Points of View

PowerPoint in the Classroom

Note from the Editors
Points of View (POV) addresses issues faced within life science education. Cell Biology Education *has launched the POV feature to present two or more opinions published in tandem on a common topic. We consider POVs to be "Op-Ed" pieces designed to stimulate thought and dialog on significant educational issues. Each author has the opportunity to revise a POV after reading drafts of the other POVs. In this issue, we ask the question, "Is PowerPoint the best instructional medium to use in your class?" Everyone seems to have an opinion on Microsoft, but the intellectual merits of using PowerPoint (or similar software) is a growing question as states and institutions put more and more money into information technology and distance learning. Four POVs are presented: 1) David Keefe and James Willett provide their case why PowerPoint is an ideal teaching software. Keefe is an educational researcher at the Center for Technology in Learning at SRI International. Willett is a professor at George Mason University in the Departments of Microbial and Molecular Bioscience; as well as Bioinformatics and Computational Biology. 2) Kim McDonald highlights the causes of PowerPointlessness, a term which indicates the frequent use of PowerPoint as a crutch rather than a tool. She is a Bioscience Educator at the Shodor Education Foundation, Inc. 3) Diana Voss asks readers if PowerPoint is really necessary to present the material effectively or not. Voss is a Instructional Computing Support Specialist at SUNY Stony Brook. 4) Cynthia Lanius takes a light-hearted approach to ask whether PowerPoint is a technological improvement or just a change of pace for teacher and student presentations. Lanius is a Technology Integration Specialist in the Sinton (Texas) Independent School District. The authors span the range of teaching experiences and settings from which they bring different points of view to the debate. Readers are encouraged to participate in the online discussion forum hosted by* CBE *at www.cellbioed. org/discussion/public/main.cfm and/or contact the authors directly.*

PowerPoint in the Classroom, Is it Really Necessary?

Diana Voss
Instructional Computing
SUNY Stony Brook
Stony Brook, NY 11794-3800

Have you ever asked your students how they feel when their professors bring up a PowerPoint presentation in class? For the past 3 yr, I have taught "Effective Presentation" workshops for students at SUNY at Stony Brook. During the workshops, I ask the students, "Do your professors use PowerPoint?" Based on their responses, it appears that a majority of teachers use PowerPoint. When I ask, "Does PowerPoint improve your ability to learn?", they feel the same way about the use of this tool in their classroom as I do.

Students feel ignored in lecture halls when the instructor is focusing on the presentation and not paying attention to the class. Part of the problem is limited technology. If the faculty member does not have a remote mouse, he or she may not be able to leave the podium because of the need to advance to the next slide. This inability to move inhibits the teacher from being able to walk freely across the room and see when the students have questions. However, part of the problem is also the fact that faculty tends to focus on the technology and ignore the audience.

The students and I both agree that PowerPoint should not be used simply to demonstrate that an instructor is using technology in his or her classroom. Students' comments reveal that instructors too often focus on the technical aspects of the presentation rather than on the information being presented. Students get frustrated by PowerPoint presentations that are full of graphics and words flying across the screen while lacking substantive content.

The next time you attend a PowerPoint presentation, instead of watching the presentation, watch the audience. If the presenter is using animation (words flying onto the screen, for example), do you see the audience's heads moving to follow the words? Perhaps the presenter is using the appear feature in which the letters appear one at a time. What is the point of that? To keep your audience on edge? When used infrequently, this can be an effective tool, but at times, I have found myself wanting to leave a presentation because I was tired of waiting for the information to appear on the screen.

