



The Technology Literate Professoriate: Are We There Yet?

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In the late 1980s, when the first signs of digital technology began to infiltrate the college campuses, very few faculty in higher education, outside of computer sciences and some small pockets of innovators, were savvy users of the technology. But in 1989 all that began to change when Tim Berners-Lee invented HTML and HTTP, and basically worked with others to standardize communication and document retrieval through the web. College campuses embraced the web and its potential, and by 1994 educational personnel worldwide were demanding more, better, and relevant technology in which to do their work. That was then, this is now.

Today there are those who argue that universities have poured money into digital technology at the expense of important academic programs. Shouts of technology bankruptcy can be heard from the hallowed halls of academe. Some say that digital technologies have increased the workload of faculty without commensurate gains in productivity or enhancement of student learning. In many cases across campuses, this charge would not be difficult to prove. For example, we see laptop computers being used for connectivity in the classroom, but for purposes not related to the learning outcomes of the subject. And, we see the Internet replacing valuable teacher to student contact. Certainly we have all felt, at one time or another, that the technology has not lived up to its hype.

But at the risk of alienating those who hunger for a debate about technology waste, I'll take a stand. Used responsibly, digital technology is, and most likely will be, an important factor in the higher education equation and its potential for increasing student learning and faculty productivity should not be casually dismissed. Computer Aided Instruction (CAI), for example, has been researched extensively over the years and has shown it can improve test scores and motivate students. To date, however, there has been a dearth of critical research that investigates the value, in regards to student learning, of digital technologies in educational institutions.

As a primary and practical focus, this paper addresses the kinds of technology that have the potential for enhancing student learning, the ways in which new technologies can be assessed to determine its impact on learning outcomes and ultimately student learning, and some creative ways that universities can support this judicious use of technology. But before the practical focus in this paper, some important background is necessary.

Our World is Changing

Much has been made about how the world has changed because of the advancement of digital technology into our daily lives. Thomas Friedman (2005), for example, reminds us that people are using the Internet and digital technologies to level the playing field worldwide — especially in the business environment — so that knowledge and services are readily accessible and available through cost-efficient means and by anyone, anywhere, and at any time. How does such a notion transfer into the world of higher education? We only have to look at the rise of private online universities to get a prime example of how digital technology is transforming the landscape of today's university. There are even more obvious examples. For instance, who in higher education has not been impacted by the predominance of email, presentation software, listserves, and documentation programs? Further, many universities, colleges, and K-12 schools have adopted variations of content management systems (CMS) that either are homegrown, adapted from open source programs, or commercial. The list of new technologies available for today's educator and student seems inexhaustible as podcasts, webcasts, smartphones, etc., illustrate. Our world is definitely changing and we need to learn how to invest wisely in technology to support our learning needs.

The Millennial Student

To invest wisely, educators first need to know the purposes for using technology for pedagogical practices. It is not about spending the most, nor about keeping up with the Jones's that is most important. It is, however, all about the student learner. We are at a place in this evolving digital

environment where we need to stop, take inventory and reflect on our successes and failures in using technology to enhance student learning. We need more ideas about how to use and assess this technology for what it can and cannot do to support learning. And, we need to find creative and alternative ways to efficiently learn the technology that supports student learning. We can begin this process by reviewing what we know about our students as learners and what we mean by learning. Only then can we develop an effective strategy for implementing a technology plan across educational institutions that supports student learning.



You're WRITING a note to my Mother? How quaint.

Source: Abbott, G.B. (2005). Used with permission.

One of the biggest changes reflecting the evolving technology revolution has been the student learner. Although Abbott's cartoon (2005) is about today's children, it reflects the attitudes of the millennial student who were born between 1980 and 2000. These students are the bulk of the students at many universities today. They are different in many ways from the students we educated when the digital revolution first swept college campuses. Much has been written and said about millennial students (Stern, 2005; Lancaster and Stillman, 2003; Martin and Tulgan, 2001; Raines, 2003) and how these students are challenging educators in interesting new ways. Among their many strengths, students are goal and achievement oriented and they are used to multi-tasking. In addition, these students are technology savvy. It is this last strength that demands particular attention.

