



An assessment of student preferences for PowerPoint presentation structure in undergraduate courses

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Abstract

Studies have demonstrated that students prefer PowerPoint and respond favorably to classes when it is used. Few studies have addressed the physical structure of PowerPoint. In this study, students enrolled in several psychology classes on two campuses completed a 36 item questionnaire regarding their preferences for the use of PowerPoint in the classroom. Students preferred the use of key phrase outlines, pictures and graphs, slides to be built line by line, sounds from popular media or that support the pictures or graphics on the slide, color backgrounds, and to have the lights dimmed. It is recommended that professors pay attention to the physical aspects of PowerPoint slides and handouts to further enhance students' educational experience.

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Colleges and universities are embracing the use of presentation graphics (e.g., PowerPoint) in the classroom. Studies have consistently indicated that students generally believed that the use of PowerPoint facilitated their learning (Apperson, Laws, & Scepansky, 2006; Atkins-Sayre, Hopkins, Mohundro, & Sayre, 1998; Beets & Lobingier, 2001; Mantei, 2000; Rankin & Hoas, 2001; Szabo & Hastings, 2000). A recent study published in this journal examined the impact of the use of PowerPoint on students' experience in the classroom (Apperson et al., 2006). This study indicated that although there were no differences in grades as a result of the use of PowerPoint in the classroom; there were differences in the students' responses to the classroom experience. Students in the PowerPoint condition believed the class was more organized, clear and interesting. Students also liked the professor more (rated the professor higher overall) and indicated that they would like to take another class from the professor when the professor used PowerPoint. Finally, students responded more favorably in classes using PowerPoint to professor behaviors seemingly unrelated to the use of PowerPoint (e.g., handing back papers on time with helpful feedback, assigning more tasks requiring critical or creative thought). The authors concluded that the use of PowerPoint confers an enormous benefit towards

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education in that students like the courses better, have a more positive impression of the instructor, and therefore, have a more favorable attitude toward their education. To this end, the construction of both effective and pleasing PowerPoint presentations is an issue instructors should address and evaluate.

Several authors have detailed the most effective properties for presentation graphics slides for use in the classroom. The text must be properly sized (Rickman & Grudzinzi, 2000). Holzl (1997) recommends the use of a 32 point font for headings and a 24 point font for the text in classrooms with fewer than 50 seats; and a 36 point font for headings and a 28 point font for text in classrooms between 50 and 200 seats. For maximum legibility, Holzl (1997) recommends the use of the sans serif fonts (such as Arial) because their uniform line thickness makes them easier to read. He also suggests the use of no more than two different fonts per presentation (one for headings and one for text). Because the use of all upper-case letters can be difficult to read, text should be in all lower-case letters or a combination of upper and lower-case letters (Holzl, 1997). Color, motion and sound should be used conservatively (Gotsick & Gotsick, 1996) and should be purposeful (Holzl, 1997). Color and sound can be used to provide cues regarding relationships between concepts, highlight key concepts, or provide cues for learning (Holzl, 1997). Color also can serve to organize the material (Seaman, 1998). Color selection should be consistent throughout the slide presentation and the color used for text must be clearly distinguishable from the background. Sounds should be relevant to the educational purpose of the slide presentation (Holzl, 1997). Motion can be used to emphasize key points, for slide transition and for “building” slides (revealing the slide content line by line during the presentation). The decision to use motion should be made based on its effect on student understanding and learning (Holzl, 1997). In general, the slides should be as simple and uncluttered as possible, the text should be short, and slides should contain one concept per display (Gotsick & Gotsick, 1996; Seaman, 1998).

The content of the slides should reflect the educational purpose of the presentation. Students (Frey & Birnbaum, 2002) indicated a slight preference for graphics (pictures, charts, graphs) over text. Graphics used should be relevant to and enhance the meaning of the text (Bartsch & Cobern, 2003; Holzl, 1997; Mayer, 2001; Seaman, 1998). In one study (Bartsch & Cobern, 2003), the use of irrelevant graphics on slides resulted in a decrease in performance on quizzes. Graphics should be properly sized and placed so that they do not cover the text (Holzl, 1997). Examples can be used after concepts have been presented to aid in recall and to tie the new knowledge to old knowledge to enhance recall (Seaman, 1998). Instructors should make presentations multimedia by using a spoken narration, rather than text alone, in addition to graphics (Mayer, 2001). Slides may also contain questions to serve as a review of previously learned material, to check comprehension of material in the slide presentation and to stimulate discussion (Quible, 2002; Seaman, 1998).

