

# **Is Your Selection of Content Delivery Vehicles Closely Aligned With Your Pedagogical Goals?**

**David N. Yearwood**

University of North Dakota

## **Abstract**

The instructional techniques utilized by educators are largely influenced by their knowledge and understanding of teaching and learning theories and also by their own experiences as a student. Modern classroom technologies have added another dimension to teaching and learning by virtue of its potential for explanatory and exploratory understanding of course content. However, determining how to effectively utilize such tools in one's practice may elude educators who lack an understanding of electronic pedagogy—the art and science of teaching and learning with technology. This paper will examine factors guiding classroom practices, the need for educators to have more than a cursory understanding of electronic pedagogy, and some suggestions for faculty to use technology in a more pedagogically responsible manner.

## **Introduction**

Humanity's desire for efficiency has led to the design and development of tools that ultimately determine how we live, work, and conduct many aspects of our lives. Today, the tools of a bygone era have been replaced by more efficient miniaturized versions designed to save time, increase productivity, and improve the quality of life. Within the last two decades, many of these tools are increasingly being utilized in education to enhance teaching and learning (Hawkins, B., Rudy, J., & Madsen, J. 2003). However, effective use of classroom technology requires not only an understanding of hardware and software systems, but also knowledge about instructional methodologies that allow educators to create opportunities for engagement with those in shared learning communities. Too often, presentation technologies are used as mere extensions of the lecture method in which faculty systematically sequence through bulleted content with little or no interaction from students. While the addition of colorful graphics, charts or diagrams may add to the visual appeal of a presentation, failure to involve students in a discussion about what is presented to them may negate the value added benefit of using such technologies. The net result is that there is no change in instructional methodology from how older technologies such as the overhead projection units were used and thus no increased learning.

The effective utilization of classroom technology—old or new—should include elements of creativity in which presentation tools are utilized to promote critical thinking, problem solving, and interaction, rather than tools that are only used for lectures or drill and practice activities. The successful marriage of technology and instructional methodology requires a fundamentally different approach to using presentation software in ways that actively engage

students with the content, with their peers, and also with the instructor. This paper will examine factors guiding classroom practices, the concept of ‘electronic pedagogy’—the blending of best classroom instructional practices with technology—and some practical approaches using presentation software (particularly PowerPoint, simulation programs, and concept mapping software) that faculty can consider to enhance teaching and learning.

### **Factors Guiding Classroom Practices**

Traditional classroom practices have been influenced largely by educational psychology and learning theories that emanate from the developmental, behavioral, and cognitive perspectives. Developmental theories represent a multi-faceted way of thinking about learners— younger and older students—therefore, any discussion about best instructional practices will require knowledge of child or adult development from the standpoint of what to teach, when to teach, and how to assess students’ understanding of what is presented to them. From a behavioral perspective, learning is essentially a response to external motivation (Lever-Duffy, McDonald and Mizell, 2003). Thus, the important factor for educators to keep in mind is that the timing and strength or intensity of the reinforcement given to students is a crucial factor in eliciting learning as this plays a significant role in behavioral changes (Lever-Duffy et al, 2005). Of the three general theories, the work of Bloom and his associates (1956) in the cognitive domain is perhaps more widely recognized and employed in higher education because it is centered around curriculum development and “encompasses objectives that deal with the recall or recognition of knowledge and the development of intellectual abilities and skills” (Orlich, Harder, Callahan, Trevisan, & Brown, 2004, p. 81). Therefore, educators wishing to design curriculum aimed at promoting critical thinking by students should formulate clearly articulated learner outcome statements that are measurable from which they can assess what students know and are able to do along a continuum from simple recall or recognition; translation and interpretation; examination and hypothesizing; and ultimately, to assessment, evaluation, and critique.

Classroom practices in the 21<sup>st</sup> century are changing in subtle and not so subtle ways to reflect the requisite knowledge, skills, and competencies required of graduates in occupational, academic, and business environments. The extent and magnitude of the change, however, may well depend on faculty willingness to use a different frame of reference that does not tie current technology to lecture-based pedagogy (Detweiler, 2004) but one that utilizes the most appropriate use of technologies as tools to complement best practices in teaching.