There are those who say that our educational institutions, and the way we teach, need to change dramatically in an effort to accommodate the millennial/digital student (Carlson, 2005). And why not? Today's students, like faculty, are mobile workers. They use technology daily for seeking information, for participating in their social milieu, for communication, and as a way to learn. In response, some universities have changed dramatically. For example, the University of Texas is going bookless in their main library (Mangan, 2005). The reason? They needed to make room for an "information commons" — a place that parallels a trend in society to create spaces where students expect wireless, easy, and full access to information any time of the day. Others disagree with catering to the digital

student. They say, just because students are immersed in technology throughout their daily lives does not mean we have to use it in the classroom — especially if it does not serve to enhance student learning. As this debate continues, we should not lose sight of the reality, nor of the nuances of the debate. Today's students are comfortable with technology for learning and we should use this knowledge to create a dynamic learning environment wherever that might be.

Most importantly for this discussion, however, is that students may not be using technology in ways that promote critical thinking and deeper learning. We have ample evidence of how students achieve such learning (Donovan and Bransford, 2005; Zull, 2002; Bransford, Brown, and Cocking, 2000; Pelligrino, Chudowsky, and Glaser, 2001), and we need to use such knowledge to develop a dynamic learning environment that uses technology to support learning. Prior to the explosion of digital technology on campuses, Kozma (1987) argued that the computer is a perfect tool for learning as it closely parallels the learning process of humans. I would add that computers and digital technologies of today have even more potential for enhancing learning as they parallel the tools we use daily for such needs as communication, collaboration, and information retrieval.

New Technologies that are Shaping Teaching and Learning

Although there have been many claims of late that digital classroom technology produces gains in student learning, most research in this area is sparse and too often anecdotal (Cuban, 2001). Individually, we as faculty need to be better researchers in our own courses — to ask better questions regarding how any technology might impact student learning. Before we look at any technologies for use in teaching, we need to ask ourselves these key questions: How does the technology support the learning goals of any given course? And more specifically, we need to ask ourselves how the technology will support what Fink (2003) refers to as the key components of an integrated course design. This means the integration and interconnection of course learning outcomes, their assessment, and the activities that support the achievement of learning outcomes. Of course, without good pedagogy even the best of technologies can prove ineffective for student learning.

In this section, we will look at 10 examples of technologies that are shaping or have the potential for shaping the way we teach today. Within these examples will be a description of the technology and a discussion about its potential to enhance the student learning experience. These discussions are framed around some important ways that technology can be used to support an integrated course design. That is, technology can be used to:

- Further support and strengthen learning activities and assessment strategies that have proven over time to be

effective pedagogical practices.

- Create new learning environments and opportunities where communication, collaborations, resource sharing, and creativity are encouraged in ways that positively impact student learning.

Before deciding on a technology for your course ask yourself:

To what degree will the technology enhance and support assessment strategies and learning activities that in turn help students achieve each of the learning outcomes you have identified in your course? Is the technology necessary or could you achieve an integrated course more effectively with other pedagogical methods?

Blogs

Description: A web log or blog is a web-based publication consisting primarily of articles that are usually made public. Blogs have gone through a remarkable growth over the last 4 years, partly because they are free and easy to create and range in scope from individual diaries to political, social, public and private forums. Many blogs are interactive in that they allow guests to post relevant comments or ideas in response to other postings. Blogs also have the potential for including media such as images, audio and video. Blogs have become one of the most popular forums for discussion and dissemination of current news and events. Blog technology allows blogs to be syndicated and aggregators allow users to automatically search for favorite blogs on the web and have them delivered to personal accounts.

Potential: Today, many college courses include a blogging activity as they help promote the skills of reading, writing, and communication in unique, creative ways. Because they are easy to use and set up, students find blogs useful forums for making public multi-genre writing that includes letters, journals, essays, and short stories. For purposes of convenience, student blogs can be easily accessed through an Internet connection, and archived for later use. Blogs not only allow a forum for students to self-assess their own work, but the global nature of the blogs allows others from anywhere in the world to comment and assess an entry in an easy and fluid way. Faculty and students can also take advantage of the syndication technology inherent in the blog design to automatically receive topic-based blogs on a personal web space. For example, in a political science class, faculty might want to encourage students to receive the blogs of candidates or action groups for comparison, contrast, and analysis. Students could post their analysis, resources, and reflections on their own blog that can be used for other classroom activities.

