

RETHINKING THE DESIGN OF PRESENTATION SLIDES: THE IMPORTANCE OF WRITING SENTENCE HEADLINES

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ABSTRACT

Presentation slides are often used for teaching engineering classes, presenting engineering research, and explaining engineering designs. For those presentations in which the presenter desires to communicate and defend results, using a succinct sentence headline for all slides but the title slide has three advantages over relying on a phrase headline. The first is that a sentence headline not only can identify the topic, but also can state an assertion about the topic. Emphasizing the assertions in an engineering presentation is advantageous, because audiences are more inclined to believe an argument if they realize the assertions and sub-assertions. Also, for a presentation that serves as a classroom assignment, having the student write sentence headlines provides a written record for the faculty member of that student's assertions in the presentation. A second advantage of using sentence headlines, rather than phrase headlines, is that a sentence headline can clarify much more effectively the role of the slide in the presentation. Such a clarification not only helps the audience during the presentation, but also serves the audience reviewing the slides days or weeks later. Yet a third advantage, and perhaps the most important, is that a sentence headline forces the presenter to come to grips with the main purpose of each slide. If the presenter cannot create a sentence headline that states the slide's main purpose in the presentation, then the presenter should consider cutting that slide from the presentation. For engineering presenters who have used this design, the result has been that significantly fewer slides are presented, thus helping the presenters avoid a frenetic pace, which undermines so many engineering presentations. This paper uses several examples from the Mechanical Engineering Department at Virginia Tech to show these three advantages. The paper also analyzes why faculty and students are reluctant to use sentence headlines. Finally, the paper includes a preliminary assessment on the effectiveness of these sentence headlines in engineering presentations.

INTRODUCTION

The new presentation slide goes up, and the audience immediately gives it their attention. Does the audience quickly grasp the main assertion of the slide? Does the slide actually help the audience understand and retain the material? If the slide is posted as part of a set of notes, do those notes serve the audience weeks later? In the past decade, presentation slides have become a common addition to the teaching of engineering subjects, the presentation of engineering research, and the explanation of engineering designs. Ideally, these slides can emphasize key points, can show images too complex to explain in words, and can reveal the organization of the presentation. In addition, according to a study by the Wharton Research Center [1], well designed slides can increase the retention of the audience from 10 percent, for just hearing, to 50 percent for both hearing and seeing the material. Because of its position at the top of the slide, the headline is the group of words on the slide that receives the most emphasis. However, is the traditional design of a short phrase headline, which most engineering faculty and students use and which Microsoft PowerPoint touts as its default, the most effective at communicating topics in engineering? We assert that, for many presentations, it is not.

While a phrase headline can identify the topic of the slide, a phrase headline is ineffective at orienting the audience to the assertion on that topic. A sentence, however, can state an assertion about a topic. Given the power of sentences, we recommend using succinct sentence headlines for all slides but the title slide. This recommendation is for presentations in which the speaker wants to communicate and defend results. Not applicable would be presentations in which the speaker desires to solicit opinions from the audience—for instance, a planning meeting in which the presenter wants to gather opinions from the audience about alternative solutions to a problem.

To have the sentence headline be read as quickly as possible by the audience, we recommend that the presenter left-

justify the headline in the top left corner of the slide and keep the headline to no more than two lines [2]. Such a sentence headline has its roots in a slide design developed in the 1980s at Lawrence Livermore National Laboratory [3]. The Lawrence Livermore design arose from a desire to communicate complex technical information to funding agencies, which often included managers without expertise in the technical area being presented. Influencing the slide designs at respected institutions such as Sandia National Laboratories [4] and DuPont [5], the Lawrence Livermore design became popular for a few years. However, this design was overshadowed by the ubiquitous spread of PowerPoint and its default design of a centered phrase headline.

