SAMPLE CHAPTER 13

FOUNDATIONS OF AMERICAN EDUCATION, 14/e

James A. Johnson
Diann L. Musial
Gene E. Hall
Donna M. Gollnick
Victor L. Dupuis

ISBN-10: 0-205-51469-3
ISBN-13: 978-0-205-51469-4

SAMPLE CHAPTER 13
Technology in a Changing World

The pages of this Sample Chapter may have slight variations in final published form.

PEARSON Allyn and Bacon PEARSON Longman
ALLYN & BACON/LONGMAN
www.ablongman.com


Aa Bb Cc Dd Ee Ff Gg Hh
yellow

CHAPTER 13

Technology in a Changing World

CASE STUDY

Technology: A Class Act

By Garance Burke, Associated Press, December 19, 2005

OLATHE, KAN.—Aesop's fables came beaming across the classroom and landed in Eva Hernandez's Palm handheld.

On the bottom floor of Ridgeview Elementary School, she sat scrolling, using her stylus to navigate through "The Flies and the Honeypot."

"Hmmm," said the 12-year-old. "I think I can animate the flies."

Eva, a sixth-grader, is part of a new generation of kids using handhelds to read, write, do math, take pictures of the human eye or research Egyptian hieroglyphics—all as a regular part of their curriculum.

As school districts scout ways to engage students already accustomed to instant messaging and interactive video games, they're buying up the kind of tech tools once reserved for jet-setting corporate executives.

Educational sales of personal digital assistants, laptop computers and handheld remote controls called "clickers" are ballooning nationwide. Last year, a survey by Quality Education Data Inc. found that 28 percent of U.S. school districts offered handhelds for student and teacher use. One of every four computers purchased by schools was a laptop.

One of the frontrunners was Yankton High School in South Dakota, which adopted Palm handhelds in 2001 and found they improved students' grades.

Electronic learning has become so popular that one school in Arizona went textbook-free this year, instead equipping its students with laptops. Seventeen schools outside Eugene, Ore., now use handhelds on most science field trips.

Eva Hernandez's district has spent $1.84 million to build "smart classrooms" with electronic interactive whiteboards, handheld computers, DVD-VHS players, high-definition sound and video systems and wireless keyboards and mice, all of which connect to the teacher's desktop computer. High schoolers use their Palms to write college applications and work through calculus problems. Nine-year-olds routinely "beam" in their homework, making the district a poster child for the digital classroom.

For Eric Johnson, who directs educational sales for Palm Inc., the manufacturer of Eva's Zire 71 model, public schools represent a $300 million market. And as schools purchase handhelds, dozens of spin-off industries are racing to integrate themselves into teachers' lesson plans.

Ridgeview Elementary, which sits in a squat building on the edge of this booming Kansas City suburb, bought Zire 71 and Zire 72 models for the fourth and sixth grades. Aside from their basic functions, the handhelds boast color screens, digital cameras, Internet capabilities and MP3 players. They can be easily hooked up to wireless keyboards.

Eva's teacher, Regan Veach, was one of the first in Kansas to embrace handhelds and now trains educators across the state.

Veach touts a new generation of educational software that makes the devices worthwhile. Using a drawing and graphics application called TealPaint, students can animate their versions of Aesop's tales to transform a fable into a digital flipbook. Another program, Inspiration, lets students create clickable

"mindmaps" to diagram ideas before they start writing, while Quizzler gives children instant feedback on multiple choice tests.

Veach's instructional process illustrates just how crucial the handhelds have become to everyday learning in Olathe schools.

First, she downloaded Aesop's Fables from a free online site and reformatted it using a program called ebookstudio that crunches it into a format the handhelds can read. That left Eva and her classmates fidgeting with anticipation. Then, once Veach "synched" her Palm to her desktop and "beamed" the fables from student to student, excitement spilled through the room.