Wiki

Description: A wiki is a compilation of web pages that is very organic in nature. Often, users can add and edit content on wiki web pages in unrestricted ways. It is the ability to edit anything on a wiki page that distinguishes this tool from a blog. Typically, wiki content represents the

work of the last person to edit a wiki site, the date and time of the contribution and an option to revert the page back to the original source page and author. Wikis are particularly valuable to people who work collaboratively and who want the convenience of a web-based environment that easily allows all content and all changes to be archived and reviewed. These sites can be made private and/or public. Like blogs, wikis are multi-genre forums that can be accessed by local and global audiences. There are many places on the web that offer wiki support for free wiki.

Potential: By their very nature, wikis foster interaction, group ownership and encourages individual responsibility. This makes the tool ideal for educational purposes as wikis create spaces for students to engage in collaborative projects and writing assignments. Wikis make it possible for writers to continually build upon a text, revising, editing, and making comments through the duration of the project. This encourages shared ideas, assessment, and reflection. Like blogs, wikis extend the boundaries of the bricks and mortar classroom and can be shared globally. Think of language students in Spain creating a co-authored piece of writing with students in the United States. The cultural and linguistic impact of such collaboration could lead to a richer understanding of both Spanish and English. The history of a wiki site can serve as a valuable assessment tool for teachers as they can instantly see who has contributed to a project and to what extent. This allows teachers, for example, to provide formative feedback to a group or an individual just in time and as needed. One can imagine a wiki as a place where ideas are generated for a project and where the thinking can be observed by the authors in ways that lead to a deeper understanding of an idea.

Learning Management System

Description: A Learning Management System (or LMS) is a software package that enables the management and delivery of learning content and resources to students. The most common and practical LMS systems are web-based to facilitate a 24/7 anytime, anywhere access to learning content and administration of that content. A comprehensive LMS allows for such things as student registration, the delivery and tracking of e-learning courses and content, tests and quizzes, discussion forums, the sharing of resources, and virtual live classes. Most systems allow for learner self-service, facilitating self-enrollment, and access to courses. An LMS is usually password protected to insure privacy and to recognize and observe copyright licenses. Many universities buy a proprietary LMS, but increasingly universities are building their own LMS based on open source software like Moodle. Its no cost (excluding costs associated with hardware and support), flexibility to adapt to small or large institutions, departments, programs and individuals, and world-wide support are attractive features.

Potential: LMS systems are increasingly becoming a staple of educational institutions today. Universities use them to deliver web-based courses and web-enhanced courses to

manage those courses from an administrative and teacher perspective. An LMS creates opportunities for various kinds of learning activities to occur within an enclosed online environment. For example, LMS systems support discussion boards where students can post in threaded discussions relevant to course content. These discussions can be open to everyone or restricted to small groups. In addition, teachers can use discussion histories to assess particular learning outcomes such as whether the students understand certain concepts introduced in the online discussion forum. Assessment tools are also built into an LMS and can quickly calculate grades for instant feedback to students. Perhaps the most common use of an LMS by the typical face to face teacher is to support the sharing and archiving of resources such as presentations, notes, papers and valuable links for retrieval anywhere and at anytime. An LMS can become a home away from home for the mobile student and teacher. Although an LMS is not unique in its support of some of the popular applications described here, it does offer one stop shopping for the users as it manages those tools in a common space.

Presentation Software

Description: A presentation program is computer software designed to support the creation of presentations, normally in the form of a slide show. In early iterations of this type of program the output was for the creation of slides, overheads, handouts, and speaker notes. Today, these programs are mostly used in conjunction with a dedicated LCD-based projector so that the slide show can be projected on a screen for large or small audiences. Typical programs allow the author to edit and display content in the form of text, images (including charts and graphs), sound, and video. Although PowerPoint may be the most common example of this program, there are many other programs including Keynote, Adobe Acrobat, and the popular and free Open Office Suite package that includes IMPRESS as its presentation program. Simple presentations can also be created using the Simple Standards-Based Slide Show System (S5). This open source system requires only basic knowledge of web skills and can be learned quickly.

