where they had to quickly remind themselves what came next using the presenter notes.
- The body language and delivery suggested nervousness and discomfort.

As a result, the highest grade for the AppTalk portion of the course (based on peer and instructor evaluations) was a B- while over a third of the class received a D or below. While this grade includes the evaluation of the students' technical content which was noticeably deficient, the students struggled to produce compelling presentations at the same time.

Why the students, who exhibited tremendous potential in the Briefs from the Labs exercises, failed to yet again live up to the expectations? The answer lies in the student surveys which gave an insight on their preparation approach towards each assignment.

Student Surveys

Three surveys were administered to gain students' perspective on their background with respect to technical presentations, their approach towards preparing for one and finally to evaluate their performance. The surveys were conducted following each From the Labs activity and the final AppTalk. Table 1 lists the questions asked and the multiple choice responses available to the students. The questions were customized following each activity and were administered using SurveyMonkey.com. The students were aware that their responses were kept anonymous.

Table 1. A list of three surveys and the accompanying questions and multiple choice responses. The percent-based responses to the questions are provided in square brackets.

	Survey 1	Survey 2	Survey 3
	Administered following From the Labs I	**Administered following From the Labs II**	**Administered following individual AppTalks**
1	Approximately how many professional/technical presentations have you been involved with during your academic career so far (beyond high school)?	How would you rate the level of your presentation/delivery compared to Briefs from the Lab I?	How would you rate the AppTalk presentation/delivery compared to Briefs from the Lab I and II? (Rate yourself and others, respectively)
	0-10 [18%], 10-20 [64%], 20-30 [9%], > 30 [9%]	Worse [27%], The Same [18%], Slightly Improved [36%], Greatly Improved [18%].	Worse [18%, 9%], The Same [18%, 55%], Slightly Improved [55%, 27%], Greatly Improved [9%, 9%].
2	Have you had a course or have been exposed to effective presentation skills during your undergraduate career?	How would you rate the level of presentations/delivery by your colleagues in general compared to Briefs from the Lab I?	Please explain your response to your own performance to the above question.

		Survey 1	Survey 2	Survey 3
		Yes [100%], No [0%]	Worse [0%], The Same [9%], Slightly Improved [82%], Greatly Improved [9%].	(type your comments) [discussed later]
3		How would you rate your ability to present?	How much did the following factors influence your presentation/delivery for Briefs from the Lab II (rate 1-5):	How much did the following factors influence your presentation/delivery for your AppTalk: (rate 1-5):
		Poor [0%], Sub-par [9%], Average [36%], Good [27%], Great [27%]	Stage fright [2.1/5.0], topic familiarity and research [3.6/5.0], experience [3.1/5.0], audience [1.9/5.0], presentation skills [3.6/5.0], preparation and practice [4.4/5.0].	Stage fright [1.8/5.0], topic familiarity and research [3.8/5.0], experience [3.1/5.0], audience [2.1/5.0], presentation skills [3.4/5.0], preparation and practice [4.4/5.0].
4		How much do the following factors influence your ability to present well (rate 1-5):	How much did the following activities assist your performance for Briefs from the Labs II (rate 1-5):	How much did the following activities assist your performance for AppTalks:(rate 1-5):
		Stage fright [1.9/5.0], topic familiarity and research [4.3/5.0], experience [3.6/5.0], audience [2.3/5.0], presentation skills [3.9/5.0], preparation and practice [4.3/5.0].	Experience with From the Labs I [2.9/5.0], YouTube video [3.2/5.0], Slide Preparation Discussion [2.6/5.0]	Experience with From the Labs I and II [3.6/5.0], YouTube video [2.9/5.0], Slide Preparation Discussion [1.9/5.0]
5		Do you generate notes for your presentation?	How many times did you practice aloud on your own for Labs II?	How many times did you practice for your AppTalk with yourself or with your partner? (Rate for 'aloud on your own' and 'with your partner', respectively)
		Yes [64%], No [36%]	I did not [10%], 1-2 [30%], 3-4 [0%], >5 [70%]	I did not [0%, 27%], 1-2 [36%, 73%], 3-4 [36%, 0%], >5 [27%, 0%]
6		How often do you typically practice a presentation aloud before presenting?	How many times did you practice with your partner or someone else?	Approximately, what percent of time would you say you devoted to the slide content creation versus delivery for this activity?
		Once [27%], twice [36%], thrice [18%], more than thrice [18%].	I did not [10%], 1-2 [60%], 3-4 [20%], >5 [10%]	100%, 75%, 50%, 25% on slide content : 0%, 25%, 50%, 75% on delivery, respectively. [0%, 64%, 18%, 18%]

	Survey 1	Survey 2	Survey 3
7	Do you ask a friend or a partner to observe your presentation?	Approximately, what percent of time would you say you devoted to the slide content creation versus delivery for this activity?	What is the likelihood of using the techniques you learned beyond this course?
	Yes [36%], No [64%]	Slide content vs. delivery, respectively: 100% vs. 0%, 75% vs. 25%, 50% vs. 50%, 25% vs. 75%. [0%, 55%, 36%, 9%][9%, 18%, 18%, 56%]	Unlikely [0%], On rare occasions [9%], Often [45%], Highly Likely/Every time [45%].
8	Approximately, what percent of time would you say you devote to the slide content creation versus delivery?	Would you say you are a better presenter as a result of taking this course?	Would you say you are a better presenter as a result of taking this course?
	Slide content vs. delivery, respectively: 100% vs. 0%, 75% vs. 25%, 50% vs. 50%, 25% vs. 75%. [0%, 55%, 36%, 9%]	No. I was good to begin with [9%], No. I still suck [9%], No. But I know what it takes [9%], Yes. I am slightly better [64%], Yes. I feel much better at presenting [9%].	No. I was good to begin with [9%], No. I still suck [9%], No. But I know what it takes [18%], Yes. I am slightly better [55%], Yes. I feel much better at presenting [9%].
9	What is your response to the following statement: "Good presenters have an innate ability for public speaking."	What is your response to the following statement: "Good presenters have an innate ability for public speaking."	What is your response to the following statement: "Good presenters have an innate ability for public speaking."
	Absolutely [27%], Not Necessarily [64%], The do not [9%].	Absolutely [27%], Not Necessarily [55%], The do not [18%].	Absolutely [18%], Not Necessarily [64%], The do not [18%].