The students explained that they are insulted when the instructor does not recognize that they can read what is on the screen and proceeds to read the slides to the class. Reading PowerPoint slides verbatim is not limited to college classrooms; I have witnessed the same presentation style at
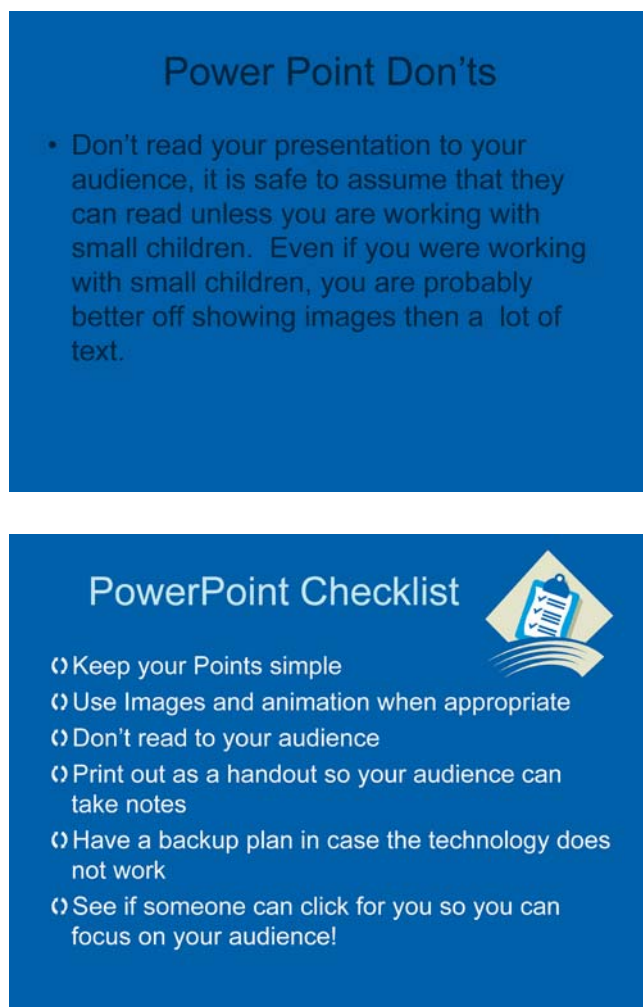
Figure 1. Do's and Don'ts of PowerPoint Slide Creation.

many conferences. The presenter turns his or her back to the audience or stares at a monitor and never looks at the audience. Poor presentation skills? Uncomfortable with the topic? Perhaps, but I also think this is poor use of the technology. When being read to, I find myself thinking, "Yes, I can read that, but what is your point? Why am I here listening to you? If you are not adding any additional information to your slide show, then why not just e-mail it to me and I'll go to another session?"

When I teach presentation workshops to my students, I always discuss "Death By PowerPoint." The students laugh at this phrase, but they also quickly recognize the reference. How many times have you attended a presentation in which the presenter has 80 slides to show in an hour and each slide contains one line of information? Is there a prize for "largest" slide show of which I am unaware?

Recently, I attended a presentation in which the slides contained so much information that I couldn't read anything on them. The text was very small, and the color scheme was very difficult to read (Figure 1A). In fact, when I looked at the slides, my head hurt. When using PowerPoint, it is important to consider the design of the presentation. What is the best color scheme? Is the font big enough? If I project this on a screen, will the last row of audience members be able to see everything they need to see? Are the images appropriate for the information I want to convey (Figure 1B)?

Recently, I was asked to speak with a group of fourth graders about my job and how I became involved with technology. I created a PowerPoint presentation in which I used images to tell my story; it included several pictures, such as a picture of my parents and a picture of me when I was in fourth grade. Without PowerPoint, I would have had to pass out the old photographs and hope that, when returned, they were not covered with fingerprints. Power-Point can be a useful tool when it is used to display images that students normally would not be able to see or when instructors use it as an outline to keep them focused on their lectures and also give the students an idea of what to expect.

While writing this Point of View, I found this Web site, http://training.ifas.ufl.edu/deft/produce/pptart.htm, which contains suggestions for using PowerPoint. If you are curious to discover ways in which PowerPoint can be an effective learning tool in the classroom, I suggest you visit that Web site. The next time you are preparing a lecture, ask yourself, "Will PowerPoint help me communicate better with my class, or will it be a distracter for me and my students? PowerPoint is a tool; whether or not it is useful is up to you.

ACKNOWLEDGMENTS

A Case for PowerPoint as a Faculty Authoring System

David D. Keefe and *James D. Willett*[†]
*Center for Technology in Learning
SRI International
Menlo Park, CA 94025
and †Department of Microbial and Molecular Bioscience
College of Arts and Sciences
and Bioinformatics and Computational Biology
School of Computational Sciences
George Mason University
Fairfax, VA 22030
jwillett@gmu.edu

