THE STUDENTS' FEEDBACK: A SURVEY OF THREE APPROACHES TO TEACHING WITH MODERN POWERPOINT PRESENTATIONS

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ABSTRACT

Once the initial development work is done, using PowerPoint slides allows the instructor to focus more on the students and how they're absorbing the material. It also makes lectures much easier—for the instructor. On the other hand, it can be much harder for the students to keep up with their note-taking.

This paper discusses three different approaches for teaching with PowerPoint slides. The first uses slides alone—almost exclusively lecture, perhaps with a small amount of "chalk talk" to handle questions or extra details. The second and third techniques both use a form of note-taking aids. One uses plain text "fill-in-the-blank" note-taking guides created with Microsoft Word. The other uses a subset of the PowerPoint slides, with some details removed so students must take some notes to get all of the important information.

The purpose of the guides is to help students stay engaged and attentive during lecture. The idea is to encourage them to write enough to stay alert and engaged, without having to write too much. Constant note-taking during lecture—the "smoking pencil syndrome"—can be detrimental to learning because it takes focus off the material being covered. On the other hand, students who take no notes sometimes tend to lose their concentration, which is still counterproductive. The hypothesis is that a good note-taking guide will allow students to strike a good balance between the two extremes, and maximize learning by increasing absorption during lecture while simultaneously producing a solid set of notes for later reference.

Three electronic circuits classes were surveyed. Each class was given lectures with all three methods (different materials on different days), then asked to evaluate the effectiveness of each lecture style. This paper briefly discusses the lectures for each class, the results of the surveys, and possibilities for further research.

1. INTRODUCTION

The impetus behind this study was the author's observation that many students had difficulty keeping pace with their note-taking during lectures (verified by a couple of student complaints).

A related concern was that keeping pace with notes required so much of their focus that note-taking diminished concentration on the lecture material itself, and was hindering rather than enhancing learning while in the classroom. The underlying question, then, was how to ease the burden of taking notes during lecture, while enhancing concentration and comprehension, and still end up with a high-quality set of notes for later study outside of class.

The premise of this study is that a good set of note-taking guides can improve learning by helping students focus better during lectures, while providing the basis for a complete set of notes for later reference. This premise is supported by earlier research done by Frey/Birnbaum (2002) and Quible (2002). The latter found that eighty percent of learners thought handouts aided their note-taking. The question addressed here is not only whether note-taking guides are helpful, but which of two types—text-based and slide-based—is preferred. So, three types of PowerPoint lectures are compared: 1) those where students took notes on blank paper; 2) those where students used text-based guides to assist their note-taking; and 3) lectures where students used slide-based guides to help their note-taking.

2. METHODOLOGY

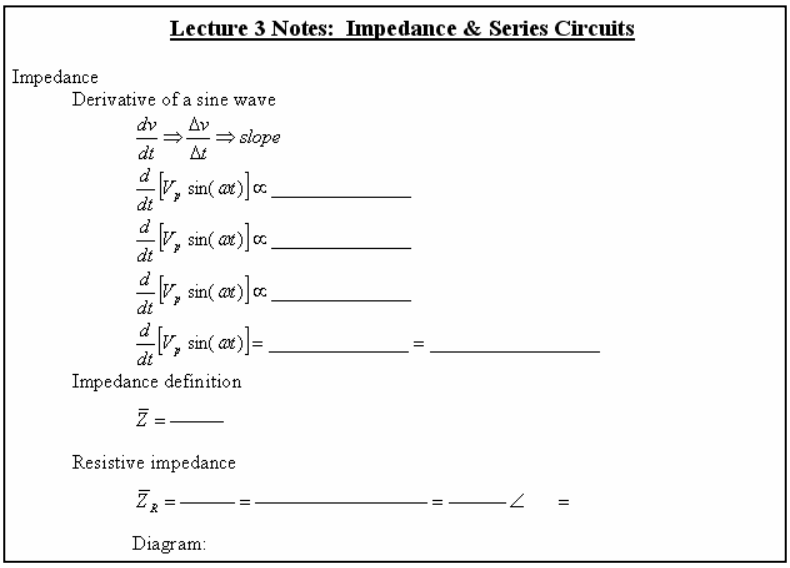
The classes in this study are relatively small, at less than 25 students per class. Moreover, there was only one section of each class (first semester basic circuit analysis, first semester digital fundamentals, and third semester AC circuit analysis), so it was not possible to set up a good control group. Because of these limitations, the study focused on *student* impressions of the differences among the presentation techniques. Each class was first presented with a plain PowerPoint lecture, followed by one accompanied with a text-based note-taking guide handout, followed finally by a presentation with a slide-based handout.

