

Getting Results

MODULE 5: Teaching with Technology

Explore two aspects of technology: technology used to teach and technology that students will use in the workplace.

Getting Results


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Section 1: Introduction and Intended Outcome

I. Preface

Technology continues to change the way we live, work, and play. Technology is also changing education in two ways: first, by offering new resources to engage students in learning, and second, by giving them an opportunity to learn about new technological fields, leading to jobs and to a greater understanding of how these fields affect the world. In this module, you will examine a variety of technologies that support teaching and learning, focusing on the impact of technology on the learner.

Intended Outcome for This Module

As a result of this learning experience, you should be able to choose and implement appropriate technologies for enhancing your students' learning.

II. Module Overview **V I D E O**

Watch this video in which students apply mathematics concepts as they program graphing calculators and control robots.

V Video Note

At this point in the module, please view the **Teaching with Technology** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

Why did this instructor integrate robotics technology into his mathematics class? What is the potential effect on student learning?

V More about the class in the video

Robert Chaney teaches Technical Mathematics at Sinclair Community College in Ohio. In this activity, students apply the concepts of variables and functions to program a robot.

Now take a moment to reflect on your own experience.

Notebook

What are some examples you have encountered of effective and ineffective uses of technology for teaching and learning? What strategies do/might you use for integrating technology into your course?

Section 2: Selecting Appropriate Technologies

I. Technology as a Teaching Tool

The teacher in the previous video used robotics technology to demonstrate how mathematics and a graphing calculator could be used to solve a real problem. Effective use of technology involves considering the concepts, skills, and issues you expect students to learn, selecting technologies to offer related opportunities for student learning, and implementing strategies for best use.

Technology can be a great addition to the classroom. It is most successful when used to improve student learning and help students reach their goals. You may get ideas about using different technologies from a variety of sources, including colleagues who have had success or from a particular resource made available by your college. The range of technologies is great and increases every day. Ultimately it will be up to you to evaluate the potential effectiveness of a particular technology for your course and your students.

II. Enhancing the Learning

Technology can benefit learning in so many ways. Consider the following ways technology might enhance the learning experiences of your own students:

Enhance the Presentation of a Concept

- Illustrate procedures, equipment, or situations that students may not have the chance to experience firsthand
- Help students visualize problems they will encounter in industry
- Help students gain access to a wide range of information

Stimulate Learner Participation

- Reach students with different learning styles, including visual, auditory, and experiential learners
- Help students gain experience with a process or skill
- Build community
- Encourage students to interact with material
- Facilitate effective teamwork

Enable Self-Instruction

- Add depth to points covered in lecture or demonstration
- Free students from taking notes

Extend Information Access

- Increase communication among teachers and students
- Emphasize key points in lab or lecture
- Clarify lecture, lab, or textbook explanations
- Improve access to educational resources
- Provide feedback

Bring the World into the Classroom

- Enable students to interact with authentic data

Help in Administrative Tasks

- Free up instructors' time for instruction and relationship development with students by streamlining processes
- Eliminate the need for extensive photocopying and give students more access to classroom materials by managing information

III. Using a Range of Technologies VIDEO

Technical instructors often prepare future science and engineering technicians. They need to consider an entire range of technologies in their fields and give students strategies for using these tools.

Watch this video of a Mammal Biology class in radio tracking making use of transmitters, receivers, GPS, compasses, PDAs, data sheets, and aerial photos.

V Video Note

At this point in the module, please view the **Using a Range of Technologies** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

How has the instructor put technological tools in students' hands? What is the value of relating animal tracking devices to GPS, a compass, a PDA, and paper and pencil?

V More about the class in the video

Walter Shriner teaches Mammal Biology and Techniques at Mt. Hood Community College in Oregon. In this class, students use a range of technologies to practice data collection and relevant biotelemetry field techniques.

Now consider your own field and how you might provide similar experiences.

Notebook

What technological devices are used in your field? How can you encourage students to understand how and why these devices work? What can they do when such devices fail to work?

IV. Presentation Aids

Matching learning outcomes to appropriate technologies is an important step for effectively integrating technology into classroom teaching and learning. The following are some technologies commonly available at community colleges for aiding instruction in a wide range of subjects:

- Overhead projectors and PowerPoint software can enhance lectures by emphasizing key points and incorporating photos, graphs, and cartoons into presentations that would otherwise lack visual interest. Overhead projectors have the advantage of being interactive, as the instructor can change or add to a transparency as necessary.
- Slides and transparencies can be prepared in advance, a distinct advantage for instructors who have poor handwriting. Never copy your lecture onto the page and read it aloud in class. Keep visuals short and graphically interesting. Face students when using visuals to catch the cues that tell you how students are responding to the information.