Potential: Presentation tools are best used to convey information in a pleasing way through various forms of expression, and not as teleprompters to regurgitate information that students could have learned through readings or other ways. Dynamic presentations support slide content that enhances the meaning of an idea or concept rather than acting as an anesthesia for the audience. For example, an image or a slideshow of digital images can be used to convey ideas in creative ways that support the different ways humans learn through audio and visual stimuli and storytelling. A diagram, graph, chart, or image are some types of media commonly used to convey ideas through presentation software. Digital stories created through presentation software are a powerful way for both teachers and students to present complicated ideas visually and with supporting audio that might include interviews, music, sound effects, and narration. These

“stories” can complement lectures and other ways to learn course content and also serve as types of assessment for learning outcomes. There are other ways in which such software can be used to assess students’ learning. For example, after presenting concepts and ideas via a slide show a slide can include an assessment activity for either individuals or groups to complete. This kind of activity supports an interactive environment where students are encouraged to challenge one another’s answers and to support critical inquiry.

Tutorials/Self-tutorials

Description: Traditionally, tutorials were small classes of one or a few students that were given individual attention by a teacher. Today, tutorials more likely refer to a list of instructions or tips for how to do any of a wide variety of tasks. Digital technology allows educators to create more advanced tutorials that are interactive, visually appealing and competitive with other pedagogical methods for contributing to student learning. A basic tutorial can be created with any text editor and delivered to students through a variety of digital technologies such as email, Portable Document Files (PDF) that can preserve the document format and colors, web pages, and CDs. Tutorials that appeal to the visual learners can be created with scanning software or basic screen capture software found on any operating system. Video tutorials, like those for software applications, can be created with screen capturing software that captures the movement of a mouse as it is used to open windows and select options in a program. A microphone, used simultaneously with the screen-capturing tool to narrate the actions and video-editing software, completes the process. More advanced tutorials include functions that, for example, mimic teacher/student interactions and exchanges, and include an assessment of those interactions. These interactive tutorials can be created through advanced programs such as Adobe FLASH and java scripting.

Potential: Digital tutorials are very utilitarian and versatile. Simple video tutorials, for example, allow for just-in-time learning that appeals to both instructor and teacher. Imagine teaching a business course where your students are required to learn spreadsheet skills and presentation skills using typical software available on campus. Some of your students already know how to use the software and some have no clue. Do you require the whole class to attend a workshop on these tools or just the students who lack the skill? Do you teach the class or does someone else from support services teach the class? Consider the digital video tutorial and their advantages. They can be viewed as many times as the user would like and can be viewed simultaneously on the screen with the software being learned. Instructors do not have to use valuable class time to teach tools that can be learned just in time and anywhere. Digital video tutorials can be custom made by individuals or licensed by educational institutions from vendors such as Atomic Learning. More complex digital tutorials, like algebra tutorials developed by artificial intelligence researchers at the Pittsburgh Science of

Learning Center (Corbett, Koedinger, and Anderson, 1997), are interactive and have self-assessment support built into the tutorials. These tutorials lead students through a process of learning where interventions are built into the tool to ensure that students are fully learning a concept or strategy in Algebra. These digital tutors make smart decisions about when to step back and let students try problems on their own.

Concept Mapping Software

Description: Concept mapping (a method of brainstorming) is a technique for visualizing the relationships between concepts and creating a visual to represent the relationship. Concept mapping software serves several purposes in the educational environment. One is to capture the conceptual thinking of one or more persons in a way that is visually represented. Another is to represent the structure of knowledge gleaned from written documents so that such knowledge can be visually represented. In essence, a concept map is a diagram showing the relationships, often between complex ideas. With new mapping software such as the open source Cmap, concepts are easily represented with images (bubbles or pictures) called concept nodes, and are connected with lines that show the relationship between and among the concepts. In addition, the software allows users to attach documents, diagrams, images other concept maps, hypertextual links and even media files to the concept nodes. Concept maps can be saved as a PDF or image file and distributed electronically through a variety of ways including the Internet and storage devices.

Potential: Concept mapping software is readily available at low or no cost, but is underutilized as a tool for visually representing both simple and complex ideas. Typically, instructors rely more on outlines and brainstorming activities using paper, stencils, and pen rather than digital technologies to convey ideas. While these strategies may work well for some students, they may not necessarily be the most appealing or practical for others. Concept mapping software allows even the most artistically challenged individuals to create visual maps that represent thinking about complicated ideas. For example, imagine a marketing class that is trying to assess the value of concept mapping tools for developing thought on organizational change. The visual might start with a node at the top representing a particular concept mapping tool. Lines from that node might go to other nodes that represent where the tool was developed, how and where organizations use the tool, examples of archived concept maps, and where the tool can be downloaded. Imagine also that each of the nodes can contain pertinent links to such things as resources and contacts. Additionally, concept mapping software can be effectively used as an alternative assessment tool that, with practice, can convey to teachers how a student makes relationships between concepts and ideas.