Figure 1 presents a sample slide that uses a sentence headline. This slide, which was created by a mechanical engineering professor at Virginia Tech, shows the results of a computational analysis of a fillet design on vanes in a gas turbine engine. Used in a proposal presentation, this slide played a key role in obtaining research funds for an experimental assessment of that fillet design. Note how the sentence headline defines the main assertion of the slide. A phrase headline, such as “Results” which many presenters following the defaults of PowerPoint would have chosen, would not have communicated nearly as much valuable information. For this slide, such communication was important both during the presentation when the audience first heard the assertion and weeks after the presentation when the company reviewed the presentation slide to make its funding decision. In effect, a phrase headline would have indicated that this slide contained results, but would have left the interpretation of those results to the audience. Given the complexity of this analysis, the presenter needed to make that assertion on the slide, and the top left corner of the slide was place on the slide that the audience looked to first and the place that received the most emphasis.

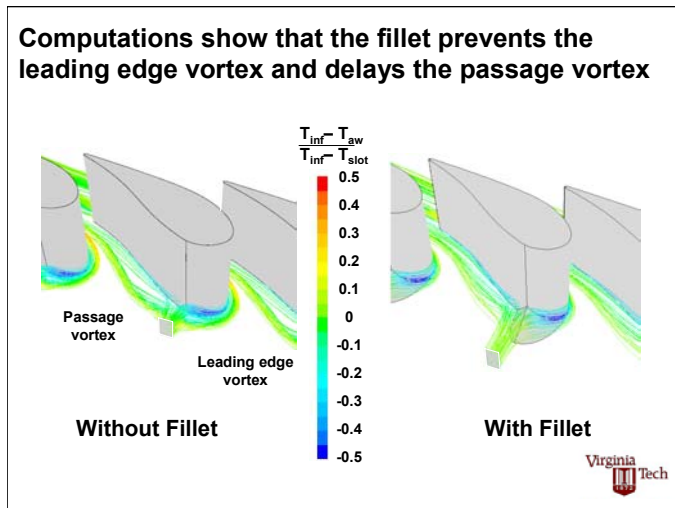


Figure 1. A slide that uses the recommended sentence headline design [6]. This slide comes from a talk presenting computational results of incorporating a fillet design on vanes in a gas turbine engine.

This paper uses examples from mechanical engineering classes, research presentations, and design talks by faculty and students in the Mechanical Engineering Department at Virginia

Tech to show the advantages of using sentence headlines in engineering presentations. The paper also analyzes why many engineering faculty and students are reluctant to use sentence headlines. Finally, the paper includes an assessment of the effectiveness of sentence headlines in engineering presentations.

ADVANTAGES OF USING SENTENCE HEADLINES

For presentations in which the speaker desires to communicate engineering principles, research, and designs to the audience, using sentence headlines has three key advantages over using phrase headlines. The first is that a sentence headline can not only identify a topic, but can make an assertion on the topic. Such an assertion can be a result, a definition, or an assumption. Emphasizing the assertions of an engineering presentation is advantageous, because audiences are more inclined to believe an argument if they realize the claims (results) and warrants (definitions and assumptions) of that argument [7]. Placing such assertions in the speech or within the bodies of slides does not emphasize these assertions as much as placing them in the headlines.

Figure 2 presents a conclusion slide from a graduate student’s master’s defense that presents a key result about the effectiveness of the singular value decomposition (SVD) method versus the exhaustive method in a computational simulation. What was most significant here was that by stating the key result in the headline of the slide, the graduate student had to face the important question of how to defend that result in the slide’s body. In this case, she defended that result with two key sub-assertions and then numerical evidence for those sub-assertions. In essence, this slide not only showed the argument of her work but also showed this argument on the slide that received the most emphasis in the presentation—the conclusion slide, which remained up for the duration of the question period.

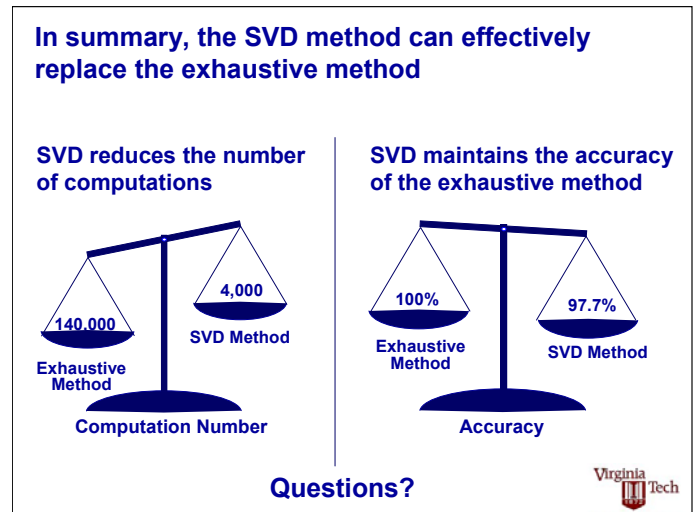


Figure 2. Slide from graduate student’s defense [8]. This conclusion slide makes the key assertion of the presentation in the headline and supports that key assertion with sub-assertions and evidence in the body.