V. Communication Aids

E-mail, bulletin boards, instant messaging, chatrooms, and Web course management software like WebCT or Blackboard can enhance communication among students and instructors and expand access to learning. In face-to-face classes, online technologies supplement classroom-based learning, and in hybrid or fully online courses, they replace some or all of it.

To ensure successful use of these technologies, make sure that all students have access to the Internet, set up clear guidelines for use, and be prepared to help students who need extra support with computers. Additionally, have the IT department onboard to troubleshoot any technical difficulties.

VI. Video and Audio

Media presentations can also enhance lessons by capturing students' attention and providing visual or auditory examples of subjects discussed in class. Make sure that you preview any resources you plan to use in class, and cue them to the appropriate spot before class begins.

Providing a viewing guide or asking students to pay attention to certain issues will help focus their experience and prevent them from tuning out. Stop the video at least every five to 10 minutes for discussion, questions, and to reinforce important points. Try to place copies of video or audio used in class on reserve in the library for students who missed class or would like to review the materials.

Notebook

Of all of these technologies, which ones are available at your school? Given what you've explored so far in this module or your own experience, what thoughts do you have about how technology might support student learning in your class?

Section 3: Strategies for Implementation

I. Tips for Success

Technology can be used well, or it can be abused. The following tips will help you make the most of technology in your classroom. If you don't have any experience teaching with technology, just start with one aspect.

Establish Guidelines

Students do better when they know what is expected of them. Take the time to explain how any technology works and outline your goals for using it. If you are incorporating Web discussions or online chats into your class, for example, make sure that students know what kind of responses are expected, how often to contribute, and how their responses will be evaluated.

Encourage Student Interaction

Use of technology can lead to passive learning, as when students watch a video or read information off the Web with no follow-up. Engage students with the material by discussing video presentations in groups or by searching for and summarizing their own Web research.

Vary Technology

If you've just learned a new technology or have a limited amount of time to develop lesson plans, it may seem like one method will suffice. But because students are so diverse, different instructional technologies will prevent students from getting bored.

Practice

Technology can take some time to master. Class time is at a premium, so don't spend time fumbling with Internet connections or troubleshooting software. Get up to speed on the technology outside of class and then practice in the classroom to make sure you know where to plug equipment in, how to dim the lights, and how long an activity will realistically take.

Have a Backup Plan

Always have backup material on hand. Carry a hard copy of lecture notes rather than relying on PowerPoint slides, prepare a written summary of video you planned to show, or bring students to the library rather than conducting research online. In some cases, you might need to have an entirely different lesson plan on hand.

Provide Access

Make sure that media-based experiences can be enjoyed by all of your students, including those who are visually or hearing-impaired. Audio components can be presented in text, and your college may also have funding for captioning video. Your school may also be able to provide video description or translate visual material into braille. Check with your college's student services department to find out more.

Avoid Overuse

Remember that technology is a tool with which to learn about course content. Overuse of technology where it is not needed can slow you down and obscure the point. Ask yourself how the technology is helping the student learn the material. If you can't answer that question, don't use it.

So far we've discussed how to select appropriate technology and implement strategies for successful use of technology in the classroom. As we continue with this section of the course, you'll take a closer look at some examples of teaching with technology, and learn some strategies for implementation.

II. Making Internet Connections **V I D E O**

Building community is one of the fundamental responsibilities of teaching. As you learned in Module 1, positive learning communities are those in which students feel confident to explore, take risks, and contribute to class activities.

Watch this video to see how an instructor creates a class Web site, supplemented by Blackboard, an online system used to support teaching and learning, to build community in a biotechnology class.

V Video Note

At this point in the module, please view the **Making Internet Connections** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

How does this teacher use the Web to expose students to the idea of an online community, both in the classroom and in the larger scientific community? What other benefits to students come from this teacher's use of the Web?

V More about the class in the video

Leslie Barber teaches biotechnology at New Hampshire Community Technical College. Students in her class are looking at DNA and working on isolating proteins.

Now take a moment to consider your own practice.

Notebook

How might you further integrate the Web into your curriculum? What resources exist on your campus to help you begin to move course materials online? How would you introduce students to important Web resources in your field?

Technology Training

Many schools offer professional development in technology, and some even pay stipends to instructors who complete training.

Check with your administration for more information on upcoming training at your school. Alternatively, arrange for someone to come into the classroom to teach both you and your students how to use new technology. In this way everyone learns from an expert and can then serve as resources for each other. Look for developments such as online environments for grading and "smart" classrooms that are computer-assisted to support different kinds of technology.

One way to build familiarity with new technology is to use it for research or administrative tasks before assigning it in the classroom. For example, try posting your class syllabus on the Web and then build a class Web presence from there rather than trying to tackle an online course without prior experience.