When professors use presentation graphics as a method of presenting lecture material, it is clear that they must take care not to rush too quickly through the material to allow students the ability to process the information and to write sufficient notes for later review (Rickman & Grudzinzi, 2000; Seaman, 1998). Since some students may learn by writing the material themselves, instructors must go slowly enough to allow them to write (Frey & Birnbaum, 2002). Others may feel burdened by the necessity of copying material from the screen while attempting to listen to the professor elaborate on the material presented on the slides. Several authors comment on allowing students access to the slides in electronic or print format (Frey & Birnbaum, 2002; Mantel, 2000; Quible, 2002; Rickman & Grudzinzi, 2000; Seaman, 1998). The advantage of providing students with copies of the slides is that it decreases the amount of time students spend on the more clerical process of copying notes from the screen and increases the amount of time spent on processing the content of the slides, attempting to understand the material and listening to the instructor’s elaborations. Students may process the information more deeply when the focus of the class experience is other than copying material from a screen. The notes taken during class will personalize and elaborate on the basic outline from the slides. The copies of the slides can serve as a starting point for developing a comprehensive set of class notes for review (Seaman, 1998). In one study (Frey & Birnbaum, 2002), 80% of students reported that slide handouts helped them take notes and 91% said the slide handouts helped them study for the exam. They also indicated that the handouts did not decrease their likelihood of attending class. One disadvantage of supplying copies of the slides is that it might allow students to be passive and disengaged from the learning process (Quible, 2002; Vandehey, Marsh, & Diekhoff, 2005). This could be countered by providing students with abbreviated outlines of the material or by omitting information from the slides requiring students to pay close attention to discover the missing information (Quible, 2002).

In our previous research, we established that students in classes where PowerPoint was used reported that they believed the class was more organized, clear, and interesting; that they liked the professor more; and that the professor exhibited more positive behaviors seemingly unrelated to the use of PowerPoint. If one of the goals for the use of PowerPoint is for the students to have more favorable experiences in the classroom then instructors should structure PowerPoint presentations in a manner most desirable to the students. Few researchers have asked students what they find most desirable. Independent of the actual content of the presentations, we were interested in assessing student preferences regarding the structure and use of PowerPoint in college lecture classes.

1. Method

1.1. Participants

Data were collected from 275 psychology students, 225 women and 45 men (5 failed to indicate gender), aged 17–53 years ($M = 20.77$, $SD = 5.31$) at two educational institutions. The first was a public, co-educational state university ($n = 215$) and the second was a private, liberal arts college ($n = 60$, all women) where traditional daytime students are exclusively women; however, there is a large “life-long learner” population (22 years old and above when starting/continuing college) who take classes predominantly at night. Both types of students from the second institution were included in the study.

1.2. Materials

Student responses to a PowerPoint Preferences Survey were obtained. This was a 36-item 7-point Likert scale survey (with 1 being *Strongly Disagree* and 7 being *Strongly Agree*) consisting of questions regarding the nature of PowerPoint presentations and students’ preferences for aspects of those presentations (e.g., full text vs. bullets, use of graphics and sounds, using lights dimmed or bright, presenting slides all at once or line by line; reading slides to the students as they are presented, providing handouts or electronic, Web-based access to accompanying class notes). Seven of these questions were identical to and four were similar to those contained in a previous survey administered by the authors to a different participant sample (Apperson et al., 2006). The last four questions were open-ended asking students to comment more specifically about backgrounds, sounds, and the best and worst things about professors’ use of PowerPoint in the classroom.

1.3. Procedures

Students from both institutions completed the surveys during the fall 2004 semester. At the first institution, the instructors of various psychology courses administered the surveys in class. At the second institution an announcement for the study welcomed participation from any students enrolled in various psychology classes in which the professor allowed extra credit. In some cases at the second institution, surveys were distributed in class; otherwise, students obtained the survey from a departmental secretary, to whom they were returned. PowerPoint was currently being used in classes at both institutions, and students were familiar with its use.