Another type of assertion that a presenter can emphasize in a sentence headline is a definition. Figure 3 presents a slide that includes such a headline. Occurring in an undergraduate’s

presentation of a design, this slide presents a definition of a blood perfusion, a key concept in the presentation. Note that the type size of the headline advocated in our design is 28 points, as opposed to the 44 point typeface that PowerPoint has as its default for headlines. To write an effective sentence headline, the presenter requires a smaller typeface than what PowerPoint touts. Otherwise, the presenter cannot limit the assertion to two lines—blocks of text longer than two lines are often not read by the audience. Is the audience able to read that smaller typeface? If that smaller typeface is placed at 28 points in a bold sans serif such as **Arial**, that typeface can easily be read by everyone in the room [10] and can still maintain hierarchy over the type (24–18 points) in the slide’s body. Size for size, a bold sans serif typeface is much more easily read than a normal serif type, such as Times New Roman, particularly when the audience views that type from an angle.

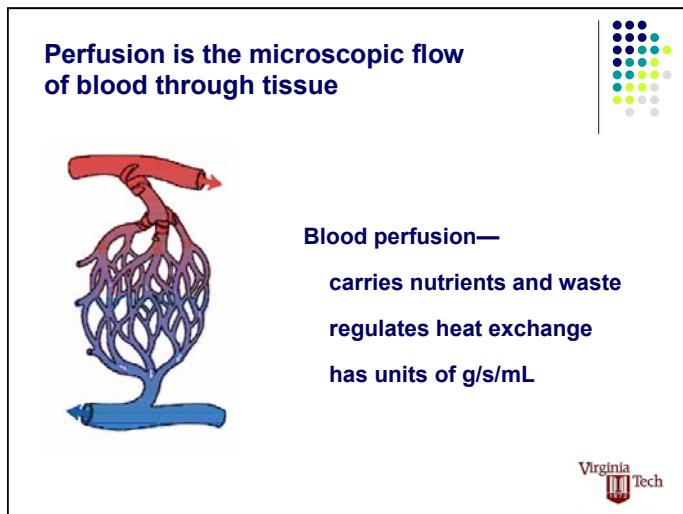


Figure 3. Slide from design presentation by undergraduate [9]. This slide provides a definition of a key concept in the presentation.

Yet a third type of assertion is one that provides an assumption. Figure 4 presents a sentence headline that emphasizes two key assumptions (in this case, criteria) in a laboratory problem: (1) the assumption that the flow had to be greater than 1800 cfm, and the (2) assumption that the power level reduction needed to be reduced by more than 15 percent. Granted, the presenter showed those assumptions in the graph and stated them in the slide’s body, but by mentioning them in the headline, the audience is much more inclined to see the importance of those assumptions.

When students have to write sentence headlines in presentation slides for a classroom assignment, the faculty member has a record of the students’ assertions on that assignment. Such a record is valuable in reviewing the work of the students. In other words, the faculty member does not have to rely on memory of what was said to determine if the students understood the main points of the assignment. Figure 4, for example, is from a presentation by students in a mechanical engineering course at Virginia Tech. If the students had just written “Results” for the headline of the slide, the faculty member reviewing this presentation would not have been sure that the students had used the appropriate reasons for choosing the 65 percent option.

A second advantage of using a sentence headline, rather than a phrase headline, is that a sentence headline orients the audience much more effectively to the role of the slide in the presentation. Such an orientation not only serves audience members who have missed the presenter’s spoken transition to that slide, but also serves the entire audience reviewing the slides days or weeks later. Figure 5, for example, contains a headline that effectively orients the students of the junior-level measurements course. A phrase headline would not have been nearly as effective, especially when the students reviewed the slide days or weeks after the lecture.

