



EFFECTIVE USE OF TECHNOLOGY IN THE CLASSROOM

**BY
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ABSTRACT

Over the course of an academic year, the typical business faculty member spends 270 hours making presentations to students. Today many of these presentations are technology assisted. Unfortunately, most faculty members have had little or no training in how to make the technology work for them. A focus group of 15 university faculty members was held to identify how to make the technology an effective tool. In the end, the broad conclusion is that it is your presentation with or without the technology. As such, the technology

should support you and your style. The technology should not dictate how you present the material nor should it detract from your professionalism. Instead, it should support what you are trying to get across to the audience. This paper highlights several issues that can lead to ineffective use of technology aids and suggests some tips and tricks that can be used to avoid them.

INTRODUCTION

Most universities offer a variety of classes designed for faculty development. In recent years many of these classes have focused on technology in the classroom. Unfortunately, these classes have generally been designed to teach the technology as opposed to how to integrate it into an effective presentation.

Faculty members learn how to make presentations by observing the presentations of others and getting feedback from students. Because technology enhanced classrooms are relatively new on most campuses, faculty members are generally in a trial and error mode in trying to make their presentations work in the new environment.

As experience has been gained, several issues have surfaced relating to using the technology as a positive tool. This paper focuses on the issues that a presenter needs to consider in developing a technology assisted presentation that will work for both them and the audience.

This paper focuses on live presentations. The same software tools can be used to generate on-line presentations that are meant to function in a stand alone setting. However, the approach that is appropriate for that setting is significantly different since the materials move from a supporting role to being the exclusive means of conveying the information.

A thorough review of the literature is presented as a resource for suggestions that are already in the literature. The results of a faculty member focus group are also presented as a means of picking up additional insights about how to improve the use of technology in the classroom.

LITERATURE

A number of articles have been written on presenting with PowerPoint and other software. Additionally, there are numerous how-to books available both from the software developers and third parties that provide specific information on the use of the software. Those books are not reviewed here.

The following discussion has been broken down into several sections that reflect the different directions that prior research has taken. The first section deals with research that is aimed at preparing a presentation in general. This is followed by an examination of several articles that address specific situations other than classroom based education. The third section deals with articles that focus on integrating multiple software platforms into one presentation; while the final section examines what has been written about the use of technology aids in higher education classroom settings.

Preparation of the Presentation

Several authors have looked at the preparation needed to make an effective technology aided presentation. Dudman (1996) suggests that the use of technology has increased the need for planning presentations. The off-the-cuff style used by many presenters doesn't work well when paired with a rigid presentation system. Additionally, the presenter must be familiar with all of the aspects of the technology they are using. There is nothing worse than the presenter spending significant amounts of time trying to get the technology to work while the audience waits. Following on this idea, Harshaw (1995) suggests getting training before creating a presentation. Much of his article focuses on mechanics that must be addressed. Ellwood (2005) also emphasizes planning. In particular he points out that an endless stream of bullet points is not effective. Instead presenters need to make sure the audience focuses on the presenter not the presentation aids. Variety keeps the presentation lively and the audience involved.

Klinger and Siegel (1996) present substantial insights about slide design. They focus on issues such as color choices and layout to generate visual appeal. However, no mention is made about the relationship between the presenter and the presentation aid. Lucky (1998) cautions, however, that although PowerPoint helps presenters stay on topic, presentations are becoming too cookie cutter. Everything is reduced to bullet points and graphics. He is also concerned that too much time is being spent on the visual appeal and not enough is being spent on the content.

Stratten (2001) reinforces the notion that PowerPoint is not automatically going to lead to a great presentation. Excessive use of all of the bells and whistles tends to get the audience focused on the special effects and they leave with little of the content. He promotes providing handouts to the audience in many situations, but insists that they should not be distributed until the end of the presentation. His argument is that if they are handed out at the beginning they are a distraction. The audience is looking at the handout instead of paying attention to the presenter. Tufte (2003) illustrates many of the limitations of presentation software. Although short on positive suggestions, he does an excellent job of pointing out what you cannot do and what you should not do if you want to get your point across.

Wyeth (2002) provides good comments about public speaking in general. He does not provide any specifics related to technology integration in the learning process, but reminds everyone that the basic tenets of good public speaking need to be remembered.

Collectively, this line of research seems to reflect a dichotomy between those focused on getting the most out of the tools and those focused on the content and the presenter.

Non-Classroom Presentation

Several articles are also available that look at using technology aids in corporate settings. Although not directly related to classroom presentation, many of them do offer information that could be translated to a classroom setting.