The three most compelling arguments for the use of PowerPoint in the classroom are its suitability as a powerful and easily learned authoring system for course material; its ubiquitous availability to students, courtesy of the free Microsoft PowerPoint viewer; and its
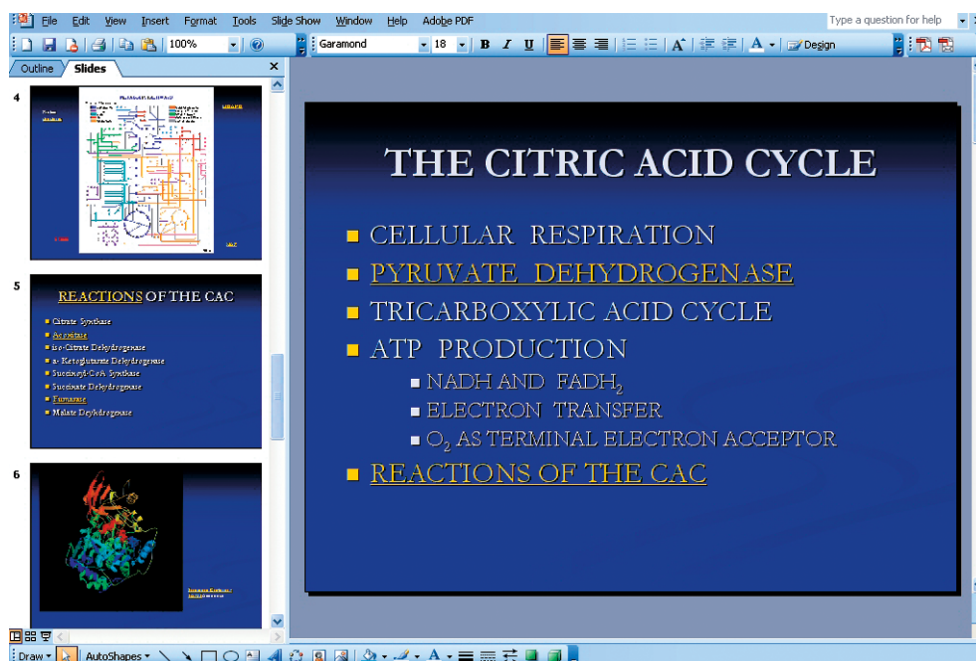
Figure 1. Screen image from lecture on The Citric Acid Cycle (http://www.america-tomorrow.com/gmu/cac.ppt). Links to supporting material are shown in underscored gold color.

capability of coexisting with an overall course management environment (in our case, WebCT). In a course in molecular bioscience, PowerPoint also provides a means of mapping and directing the course of a classroom discussion on a topic, rather than just a means of presenting the materials.

Our context for presenting these arguments is 5 years of experience in a collaboration to produce distributed learning material (Dede, 1996; Dede *et al.*, 2002) in graduate education programs for use by students who are usually practicing professionals in the biological or computing sciences and technologies. The current course, Biochemical Systematics, is an e-Learning course that, although presented in a traditional classroom setting, is offered in the context of a Web environment, giving the student and professor integrated access to all of the relevant resources on the Web and both synchronous (chat) and asynchronous (bulletin board) capabilities for individual or small group communication during study hours.

When Does PowerPoint Come into Play?

PowerPoint has evolved over the past 10 years to the point where it has many desirable features as a course-authoring system. PowerPoint was the second most popular tool for creating computer-based training applications, cited by 48 percent of 3,500 training professionals in a 2003 study conducted by Bersin & Associates. (http://www.interlake.net/download/Is_PowerPoint_an_E-Learning_Tool.pdf). Although PowerPoint presentations can be converted to HTML (Hypertext Markup Language), we have found it more useful to store the actual PowerPoint presentations on the course Web site. This preserves all of the entrance/exit effects, including timed sequences as well as automatic updating capabilities. Availability of the free Microsoft

PowerPoint viewer enables users to interact with the study material at home, without requiring the student to own the Microsoft Office software.

The PowerPoint "Master Slide" can serve as a template, providing consistent graphic appearance and text for all of the slides in the presentation. However the Master Slide can also contain any other object accepted by PowerPoint, including action settings that hyperlink to other slides, PowerPoint presentations, or (via URL [uniform resource locator]) any Web resource. Anything set onto the Master Slide becomes available on all of the slides in the presentation. Thus embedding a link to the class discussion forum in the Master Slide means that students can seamlessly bring up the discussion forum while they are reviewing the class material and raise questions or share observations with other class members and faculty. The material presented in class can be highly interactive, through the use of dynamic links to supporting information, which the professor can access during class discussions and students can access during follow-up study.