After the third presentation, students were asked to fill out a seven-question survey (see Appendix 1) to compare their impressions of how much each type of note-taking guide helped or hurt their: 1) note quality; 2) lecture concentration; and 3) comprehension. The final question was an open-ended comments/suggestions question with room to write a few sentences. The rating scale was from negative three to positive three, as shown in table one, below. The actual survey is shown at appendix one.

Table 1: Survey rating scale.

Rating	Meaning
-3	Great hindrance
-2	Significant hindrance
-1	Slight hindrance
0	No effect
1	Slight improvement
2	Significant improvement
3	Great improvement

The text-based handouts had few figures, or none at all. An advantage of these handouts is that they are relatively compact, and allow the students to really focus on key points. A disadvantage is that the omission of figures could hurt their effectiveness as references, if the figures are important to illustrate the points (or that it forces students to draw the figure, which partially defeats the purpose of the guide). A page from one of the text-based guides is shown below in figure 1.



Lecture 3 Notes: Impedance & Series Circuits

Impedance

Derivative of a sine wave

$\frac{dv}{dt} \Rightarrow \frac{\Delta v}{\Delta t} \Rightarrow slope$

$\frac{d}{dt}\left[V_p \sin(\omega t)\right] \propto$ _____

$\frac{d}{dt}\left[V_p \sin(\omega t)\right] \propto$ _____

$\frac{d}{dt}\left[V_p \sin(\omega t)\right] \propto$ _____

$\frac{d}{dt}\left[V_p \sin(\omega t)\right] =$ _____ = _____

Impedance definition

$\overline{Z} =$ ———

Resistive impedance

$\overline{Z}_R =$ ——— = ——————— = ———$\angle$ =

Diagram:

Figure 1: Text-based note-taking guide.

The slide-based handouts were taken directly from the lecture slides, with some of the text removed so students were forced to add some of their own notes. This type of guide has the advantage of being a better representation of the lecture, including figures to illustrate key points. Moreover, it is easier to correlate a given slide in the handout to its corresponding lecture slide, and thus keep one's place in the notes as the lecture progresses. An example of a slide-based guide and its associated lecture slide is shown in figure 2, below.