Feigenson and Dunn (2003) report on the need for a better understanding of the role of technology based presentations in the judicial system. Although the courtroom is a very different setting than the classroom there are some important parallels. They argue that there is very little research that has been done on the biases that can be created intentionally or unintentionally through the use of high tech demonstrations. All presenters: be they attorneys, corporate trainers, or professors, are trying to get a point across. Although courts are much more restrictive on balancing probative and prejudicial value than the other venues, it is an issue that all presenters should be aware of. They don't offer any conclusions, but instead offer numerous research questions.

Littell (1999) addresses several concerns that are specific to delivering a PowerPoint aided presentation to an audience that is geographically dispersed. Particular concerns about piracy of the presentation are addressed but not solved. Also issues relating to the lack of knowledge about how the PowerPoint will be delivered at remote sites are discussed. He cites a need to make sure that the facilities where the audience is located is conducive to receiving the message. Having ten people huddled around a laptop will not lead to an effective sales presentation. The points he makes could easily be transferred to distance learning environments. Also concerned about sales presentation effectiveness, Schrage (2003) addresses the need to share experiences with PowerPoint based presentations. He suggests that companies hold meetings where groups of sales personnel can evaluate each other's slides and collectively weed out bad slides and presentations and propagate those that have been found to work.

Spaeth (2001) presents an example where a PowerPoint aided presentation did not work in a corporate setting and then examines why the presentation failed to accomplish the intended outcome. The most striking failure was the inability of the presenter to shorten their presentation on short notice. Because of the linear nature of PowerPoint, presenters may find it difficult to drop slides out and still maintain a coherent presentation. In this case the presenter's time was cut by two-thirds and they became so engrossed in trying to adapt the PowerPoint slides that they forgot they had an audience. What they did manage to deliver was said to the screen not the audience.

Stanke (1999) outlines a ten step process for making an effective budget presentation to a Board of Directors. Although some of the points are specific to that situation, many easily translate to any presentation. Among the more general ones are things such as don't put too much on a slide and avoid distracting graphics or sound.

Zavoina (2005) provides a short and to the point list of tips specifically for post-audit compliance violation training. Within this framework he makes some specific suggestions for how to construct a PowerPoint slide show. Like many of the other authors he suggests limiting the content per slide and strongly contrasting colors. He shows a stronger preference for graphics and animation than most other authors. He also suggests turning the presentation into a screensaver as a way to reinforce the message.

Mechanical Elements of Presentation Software

A few articles address a variety of technical points for integrating multiple types of software to create a presentation. Killmer and George (2002) focus on the mechanics of linking Excel and PowerPoint so that you can keep slides current even though the underlying information is dynamic. They provide no insights about how to structure a presentation around these linked tools. Lehman (2000) discusses the benefits of using Excel as a development tool for flowcharts for presentations. He provides detailed examples of how to use the tools built into Excel but does not extend the discussion to the point of addressing how to make the resulting flowchart part of an effective presentation. Monrov, de Dios Calderón, and Miranda (2005) provide information about linking CNC

machining equipment to presentation materials to provide real-time experience to engineering students while the theory is being introduced in the classroom.

Classroom Specific Issues

McAdams and Duclos (1999) report on the conversion of a traditional multimedia (film based slides, video, and audio) presentation to an integrated PowerPoint based presentation of the same material. Although it was easier for the presenter to deal with supporting aids with PowerPoint, they report that students did not receive it as well. They also expressed concerns about the amount of time that it took to generate the PowerPoint based presentation. They had over 700 hours in the conversion process, including digitizing the old slides and video clips. All of this was to support a 90 to 120 minute presentation/discussion.

Parks (1999) reported on his first four years of using technology to aid his presentations in a Principles of Macro Economics class. Like others, he identified the additional preparation time as a significant change. He found this beneficial to the extent of being more organized but also detrimental as significant amounts of time were invested in mechanics that could have been better spent on content development.

Rankin and Hoaas (2001) report on a paired comparison test they ran in Principles of Economics classes where two sections were taught traditionally and two sections were taught with PowerPoint presentation aids. After adjusting for ACT score; gender; freshman versus non-freshman standing; whether the student had a high school economics course; and time of day, they found that grades were not significantly effected by the use of PowerPoint. Of the variables examined, ACT score was the only one to have a significant effect on student grades. Additional t-tests were performed to determine if student satisfaction or instructor evaluation were impacted by the use of PowerPoint. No significance was found in either case.

