



Teaching and Learning with Technology: A Primer on Instructional Technology in Higher Education

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Over the past decade, the rapid growth of instructional technology has been a major influence on the direction of higher education. Whether in distance learning programs or on-campus courses, technology has changed the way we teach and learn. Think about the ways you do work for your own courses, communicate with instructors and colleagues, and locate and manage information for both academic and personal uses. Chances are technology is at the heart of much of your work as a student. As you prepare to take on a variety of teaching responsibilities in higher education, you will find that technology is central to the way your students learn and work as well, and central to the ways college instructors organize and deliver class materials and engage students in learning activities. This chapter will help you prepare for those teaching roles by introducing you to a variety of instructional technologies and the ways university teachers use them to enhance their teaching and their students' learning.

Why Use Instructional Technology?

In the early days of instructional technology, there was great hope that computers would save teachers time and effort, allowing us to put more energy into advanced teaching activities and important research. What we have discovered, however, is that technology in most cases only allows us to shift time and energy from one teaching task to another—we may save time in reporting grades individually to students, for example, but setting up the electronic grade book in the first place reclaims much of that saved time. And many of the most beneficial uses of instructional technology take a good deal of time and effort to integrate into our classes. So why should we invest the time and effort in instructional technology? We'll examine several reasons below, but let's start with a very pragmatic one that will grab your attention: As you look through job listings in higher education, you will notice that many teaching positions are requiring proficiency with instructional technology, or at least are asking for such experience as a preferred

qualification. In a competitive job market, experience with instructional technology is a valuable asset. Besides increasing your appeal on the job market, however, what benefits can you gain from becoming proficient with instructional technology—what can it do for you and your students?

Increased communication: The most obvious benefit of instructional technology is that it increases and speeds up communication between you and your students, as well as among your students. E-mail allows students to contact you with questions as they arise, and it permits you to contact them outside of class meetings. This potential of constant contact can have drawbacks if students expect instant access to you around the clock, but by negotiating your availability via e-mail, you can personalize instruction by making yourself an accessible learning resource for them—establishing teaching/learning relationships that exist beyond the classroom. Other communication technologies, such as online discussion boards and real-time chat, not only can help students communicate among themselves to collaborate and develop learning communities, but they can also lessen the need for direct contact between you and each student. They can, in other words, shift the communication about learning from being teacher-centered to being learner-centered.

Extended learning opportunities: Just as e-mail allows communication to move beyond the walls of your classroom, so, too, can other instructional technologies be used to extend learning activities past the physical and temporal boundaries of your classroom. A typical limitation of class discussions, for example, is the ability to let all students participate and share their ideas; time constraints and group dynamics often limit input to a small number of students. Online discussions, on the other hand, are not limited by these constraints, so discussion activities can be designed to offer all students an opportunity to share their ideas, rather than the few who get the opportunity to speak in class. In other situations, online tutorials and simulations can be

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created to engage the students in active learning outside of class time, allowing us and our students to break out of the lecture-homework-test rut. Creative uses of technology allow us to move past the limitations of traditional classrooms and offer students unique learning opportunities that encourage them to personally engage with subject matter and new thinking processes.

Increased feedback on learning: Knowing where our students are in their learning processes allows us to better design our instruction and support to meet their needs. While traditional tests and assignments give us some of this feedback, instructional technologies allow us to gather important feedback continually throughout the semester in less intimidating contexts. Online quizzes can be constructed for each chapter or unit, with most online testing packages allowing objective questions—true/false, multiple choice, fill-in-the-blank, etc.—to be graded automatically. Such quizzes not only provide students with immediate feedback on how well they are understanding new concepts, but it can provide us with feedback about both individual and group performance—long before a big test reveals big problems. Imagine, for example, that I provide an online chapter quiz that is due by Tuesday at 10:00 a.m., and my next class meeting is at 2:00 p.m. later that day. I can look over the results of that quiz and determine which concepts students seem to understand well, and which topics deserve more attention in the upcoming class, making far more efficient and effective use of valuable class time. Combine such quizzes with other small learning assessments and surveys, and I can design a comprehensive approach to understanding and meeting my students' learning needs.