"My stepdad, he was like freaked out because he didn't get to use (the devices)," said Alejandro Najera, 11, as he selected colors from a rainbow template on his 3-inch screen. "Now whenever I go home, he's like, 'What did you do with the Palms today'?"

Next was an exercise with the "clickers," handheld remotes that Veach uses to gauge students' progress. As pupils took a quiz to instantly test their understanding of Greek mythology, Veach got out a wireless whiteboard to write up the day's homework.

The day's assignments—90 minutes of reading and a few multiplication exercises—were then wirelessly projected onto a roll-down screen at the front of the classroom and onto her desktop. The kids copied those notes down on paper—in the sixth grade, they're not allowed to take the handhelds home.

Studies show that when used regularly, such media-rich instructional tools can work well to assess student performance.

But some worry that while children may learn to beam in their papers, this generation of "digital natives" could come up short in learning basic math, science and English.

"Despite the fact that we have spent gazillions of dollars in schools on technology, it's still just a leap of faith that kids are better educated because of that," said Robin Raskin, the founder and former editor of FamilyPC magazine. "Students need to have some opportunity to digest material serially, like reading a book from end to end. A tiny screen might stop you from being an analytic thinker, because you just can't see enough of a thing at once."

Ridgeview's principal, Kelly Ralston, is aware that technology won't erase the difficulties faced by her students, over half of whom come from low-income families.

Last year, she spent just one-third of her annual $63,000 budget for handhelds; the district has spent at least $952,000 to equip 4,000 students with the devices in the last four school years. "The overall achievement is rising and the Palms have been a piece in keeping our kids engaged," said Ralston.

Questions for Reflection

1. Why are students excited about doing school work on handheld devices?
2. Why are manufacturers of handheld devices and other technology becoming so interested in the school market?
3. Why are some adults questioning the extensive use of technology in the curriculum?

INTASC

Learning Outcomes

After reading and studying this chapter, you should be able to:

1. Describe the fundamental concepts of computer technology. (INTASC 9: Reflection and Professional Growth)
2. Determine how to use technology to support student learning. (INTASC 4: Instructional Strategies; INTASC 5: Motivation and Behavior)
3. Direct students to technology resources that will help them learn the subject matter you are teaching. (INTASC 1: Subject Matter)
4. Identify some of the major issues that arise as technology is integrated into the education process. (INTASC 9: Reflection and Professional Growth)
5. Think about the technology that may be available in schools of the future. (INTASC 9: Reflection and Professional Growth)

The rapidity with which **technology** changes our world can produce extremes in terms of both excitement and anxiety. A new technological innovation that can instill thrilling optimism in one person can be viewed by another as a serious threat. One person's perspective about technology could be optimistic and another's skeptical. Nevertheless, there is little doubt that it plays a significant and sometimes defining role in our society.

In today's world, it is difficult to imagine U.S. schools and classrooms without technology. An expectation exists that nearly all schools and classrooms will have access to computers in some form. Other technologies such as videotapes, DVDs, television, calculators, digital cameras, and overhead projectors are found in most schools and available to most classrooms. We are teaching and learning in a technology-rich environment.

It is much more difficult to imagine what teachers and students are actually doing with the available technology resources. Teachers and students may be limited by what technology is available, but an even bigger limitation is in imagining what can be done with technology. In far too many classrooms, technology resources are mainly on display rather than in use. In other classrooms, a particular type of technology can become the content instead of a tool for teaching established goals, standards, and curriculum. All too frequently, teachers and their students become specialists in one or another technology or a narrow set of applications.

The term *technology* is, contrary to popular usage, a very generic term that can refer to any tool used by people to accomplish a task. Thus, such common educational materials as chalkboards and three-ring notebooks could be considered educational technologies. More contemporary uses of the term are likely referring to **information technology.** This chapter will utilize the latter, more contemporary meaning. Interestingly, it is worth keeping the chalkboard in mind as one example of technology because it has some clear advantages when used in support of teaching and learning.