Webcast

Description: A webcast is the delivery of a program that is

transmitted over the Internet. These programs are similar in many ways to television broadcast programs; however, they can be more interactive than TV broadcasts. Webcasts allow the user to connect to a server where they will become real-time participants in a program — which often takes the form of a facilitator-guided workshop or class. These live sessions are highly interactive and allow users to share applications, such as whiteboards, concept maps and word documents, and to communicate live through audio and chat. Elluminate is one of many server-based software programs that is enjoying popularity in educational settings. Webcasts provide educational institutions with the ability to support conferencing and to deliver training and presentations to personnel anytime and anywhere. Recorded and archived webcasts, because they are economical to develop and store, are increasingly becoming the preferred way for universities to deliver lectures, events and presentations to faculty and students through the web, CDs, DVDs and even TV broadcasts.

Potential: Although interactive webcasts are cheaper to deliver than other forms of broadcast and satellite delivery methods, they are still a relatively expensive method for delivering content to students. For campuses that must stay within a limited budget, webcasts can be recorded, compressed using common video editing software, and delivered through broadband that is already supported at the university. Recorded lectures and presentations can be packaged together and turned into a webcast when instructors can't meet face to face with their students. This supports the mobile worker and helps to increase learning opportunities outside of the classroom for students. With the newer technology available, webcasts can now be syndicated and uploaded to any device, such as an iPod, that is capable of playing videos on screens commonly found in all classrooms and lecture halls. Webcasts can be sorted and automatically delivered to faculty and student websites for use anytime and anywhere the user/subscriber has access to the Internet.

Podcasts

Description: Podcasting is a method of publishing audio and video programs via the Internet that allows users to subscribe to a “feed” that delivers those files directly to a user's computer. This is similar to getting a newspaper delivered to your door whenever a new publication is released. Using podcast technology, independent producers can publish a digital program, for example, as a series of digital lectures or interviews about higher education, and have it syndicated so that any subscriber can receive updates (new feeds) on their personal computer. Listeners and viewers can subscribe to feeds using podcatching software (a type of aggregator) which periodically checks for and downloads new content automatically. Podcatching software also enables the user to copy podcasts to portable devices for listening or viewing. Some popular free podcatcher websites are iTunes and iPodder. The browser Firefox also has podcatching features.

Potential: As a web-based technology, podcasts are available to users anytime and anywhere. This opens up a whole new way of not only making available important university resources such as lectures, speeches, radio shows, debates, campus events and interviews, it does so in ways that make it convenient for faculty and students to have these podcasts delivered to their laptops. From a personal computer, the podcast can be transferred to any player device such as a CD player, MP3 player, or iPod for listening at any time. The possibilities for such technology are endless, and some universities are already developing the technology so that important lectures and other audio resources might be automatically uploaded to a student's computer or a learning management system to supplement class materials and as a way for students to review important information. For example, an interview by a famous novelist who was part of the university's lecture series can easily be made into a podcast that finds its way into a student's mini MP3 player for listening at the user's convenience. Podcasts can be sorted and automatically delivered to faculty and student web sites for use anytime and anywhere the user/subscriber has access to the Internet. As universities learn more about the potential of podcasts, the number of speeches, events, etc. made available electronically to students and faculty will increase dramatically in ways that are both convenient and creative.

ePortfolios

Description: An electronic portfolio (ePortfolio) serves as a depository of artifacts for individuals or groups that can be shared with anyone given permission to view it. There are three main types of ePortfolios: developmental, reflective, and representational. In the context of education, ePortfolios recently have gained popularity. Students use ePortfolios to archive select artifacts that are representative of their growth as learners over a period of time. Artifacts can include written documents representing multiple genres, videos, audio recordings, artwork, and other images. The ePortfolio offers students the opportunity to determine who has access to the portfolio and what artifacts visitors can see. Although many standard software programs can be used to create basic ePortfolios, the most dynamic programs, such as Open Source Portfolio, are designed specifically for developing portfolios that serve a variety of reflective and representational functions within a password protected system.