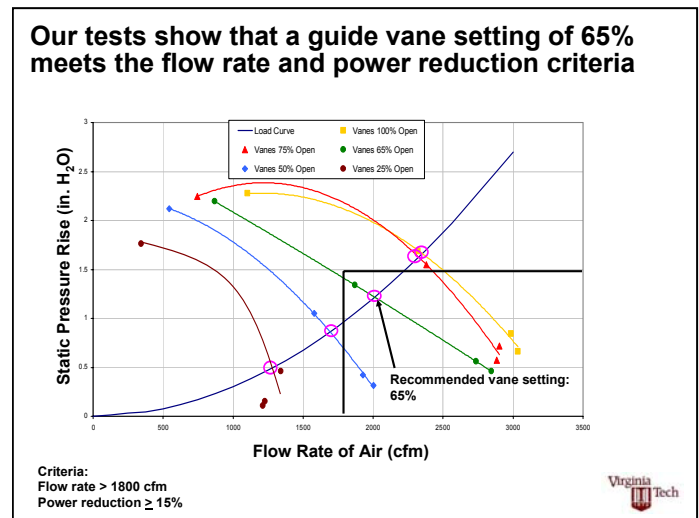


Figure 4. Slide from an assignment in a laboratory course [11]. This headline emphasizes both the recommendation for the problem and the criteria (assumptions) for making that recommendation.

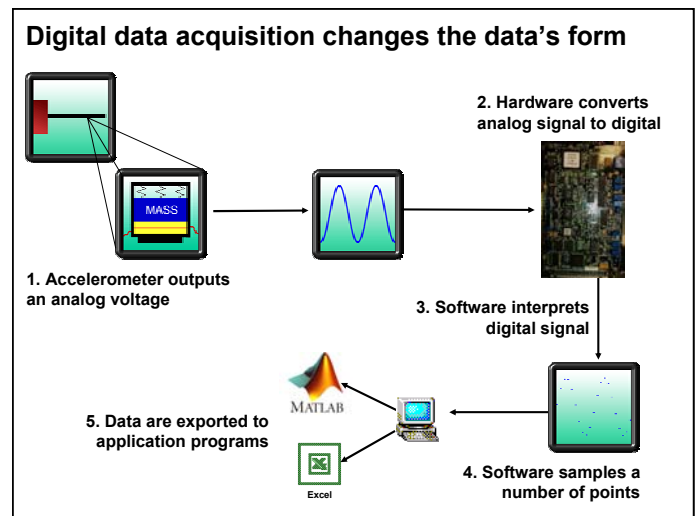


Figure 5. Teaching slide from course in mechanical measurements [12]. This headline emphasizes an important assertion about the subject.

Yet a third advantage, and perhaps the most important, is that a sentence headline forces the presenter to come to grips with the main purpose of the slide. Stating the main assertion (or purpose) of a slide helps the presenter select the evidence in the body that best supports that assertion. Figure 6 presents an excellent example of this relationship between an assertion of the headline and the supporting evidence in the slide’s body.

Had the student just begun with the headline “Results,” she might not have chosen such persuasive evidence. Likewise, without the headline, the audience would not have understood as clearly the significance of the evidence.

Interestingly, using sentence headlines affects the pace of the presentation. If the faculty member or student cannot create a sentence headline that states the slide’s main purpose in the presentation, then the presenter should consider cutting that slide from the presentation. Such a strategy has served presentations by faculty, graduate students, and undergraduates in the Mechanical Engineering Department at Virginia Tech, because significantly fewer slides have been needed for these presentations. In comparing presentations that used sentence headlines against presentations that used phrase headlines, we have found that about half the number of slides occurred in the presentations with sentence headlines. For instance, graduate students who used sentence headlines in their thesis defenses typically had 20–25 slides for the 50 minute presentation, while graduate students relying on phrase headlines typically had about 45 slides for the same length presentation. From the audience’s perspective, the effect was that the sentence-headline presentations seemed less rushed, because the presenter did not change slides (the scene) so often.