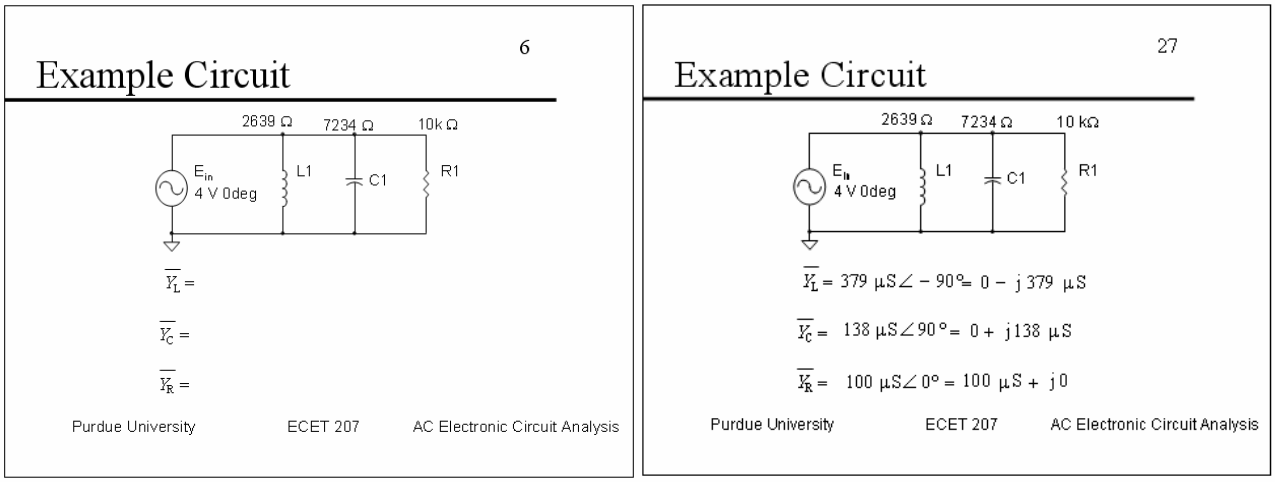


Figure 2: Slide-based note-taking guide and associated lecture slide.

3. SURVEY RESULTS

The overall results were not surprising. As a whole, students thought the text-based note-taking guides made a slight improvement in their note quality (1.0), concentration (0.7), and comprehension (0.9). Interestingly, the third semester AC circuit analysis class rated the text-based guides much closer to neutral, more than half a point lower than the other two classes. The author did not do a slide-by-slide comparison of the lectures to determine if the third semester material had significantly more figures, but this may have been a factor. It should also be pointed out that the same students comprised the majority of the two first semester classes.

There was a pretty clear consensus among the three classes that slide-based guides were a significant benefit for note quality (2.0), concentration (1.8), and comprehension (1.9). These results are summarized in table 2, below.

Table 2: Survey Results.

Criterion\Class	3rd-sem AC Ckt Analysis	1st-sem Digital Fundamentals	1st-sem Intro to Ckt Analysis	Averages
Text-based guide's effect on note quality	0.6	1.4	1.1	1.0
Text-based guide's effect on concentration	0.2	1.1	0.9	0.7
Text-based guide's effect on comprehension	0.4	1.1	1.2	0.9
Slide-based guide's effect on note quality	1.9	2.1	2.0	2.0
Slide-based guide's effect on concentration	1.7	1.8	1.9	1.8
Slide-based guide's effect on comprehension	1.7	1.9	2.1	1.9

The raw survey data for the three classes are listed at appendices 2-4. Most students chose to provide written comments, in addition to the numeric ratings. Some noteworthy comments on the positive side included:

- the text-based guide’s focus on key points;
- less writing allows better class participation;
- having neat notes that are easier to read later.

Some noteworthy negative comments included:

- the text-based guide felt like an exam;
- the slides in the slide-based guide were too small;
- page references to the text would be helpful.

4. CONCLUSION

It seems clear that students favor the slide-based note-taking guides. They allow better class participation and provide the best representation of the lecture for later use. Improvements that could be made include:

- printing the slides two to a page instead of three to a page, to allow easier annotation by students; and
- adding page references to the text, where appropriate, to assist research/reinforcement using the course textbook(s).

The students' favorite is what this author expected, and reinforces the belief that slide-based note-taking guides should accompany PowerPoint lectures to enhance student learning.

REFERENCES

Frey, Barbara A, and Birnbaum, David J (2002). *Learners' Perceptions on the Value of PowerPoint in Lectures*. ERIC Document Reproduction Service, ED 467192.

Quible, Zane K (2002). *Maximizing the Effectiveness of Electronic Presentations*, Business Communication Quarterly, **65**, (2), 82-85.

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Appendix One: Survey

Please answer the following questions. Use a PowerPoint-based lecture with no note guide as a basis for comparison.