2. Results

Means and standard deviations were calculated for each question on the survey (see Table 1). There were some differences on responses to eight of the 32 items between the two institutions as assessed via *t*-tests. For five of these items, students at both institutions were consistent in agreeing or disagreeing with the statements (one group simply agreed or disagreed more). For two of these items, responses were *unsure* but slightly biased toward *agree* (just above 4.00) for one institution and *agree* for the other. For only one item were the responses *unsure* but slightly biased toward *agree* (4.32) for one institution and *unsure* but slightly biased toward *disagree* (3.72) for the second (see Table 2). Furthermore, some of these differences were likely due to institutional differences regarding the use of e-mail and password-protected web-based systems like

Table 1
Means and standard deviations for PowerPoint preferences student survey

Measure	<i>M</i>	<i>SD</i>
I find it helpful for professors to use the PowerPoint slides as discussion points for the lectures	5.84	1.12
I generally find visual elements (e.g., pictures/charts/graphics/maps) helpful in PowerPoint presentations	5.84	1.24
I prefer it when professors put key terms and definitions completely written out on PowerPoint slides	5.56	1.28
During lectures using PowerPoint, I prefer the lights to be dimmed, producing a sharper screen image	5.48	1.42
Everything that is on the slides should be provided to the students electronically or as a hard copy	5.33	1.64
I generally prefer slides that provide key phrase outlines of the lecture material so the slides are not so “busy”	5.31	1.62
Faculty should post slides electronically for students to access and print before class begins	5.30	1.63
If faculty cannot provide a hard copy of the presentation, I prefer they make it available on a password-protected system like Blackboard	5.21	1.65
Professors should be careful not to put too much text on each slide	5.10	1.49
I find it helpful for professors to read the PowerPoint slides as they are presented	5.06	1.69
If faculty cannot provide a hard copy of the presentation, I prefer they make it available on the web	5.03	1.58
I find it helpful when information is revealed line by line to go along with the lecture	4.92	1.79
I like it when professors use sounds from popular media and movies in their presentations	4.84	1.73
If faculty cannot provide a hard copy of the presentation, I prefer they send it to me on e-mail	4.67	1.75
I like it when professors use sounds that go along with the pictures or concepts that are being presented	4.58	1.80
I prefer the computer generated decorative backgrounds that PowerPoint provides	4.26	1.48
I prefer slides that provide full sentence outlines of the lecture material	4.19	1.67
I prefer bright colored backgrounds on PowerPoint slides	4.17	1.42
All text on slides should be provided electronically or hard copy but with the pictures removed	4.15	1.79
I prefer light pastel colored backgrounds for PowerPoint slides	4.05	1.38
I prefer darker colored backgrounds for PowerPoint slides	4.01	1.39
I find it helpful for professors to use computer-generated sounds with PowerPoint presentations	4.01	1.81
I generally prefer slides that provide full text of the lecture material (whole sentences written out)	3.87	1.85
During lectures using PowerPoint, I prefer the lights turned off producing the sharpest screen image	3.59	1.93
I find it helpful when each slide is revealed all at once even if it is ahead of the lecture	3.45	1.85
When I have a copy of the presentation before class, I find it easier for my mind to wander since I have already seen the material	3.37	2.03
I find it boring when the professor says the same things the PowerPoint slides say	3.33	1.91
I prefer slides that contain pictures, graphs, charts, or maps only	2.84	1.55
During lectures using PowerPoint, I prefer the lights on full (possibly sacrificing the quality of the screen image)	2.82	1.42
I prefer it when professors use a plain white background for the PowerPoint slides	2.73	1.42
When I have a copy of the presentation, I am less likely to attend class since I already have the material	2.70	1.90
I wish professors would spend less time using PowerPoint slides	2.00	1.29

Blackboard. Because of this minimal difference in response and general consensus in direction of response, scores were combined across both institutions for further analyses.