Try out new technology in your own life before introducing it to the classroom. For example, try logging onto a Web chat or joining a listserv outside of class before setting up your own in class. By experimenting with technology on your own, you will experience the same missteps that students will later encounter, and you will be better prepared to help them overcome frustrations.

Ask colleagues to show you how they use technology in their classrooms and offer to share your own strategies in return. Or ask an experienced colleague to serve as moral support and sit in on a class in which you are introducing a new technology. It may put your mind at ease to have an expert available should problems arise. Your students may have experience with software, research techniques, or equipment that you would like to introduce in class. Asking them to share their expertise with the class will develop their presentation skills while reinforcing their knowledge of new technologies.

III. Visualizing Concepts Through Technology

VIDEO

A model can be a useful classroom tool when you want to help students gain experience with equipment or procedures that are not normally available. Models can be physical constructions, or they can be computer simulations that ask students to manipulate data or objects.

Models of scientific processes can clarify abstract concepts or bring large-scale operations into focus for student understanding.

Although not all students find models meaningful, use of models is an excellent way to reach experiential learners, who learn best by focusing on practical application of ideas.

Watch this video in which a scaled-down version of a refinery helps students understand the concepts and operation involved.

V Video Note

At this point in the module, please view the **Visualizing Concepts Through Technology** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

How does the instructor make students responsible for equipment? How does the classroom experience relate to what they will see on the computer during a site visit?

V More about the class in the video

Jerry Duncan teaches a course on Process Engineering Equipment at College of the Mainland in Texas. In the class, students are exposed to various pieces of equipment and small-scale operating units that might be found in refineries or chemical plants.

IV. Learning Online **V I D E O**

Watch this video to see how one instructor puts as much material as possible online—from textbook and syllabus to references and final exams.

V Video Note

At this point in the module, please view the **Learning Online** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

What kind of learner do you think would benefit from online learning? What would an instructor need to successfully implement an online course such as this one?

V More about the class in the video

Rudy Helm teaches a PC Configuration and Analysis class at Bellevue Community College in Washington. The students learn to repair and become PC service technicians.

Distance Learning

Distance learning is growing, with an increasing number of courses offering at least some form of online access to course materials.

More and more colleges are adding distance learning options for students. The materials they use have been formatted for computers and may be helpful to you. Distance learning techniques can also enhance your course, giving you and your students more flexibility for interaction. Contact your college's distance education department to learn more.

V. Introducing Online Learning

As a community college teacher, you may be approached to teach an online course. You might be quite comfortable with face-to-face teaching, but have fears or confusion around Web-based learning. The transition to a completely Web-based learning environment may be unimaginable.

The following activity describes how you might adapt parts of a lesson within a course you currently teach to an online environment. It includes a list of five common components of a lesson, and suggestions on how they might translate into a Web-based course. This will give you a good start in planning your course for an online environment. You should also consider talking with distance learning staff at your school for further guidance and resources.

But for now, imagine the possibilities for translating just one of your favorite lessons from traditional delivery to Web delivery. Follow the instructions below to fill out the chart on the following page on adapting your lesson to an online environment.

- First, look at five typical components of a face-to-face lesson.
- Next, describe how you normally accomplish tasks associated with these components.
- Finally, look at the **Sampling of Online Activities for Web-Based Courses** at the end of this document and think about how you could accomplish your lesson's learning objectives in a Web-based environment. Beside each activity, jot down a corresponding activity in the right margin.

VI. Transitioning to Online Teaching

Use this chart to start thinking about how the typical components of a face-to-face lesson would translate in an online environment.

Name of Lesson:

Objectives of Lesson:

Activity/ Component	How is this accomplished in a face-to-face classroom?	How could this be accomplished in a Web-based environment?
HANDOUTS		(For possible approaches, see A Sampling of Online Activities for Web-Based Courses at the end of this document.)
LECTURE		
DISCUSSION/ DEBATE		
GROUP WORK		
EXAMS		

VII. Our Recommendations

After considering how you would translate a face-to-face lesson to an online environment, here are some of our recommendations on how to do so:

Activity/ Component	Face-to-Face Classroom	Web-Based Environment (Possible Approaches)
HANDOUTS		Printable HTML: Can be opened by any browser, clickable links, may contain images, text, sound, and more
LECTURE		Web cam: Allows live views and still shows, one way or between participants
DISCUSSION/ DEBATE		Threaded discussion forums: Post and reply to messages, ask questions, make introductions, respond to assignments, debate, discuss
GROUP WORK		Blog: Online journal or diary, public or private, option to receive comments
EXAMS		Quiz/exam module: Most Web courseware contains testing components that allow instructors to specify and randomize questions, determine deadlines, grade, and give feedback.