Student needs and expectations: As any faculty member in higher education will tell you, today's college students are very technologically experienced and oriented. The latest technologies have permeated every aspect of their lives, and they have come to expect technology integration in their education as well. They are increasingly used to easy access to class materials and resources online, and are growing more comfortable with "just-in-time" learning than traditional models of education. They expect quick access to smaller chunks of learning as they require them. Admittedly, such a fast-food approach to education can ignore the value of slow, deep thought

and long-term research, but that doesn't discount the benefits of providing students with the learning tools and resources they prefer. According to Nancy Baker of University Computing Services, 80% of BSU students had at least one class during Spring 2004 that used Blackboard, the course management system purchased by the university. And while those students are online to review information or complete assignments for their other classes, they are looking for similar materials for our courses as well. An important part of a teacher's job is to provide students with the information, tools, and skills they need to learn. Providing at least some of these in a technological environment helps students work best in the ways they have grown up communicating and learning.

Overview of Major Instructional Technologies

There are a variety of instructional technologies: Some have been designed specifically for use in educational settings, whereas others are general commercial applications that have found use within higher education. No matter what sort of technology we use in our teaching, however, we should always remember that our thoughtful use of the technology is what makes it appropriate or not for our educational context, not the nature of the tool itself. What follows is a quick overview of major instructional technologies; the list is not meant to be comprehensive, but rather to give you a starting point for your thinking and for further research and exploration. The Resources section at the end of this chapter will provide information on where to go to learn more about these technologies.

Course management systems (CMS): These systems are rapidly becoming commonplace in higher education, because they offer a more comprehensive approach to instructional technology. They combine a variety of tools to provide an integrated learning environment—content tools for posting syllabi, readings, and other course documents; discussion tools that allow for online conversations; testing and quizzing applications; and electronic grade books for reporting grades to students. Further, CMS interfaces are typically designed so that teachers can create and manage online resources with no knowledge of website construction; simple forms allow for the input of text or the uploading of files. Ball State utilizes the

Blackboard CMS, which includes a variety of content, communication, and assessment tools. Further, the BSU implementation of Blackboard is tied closely with other university systems so that the creation of courses is simple and the enrollment of students is automatic. More information about Blackboard is available through your academic department and, if you are assigned teaching responsibilities, through the Office of Teaching and Learning Advancement. Besides Blackboard, other popular course management systems include WebCT, Angel, Desire2Learn, and Oncourse (Indiana University's CMS). You may view information about these and other course management systems at the EduTools website (<http://www.edutools.info/course/>).

Getting Started with Blackboard at BSU

Every student and faculty member at BSU is automatically given a Blackboard account. You can access your Blackboard account at this web address: <http://my.bsu.edu>. Log in with your BSU username and password, and you will be brought to a personalized "My Blackboard" screen. The tabs across the top give you access to various university resources, and the right column provides links to any Blackboard courses you are taking or teaching.

When a teacher creates a new Blackboard course, students from the associated BSU class are automatically added. New Blackboard courses can be created by faculty via the Blackboard Maintenance Menu at <http://www.bsu.edu/webapps/bbmaint>.

Information about using Blackboard as a student or teacher is available on the company's site—<http://www.blackboard.com>. Look for the "Support" link and then for references to "Behind the Blackboard." You will be required to create an account there to access their resources.

Asynchronous Discussion Boards: This useful communication tool is known as "asynchronous," because participants do not need to be online at the same time to use it. Users can post messages in a bulletin board style environment, then come back later to see what replies and new messages others have posted. Because of this asynchronous design, interactive discussion board assignments may stretch across several days, but that inherent delay also has benefits in that it provides adequate time for careful thought and reflection. Discussion boards can be used to discuss readings, respond to classmates' projects, role-play case studies, gather and annotate resources, and a variety of other creative group tasks. Because asynchronous discussions lack the visual cues and spontaneous interaction of class discussions, carefully designed assignments and prompts are important to the activity's success. It is important to provide adequate structure to discussion board assignments, including details about requirements, expectations, and roles. Simply asking students to discuss a topic online will often lead to lack of significant participation—with plenty of simplistic "I agree" messages—so be prepared to provide more detailed instruction than you normally would in a face-to-face class. For example, Round One of a discussion might involve everyone posting a real-life example that illustrates a theory discussed in class; Round Two could then require each student to critique two classmates' examples, using a specific set of criteria or guidelines; and Round Three might require students to review all the posts and explain which example proved most accurate and useful in explaining the theory. Such an assignment follows a pattern that moves from personal examples through directed analysis to useful conclusions—a "scaffolding" of sorts to guide the discussion. Teachers who use discussion boards successfully also frequently report structuring discussions around case studies or other scenarios where students have pre-defined roles to play, whether those roles revolve around a group function or a particular character in a scenario. More information about planning effective discussion board activities can be found online by searching for phrases like "discussion board activities."