Statistical analyses (ANOVAs and *t*-tests) were conducted between conceptually related questions and effect sizes were calculated. The effect size analyses (Cohen's *d*) revealed that most of the effect sizes were indicative of moderate to large effects. Results of the statistical analyses indicated that students significantly preferred use of key phrase outlines to full text with terms and definitions written out, $F(2, 546) = 48.49$, $p < 0.001$, $d = 0.68$, and to full sentence outlines, $d = 0.82$. Furthermore, full text with terms and definitions written out were preferred more than full sentence outlines, $d = 0.18$. Participants preferred pictures and graphs when accompanied by text explanations. The students wanted professors to read slides; but wanted them to be used as discussion points significantly more, $t(274) = 6.46$, $p < 0.001$, $d = 0.54$. They preferred slides to be built line by line rather than revealed all at once, $t(274) = 7.38$, $p < 0.001$, $d = 0.80$. They found computer-generated sounds acceptable, but preferred professors to use sounds supporting pictures or graphics on slides, $F(2, 542) = 52.57$, $p < 0.001$, $d = 0.31$, particularly from popular media, $d = 0.45$. Students preferred any color background (dark, $d = 0.98$; bright, $d = 1.03$; pastel, $d = 0.95$; or decorative, $d = 1.06$) to a white background, $F(4, 1080) = 54.83$, $p < 0.001$. When PowerPoint is used in classrooms, students preferred the lights dimmed rather than off, $F(2, 548) = 157.37$, $p < 0.001$, $d = 1.11$, or on full, $d = 1.87$. They also preferred the lights to be off rather than on full, $d = 0.45$.

Students preferred that faculty make slides available from PowerPoint presentations electronically for printing before class, with no significant difference in their preference for a password-protected system like

Table 2
Means and standard deviations for PowerPoint preferences student survey items different across the two institutions

Measure	<i>M</i>	<i>SD</i>
I prefer slides that provide full sentence outlines of the lecture material		
Institution 1:	4.32	1.65
Institution 2:	3.72	1.67
I find it helpful for professors to use the PowerPoint slides as discussion points for the lectures		
Institution 1:	5.77	1.16
Institution 2:	6.13	.91
During lectures using PowerPoint, I prefer the lights turned off producing the sharpest screen image		
Institution 1:	3.74	1.89
Institution 2:	3.05	1.98
I wish professors would spend less time using PowerPoint slides		
Institution 1:	1.83	1.09
Institution 2:	2.60	1.71
When I have a copy of the presentation before class, I find it easier for my mind to wander since I have already seen the material		
Institution 1:	3.64	2.03
Institution 2:	2.41	1.73
When I have a copy of the presentation, I am less likely to attend class since I already have the material		
Institution 1:	3.01	1.97
Institution 2:	1.56	1.01
If faculty cannot provide a hard copy of the presentation, I prefer they send it to me on e-mail		
Institution 1:	4.39	1.74
Institution 2:	5.70	1.38
If faculty cannot provide a hard copy of the presentation, I prefer they make it available on a password-protected system like Blackboard		
Institution 1:	5.52	1.49
Institution 2:	4.07	1.73

Note: Institution 1: public, co-educational state university; Institution 2: private, liberal arts college.

Blackboard or by the Internet. They preferred least to receive them by e-mail than by either Blackboard, $d = 0.30$, or the Internet, $F(2, 540) = 10.67$, $p < 0.001$, $d = 0.21$. Furthermore, students indicated a preference for copies of actual PowerPoint slides, including pictures, graphs or charts, significantly more than text alone, $t(270) = 8.74$, $p < 0.001$, $d = 0.68$. They also reported that access to copies of presentations prior to class would not decrease their attendance, nor would they find it easier for their minds to wander during class.

In response to the open-ended questions, students indicated high contrast between text and background made it easier to read. They indicated no preference for background color, but recommended that instructors avoid using a white background with black letters or extremely bright backgrounds that “hurt the eyes”. They found sounds most helpful when they were consistent with or complemented slide content and felt they aided recall. Those who did not like sounds said they were a distraction or “not worth the effort”. Also according to answers to the open-ended questions, the worst things faculty members do with PowerPoint are to read each slide word for word without elaboration or discussion, move too quickly through slides, put too much text on each slide, copy text directly out of the textbook, or use all capital letters in text. The best things faculty members do with PowerPoint are to build each slide line by line and use bullet points with key phrases on slides. Students preferred that faculty elaborate and discuss each point, adding examples. They also appreciated the use of graphs, charts, pictures and movie clips; and they preferred having copies of slides prior to class.