	Great Hindrance	Significant Hindrance	Slight Hindrance	No effect	Slight Improvement	Significant Improvement	Great Improvement
1. How did the text-based note guide affect the quality/accuracy of your notes?	-3	-2	-1	0	1	2	3
2. How did the text-based note guide affect your ability to focus on the lecture?	-3	-2	-1	0	1	2	3
3. How did the text-based note guide affect your understanding of the material covered?	-3	-2	-1	0	1	2	3
4. How did the slide-based note guide affect the quality/accuracy of your notes?	-3	-2	-1	0	1	2	3
5. How did the slide-based note guide affect your ability to focus on the lecture?	-3	-2	-1	0	1	2	3
6. How did the slide-based note guide affect your understanding of the material covered?	-3	-2	-1	0	1	2	3
7. Comments/suggestions?							

Appendix One: Survey (cont'd)

8. Other comments/suggestions?

Appendix Two: Survey Data for Third-semester AC Circuit Analysis Class

	Text-based --> Note Quality	Text-based --> Concentration	Text-based --> Comprehension	Slide-based --> Note Quality	Slide-based --> Concentration	Slide-based --> Comprehension	Comments/Suggestions
207	-1	-2	-1	2	3	1	Slide based is super.
	2	2	2	1	1	1	I can better follow when I see the equation worked out rather than slapped on the board.
	1	2	1	1	1	1	I think that the text based guide helped the most, because it pointed out the most important things to get down on paper.
	1	-1	0	2	1	1	
	0	0	1	3	2	3	Note: I'm a bad note-taker a lot of times when using plain paper, so the slide-based lecture notes are more helpful to me.
	-1	-1	-1	3	3	3	With the text based note guide, it felt like doing an exam!
	-2	-1	-2	2	3	2	The PowerPoint print-out is very helpful, but the fill in the blank sheet is a little annoying.
	2	2	2	2	3	3	It has been easier for me to remember information when I am able to study from the slides (printouts) rather than w/the book or w/my own notes.
	3	3	3	3	2	2	
	2	2	2	2	2	2	With the slide based I would prefer a larger slide to fill in equation and such on the slide. That is what I liked about the text version, but w/the slide based I could see better where you were going. I wasn't having to guess when we got to the next equation.
	-1	-2	0	2	2	3	Less has to be written, allowing for better participation in class. Formulas are also typed which improves understanding at home during homework/study time.
	0	-1	-1	2	3	2	Stick to the slide-based.
	1	-1	0	1	-1	0	The guides may be great for some people…for me, they really don't help…in a way, I feel like looking at them more then the real slides. I personally prefer to watch your presentation and just take notes on my own like regular…the only improvement I see is for circuit examples...It's nice to have it alread drawn on a printout rather than copying it...so...in summary, even though the guides don't help me personally...it doesn't really bother me or take away from the learning.
	2	1	0	1	-1	0	If more writing of notes is to take place please slow lecture a little so I am not looking at paper and pencil while trying to pay attention.
207 Avg	0.6	0.2	0.4	1.9	1.7	1.7	