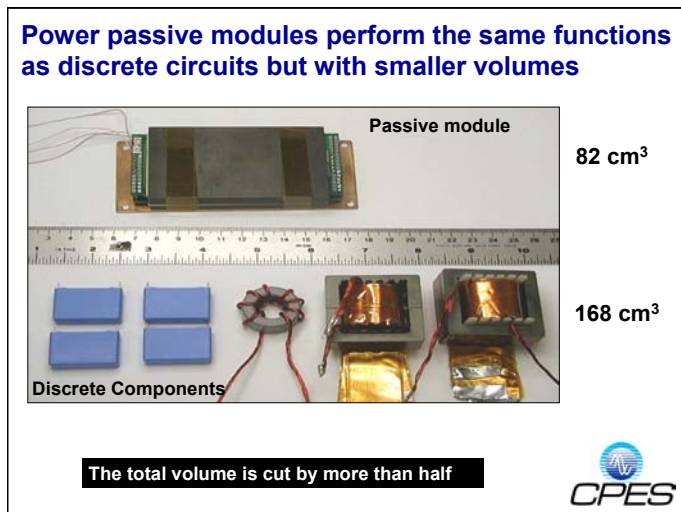


Figure 6. Slide from a graduate student’s presentation of her research [13]. The assertion made by this headline helped the presenter to choose appropriate supporting evidence.

RELUCTANCE TO USING SENTENCE HEADLINES

Although using sentence headlines has clear advantages for both the presenter and the audience, resistance exists to using them in engineering presentations. Much of that resistance can be attributed to inertia—many people are hesitant to adopt or even try a presentation style that is not commonly used. It takes a certain amount of courage, especially on the part of a student, to deviate from what is so often seen in classrooms, conferences, and industry presentations. Still, even beyond the resistance to try something new, we have found, through interviews of faculty and students, additional resistance to using sentence headlines.

One additional source of resistance exists because writing sentence headlines demands so much more understanding of

the presentation’s content and the presentation’s structure at the time that the presenter creates the slides. It is much easier to write down “Background” as the heading for a slide than it is to state succinctly the definition or assumption that one wants the audience to understand at that point of the presentation.

Another source of resistance sometimes raised is that the audience might not read the entire headline. Granted, if the headline goes more than two lines, the audience may very well not read the headline, because the text block is intimidating. That is the reason that we recommend keeping the headline to no more than two lines. Still, one could argue that the audience would be more likely to read a short phrase headline than a two-line sentence headline. While we agree that the audience would be more likely to read the short phrase headline over the two-line sentence headline, we have observed that overall the amount of text on slides that use sentence headlines is significantly less than the amount of text on slides that use phrase headlines. Therefore, the audience is more likely to read all the text on the slides with sentence headlines than to read all the text on slides with phrase headlines.

Our explanation for this presence of less text is that the assertion made in the headline focuses the presenter to the task of supporting that assertion. If a presenter, for example, has just listed a phrase topic such as “Background,” the presenter is more inclined to include extraneous points that fall under a phrase’s topic—points that do not directly support the purpose of the slide. This adding of extraneous points is even more likely to occur when the presentation is a group presentation. In other words, the purpose that one team member has for a slide entitled “Background” could differ significantly from the purpose that another team member has. For that reason, when the two team members contribute ideas for the body of that slide, they are not likely to agree on what to include. As often occurs in such situations, they include both sets of ideas, leading to a large amount of text on the slide. On the other hand, if the headline were a sentence (for example, “In this study, we assumed the flow was axially symmetric and fully developed”), the two team members would be much likely to agree on the supporting evidence for that assertion.

A third source of resistance, which a number of faculty members have voiced, is that switching to sentence headlines would require too much work on their part. Having already created large numbers of slides with phrase headlines, these faculty members have stated that if they began creating sentence headlines on their new slides, then they would feel inclined to transform the headlines for all their slides to maintain consistency. Our response to this criticism has been for them to transform gradually their sets of slides—for instance, choosing to transform only a few classroom presentations each semester.