### **Electronic Pedagogy—The Marriage of Pedagogy to Technology**

One aspect of the pedagogical model that faculty may struggle with the most is the concept of ‘electronic pedagogy,’ a term that may not be familiar to many. The marriage of pedagogy and technology—electronic pedagogy—is not always well understood, as evidenced by the manner in which faculty use modern computer classroom technologies in a fashion similar to the way more traditional classroom technologies were/are utilized. Some assume that lectures are enhanced by merely placing PowerPoint slides with accompanying audio in a course management system for later download by students; or, by sharing their bulleted, text-laden PowerPoint slides or overheads as handouts. However, what is it about this practice

(downloading a lecture or printing electronically projected slides) that will engage students with the content and with each other, when attempts that encourages the use of the most important resource in their possession—their text books—results in no significant understanding because students struggle with comprehending its content?

It is easy to see why some users of various technologies have become excited about such tools (Microsoft Office, tablet PCs, projection units, electronic whiteboards, etc.) given their ubiquitous presence, and to a large extent, their successful use in the business and manufacturing arenas; but how can tools for productivity and efficiency purposes in a commercial setting be used to promote thinking, problem-solving, and an increased understanding of course content in academe? The issue is not merely about using technology in classrooms but rather, the requisite conditions teachers establish and the manner in which they *creatively and effectively* infused technology into their practice to generate interest that results in *meaningful engagement* and improved understanding of course content at multiple levels. It is therefore vital for educators to have more than a cursory understanding of electronic pedagogy, which encompasses not only the technological possibilities but also knowledge about instructional methodologies, learning styles, and the timely utilization of best practices to facilitate learning.

### **Possible Ways of Using Presentation Technology to Emphasize Student Centered Learning**

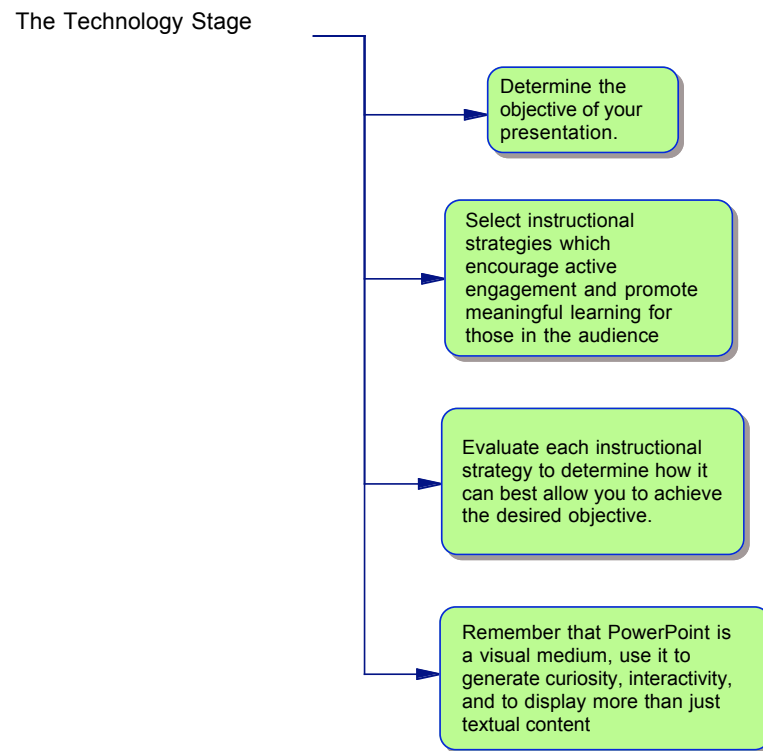
It is generally assumed that faculty spend a considerable amount of time in preparation prior to going into the classroom, so it may be appropriate to first examine some pre-class activities that should be undertaken, a sort of macro view of a teaching unit. A possible beginning point might be to first consider the objective of the presentation. Is it one of providing information; promoting understanding about a given topic; attempting to sway someone's opinion or change their way of thinking about an issue; or is it to encourage participation, promote dialogue and involvement? The answer to these questions is very important because it ultimately determines the instructional strategies that would be most appropriate to meet the identified objective. There are a variety of instructional methodologies that faculty can select (i.e., the lecture method—traditional or mini lectures— a questioning or discussion approach, collaborative activities, problem-based learning, simulations, or games), however, it is important to realize that the chosen method should provide for student experiences that are relevant/meaningful and authentic. Thus, any planned use of technology must be driven by student outcomes and a way to assess students' understanding of the content and only after this has been thought through can there then be a discussion about the type of content delivery vehicle that will assist in accomplishing a given task. If after careful consideration a decision is made to use PowerPoint as the content delivery vehicle because of its visual appeal and the ability to insert video, animation, or audio element, then the next stage may be to determine how the medium will be used accomplish the following:

- Capture and maintain the attention of your audience
- Provide learners with information that adds to existing knowledge about a given subject
- Challenge those in the audience to think more deeply about what is being presented to them
- Provide learners with opportunities to interact with you as the presenter/instructor, their peers, and with the content. This can best be accomplished by two methods: a) utilizing a

process called chunking in which lectures are reduced to no more than 10-minute segments or less; and b) building in opportunities for engagement by asking questions that stimulate conversation. These two methods are more effective than providing the content verbatim on the PowerPoint slide and could be further enhanced by creating quizzes in PowerPoint that require learner interaction.

Figure 1 provides a way to visualize the technological vehicle, in this case PowerPoint, while still keeping the focus of instruction on the learner.

Figure 1 A Prelude to Selecting a Content Delivery Vehicle



## PowerPoint

PowerPoint is perhaps one of the most frequently used classroom software by both teachers and students. This software is largely a visually based medium because it allows the integration of graphical, video, animation, audio, and textual elements. However, many individuals frequently utilize PowerPoint for presenting textual information with an occasional sprinkling of graphical elements, some of which might be unrelated to the content. As a tool, PowerPoint is extremely useful for organizing and presenting information in a manner best appropriate to the technology user. Often, though, the user fails to keep the audience in mind and this could result in a terrific learning experience for the PowerPoint presenter—teacher centered—but not necessarily for the learner. Creed's (1997) dissatisfaction with PowerPoint is that it appears to limit rather than promote student involvement or engagement, and as a result, runs counter to the pedagogical goals for the classes he teach—student centered versus teacher

centered instruction. PowerPoint presentations which employ a lecture type format, where information is presented in a sequential manner, seldom encourages audience involvement or participation. Lectures that are well presented can be intellectually stimulating, however, lectures poorly delivered could promote a certain level of passivity and possibly limit any real engagement by learners with the content and with their peers about what is presented to them. Given the short attention span of students, a better option when using PowerPoint, might be to break lectures into small segments with opportunities for some discussion of what was just covered.

Two additional things worth mentioning about PowerPoint that instructors may wish to consider are: the number of individual slides that make up their presentation and the concept of reductionism. While attending two national workshops, the author used an electronic counter to tally the number of slides in ten 30 and 60 minute workshops, where presenters choose to use PowerPoint as their content delivery vehicle. Of the five presenters in the 30-minute workshop, only two had a slide count of less than 25 slides, 19 and 24 slides. Presenters in the 60-minute sessions had slide counts of: 27, 35, 40, 41, and 44 respectively. What may not be immediately obvious is the slide count rate for individuals with the highest number of slides for the 30 and 60 minute sessions: .83 slides-per-minute for the individual using 25 slides in the 30-minute workshops; and .73 slides-per-minute for the 60 minute session. Realistically, the slide count rate is higher given that about 5-10 minutes of each presentation (30 or 60 minute sessions) was set aside for discussion, question/answer period. If this same practice is employed in the classroom how much of the presented information will students retain given their unfamiliarity with the content? Further, how much time is there for student interaction with the content, with each other, and interaction with the instructor if bulleted text flies past them at the rate of more than one slide per minute?

Recently, a graduate student in one of my classes, who knew I was looking into PowerPoint use in the classroom, presented me with 19 pages of framed/boxed PowerPoint slides—six slides per page—that she downloaded from Blackboard for one of her other classes—a 50 minute class. She added, “everything here was read to us as it appeared on the screen” (personal conversation, February 10, 2005). Such use of technology is likely to lead to cognitive overload for the learner and may result in less, rather than more effective communication (Tufte, 2003).

The concept of reductionism regarding PowerPoint use was alluded to by Tufte (2003) who notes that this program limits and compromises the content presented to audiences by reducing important information to simple one-line bulleted statements. The problem with such practice may well be the loss of meaning and context for what is presented. Correcting for this is no small task and suggests a need for balance regarding providing too little and too much information where meaning and context becomes an issue for those in our learning communities.