When I took office, only high energy physicists had ever heard of what is called the Worldwide Web. . . . Now even my cat has its own page.

Bill Clinton

Technology Basics

A foundational knowledge of educational technologies can enhance a teacher's capacity to meet any number of goals related to teaching. In addition, a comfort with technology can help teachers quickly adapt to the changing needs of students and expectations of society. A set of knowledge and skills as they relate to educational needs are described in general terms in this section.

Standards

The International Society for Technology in Education (ISTE) has developed a set of standards that delineate what knowledge and skills teachers should possess to effectively integrate technology into the classrooms. The resulting National Educational Technology Standards for Teachers (NETS-T) consist of six general areas:

1. Technology Operations and Concepts
2. Planning and Designing Learning Environments and Experiences
3. Teaching, Learning, and the Curriculum
4. Assessment and Evaluation
5. Productivity and Professional Practice
6. Social, Ethical, Legal, and Human Issues[1]

The first area, Technology Operations and Concepts, consists of the general skills and knowledge that any professional would need to utilize technology. This area

CROSS-REFERENCE
Standards are also discussed in Chapter 11.

technology
A tool such as a computer or a chalkboard used to complete a task.

information technology
Computer, software, telecommunications, and multimedia tools used to input, store, process, and communicate information.

Most people do not innately know how to use a computer or make a software program work. Experimenting with the equipment and software is the best way to become comfortable with using them.

will be addressed in more depth in the Fundamental Concepts section of this chapter. The next four areas deal directly with the common activities of the professional teacher and how technology is used to support those activities. These areas will be briefly described in the second section of the chapter. The final area deals with a number of general issues that arise in the final section of the chapter.

Fundamental Concepts

One way to increase your comfort with computers and other technologies is to play with them. Some of the more apprehensive computer users are concerned that they might somehow harm the computer if they make a mistake. In reality, computers have now advanced to the point where it is quite difficult to do any significant harm. Another way to increase your comfort with computers is to learn more about how they work. Although computers have become very complicated, they are really based on some simple concepts that deserve a bit of attention to help overcome the black box mentality that they are magical.

bit
One unit of information represented as a 1 or 0 on a microchip by being either on or off.

byte
A computer code that combines eight bits into segments that convert into letters, colors, font sizes, pitches, volumes, etc.

software
Programs and procedures that direct the computer to perform a specific task such as word processing or browsing the web.

hardware
Physical components of a computer such as the CPU, monitor, mouse, and keyboard.

peripherals
Components of a computer such as a mouse or keyboard that are separate from the CPU.

Every task that a computer completes is a result of a series of on and off switches that are not much more complicated than that used to control a room light. These switches are found on computer microchips which can now contain the equivalent of billions of switches. If the switch is *on* the computer views that as a 1. Off equals 0. Each 0 or 1 is termed a **bit.** Since it is difficult to describe too many things as simply yes and no (or on and off), bits are generally combined into segments of eight, or a **byte.** Computers use codes to convert bytes to more useful items such as letters. For example, the code 0100 0001 is equivalent to the letter *A*. Similar conversions can be made for visual elements such as color and size as well as auditory elements such as pitch and volume.

Programmers use these codes and related procedures to develop useful **software** tools such as word processors and spreadsheets. Computers simply react to the instructions the programmer provides. At its most fundamental level, a computer simply accepts some input (e.g., keystrokes from a keyboard), processes that input, and finally produces some form of output. A simple handheld calculator is a computer that reflects each of these steps. To complete a calculation, you input data by pressing several keys (e.g., 2 + 2 =), the calculator processes the input (e.g., determines that 2 + 2 = 4), and produces some output (e.g., displays 4 on the screen).

COMPUTER HARDWARE

All input and output tasks are largely the function of **hardware,** or the tangible objects that make up the computer. Each of the **peripherals** described in this section are examples of computer hardware.