Interestingly, that argument for consistency in the form of the slides is one of our counterarguments to another source of resistance that some people voice to using sentence headlines. Some faculty and students have acknowledged that sentence headlines are clearly superior for slides that present results. However, these faculty and students prefer to use phrase headlines for certain slides such the mapping slide of a presentation. Our reasoning for using a sentence headline on all slides (except for the title slide) is two-fold: (1) consistency in the form of the slide throughout the presentation, and (2) an

opportunity to emphasize a detail, which the headline affords. Figure 7 presents an example of a mapping slide that includes a sentence headline. In this slide, the presenter has used the headline to emphasize the scope of the presentation. Notice how much more information this headline conveys than the headline “Outline,” which many presenters would have chosen. By the way, this presentation slide comes from a graduate student’s presentation that was awarded the best master’s thesis presentation in the College of Engineering in 2002 [14].

ASSESSMENT OF USING SENTENCE HEADLINES

For the past three years, we have advocated that faculty, graduate students, and undergraduates in the Mechanical Engineering Department at Virginia Tech use a new slide design, which includes using sentence headlines, for their engineering presentations. To assess the success of this slide design, several measures exist. One such measure is the success that presenters have had with the slide design. Three best presentation awards by graduate students at national conferences, three best presentation awards by graduate students in the College of Engineering, two first-place finishes in the regional ASME Old Guard competitions, many compliments given to faculty and students on research presentations, and many compliments given student interns and recent alumni on industry presentations—these are anecdotal successes of this slide design. One specific anecdote comes from the senior design course that follows the lab-course sequence in which our slide design is taught. The ten faculty members of this course agreed that the senior design presentations became significantly stronger once our lab-course sequence began teaching this new slide design [15].

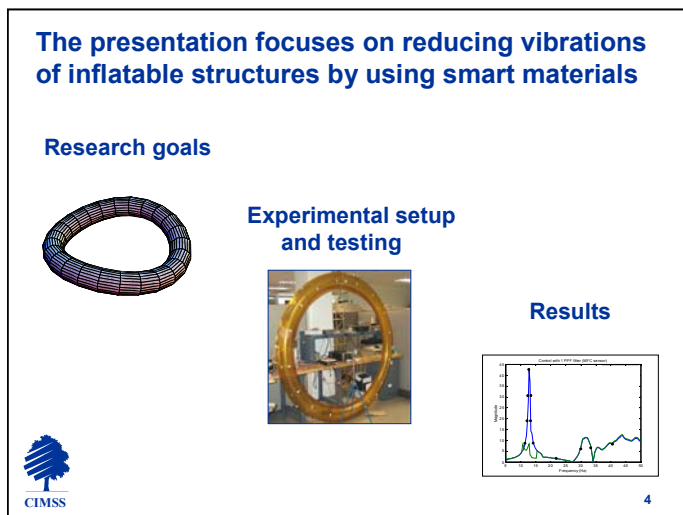


Figure 7. Mapping slide from a master’s defense [14]. This headline restates the scope of the presentation.

Another measure for the success of sentence headlines is how many undergraduates, graduate students, and faculty have adopted the design. Our Department graduates about 225 undergraduates each year, enrolls about 175 graduate students, and includes 35 faculty members. In our lab-course sequence that teaches the sentence-headline design, all the undergraduates use the design because it is required. The interesting question then becomes, how many undergraduates

continue to use this design after they leave this sequence? If the students value the slide design, they will continue to use the design even if it is not required and even if it is significantly more difficult to follow than PowerPoint’s default. As observed over the past three years in the senior design course, which undergraduates take during their last semester, more than half of these undergraduates continue to use the sentence-headline design in their final design presentations. Interestingly, in these final presentations, more than three-fourths of the seniors use three other aspects recommended in our slide design [2]: (1) the use of an image such as a graph on every slide, (2) the avoidance of text blocks more than two lines, and (3) the use of a bold sans serif typeface. That more students do not also follow the sentence-headline aspect points to the level of understanding that the headline imposes on the presenter and perhaps to the lack of time that students claim to have for preparing their final design presentations.

What about the use of the slide design by graduate students? Unlike the undergraduates, graduate students are not taught the design in a required course. Some graduate students learn the sentence-headline style through serving as teaching assistants in the lab-course sequence; others learn the design in a free presentations workshop that is offered each year in the Department; others learn the design from when they were undergraduates here; and still others learn the design from professors who use the design. As observed in thesis and dissertation defenses, about one-half of the graduate students use the sentence-headline style. In general, those who use sentence headlines claim that using sentence headlines has improved their presentations.