Community colleges that have online learning environments typically offer instructional support for faculty who are teaching online. Check with your distance education or educational technology division.

Section 4: Self-Assessment and Resources

I. Looking Back at Your Notebook

Think about what you wrote at the beginning of this module regarding examples you have seen of effective and ineffective uses of technology. What generalizations might you make about what constitutes successful use of technology?

What insights have you gained about how to effectively integrate technology into your course? Update your notebook with your thoughts.

II. Resources and Readings

This article outlines seven principles for good practice in higher education and explains how technology can help instructors achieve them:

<http://www.tltgroup.org/programs/seven.html>.

EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology:

<http://www.educause.edu/>.

This primer provides helpful advice on using media in the classroom:

<http://ctl.unc.edu/fyc11.html>.

Pathways to Technology is an online resource featuring a range of training programs:

<http://www.pathwaystotechnology.org/videos.html>.

The Instructional Technology Council has numerous resources for instructional technology and distance learning:

<http://www.itcnetwork.org>.

III. Summary of Module 5

Teaching with technology is changing the face of education. Teachers have more resources available to present information, and students have more opportunities to engage in learning. The teaching and learning are more effective.

When thinking about teaching with technology:

- You need to *select technologies based on the course outcomes* and learning goals. Technology will benefit the learning if it enhances the presentation of a concept, motivates the learner, and provides an authentic learning experience.
- You need to *establish guidelines, vary the technologies, and provide time and resources* that allow students maximum access. Technology can take time to master, but if you give yourself and students time and are intentional in planning, you will increase the likelihood of success.
- Finally, you should *try new technologies for delivering content* and add technology education to your curriculum. As a result, students will be more confident and valuable to employers when they enter the workplace.

A Sampling of Online Activities for Web-Based Courses

ACTIVITY	DESCRIPTION
Printable HTML (Web) pages	Can be opened by any browser, clickable links, may contain images, text, sound, and more
Downloadable documents	Can be created in any software program, students must have that program on their computers to open and/or print
Simulation software	Mimics real-world scenarios, responds to user input, allows users to plan and test experiments and activities
Scheduled chat	Live (synchronous) event allowing participants to type conversations in real time
Video	Captures/presents action, plug-ins required on student computers, can be memory intensive, often used for lectures
Whiteboard	Some Web courseware contains a screen that instructor/students can write or draw on
Threaded discussion forum	Post and reply to messages, ask questions, make introductions, respond to assignments, debate, discuss
E-mail	Send messages to and from individual students or groups of students, with or without attachments
Student assignment area	Students upload documents or typed text to be viewed/evaluated by other students or only by instructor
Student project area	Group or individual field reports, or presentations to be viewed/evaluated by other students or only by instructor
Student Web page area	Group or individual pages of introductions, assignments, projects in HTML format
Digital photos area	Participants upload sharable images to use in class
Photo journals	Participants document work, projects, activities in themed groupings, with commentary
Image maps	Clickable images allow interaction; can be used for content delivery or assessment
Quiz module	Most Web courseware contains testing components that allow instructors to specify and randomize questions, determine deadlines and number of tries, grade, and give feedback
Independent Internet research	Students find information on the Internet via open source pages or subscription services
Compilation of Internet links	Participants use Internet reference sites and other useful resources for course content
Online articles	Scholarly and other resources posted by the instructor or linked from online course materials
Web-ready textbook	Textbook purchase includes uploadable materials, often multimedia, test question banks, etc.

ACTIVITY	DESCRIPTION
Online textbook	All materials are developed by publisher for the online environment
Textbook companion Web site	Textbook purchase includes access to a Web site for additional resources, assessment, and other features
Campus virtual library	Maintained by your school or partner school; card catalog access, subscription to reference services, and other features available
Teleconferencing	Phone meetings, can be accompanied by Web-based activities
"Snail" mail	USPS or other shipping service, for mailing course materials and/or student work
Web cam	Allows live views and still shots, one-way or between participants
Telepresence/remote laboratories	Allows live views of a room or lab, some software allows simulation interface with participant controls
Screen captures	Pictures of computer screen, especially useful for software training
Multimedia presentations	Combine sound, movement, video and/or animation via one or more software programs; can be memory-intensive
Independent study	Can be delivered via self-paced online lessons, correspondence, research, with or without deadlines
Newsfeed	
Blog	Online journal or diary, public or private, option to receive comments
Games	Interface appeals to younger participants, entertainment value
Surveys	Some Web courseware contains survey features for use in gathering feedback, opinions, and other information about lesson delivery, course content, or for other purposes, private or shared with participants