Synchronous chat: Online "chat" tools vary in names and interfaces, but they share one thing in common: all participants in these electronic conversations are online at the same time, leading to the associated terms "synchronous" and "real-time." At the most

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basic level, chat interfaces have two boxes—a small input box where users enter their comments, and a larger box that contains the growing transcript of the conversation. Online chats are fast and sometimes confusing, as all participants are frequently typing at the same time, leading to overlapping comments and conversations. But it is just this speed and multi-directional conversation that some teachers seek, particularly when the chat activity is being used for brainstorming or other activities where lack of linearity and control is desired. These characteristics of chat sessions also can lead to a significant amount of off-topic comments and even some inappropriate ones, as students may say things to disembodied classmates online that they would not say face-to-face. Teachers may avoid some of these problems by laying out ground rules before chats are used, letting students play a role in determining what behaviors are acceptable or not within this class-related activity. Synchronous chat is also used for group meetings among geographically distant students and for “virtual office hours” where a teacher may be online to answer questions. Most chat tools have a recording function as well, so that chat transcripts can be saved for later reference and analysis.

Testing and quizzing tools: Most course management systems have their own testing tools, and a variety of stand-alone online testing software is available as well. Typically, such programs allow for a wide range of questions types, with objective questions being graded automatically. This automation not only saves the instructor grading time, but allows students to have instant feedback on their performance. Security is always a concern, as online testing isn’t proctored, but most testing systems have features that make cheating more difficult—randomized question order, larger question pools, limited testing windows, time limits, etc. Still, even as many teachers are hesitant to use online testing for major exams, many are finding these tools useful mainly for small reading quizzes and comprehension checks.

On the Ball State campus, teachers either use the testing tools incorporated into Blackboard or the BSU-authored program called inQsit (“in-quiz-it,” as in *inquisitor*). Each program has its strengths and weaknesses; inQsit has slightly more advanced features, whereas Blackboard is integrated into that larger integrated course management system. The

most practical difference is that Ball State University Computing Labs manages a proctored testing lab in Robert Bell 134 that uses inQsit; students register for testing times in advance, and then take the test in the secure, proctored environment. Training on the use of inQsit is available through the library’s Technology Training Support Services (<http://www.bsu.edu/techtrain>).

Presentation software: One the most widely used technologies in higher education was not actually designed specifically for teaching and learning. Even so, presentation software like Microsoft PowerPoint or Apple Keynote is now widely used in education, allowing teachers to display visual content via the digital projectors available in many BSU classrooms. Teachers may display key concepts and notes as they lecture, and may also share important visual elements such as charts, diagrams, photos, and even video clips. If teachers also use a course management system like Blackboard, those presentation files may also be made available online either before or after class, allowing student to add their own notes to slide printouts or review class materials later. Although this software makes it easy to add visuals to lectures, criticism is growing about over-reliance on such tools. According to critics like Edward Tufte (2003), software such as PowerPoint encourages mechanical presentation styles, reducing the analytical, narrative, and dialogic elements of teaching in favor of bullet-point summaries. While the individual teacher’s use of these tools is ultimately what determines the nature and quality of the presentation, these cautions are worth noting as we assemble visual support for our teaching. Graduate assistants may learn to use PowerPoint via online and face-to-face training available through the library’s Technology Training Support Services (<http://www.bsu.edu/techtrain>). GA’s with teaching assignments may learn to use the computers and projection equipment in Ball State’s electronic classrooms by making an appointment with John Dalton in Video Information Services at 285-9148.