What about the use of the design by faculty? As observed in research and teaching presentations given in the Department, only about 7 faculty members (out of 35) consistently use this design. That more faculty members do not use this style is not so surprising. Some faculty members do not realize the sentence-headline design exists—for instance, those faculty members who are new to the Department or who have isolated themselves from presentation techniques that students and other faculty members are trying. Other faculty members claim not to have the time to incorporate the sentence headlines, although several of these faculty members have acknowledged that the design is stronger. Still others have voiced the argument that they have too many slides with phrase headlines to make the switch. Interestingly, two of the faculty members who bring in the most research funding use sentence headlines and consider the slide design to be a distinct advantage in their proposal presentations [16–17]. In addition, most of the graduate students in the Department’s five largest research centers use the sentence-headline design in their research presentations at conferences and contract meetings. That their advisors allow them to use this design indicates that the advisors accept the design as being worthy of representing their research.

Yet a third measure for the success of the sentence-headline design is interest in it by other departments. This past year, the following departments at Virginia Tech requested formal presentations of this slide design: Industrial Engineering (design course, 100 seniors); the Center for Excellence in Undergraduate Teaching (workshop, 45 faculty); Computer Engineering (design course, 60 seniors); Civil and Environmental Engineering (workshop, 30 graduate students);

Electrical Engineering (workshop, 20 graduate students); Education (seminar, 30 faculty and graduate students); Biological Systems Engineering (design course, 15 seniors); and Geology (design course, 15 graduate students). In general, interest in the design has grown over the past three years and once a department has requested a formal lecture on the design one year, that department usually makes the same request in the following years. In addition, universities outside of Virginia Tech that have invited us to give guest lectures on this design in the past three years include the University of Texas at Austin, the University of Illinois at Urbana-Champaign, the University of Texas Medical Branch, Seattle Pacific University, and the University of Oslo.

Yet a fourth measure for the success of the design comes from how audiences value the slides that use the design. In a junior-level measurements course in which all the teaching slides followed this design, students were asked to evaluate three aspects of the teaching: (1) the lectures in the classroom, (2) the value of the slides in those lectures, and (3) the value of the slides as a set of notes posted on the web. The more than 150 students rated the slides as viewed in class as having significantly more value (2.7/4.0) than the lectures (2.4/4.0). In addition, the students rated the slides as a set of notes as the most valuable of the three (2.9/4.0). That the slides received significantly higher ratings than the lectures points to their value in the students' understanding of the material.

CONCLUSIONS

This paper has presented the advantages of using sentence headlines on slides in presentations in which the speaker desires to communicate results to the audience. Showing that this design for slides is more effective than the default PowerPoint design is one thing—persuading faculty and students to adopt the new design is quite another. One large hurdle is the difficulty that the presenter faces in overcoming PowerPoint's default of a phrase headline. For the presenter, it takes much work to change the defaults for placement, orientation, and size of the headline's textbox in PowerPoint. To help presenters overcome this hurdle, we have found much success in using PowerPoint templates that circumvent this hurdle. These templates are designed such that headlines begin in the upper left corner, have a size that can accommodate a two-line sentence, and have an appropriate default typeface. Such templates are available for downloading from the following new web site [18]:

<http://writing.eng.vt.edu/slides.html>

In the past six months on Google, the ranking of this web site has risen to #3 out of more than 2 million sites listed for the phrase *presentation slides*. That Google ranks this site so highly reflects how many people visit and link to this site.

Given the criticism that PowerPoint presentations have received in the past year [19–24], the time is ripe for engineers and engineering educators to rethink the design of presentation slides. As shown in this paper, using a short sentence headline (no more than two lines long) offers distinct advantages to the audience, but presents stiff challenges to the presenter. As more of our Department's faculty and students make presentations with this design to outside audiences and as more colleges and

universities learn about this design through invited lectures, national publications [2], and web sites [18], the design's use on a national scale will serve as a key measure for whether the advantages that this design offers to the audience outweigh the extra effort that the design requires from presenters. Much needed is a quantitative assessment of the effect of sentence headlines on the comprehension and retention of details by audiences in engineering presentations.

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