### Simulation and Concept Mapping Software

Other types of instructional technologies that faculty may find helpful are simulation software—computer programs which mimic real life activities of one kind of another and might be considered as suitable substitutes for conducting laboratory exercises—and brainstorming or

ideation software frequently used as a medium for recording and organizing ideas. Such software, when mated to a projection system, can allow instructors to present ‘what if’ scenarios to students that require them to employ knowledge and skills acquired to solve real world problems in a safe environment. For example, the author’s use of MultiSim by Electronics Workbench ® provided numerous opportunities to engage Industrial Technology students in project design, testing, and troubleshooting, all of which were intended to move students beyond the knowledge or recall levels to higher levels of cognition advocated by Bloom and associates (1956). Additionally, simulation software allow faculty to replicate the laboratory environment in the classroom as questions are raised without having to move the class to the lab or waiting until the next scheduled laboratory session. A variety of similar simulation programs exists for different disciplines and a search for “simulation” or “brainstorming software” using any of the popular internet search engine would provide extensive listing of commercial, shareware, or available freeware software. Faculty must therefore evaluate all such software to determine the extent to which their use would provide for the enhancement of instruction and student learning.

A number of educators frequently employ brainstorming activities as part of their instructional practice. This strategy is very effective for engaging students in the generation of ideas related to a concept or theory, a project, or other course-related activities. While the chalk or whiteboard activity of brainstorming is a useful one, its electronic counterpart offers a significant enhancement—the opportunity for students to be more fully involved in the activity itself and the connections made to generated ideas. Most instructors are aware that students consider anything written on the chalk or whiteboard to be important and should be copied. Students thus engaged in a traditional brainstorming activity which uses the chalk or whiteboard are likely to split their attention between generating ideas and copiously copying them in their notebooks. This multitasking may be difficult for some students who might choose instead to focus on copying the generated ideas. These individuals are therefore likely to miss out on discussions relating to the brainstormed ideas and may not see the crucial connections being made by the instructor or others in class. Other students may engage more fully in the brainstorming activity and as a result may not record the information being assembled on the board.

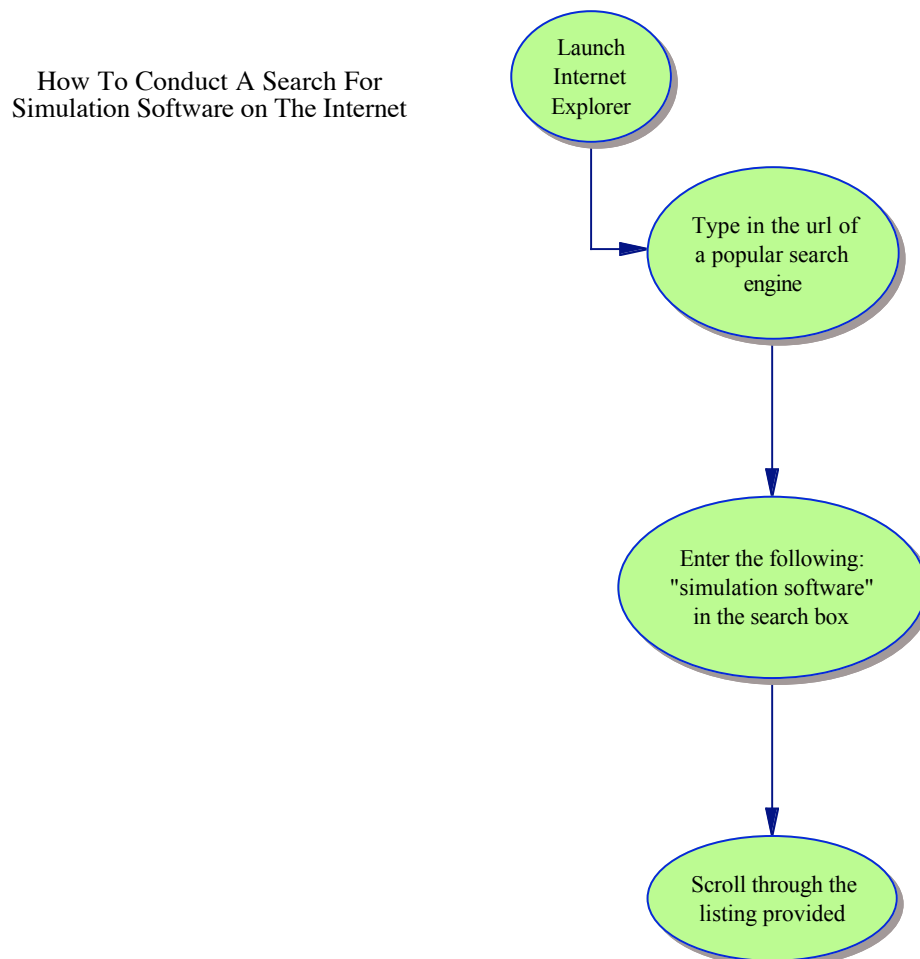
Electronic brainstorming and ideation software are computer visualization software (e.g., Inspiration© and MindManager©) that can be utilized for brainstorming or concept mapping, creating outlines or semantic networks, and as graphic organizers (Dabbagh & Bannan-Ritland, 2005). The use of such software can allow all to be involved in the brainstorming activity because the information generated can be printed, disseminated, and electronically stored for later retrieval. Thus, instructors can say to students, “put down your pens, do not bother to record anything because I will make a copy of this brainstorming activity for you at the end of class.” Such a possibility is likely to result in more involvement by students in generating ideas and pursuing discussions related to the brainstorming activity.