Digital audio and video: The spread of high-speed networking has made digital audio and video common on our wired campuses and in our homes; video clips can be delivered online in surprisingly high quality through programs like Windows Media Player, Quicktime, and RealVideo. These technological advances have made it easy to create and share rich media content as part of the learning experience—far

beyond showing videotapes in class. While copyright laws give a good deal of flexibility for classroom display of videotapes and DVDs, these regulations do place limits on how we can use and redistribute commercially-produced video online; you cannot simply convert video to an electronic format and deliver it online or on CD to students. The University Copyright Center in the library has clear and useful information for teachers about copyright, as well as services for securing permission to use materials in cases where such permission is required. (<http://www.bsu.edu/library/collections/copyright/>).

Teachers can create and distribute their own video clips, however, leading to a wide variety of instructional possibilities—online mini-lectures and supplemental instruction, previews or reviews of lab procedures, video case studies, video tours of remote locations or facilities, interviews with experts or professionals in a field, and much more. The BSU Teleplex offers full video production services for educational projects, offering teachers and their GAs the assistance needed to plan, produce, and deliver instructional video, including the creation of educational CDs and DVDs. Producing these teaching materials may take anywhere from a few hours to a few months, depending upon the scope of the project. In order to discuss an instructional video project with a Teleplex staff member, contact Production Manager Alan Gordon at 285-2983.

Finally, live videoconferencing is available for teachers who want to incorporate guest speakers from anywhere in the world into their teaching. The cost of Internet-based videoconferencing has dropped, and many universities and businesses have access to high-quality equipment such as the Polycom system Ball State University uses. Using this advanced technology typically takes a few weeks of advanced planning; for assistance in planning a videoconferencing event, contact Larry Cannon at 285-2981.

Student response systems: Understanding levels of student comprehension is an excellent way to focus our teaching and enhance student learning; if we know what students do and do not understand, we can adjust our teaching to move past subjects they understand and focus on ones they do not. Gathering this information—particularly in a large class—can be challenging, however. Several companies now offer

student response systems that allow teachers to gather input instantly from students by way of devices that look like small remote controls. Students use these devices during class to respond to questions the teacher displays on the computer projection screen. A receiver connected to the teacher's computer collects and processes these responses instantly, providing the teacher with the results and various analysis options. This type of feedback system can be used to provide quick comprehension checks, poll students for opinions, take attendance, and even give short in-class quizzes. As is the case with other instructional technologies, student response systems are beginning to be integrated with textbooks; McGraw-Hill, for example, had partnered with eInstruction (<http://www.einstruction.com>) to package the student devices and question pools with several of their textbook lines, and many other textbook companies are beginning to offer their content in formats that can be imported into these feedback systems.

Pedagogical Issues Surrounding Instructional Technology

As you may gather from the prior sections, much of the impact of instructional technology has more to do with the individual teacher's use of these teaching tools than with the hardware and software itself. I may design discussion board activities that engage students in critical thought about a subject, or I may use the same tools to ask close-ended questions that never engage students and seem only like busy work. Successful use of instructional technology becomes more of a pedagogical issue than a technical one. So what are some of the important pedagogical issues to keep in mind as we consider using instructional technologies? Here is an overview of some key concepts.

Leading with instructional and learning objectives:

One of the greatest pitfalls of working with instructional technology is to become excited about a technology and to let the tool control our pedagogy. We see some new technology, think it is exciting or promising, and decide we must find a way to use it in our teaching. Sometimes we can make this work, but more often than not, letting the technology take the lead keeps us from focusing on what really matters—our students' learning. Sound teaching practice has us start with learning objectives—what we expect students to be able to do at the end of a unit or

semester—and build learning activities that will best help them meet those goals. The key to successfully integrating instructional technology is to determine how a certain tool will help students reach those objectives. What learning objective can the technology help us achieve? Will the technological approach help students meet an objective more easily or effectively than some other method? Is the extra effort to use the technology worth the payoff for us and our students? Quickly attaching instructional technology to our teaching can bypass these important questions about learning objectives, leading to failed activities and frustration on everyone's part. Successfully integrating technology into our teaching takes time and careful thought, making sure the technology, our pedagogical approaches, and our learning objectives all work smoothly together.