By definition, all textbooks are outdated compared to research literature. Therefore, faculty often supplement textbook information with more recent information, images, and movies. Faculty can embed video segments, charts, photographic images, and tables in PowerPoint slides; these can also be linked to source documents so that the slide is automatically updated whenever the source documents change. This is particularly useful when presenting the results of research experiments that will evolve as the course progresses.

PowerPoint is used by the professor in the Biochemical Systematics course primarily as a means of moving directly from class discussion on a particular point within the context of the subject of the moment to the relevant databases or

visual materials that enhance access to an understanding of these materials. Figure 1 is an excerpt from a presentation on The Citric Acid Cycle, showing links to relevant databases. Access to electronic journals in the molecular biosciences at George Mason University makes it easy for the instructor to focus on current research articles pertinent to the class subject under discussion as a core element of the lecture. Thus, PowerPoint serves more as a means of mapping and directing the flow of a classroom discussion on a topic than as a means of presenting the materials themselves. As molecular bioscience becomes ever more complex in both its depth and breadth, discussions of current studies of the cellular and subcellular processes that provide and drive cellular function become more revealing of the molecular structures and mechanisms involved. In so doing, molecular representations, pathway presentations, gene regulatory networks, and signaling cascades are described and represented graphically to enable a better view of the process and facilitate understanding of the phenomenon involved.

Students are expected to work in small group projects and to develop a PowerPoint presentation on their project for presentation to the class. The PowerPoint presentations used by the instructors serve as models for student projects in terms of providing guides on how to organize material. Observing how the professor makes use of the material conveys an understanding of how to connect the student project to the wealth of relevant information available on the Internet. The instructional model is an example of situated learning, a modern master-apprentice technique where the instructor models the behaviors expected of the student (Brown *et al.*, 1989; Lave and Wenger, 1991).

The students produce an electronic portfolio at the completion of their projects, which includes the PowerPoint presentations. The presentations aid in faculty assessment of the student projects and give the students a useful vehicle for reporting on their graduate work in conference presentations or providing feedback to their employers.

REFERENCES

Brown, J.S., Collins, A., and Duguide, S. (1989). Situated cognition and the culture of learning. Educ. Res. *18*(1), 32–42.

Dede, C. (1996). Emerging technologies and distributed learning. Am. J. Distance Educ. *10*(2), 4–36.

Dede, C., Whitehouse, P., and Brown-L'Bay, T. (2002). Designing and studying learning experiences that use multiple interactive media to bridge distance and time. In: Current Perspectives on Applied Information Technologies, ed. C. Vrasidas and G. Glass (Volume 1: Distance Education). Greenwich, CT: Information Age Publishing.

Lave, J., and Wenger, E. (1991). Situated Learning: Legitimate Peripheral Participation. Cambridge, United Kingdom: Cambridge University Press.

PowerPoint, Not Your Grandmother's Presentations, but Is it Evil?

Cynthia Lanius
Sinton Independent School District
Sinton, TX 78387

When I was in 10th grade, my school got its first overhead projector. My teacher, Mrs. Bankston, loved that new projector; she sat right beside it and taught to it all day long. Before that, she'd written all the theorems and proofs on the chalkboard. The overhead projector was basically the same as the chalkboard, except that now, she wrote on the overhead's glass plate with black paste pens. I'm not sure whether Mrs. Bankston was, as a presenter, any more effective when she moved from the blackboard to the overhead projector. I also don't remember us being wowed by the technology; it was still the teacher droning on about something in which we weren't particularly interested. However, I know she was a lot happier with the new toy.

For student presentations (we called them "oral reports" back then), I don't remember ever using the overhead projector. Oral reports consisted of students standing before the room reading from typewritten pages. Passing around a *World Book Encyclopedia* with a picture was as multimedia as oral reports got. I remember giving lots of these reports, but I can't remember hearing a single one. Eventually, students started making transparencies to accompany their presentations when fancy copiers became available.

Overhead projector technology improved a lot over the years. Textbook companies started providing colorful slides, some with overlays to help demonstrate change. By the time I was teaching geometry, the slides even simulated animation with brads and arrows. I used the overhead projector a lot in my teaching, primarily because I could communicate with the students much better by facing them than by facing the chalkboard with my back to the class. But basically, my presentations were the same whether I wrote on the board or presented with transparencies.