Potential: At the basic level, the ePortfolio serves the same function as a conventional portfolio to document student work over a period of time. However, with a little creativity, the electronic portfolio can offer more than the standard model. For example, some universities have been using student ePortfolios to demonstrate the student's growth related to both discipline and university identified learning outcomes. These types of portfolios can be easily shared over the web with advisors, instructors, and potential employers. Advisors might want to view the ePortfolio periodically to see areas in which students might

need more work or are most proficient. Instructors might use the ePortfolio to assess the progress of student work throughout a course. Employers might view the student ePortfolio to see specific samples of work that show creativity, skills, and critical thinking. Finally, students might use their own ePortfolios as a self-assessment tool for constant improvement. Some universities are also supporting the notion of life-long learning by hosting student's ePortfolios after graduation.

Personal Response Systems (Clickers)

Description: Personal Response System (PRS) remote units are similar to wired systems used by universities 25 years ago that mimicked game show technology that simultaneously captured and tabulated audience responses electronically. The biggest difference between the game show technology of the past and today's PRS is its portability, low cost installation and operation, and the ability of the PRS to synchronize with other computer digital applications such as Powerpoint. Individuals are equipped with their own remote control keypads that have letters or numbers that correspond to choices given by a presenter. The results of the responses are captured on a computer either through infrared or radio signals and compiled in ways that show such breakdowns as class distribution and individual responses. Typically, the results are instantly made available to the participants via some type of graphic that is displayed on a projector. Presenters can set automatic controls within the system that limit the time a responder has to answer a question. Each remote "clicker" has a serial number so that all users and their responses can be individually identified and recorded.

Potential: There are many reasons for the increased use of personal response systems in an educational setting. Such systems can promote interaction and further the pedagogy of active learning as students can work together and post group responses. They allow immediate student feedback so a teacher can gauge how students might understand a particular concept and then adjust a lecture or presentation accordingly. These systems support simple quizzes that can be automatically tabulated and entered into an electronic grade book. Since a PRS allows for quick and anonymous responses to in-class questions by instructors that would otherwise require an oral response, student answers are less likely to be influenced by a crowd psychology and more likely to reflect individual knowledge. Although teachers report that the PRS system has contributed to increased participation, better motivation, better attendance, and more student interest in a course, more research is needed to verify these affects. The real impact of these systems on learning seems to be the way they can facilitate immediate formative feedback. This just-in-time feedback allows and encourages teachers to push continual assessment to the front of their lectures and make adjustments in their teaching to ensure that all students are learning targeted concepts.

Supporting Digital Technology for Teaching and Learning

As instructors are carefully assessing their use of technology for purposes of teaching and learning, universities need to assess whether their technology support is adequate and responsive to the needs of those instructors. During the early phases of the digital revolution on campuses, this meant building an infrastructure, providing equipment and offering basic skills workshops to faculty and students. Over the years, however, we have learned that basic technology support has not always been enough to ensure that digital technologies are being used effectively as ways to enhance student learning. Some universities have heeded the challenge and are creatively building upon existing programs to develop a technology of support that is responsive to the professional lives of today's faculty. What follows are five examples that serve to represent ways that universities are developing creative solutions for supporting a learning environment that is increasingly being influenced by a digital revolution that shows no signs of abating anytime soon.

Faculty Involvement

Faculty need to have a critical voice in university decisions about technology improvement and deployment on campus — especially when the technology relates to teaching and learning issues. This pedagogical voice needs to go beyond the boundaries of the typical university committee advising on software and hardware issues for the classroom. It needs to be a voice coming from the bottom up — pedagogical voices from the classroom. These collective voices should drive discussions on such topics as wired classrooms, courseware, online courses, hardware deployment, and basic technology support. Forward thinking universities find new and inclusive ways to tap into the collective voice so that student learning and new technologies can be effectively aligned.

Blended Workshops

Forward thinking universities go beyond the skills-based technology workshops. They have found creative ways to blend pedagogical instruction with technology instruction. In some cases universities link stand-alone technology workshops with stand-alone pedagogy workshops in ways that show the relationship between the two. These linked workshops do not necessarily have to occur in the same physical space nor at the same time, but can reference one another. Also, universities have begun to offer blended workshops that have a distinct pedagogical focus yet blend in thinking about resources, including technology resources, which can support a strong pedagogical focus. These blended workshops can be linked to just-in-time resources, such re-occurring technology workshops, that are also offered by the university.