An obvious place to begin exploring hardware is with the personal computer. The evolution of the PC clearly illustrates the ever-expanding application possibilities and exponential increases in speed and size. The first PC used widely in schools was the Apple I, which was introduced in the early 1980s. Curiously, the term *personal computer* was coined after the introduction of the Apple and originally referred to the IBM versions. Apple I's were useful for basic word processing as long as the document wasn't too big, and they had a calculator. As innovative teachers adopted Apples, they quickly started creating new programs and even establishing

classes to teach students programming in BASIC (a computer language) so that special applications could be done by computer. Almost as quickly as the PC was introduced, educators were confronted with the age-old question about applying a new technology in the classroom: Was the primary purpose of this new educational technology to learn *about* computers or to use computers *to learn?* Fortunately, classes in writing programming code did not last long. Today, PCs are smaller than the early ones, but now they can store enormous amounts of information in digital form and are faster each year.

Hardware: the parts of a computer that can be kicked.

Jeff Pesis

The input of a personal computer is most often accomplished with the keyboard and mouse. Other common input devices include scanners, microphones, and digital cameras. The most common output device is the monitor, followed closely by printers and speakers. Storage devices such as the computer hard drive and disk drives often serve as input and output devices. Retrieving (or opening) a file from a disk is an example of using a storage device for input. After making changes to the file, you save (or output) the file back to the original disk.

PROCESSING HARDWARE The processing of information on your computer is done through a combination of hardware and software. The central device that accomplishes much of the processing work on a computer is the central processing unit (CPU) or processor. Common processor manufacturers include Intel and AMD. One other processing component that is vital to consider with today's computer is the graphics processor. With more and more classrooms making and using video technologies, the graphic capability of a computer becomes critical.

STORAGE HARDWARE A wide variety of storage devices now exists for computers. Each of these devices is rated in terms of their capacity. As noted above, information is viewed by the computer as a series of bits or zeros and ones. This results from the computer using a binary number system. This system also benefits from viewing information as a series of eight bits or a byte. Thus, you will often see references to bits and bytes as they pertain to computers and their peripherals. Since bits and bytes are relatively small units you will most commonly see them preceded by a metric prefix. A metric prefix review might be helpful. The most common metric prefixes are kilo = thousand (1,000), mega = million (1,000,000) and giga = billion (1,000,000,000). This information is organized into files and directories or folders. Files might be best thought of as individual documents and directories as organizational folders. Files are generally of a certain type, such as a word processing file or a video file.

The most common (and essential) devices include the computer hard drive and **RAM.** The hard drive is a persistent storage device in that it will store information even while the computer is off. The hard drive is not a permanent storage device because files can be modified and erased. Since this is the primary storage device on most computers, it is most often measured in giga-bytes (GB). A 100-GB hard drive can store the equivalent of about 50,000,000 pages of text. Other more intense storage needs such as audio and video can fill up a hard drive very quickly.

The great thing about a computer notebook is that no matter how much you stuff into it, it doesn't get bigger or heavier.

Bill Gates

RAM, or random access memory, functions as the real-time storage device for the computer. RAM is not persistent and thus will depend upon power to maintain its current data. This is why it is important to save prior to turning off a computer. Saving your work commonly refers to saving what you have in RAM to a persistent storage device such as a hard drive. The amount of RAM in your computer will dictate how much your computer can do at one time—and, to some degree, how fast. The amount of RAM is generally much less than the size of the hard drive.

RAM (random access memory)

Real-time storage in which files are saved while working on the computer. Its size determines how many programs and files the user can be working on at the same time.

COMPUTER SOFTWARE

The term software refers to the components of the computer that are instructional rather than mechanical. These are essentially the plans provided to the computer that guide the functions of the hardware. Two of the most familiar types of software include application software and operating system (OS) software.