Now, we have another presentation technology that is becoming very popular in schools, which I will refer to as "PowerPoint," since that is by far the most common presentation software used. PowerPoint adds color, images, sound, animation, and hyperlinks to other documents, including Web documents. The increased use of PowerPoint has been very similar to that of overhead projector technology during my education. At first, teachers produced all their own slides; then, textbook companies began providing professionally created PowerPoint presentations to accompany their texts.

Just like the overhead projector before it, PowerPoint won't turn a bad presentation into a good one, and it won't convert an ineffective presenter into an effective one. Every K-12 teacher who teaches with PowerPoint or lets students use PowerPoint ought to be required to read "Powerpoint Is Evil: Power Corrupts. PowerPoint Corrupts Absolutely" (2003) by Edward Tufte. We've all endured some really bad presentations that "fancy, smancy" PowerPoint didn't save. I love Tufte's point, "If your words or images are not on point,
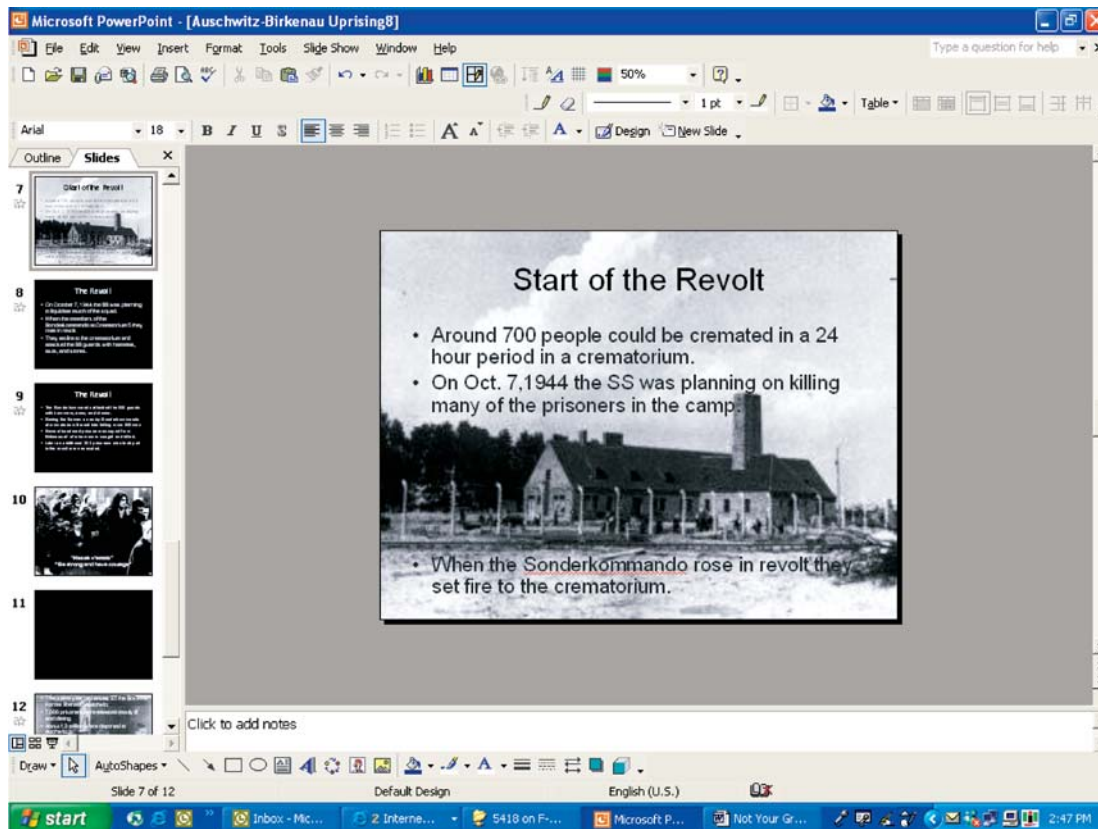
Figure 1. Screen shot from students' presentation in Alice Berecka's German II class; the Jewish resistance to Nazi extermination of humans. Image courtesy of the author.

making them dance in color won't make them relevant. Audience boredom is usually a content failure, not a decoration failure." I've seen some presentations in which the PowerPoint overkill detracted from good content instead of supporting and enhancing it.