Appendix Three: Survey Data for First-semester Digital Fundamentals Class

	Text-based --> Note Quality	Text-based --> Concentration	Text-based --> Comprehension	Slide-based --> Note Quality	Slide-based --> Concentration	Slide-based --> Comprehension	Comments/Suggestions
109	-1	-2	-1	2	-1	2	Slide based notes have an advantage as they make it easier for indexing. However, I think that my personal notes are better as they target specific areas of knowledge I'm having trouble with.
	2	1	2	1	2	2	A slide based "text" would be most helpful to me. The pictures of the slides can be difficult to read. Either way a note guide is a definite advantage in this class. I for one have trouble keeping up with the presentation while taking my notes.
	2	2	2	2	2	2	If you make copy of it at the beginning of the semester and just make it available at the bookstore. I hope you do that next semester.
	1	1	1	2	2	2	It might also be nice to have page references to the book on the note sheets.
	2	2	1	3	2	3	I like the slide based note guide. There is room to take notes on the side. Either note guide is better than none at all because I can not write fast enough to get down all of the information without them. It is helpful to have the note taking guides in your wording. It reminds me how the test questions will be worded.
	2	0	-1	2	0	1	I think what might work would be a combination of both. The slide-based guide was too small to distinguish pictures and some of the small print, maybe a page where the picture can be found in the book would be good, or if one is not in the book put it in the notes. The text based notes helped me more because it was a quick summary of what the large paragraphs in the book said, while also giving a more complete idea of what we'd gone over than did the slide-based guide.
	3	2	2	3	2	2	
	2	2	1	2	2	1	I like the new addition to the class. It helps me keep on track on the sections we cover.
	-1	-1	0	2	0	2	Bigger slides maybe with room to write on the slides and maybe lines for other notes all the way down the side instead of split up for each slide. In case we have more notes on one slide and a little/none on another. Maybe not every slide in the lecture. Key ones and examples.
	0	1	1	2	3	3	Maybe have some homework (ungraded self help tool) take home work sheets with a lot of pertent example problems available for students.
	1	-1	1	2	1	2	I prefer the PowerPoint-based lecture. However, I find somewhat distracting to fill in the blanks because I tend to loose track of the following topic.
	2	1	1	1	1	1	I liked the text based note guide better because it was in the format that I usually take notes (only a lot neater!). It also served well as a quick reference when doing the homework. It would also be nice to have the homework listed on the text based guide.
	2	2	1	3	3	2	
	-1	-2	1	3	3	3	Slide-based notes, allow us to take home the lecture's slide show. All the information on the slide-based notes is important, otherwise it is a useless slide for the class lecture. The text-based notes may cover more important points of the lecture, but all points made in lecture is important.
	3	3	2	1	1	1	
	1	2	1	1	2	1	The size of the writing on the slides can be a little larger that would make it a little easier to keep up with as well as recall later having to strain to read the numbers and the faded bits takes a little off the focus.
	2	2	2	3	3	3	The slide-based note guide is very helpful.
	2	2	2	3	3	3	The slide-based was better because it included pictures to help understand text.
	1	2	1	1	2	1	
	2	2	2	2	3	1	
109 avg	1.4	1.1	1.1	2.1	1.8	1.9	

Appendix Four: Survey Data for First-semester Intro to Circuit Analysis Class

	Text-based --> Note Quality	Text-based --> Concentration	Text-based --> Comprehension	Slide-based --> Note Quality	Slide-based --> Concentration	Slide-based --> Comprehension	Comments/Suggestions
107	1	2	1	2	2	2	
	2	2	2	2	2	2	Either one was as good as the other. I found it easy to pick up on key points, instead of searching and wonder if this key point or that is a key point.
	1	2	2	3	3	3	I'm not sure why but my answer are exactly the opposite of my answer for 109. Perhaps it's just my attitude that's different.
	2	1	2	3	3	3	This allows me to concentrate on what you are saying.
	1	1	0	2	2	1	Page reference to the text on the slides would be nice.
	3	3	3	2	2	2	By adding the formulas into the text based helped greatly.
	1	1	2	1	1	1	
	1	0	1	3	1	3	
	0	-1	0	3	3	3	
	1	1	2	2	3	3	The slide-based note is very helpful.
	0	1	1	0	1	1	
	1	0	1	2	0	2	
	2	0	1	1	0	1	I def. liked the slide based this time it was large and easy to read, and had all of the information we needed.
	2	2	1	1	2	1	
	1	1	1	3	3	3	
	-2	-3	-1	0	1	2	Same as ECET109
	2	2	2	3	3	3	
	0	1	1	3	3	2	4, 5, & 6 says it all
107 avg	1.1	0.9	1.2	2.0	1.9	2.1	