Every student participated in each of the surveys administered. In general, Survey 1 established students' background on effective presentation skills along with gauging how they approached the From the Labs I activity, to establish a baseline. Survey 2 and 3 primarily focussed on their approach and at same time attempting to ask them to evaluate the activities to see if the course was helping them become better presenters. Since there are several minor details obtained from the survey about student attitudes towards the activities, only the general conclusions to the surveys are summarized into four major points presented below.

1. Background: Students had experience presenting and were already aware of (and used) some effective presentation skills.

The survey indicated on average students had presented between 10-20 times in college and every student was exposed to effective presentation skills at some point in their academic careers. An overwhelming majority thought they were average or above average presenters (even

though the instructor felt the students had significant room for improvement). The students rightfully identified topic familiarity, preparation and practice as key ingredients to produce an effective presentation. Almost a third of the class felt that speaking talent is innate and did not change their opinion throughout the course. Majority of the students generated notes for presentations and practiced at least once for From the Labs I. However, the students rarely practiced with a partner - only a third did. The students said they spent majority of their time on content and minimal time preparing their delivery for From the Labs I.

2. *The 'presenting well' exercises had a strong positive influence on presentation performance for From the Labs II.*

When asked if their presentations improved after the class discussions, video, and partner checklist, over 50% of the students agreed. More importantly, almost all students felt their colleagues' presentation improved - indicating an overall improvement in the level of performance. The students felt the YouTube video helped the most out of all the activities and all but one students practiced on their own and with their designated partner. A dramatic increase in preparation was observed (70% of the students practiced aloud more than five times) towards delivery of the presentation as opposed to just the content generation. Majority of the students felt they were slightly better at presenting as a result of taking the course, at this point of the course anyways (before the AppTalk).

3. *For the final presentation students failed to yield an effective presentation due to the challenging assignment.*

Due to the longer presentations (30 minutes versus 3 minutes for From the Labs I and II) students did not practice enough for the AppTalks (mostly once or twice). This was obvious from their presentations based on instructor evaluations and by students as they did not see their colleagues improve much from the survey. When asked to comment on their low performance in Survey 3, over a half the class responded with the essentially the same reason: the more in-depth and longer presentation made it difficult to prepare for - resulting in limited time allocated to practice the delivery. Below are five excerpts from comments shared by the students.

Student 1	"...the longer length of the app talk lead to fewer full length practices which would have made it flow better."
Student 2	"It was a lot of material to cover."
Student 3	"I did not put much time in to preparing and/or memorizing. This time I put a lot more time in the research but lacked to review out loud"
Student 4	"...the flaws are due mostly to the fact that a 30 minute presentation is a lot harder to prepare for than a 3 minute presentation."
Student 5	"I was not properly prepared."

4. Yet, the students felt they gained some critical insights on how to present well, particularly the need to practice.

Considering, a majority of the class felt they would use the knowledge gained on presentation skills elsewhere and that 60% believed they improved at presenting (18% thought they at least understood what it takes to present well) as a direct result of taking the course. Specifically, the activities and exercises helped their overall comfort with presenting. In addition, based on the comments above and others, such as, "My performance felt more confident, mostly because I got a chance to practice." suggests students clearly felt there was a direct causal relationship between rehearsing and the final performance.

Discussion of the Outcomes

Even though the final presentation results failed to produce compelling presentation by demonstrating the importance of practicing, the survey indicated that the students clearly understood its importance. For the course survey at the end of the term, the students were asked, "Besides learning about nanotechnology, what were some other things that you think you gained from this course?" Majority of the students indicated presentation skills as one of the gains from the *Introduction to Nanotechnology* course, with one student's comment clearly capturing this sentiment concisely, "Better presentation skills (more motivation to practice beforehand)." Instilling this idea was the primary objective of the study. Besides, the study suggested the following notion that may help explain the final presentation performance:

> *Because of the compounding effects of students (a) giving less importance to their delivery and (b) often drastically underestimating the time required to prepare their content for longer presentations, delivery preparation (or specifically practice) is habitually sacrificed for content preparation especially when faced with a time crunch.*

Based on this notion, students in their junior and senior engineering clinics were similarly asked to watch the YouTube video but this time submit their slides (finalized content) two days ahead. This forced students to complete their content preparation beforehand affording them time to practice before the final presentation. Although subjective, the instructor along with several other professors noticed a significant improvement in delivery for their 15 minute final presentations compared to the traditional approach.

Conclusions and Recommendations

The study showed that short exercises are effective at demonstrating the importance of rehearsing and preparing how to present well. A short video served as a good resource for students to learn and recall essential presentation skills while a rehearsal partner aided practicing the verbal delivery. Whether the students rehearse is a function of how much stress is placed on delivery and how involved the assignment is. A valuable strategy to ensure students devote time

to preparing their delivery is to request presentation slides to be submitted in advance to enforce rehearsing.

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