Tufte makes a strong case against having students just write in bullets—what he calls the "PowerPoint Cognitive Style"—to which I say a hearty amen. Students should write oral reports in complete sentences, and they should present reports in complete sentences. I've heard students giving PowerPoint presentations in which they actually read the titles and bullets. Sometimes we literally have to hide the bullet points to force the students to talk in complete sentences rather than in clauses. But, obviously, what is really evil is not PowerPoint but its misuse, which Tufte has described so cleverly.

I think this PowerPoint Point of View is coming at a very appropriate time. Many more teachers are acquiring data projectors in their classroom, making PowerPoint available to them on a full-time basis (see attached 10th-grade geometry sample file). For example, in 2003, my school district (Sinton ISD; http://www.sintonisd.net/) received a Technology Applications Readiness Grants for Empowering Texas (TARGET) grant, which is putting laptops and liquid-crystal display (LCD) projectors in teachers' classrooms. All across the nation, millions of dollars are being spent on technology. A Houston teacher told me a couple of years back, "All our

students are getting laptops and now we are *desperate* to figure out something for them to do on them." In our TARGET program, we stress the opposite; let the curriculum, not the technology, drive the instruction.

For example, below are selected items from the ninth-grade "English Texas Essential Knowledge and Skills," the state-mandated curriculum.

(7) Reading/comprehension. The student comprehends selections using a variety of strategies. The student is expected to:

    (F) identify main ideas and their supporting details;
    (G) summarize texts;
    (H) draw inferences such as conclusions, generalizations, and predictions and support them from text;

Creating a title and bullet points on a PowerPoint slide helps students identify main ideas and their supporting details. Let me emphasize again that bullet points should not replace complete sentences, but they can help students structure their thinking.

K-12 students tend to enjoy working with PowerPoint; they like adding images, sound, and animation to illustrate their text. We can use their enjoyment to motivate skill developments that they find less enjoyable. Motivation is a key factor in K-12 education. The bitter-pill model ("Do this, it's good for you!") doesn't work very well, especially with reluctant learners. PowerPoint may be the spoonful-of-sugar-makes-the-medicine-go-down model, though I'm not sure I like that as a teaching philosophy. I wish all students

absolutely loved finding main ideas and summarizing texts, but they don't.

PowerPoint is by no means the only software that could support these skills and is probably not the best. Inspiration®, for example, is a tool designed to develop ideas and organize thinking and to support critical thinking, comprehension, and writing in all curriculum areas. But PowerPoint is here to stay; it's Microsoft after all, and in many school systems, there isn't enough money for specialized software.

I've seen horrific K-12 student presentations in Power-Point, and I've seen great ones. Yesterday, I saw a beautifully moving presentation on the 1940s Jewish resistance movement (Figure 1). I hope this will become the rule, rather than the exception.

REFERENCES

Tufte, E. (2003, September). PowerPoint Is Evil: Power Corrupts. PowerPoint Corrupts Absolutely. Wired Magazine. http://www.wired.com/wired/archive/11.09/ppt2.html (accessed 29 April 2004).

Examining PowerPointlessness

Kim McDonald
Shodor Education Foundation, Inc.
Durham, NC 27705

Introduction

We would all agree that software applications are more appropriately used in the classroom as tools rather than as toys. Certainly, this philosophy is why policy makers have invested billions of dollars incorporating technology into the classroom in the past 20 years (Trotter, 1998). PowerPoint is one of the most widely used software applications (Keller, 2003). Teachers and students alike use the tool in a variety of ways. I'll readily agree that there are situations in which projecting a PowerPoint presentation to teach a particular concept is an appropriate use of technology in the classroom. The strength of PowerPoint is its ability to allow an instructor to import graphics, audio, quotes, and music or to link to simulations or Web pages. It is a product that optimizes a student's visual learning experience and allows instructors to incorporate multimedia in a manner that is far less cumbersome than are ways that are available without access to such an application. However, it is the rampant misuse rather than the use of this tool that has sparked debate among educators since the presentation software started to gain popularity in the educational setting in 1998 (Keller, 2003).