Threaded Workshops

Universities are using the threaded workshop model as a framework for teaching and learning workshops that include learning about new technologies. Each workshop

in the series is “threaded” in such a way as to relate to and play off one another. Thus, a series on integrated course design might have individual workshops on such topics as assessment, learning activities, motivation, and learning outcomes that are aligned in such a way as to give participants a more comprehensive view about how to build a dynamic course. All discussions about technology in these threaded workshops are contextualized within the larger pedagogical discussion, and are focused on how the technology serves to support the pedagogy. Because instructors attend the series over a period of several weeks, they bring back to each workshop their applied knowledge and share it with one another as real world and relevant experiences. This type of sharing builds trust among group members, which leads to better learning and helps to establish future networks of support.

Just-In-Time Resources

Universities are increasingly realizing that busy instructors do not need to be experts in all areas of digital technology in order to use technology effectively in the classroom. Universities support this notion by making technology learning easy, accessible, and just-in-time. Today's digital technology allows just-in-time resources to flourish on campus. For example, Internet available tutorials that are home grown or licensed make it easy for instructors to learn new software/hardware in bits and pieces and when needed. Why learn everything there is to know about PowerPoint or your computer operating system when you can learn only what you need by going to a two-minute video that is available anywhere and anytime? In addition, just-in-time resources extend the learning environments of students. Why spend valuable class time teaching students how to use a certain technology application for a project or activity when just-in-time resources can be made available to students at their level and outside of the class?

Open Source

Many universities are supporting an Open Source software philosophy as a way to increase flexibility for purchasing and supporting critical software needs across the university community. One of the advantages of Open Source software is that it is free and customizable. For universities and faculty, this means they can save costs in proprietary software purchases and the cost of developing software from scratch. In addition, the Open Source community represents a social constructivist approach to learning and development. As these community members share ideas with one another in open forums they create a valuable and free support structure for university members. One of the best features of Open Source software is that it can be customized to fit the specific mission of universities and individual (student) needs. Some of the more popular open source software programs include: Moodle and Bazaar, two LMS programs; MySQL, a data base program, and; Open Office, a productivity suite that supports word processing, spreadsheet, and presentation applications.

Conclusions

Universities are home to a rich diversity of student learners whose cultures have been tremendously impacted by the digital revolution of the last fifteen years. These students grew up communicating, creating knowledge, and sharing resources through the Internet and all its applications. As university students, they are poised to take advantage of the digital world for learning. But, are we as teachers? We should not jump headfirst into this potential digital cauldron without taking stock of an important detail — as with all technologies and instructional practices, we must not only understand their potential to impact deeper learning in students, we must also understand their limitations as a means to achieve a deeper learning. It is not the lecture, cooperative learning, or the problem-based method itself that enhances student learning any more than it is the Internet, podcast, or blog. It is far more important to know how to use the instructional methods and technology to

support learning outcomes that are integrally linked to the student learner as a critical thinker. Students may know how to navigate the Internet and use other forms of digital technology for purposes of their own learning, but do they know how to take full advantage of those technologies for learning at the university level? This is where progressive universities enter the equation and lead.

In today's educational climate of decreasing state support and public scrutiny of educational spending, universities can ill afford to squander important dollars on technology resources that have not been critically assessed in terms of supporting student learning. But universities cannot stop there. Faculty and administrators must combine efforts to celebrate openly the important symbiosis between technology and learning. Nothing less will suffice or we will suffer from our own negligence.

For online resources related to this topic, go to: <<http://www.idea.ksu.edu/papers/paper43links/>>

Dan Madigan was the founding director of the Center for Teaching, Learning & Technology at Bowling Green State University. He currently has new responsibilities as the Interim Director of the Scholarship of Engagement. As the director of CTLT for the past 10 years, Dan has been instrumental in establishing faculty learning communities that provide faculty with an opportunity to participate in an interdisciplinary forum that focuses on sharing ideas and information about topics that promote professional growth in the areas of learning, teaching and research. He has also developed a staff that supports a variety of faculty

development initiatives on topics such as assessment of student learning, tenure and promotion portfolios, active learning strategies and the integration of technology into the classroom.

Dan's research interests are in the area of literacy and he has published a book, articles and chapters in this area. Recently, he has broadened his literacy interest and focus from reading and writing to include digital literacy in the information age. He is currently co-editing a book concerning learning and literacy in the digital age.

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