Najjar (1998) examined the information transfer process and found strong links between presentation structure and test performance. Although the evidence was not conclusive, it did indicate that presentation channel (visual, pictorial, verbal) did have an effect on test performance. In general if the testing was done using the same channel as the presentation there was somewhat better performance than if there was a change in channel between the two. This would seem to indicate that if assessment is to be done with conventional text based tests it is important to make sure that the presentation is text based as opposed to being highly visual.

Yaverbaum (1996) focuses on the idea that both faculty and students need to change their approach to the learning process when technology is introduced. The traditional model of talk versus listen will frequently not be appropriate. What is appropriate depends on how the technology is integrated into the learning environment.

Domermuth (2005) presents a detailed approach to setting up a classroom for technology aided teaching. In the article he discusses some of the trade-offs that need

to be addressed and the impact on cost that specific choices can have. His primary focus is on getting the room effective within a tight budget.

Collectively, these articles make a strong case that the presentation aids do not make the presentation. Unless they are contributing to the objective of the presentation, the technology doesn't accomplish anything except diverting the time that the presenter would otherwise be devoting to content development.

FOCUS GROUP PARTICIPANTS

In order to get a broad perspective on how the use of technology assisted lectures continues to develop, a group of fifteen faculty members from ten universities were assembled. Although originally intended to last approximately an hour, the discussion ultimately lasted about an hour and a half.

The group had both male and female participants and contained individuals with as much as thirty years of experience in the classroom down to people with under five years. All of the participants had at least a couple of years of experience with technology aided presentations with some of them having become involved as soon as early generations of the software tools were released. Most of the participants were from regional public universities although there was some involvement from major universities and private institutions. All of the participants were in colleges of business.

The following section of this paper summarizes the discussion points and the general feelings of the participants. Although students were not directly involved in the focus group, their voices were indirectly heard through the faculty who were striving to make their presentations more effective.

ELEMENTS OF IMPROVING PRESENTATIONS

Readability Issues

The first area of examination within the focus group was the readability of the projected materials. It is important to know the equipment that will be used and the environment that it will be used in. The brightness and resolution of the projector, lighting controllability, screen size, and the seating configuration all play a role in determining how presentation materials should be constructed. Weak projectors or limited ability to control light levels near the screen limit presentations to high contrast displays. Black print on a white background is the only combination that will work in some situations.

Most projection systems have lower resolutions than you have on the monitor at your desk. While 1024 x 768 pixels or better are common on monitors, most projectors are limited to 800 x 600 or less. Add to that the relative size of the image and the distance to the audience and what you can get is intricate detail becoming an unrecognizable blur.

Getting a proper size image to be readable, but not overbearing, by the entire audience is another issue that is a function of the room where the presentation is being made. Although there are some rules of thumb about how big the smallest font should be, the only real test is to try it out prior to the presentation. Just because the presenter can read the information at the front of the room does not insure that a person sitting in the back row in the corner can read it without binoculars. Walk to the back of the room and see if you can read it.

At the same time, the font should not be so big that it conveys yelling at the audience unless that is the effect that you are trying to get. It is not necessary to fill the entire screen with words. If what you want to project only takes up a portion of the slide leave the rest blank or consider a graphic that complements the points you are making. There is an old maxim in advertising: White space sells. The same is true in making a presentation.

University faculty members have an advantage over corporate presenters in this regard. On any given campus most of the classrooms tend to be comparable in size and equipment. The result is that faculty can develop a template of colors and font sizes that will work effectively over several semesters.

Background Choice

Most presentations are placed on top of a background design. This generally helps soften the tone of what is being projected. Black text on a white background looks a lot like the old transparencies that were common twenty years ago. Today the choices available for a background number in the thousands without considering what you could create yourself. They are available free of charge from many websites. Any search engine will quickly lead a presenter to many sites with available backgrounds.

The best background for any specific presentation should take into consideration several factors. The goal is to select one that works with the physical environment where the presentation is going to be made and that is consistent with the content and the presenter's style. Because it is ever present, it should work to reinforce the presentation not distract from it. Using one with a cartoon character as the backdrop for a presentation on audit methodology would convey the wrong impression. Likewise, a very animated presenter would not be well served by a background theme that is very cubic and projects a rigid structure.

In a classroom setting it is also important to recognize that the student audience is not just getting one dose of PowerPoint in a day. They are instead likely to be in several classes that are using technology aids. In the same vein as Littell (1999) suggested that sales people discuss their presentation aids and share good and bad experiences, on a campus where technology aids are being used by a significant number of faculty members those same kinds of discussions could be used to help keep the entire day

from being one long progression of presentations that look like they came out of the same box.