Beyond PowerPointlessness

What exactly do I mean by the misuse of PowerPoint? "PowerPointlessness," a term first coined by Jamie McKenzie in 2000, is defined as "any fancy transitions, sounds, and other effects that have no discernible purpose, use, or benefit" (McFedries, 2001). Focusing on graphics, animations, or sound effects more than course content, classroom discussion, or effective communication is a pitfall into which many educators and students fall when giving a PowerPoint presentation. The excessive bells and whistles of the program do not provide information, but instead, distractions that misdirect an audience's attention from the purpose of the presentation. Visual aids are important for all audiences, especially young students. However, if a presentation is more "visual" and less than an "aid" in helping an audience understand material, then it is simply inappropriate to use such technology to communicate ideas. Presenters may be seduced into spending more time on the appearance of the slides than on the organization of their thoughts or the sequence in which ideas should be presented. Thus, users may give a talk containing superficial, incomplete, or incoherent ideas that are masked by bold colors, fancy fonts, or abundant animations.

Communication Skills, Creativity, and Critical Thinking

Many teachers seemingly have the false impression that forcing students to use PowerPoint in their own presentations will spawn excellent communication skills. The crucial point is that the skills learned to design a PowerPoint presentation are different from those learned to meet effective communication demands. In his *New York Times* article, Thompson (2003) provides a disastrous example that illustrates this common pitfall.

> In August, the Columbia Accident Investigation Board at NASA released Volume 1 of its report on why the space shuttle crashed. As expected, the ship's foam insulation was the main cause of the disaster. But the board also fingered another unusual culprit: Power-Point, Microsoft's well-known "slideware" program. NASA, the board argued, had become too reliant on presenting complex information via PowerPoint, instead of by means of traditional ink-and-paper technical reports. When NASA engineers assessed possible wing damage during the mission, they presented the findings in a confusing PowerPoint slide—so crammed with nested bullet points and irregular short forms that it was nearly impossible to untangle. "It is easy to understand how a senior manager might read this PowerPoint slide and not realize that it addresses a life-threatening situation," the board sternly noted.

Whether the presenter puts so many words on a slide that the information is not discernible, mundanely reads the bulleted slides as though the audience is illiterate, or does not bother to engage the audience through eye contact and discussion, the result is the same: ineffective communication, and thus, a purposeless presentation.

Some proponents of the software argue that the tool facilitates creativity in both the teaching and learning experience. I find very little creativity in the templates offered by the AutoContent wizard that is embraced by users. PowerPoint critics will go so far as to say that the

default bulleted format of the text promotes narrow-minded thinking and oversimplifies concepts that are perhaps far more complex than a list of ideas (McFedries, 2001). Certainly, the subjects that our students study and the connections and nuances among topics within their presentations are not always best presented in bulleted format.

Another pitfall in using this software application is the potential for it to eliminate a student's need to think critically about the information being presented. Processing information is an important step in the learning process, but it is often removed when PowerPoint is misused. Instead of choosing key concepts and taking notes that reflect the relationships among the topics being presented, students become transcribers who copy the contents of the instructor's text-packed slides. Having students copy notes from a PowerPoint slide doesn't seem like an appropriate use of time or resources to some instructors, who then choose to post their slides online, readily making them available to the students. Although this approach may seem like a better solution, students often become inattentive and disengaged during a lecture in which they "already have the notes."

Conclusion

Perhaps the most comprehensive description of the misuse of PowerPoint is that it is often used as a crutch. Presently, PowerPoint is the most popular presentation software application among teachers and students. Is it the best method for presenting information? You decide. Keep in mind that PowerPoint is not the only application with which instructors can integrate technology into the classroom. Computer models, simulations, and visualizations of a concept are more authentic uses of technology and may prove to be more effective teaching tools as well. If PowerPoint is a tool that teachers choose to use, they may consider this article a warning label. PowerPoint should be used as a presentation enhancement, not a replacement for effective communication. To truly engage audiences in presentations, instructors must move beyond PowerPoint-lessness.

REFERENCES

Keller, J. (2003). Killing me Microsoftly with PowerPoint. Chicago Tribune, January 5.

McFedries, P. (2001). The word spy. <http://www.wordspy.com/> (accessed 6 May, 2003).

Thompson, C. (2003). PowerPoint makes you dumb. New York Times, December 14.

Trotter, A. (1998). Question of effectiveness. Education Week. 18(5), p. 6.