Knowledge of applications: At the same time we consider the pedagogical value of the tools, we also need to be certain we adequately understand the technical side of the technologies we use. Not everyone needs to be a techie, but we should understand the hardware and software enough to use them effectively in our teaching. Students can quickly tell if we do not understand the technology we are using, and that lack of technical proficiency can have an impact on our authority and status in the classroom. As teachers, we not only should be familiar with the content of our courses, but should be comfortable and proficient with our teaching methods as well; otherwise, students would pick up quickly on our inexperience or lack of knowledge, our credibility would drop, and the learning environment might suffer. The same holds true for instructional technology. We do not need to know everything about a piece of software, but should know enough to generate more benefits than hassles in our teaching. Further, can we assist students with the technology if needed, or at least can we help them frame the right questions and point them to the resources they need? Again, we do not always have to be expert with the technology, but competence and comfort with our teaching tools can go a long way to building confidence within our students and setting up supportive learning environments.

Adapting learning activities for online use: Many of the activities we develop using instructional technologies are analogous to activities we use in our face-to-face classes—class discussions, role playing,

collaboration on projects, quizzing, etc. But although it is useful to make these connections as a way of focusing on learning objectives and communicating expectations to students, we should also remember that online learning activities have different contexts, so they must be planned differently to ensure success. The most notable example is class discussions. In a traditional classroom, the ability to spontaneously question and clarify allows us to feel our way through group conversations. The discussions are able to grow organically and often do not need much structure, because we are able to continually question and prompt students. That spontaneity doesn't exist in discussion board activities, however, and teachers aren't as central to the conversation as we are in a classroom. Therefore, online conversations typically require more structure to succeed—clear learning objectives, expectations and requirements for participation, sample posts, specific outcomes, and explicit connections back to other class activities and goals. As we adopt instructional technologies and design learning activities, we should reflect on the changes in contexts that will take place, taking care to plan for how those changes might impact student learning.

Evaluating technologies and pedagogies: A key to successful teaching is continual reflection on why certain approaches, techniques, or activities worked or not. If we have a strong sense of why a certain assignment led to student success, for example, we are more likely to be able to reproduce that success. And if an activity fails, it is just as important to understand why so we may improve our teaching. The same holds true for use of instructional technologies. As we plan for technology integration, we should also plan ways of evaluating the success of the tools and the pedagogical approaches, so we can understand their impact and success. This evaluation should be closely tied to careful assignment planning; if we don't have an understanding about how we expected an activity to work, it will be harder to understand why it did or didn't work. Think of evaluation as the tail end of a cycle that leads right back into redevelopment of the assignments and resources—if learning objectives started the technology integration process, they will serve as good criteria for evaluating the success of those projects.

Bibliography and Resources

Ball State resources and facilities

- Office of Teaching and Learning Advancement (<http://www.bsu.edu/otla>)
OTLA provides faculty development services for BSU faculty and Graduate Assistants with teaching responsibilities. Blackboard and multimedia training are also available to faculty and qualified GAs.
- Teaching Resource Central (<http://www.bsu.edu/trcentral/>)
TRCentral acts as a clearinghouse and central resource about support services for teaching at Ball State University—a good starting point for a variety of questions.
- Technology Training Support Services (<http://www.bsu.edu/techtrain/>)
The technology training group in the library offers training and support for various software, including PowerPoint and inQsit.
- University Copyright Center (<http://www.bsu.edu/library/collections/copyright/>)
This office and its website can answer many questions about copyright issues, from “fair use” guidelines to the use of digital media in the classroom and online.
- University Teleplex (<http://www.bsu.edu/teleplex>)
The Teleplex offers full audio, video, and multimedia production support for educational projects. All services are free to BSU faculty and GAs with teaching responsibilities.

Internet resources

- Chickering, Arthur W., and Stephen C. Ehrmann. “Implementing the Seven Principles: Technology as Lever”: <http://www.tltgroup.org/programs/seven.html>
- Educause: <http://www.educause.edu>
- EduTools: <http://www.edutools.info>
- *eLearn Magazine*: <http://www.elearnmag.org>
- *Syllabus*: <http://www.syllabus.com>
- *T.H.E. Journal* (Technological Horizons in Education): <http://www.thejournal.com>
- The Teaching, Learning, and Technology Group. <http://www.tltgroup.org>
- TLT Group’s “Low Threshold Applications” site (simple and inexpensive tools and methods): <http://www.tltgroup.org/LTAs/ltaw/archive.html>.
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