Another consideration is when or if to change backgrounds during a presentation. Since the background ties the slides together, keeping a consistent background throughout a topic helps reinforce the idea that what is being talked about is all part of a bigger issue. At the same time a change of background can reinforce that a break in topics is occurring. In classes that meet only once a week it is common to have two or more distinct topics addressed. Using different backgrounds for each topic helps students recognize where a topical shift is occurring and it also helps break the monotony of looking at the same image with different words for three hours straight.

Textbook Slides

Many textbooks come with pre-developed slide shows. These shows profess that they are field tested in the classroom by the author of the text and imply that they should therefore be ready to plug in and meet your needs. That is not the case.

Publishers hire either the textbook author or another professor to develop the content of the slides. In many cases the content is then put on the background by yet another person. Since the background can take varying amounts of space in terms of the amount reserved for the title, areas that have extensive graphic content, and copyright notices, the amount of actual content space may not be as much as the content developer anticipated. The result, as distributed, can be significantly different than originally intended. Although the slides may look fine on the monitor in the office they may not be in a form that works well with the classroom environment where the presentation will be made.

Additionally, each business program around the country has its own mission and each course within that program fills a unique segment of that mission. Each instructor also has their own way of explaining concepts that works for them. If an instructor attempts to use a set of slides as supplied by the book publisher they end up trying to make someone else's presentation. Both the presenter and the audience end up frustrated. The content doesn't fit the situation so the instructor ends up adding things (usually not in a way that flows with the rest of the presentation) and skipping other slides leaving the audience to wonder why the slide was there to begin with if it wasn't going to be covered. There is also a tendency for the presenter to read the slides if they didn't create them. Essentially the presenter ends up being more of a facilitator for John Doe's presentation. That leaves the audience questioning the competence of the presenter which leads to absenteeism as the semester goes on. If the audience doesn't believe there is value being added by the presentation they are not going to make attendance a high priority.

Lost Time

Another element that is important to address in preparing a presentation is the amount of time that can be lost to transitions. Whether the transition is between slides or between applications, time management is important. PowerPoint and other presentation software systems offer many types of transitions. Although they can break the steady parade of bullet points, they also can have negative effects when used excessively. If you have a few slides and there are significant logical breaks between the slides, fancy transitions can be beneficial. On the other hand, if you are working with a large number of slides and many of the slides continue within one logical thread those same transitions can break the flow of the material being presented and consume significant time. Although each transition may only take a few seconds, cumulatively they can add up to several minutes of lost time.

In the same vein, movement to other software packages to provide examples can break up the flow of a presentation. There are two approaches available. The first is to embed links to the software or web pages in the slides in a manner similar to what is suggested by Killmer and George (2002). The strength of this approach is the smoothness of the transition. The drawback can be unpredictable load times. If information is being retrieved from network drives or the internet, congestion can cause very slow loading. To minimize these delays an alternative is to open all files and web sites that are to be used prior to the beginning of the presentation. Also any scrolling and resizing can be done at this time so they are ready for use. That way the shift can be accomplished quickly by breaking out of the presentation software and selecting the appropriate tab on the task bar for the already loaded information. Once the presenter is ready to move back to the presentation software they select that tab and continue the show from the current slide.

Use of Graphics

The inappropriate use of graphics is another area that needs to be monitored in constructing a presentation. Animated graphics can pull the attention of the audience away from the presentation. If used, they should not be left on the screen for an extensive amount of time because they will continue to compete with the presenter for the attention of the audience. Graphics in general should be scrutinized for their relevance to the presentation. If they do not help make the point they will turn out to be counter productive. Also if they do not fit the personality of the presenter and the maturity level of the audience they will generally prove to be a problem spot.

Handouts

Should the slides and other materials be supplied to the students? This is an area where practices vary considerably from one presenter to the next. Some presenters like to supply their materials prior to the presentation so that students can add annotations but do not have to try to copy everything that is coming up on the screen. Others don't like to make it available because of concerns about attendance.

The real answer seems to hinge on the amount of value that is being added by the presenter. If the slides have all of the details and the presenter just reads them, the situation is the same as thirty years ago when faculty would come to class and read the textbook to the students. It didn't take long for students to figure out that no value was being added.

It seems that it is better to use the visuals as talking points with the faculty member filling in the gaps. This reduces the number of slides and gives the faculty member the opportunity to add value. There seemed to be an inverse relationship between experiences with technology assisted teaching and slide detail. At first people tend to try to put the entire presentation on the slides. Over time the number of slides used declines and the amount of detail is reduced. The slides eventually become a topical outline and the presenter gains the freedom to interact with the audience in a meaningful way.