Instructors should also consider the option of having student volunteers enter the generated classroom ideas since this will allow them to better facilitate or manage the brainstorming activity. Another viable option might be to break the brainstorming operation into two segments—an ideation and a discussion session. In the ideation session all generated ideas will be accepted without regard to any discussion. This will be immediately followed with a

short session to decide what is relevant and what is not and the appropriate connections to make via connected arrows to show some flow or organization of the generated ideas. For example, let us assume that an instructor recorded the following student generated ideas about how to conduct a search of simulation software:

Launch Internet Explorer; type in a url of a popular search engine; type in the simulation software in the search box; and scroll through the listing provided. These four ideas could be captured in one of the brainstorming software mentioned earlier, see figure 2. The results of this effort could then be printed and disseminated among students so that they can have a map from which to work (e.g., record notes relevant to the generated flow chart of ideas) before starting the discussion session. In either scenario, the opportunity for increased engagement by students is created by the prudent use of technology.

Figure 2 A Concept Map Exercise of Generating Ideas For Class Discussion



Several things are worth noting about figure 2. Students using this concept map have a visual representation of the process that can be followed to conduct an Internet search that appears to be sequenced. A similar activity, depending on its complexity, may require a

considerable amount of text to convey a concept or idea. Additionally, students can add to what has been provided in a way that makes sense to them (e.g., make a list of several addresses of urls next to the appropriate section of the diagram from which a search can be conducted; record ideas about terms that could be entered for simulation software such as, “simulation programs, imitation or modeling software;” or create links of their own to better understand or visualize the process). Once again, student engagement, interactions, and discussions could be instrumental in more understanding about the content and thus increasing learning.

### **Conclusion**

Regardless of how one views technology it is clear that what emerges is a need for educators to reexamine their philosophy of education—their beliefs and practice about education—to ensure that it includes an ongoing study of how best to teach with media. Electronic pedagogy is all about the purposeful use of technology to create optimum classroom environments of engagement with diverse learners in ways that add value to instruction. Thus, faculty wishing to integrate technology in their practice to enhance teaching and learning must carefully decide upon the objectives or goals of their instruction before selecting the technological vehicle that will convey their thoughts and ideas to their students. Student involvement in their own learning and student centered instruction must be the primary objective, and this when merged with the appropriate technological tools could ultimately determine the success of our collective efforts by enabling students to move from the knowledge level thru analysis, synthesis, and the evaluation stages alluded to by Bloom and his associates (1956).

Educators can be more successful in their use of classroom technologies if they consider implementing instructional strategies in which: questions are inserted at appropriate times during instruction to evaluate what students know; opportunities are created for groups of students to explore a concept or resolve an issue on their own; students are presented with a problem to solve—collaborative activities which tend to promote peer learning and demonstrate what they can do; and students are exposed to real world problems via an examination of carefully written case studies which challenge them to integrate lessons learned. Success with using classroom technologies can be realized but only when instructors are careful to use such tools in a pedagogically responsible manner.

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