3. Discussion

Students in our sample indicated that it is important for PowerPoint slides to be well constructed. Five points are evident from reviewing the results. First, students indicated that they strongly preferred instructors’ use of key phrase outlines revealed line by line on PowerPoint slides and to use them as discussion points, adding examples and elaborating beyond the slides and the text book on the key points. This style of instruction

keeps students actively involved in the learning process rather than focusing solely on the mechanics of copying information directly from slides. Second, students indicated that they liked the use of sounds congruent with the slide content and from the popular media. Used in this way, sounds could serve as cues for learning (Holzl, 1997). Similar to the results of the Bartsch and Cobern (2003) study, when not used purposefully, students found sounds distracting or “not worth the effort”. Third, students indicated that they preferred the use of any color background to white, except for the use of bright colors that “hurt the eyes”. Similar to the use of sounds, colors and lightly patterned backgrounds can be used purposefully to cue learning. Fourth, students indicated that they strongly preferred the lights dimmed during the PowerPoint presentations. Newer facilities have anticipated this issue by installing lights that can be selectively turned on and off avoiding the problem of excessive light “washing out” the image on the screen but allowing sufficient light for students to see their notes and to see one another and the instructor to facilitate discussion. Finally, students indicated that they prefer copies of the complete PowerPoint slides with pictures, graphs and charts. Other authors have discussed distributing handouts of the slides. Though students report preferring to have copies of the slides, the effect of having the handouts on student learning remains unclear.

Future research could further investigate the use of handouts of the PowerPoint slides in conjunction with the use of PowerPoint on academic performance as evidenced by grades. We have previously concluded that PowerPoint does affect student attitudes toward the professor and toward the class when PowerPoint is used (Apperson et al., 2006). We have now assessed the student preferences for the physical structure of PowerPoint presentations and their accompanying handouts. What is left to evaluate is whether the use of different forms of handouts (text alone or including pictures, graphs, and charts) along with PowerPoint affects academic performance. Also, we could further investigate the specific effect on student performance and attitudes of using different colored backgrounds, sounds, lighting conditions, and animations.

In this study, we quantifiably verified students’ preferences for the structure and logistics of PowerPoint presentations. It was clear that PowerPoint is not a substitute for effective instruction and is most valued when used as a stimulus for elaboration, explanation, and discussion in classrooms. Therefore, it is recommended that instructors continue to use PowerPoint wisely as it enhances students’ classroom experiences.

References

- Apperson, J. M., Laws, E. L., & Scepansky, J. A. (2006). The impact of presentation graphics on students’ experience in the classroom. *Computers and Education*, 47(1), 116–126.
- Atkins-Sayre, W., Hopkins, S., Mohundro, & Sayre, W. (1998). Rewards and liabilities of presentation software as an ancillary tool: Prison or paradise? *Paper presented at the National Communication Association Eighty Fourth Annual Convention*, New York, NY.
- Bartsch, R. A., & Cobern, K. M. (2003). Effectiveness of PowerPoint presentations in lectures. *Computers and Education*, 41(1), 77–86.
- Beets, S. D., & Lobingier, P. G. (2001). Pedagogical techniques: student performance and preferences. *Journal of Education for Business*, 76, 231–235.
- Frey, B.A., & Birnbaum, D.J. (2002). Learners’ perceptions on the value of PowerPoint in lectures. ERIC Document Reproduction Service: ED 467192.
- Gotsick, J. E., & Gotsick, P. S. (1996). Multimedia in the classroom. *Behavior Research Methods, Instruments, and Computers*, 28(2), 291–294.
- Holzl, J. (1997). Twelve tips for effective PowerPoint presentations for the technologically challenged. *Medical Teacher*, 19(3), 175–179.
- Mantei, E. J. (2000). Using internet class notes and PowerPoint in the physical geology lecture. *Journal of College Science Teaching*, 29, 301–305.
- Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.
- Quible, Z. K. (2002). Maximizing the effectiveness of electronic presentations. *Business Communication Quarterly*, 65(2), 82–85.
- Rankin, E. L., & Hoaas, D. J. (2001). The use of PowerPoint and student performance. *Atlantic Economic Journal*, 29, 113.
- Rickman, J., & Grudzinski, M. (2000). Student expectations of information technology use in the classroom. *Educause Quarterly*, 1, 24–30.
- Seaman, M. A. (1998). Developing visual displays for lecture-based courses. *Teaching of Psychology*, 25(2), 141–145.
- Szabo, A., & Hastings, N. (2000). Using IT in the undergraduate classroom: should we replace the blackboard with PowerPoint? *Computers and Education*, 35, 175–187.
- Vandehey, M. A., Marsh, C. M., & Diekhoff, G. M. (2005). Providing students with instructors’ notes: problems with reading, studying, and attendance. *Teaching of Psychology*, 32(1), 49–52.