Even faculty who don't want to make handouts generally available find them a good way to provide "notes" to students that missed class for a valid reason. Unfortunately, as less detail is provided in supporting the presentation the effectiveness of this approach to helping a student catch up goes down.

Non-Presentation Software

Software that was not specifically designed for presentation can be effectively used in situations where the presenter wants to demonstrate things that don't fit a slide format. They can also provide a good break from the monotony of slide after slide. There are a few additional issues that become relevant; however, when projecting software other than presentation slides.

Word processing software today frequently provides real time spelling and grammar checking and puts markings where it identified issues even though there are actually no errors. The markings can cover subscripts in equations and generally don't look good. Also tables may not display exactly as they would on a printed page. To easily eliminate both of these issues, put the document in Print Preview mode. It can then be zoomed to make the type large enough to read. It is advisable to limit the amount of zooming so that left-right scrolling is not needed. If the situation is such that more magnification is needed the document would need to be modified to either use a larger font or wider margins. If the document needs to be modified as part of the presentation, the Print Preview mode cannot be used. Instead grammar and spell checking should be turned off in most cases and tables formatted to be effective in the normal screen mode. Turning off toolbars that are not going to be used can also give you somewhat more viewable space.

Spreadsheets are another commonly used software type that must be managed to be effective. Most of the time when a spreadsheet is projected there is an intention to use it dynamically so use of the Print Preview mode is inappropriate. Zooming is readily available as a means to increase the size of the characters, but limits the number of

cells that are displayed. Again turning off unneeded toolbars can help some. It still can create a situation where excessive scrolling is needed to show both inputs and results. When preparing the spreadsheet zoom it up to the size you anticipate using in the presentation. Then try to organize it to minimize the amount of scrolling that will be needed during the presentation.

Diverting from the Script

In the classroom it is common to break from the planned presentation. It may be the result of current events that are relevant to the topic at hand, a student question that leads on a tangent, or a planned discussion segment. Regardless of the reason, there are times that a faculty member wants to leave the projected presentation behind for a period of time. Unfortunately, if the presenter has developed effective materials, the students keep being drawn back to what is being projected and away from the instructor or other students that are participating. There are a couple of possibilities for dealing with this. First, if what is being projected is from PowerPoint, they have a built in function for blanking the screen. A simple touch of the "B" key will blank or restore the screen. It acts like a toggle and allows the presenter to remove the distraction. This is also effective if there are preliminary activities such as taking roll, making announcements, or introducing guest speakers that need to be done before the presentation begins. Second, if the room layout permits, the presenter can move to a location that puts the screen out of the field of vision of the students. Many classrooms have walkways down the middle or on the edges. If the projected image is outside of their peripheral vision even the most animated graphics will not draw them away from the presenter.

On-Line and Live Don't Mix

There is a temptation to try to use the same materials for both on-line offerings and live presentations. Unfortunately, the goals of the materials are not compatible. In fact they are nearly 180 degrees off. Nearly every recommendation contained here would better serve the purpose in an on-line setting if it were reversed. Font sizes need to be much smaller to be comfortable to read on screen; detail needs to be increased because it carries the entire message; other applications launched from within PowerPoint to maintain organization; etc.

In a live presentation, the materials are intended to be an aid. In an on-line presentation they are the whole of the presentation. A live presentation over good on-line materials leaves very little room for the presenter to add value. If a presenter is able to add significant value to a projected on-line presentation, it is a clear indication that the materials are not doing what they should when used in their intended on-line environment.

CONCLUSIONS

It is not difficult to present material effectively with technology. It does take more planning than it did when everyone walked into the classroom with a piece of chalk and began talking.

To make technology aided instruction work there are several points to remember:

- Check out the environment where the presentation will be made. The only thing that matters is how it will look and sound in the classroom.
- Set a tone with the aids that fits your presentation style. Backgrounds, transitions, and graphics all contribute to the atmosphere. Students will buy into a presentation that they believe is yours better than one that they are convinced you got from someone else.
- Know your presentation. If you have to read each slide as it comes up to know what comes next you lose credibility.
- Make sure that you can make smooth transitions when you want to change presentation tools. Long delays or failed attempts to get a new software application to deploy wastes time and breaks the flow of the presentation
- Don't be afraid to break from the script. Classrooms have always enjoyed the freedom to follow tangents and to back up when something isn't understood the first time. There is no reason not to put the projection away and continue to do the unscripted things that have always made the classroom work.

The presenter should always remember that they will only be successful if they add value. How value is added can take many forms. Each presenter must make choices based on the topic and their style to be successful.

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