APPLICATION SOFTWARE The most common software application in the world is likely the web browser. Internet Explorer, Netscape Navigator, and Mozilla Firefox are all examples of web browser software. Other types of application software include word processing (e.g., Microsoft Word), spreadsheet (e.g., Microsoft Excel), and database (e.g., Filemaker Pro). You can operate many applications simultaneously (with some limitations). Running multiple applications is referred to as multitasking and can be very useful. For example, tasks such as word processing can be completed while waiting for the download of a large file from the web to finish.

OPERATING SYSTEM (OS) SOFTWARE Your computer's operating system is tasked with managing all the resources associated with your computer. It is used to facilitate communication between all of your application software and your hardware. Common operating systems include Windows XP, Mac OS 10, and Linux. An example of the type of communication directed by your OS includes printing from different applications. We need printing functions from most of our application software. A print request from your browser is sent to the OS rather than directly to the printer. This might seem like a wasted step unless you consider the large number of applications and printers in existence. Having only one software program communicate with the printer (and all other peripherals) is actually much more efficient.

Knowledge of the role of the OS when compared to application software can be very useful when you are troubleshooting a variety of errors. Consider a music program as an example. For some unknown reason, the music is not coming out of your speakers when you play a song. After checking the hardware (i.e., speakers are on and plugged into the appropriate jack on your computer), you turn to the software. In this instance, both the OS and the application software likely have settings for volume. Thus, you'll need to check that each have the volume up. Where to check this varies for different operating systems and applications but they are often labeled with clearly marked language such as control panel or settings.

Networks

The need to have computers be able to exchange information quickly and easily has been critical to the successful utilization of computers in supporting our personal, workplace, and educational needs. A **network** refers to two or more interconnected computers. Most networks found in schools are based upon the use of Ethernet technology which uses cables to connect each computer to a central location. This interconnected group of computers is often referred to as a Local Area Network or LAN. Wide Area Networks, or WANs, refer to networks where multiple buildings or LANs are interconnected. School districts often have LANs in each school building and have each building in the district connected to a WAN.

network
Two or more computers that are interconnected, allowing files to be shared among users.

Internet
Global network that currently connects many of the computers in the world.

routers
Special computers or hardware devices that direct information from the Internet to the appropriate computer so that it can be read by a user.

The Internet

The **Internet** refers to the global network that currently connects many of the computers in the world. The Internet was originally designed in the United States to ensure communication could be maintained in a time of war. This original Internet was called the ARPA-NET. The tremendous growth of the Internet is due in large part to the introduction of a common protocol or language that made it possible for any network computer to share information (or bits) with any other networked computer. In addition to a common language, the Internet shares a common addressing scheme as well. The use of Internet Protocol (IP) addressing enables special computers called **routers** to direct information to the appropriate computer.

The early use of the Internet was largely restricted to large universities and research labs. In those environments the exchange of email and data files constituted the majority of the use of the Internet. However, in the early 1990s, Tim Berners-Lee developed a new protocol for formatting text files that accommodated visual elements, such as headings, and functional elements such as hyperlinks.[2] Soon after, Marc Andreessen while working at the National Center for Supercomputing Applications (NCSA) developed an application called a browser, named Mosaic, that used the codes developed by Berners-Lee to visually display text, hyperlinks and images. Current browsers like Internet Explorer, Netscape, and Firefox are all based upon the original designs of Berners-Lee and Andreessen. The Internet has become a critical component of all facets or our society as it enables any Internet-connected computer to communicate quickly and easily with any other Internet-connected computer in the world.

Journal for Reflection

1. What is your level of proficiency in relation to ISTE Standard One and the fundamental concepts introduced in this section?
2. What technologies did you use in high school? What additional ones are you using for your college work?
3. How do you use the Internet for learning purposes?

Teachers' Use of Technology

Technology is having a tremendous impact on teaching today. Spiral-bound grade books have given way to computer-based grading software. Hand-written report cards have been replaced by computer-generated printouts. When one considers the large amount of information that teachers must manage, it is easy to see how computers can be an invaluable support tool. Additionally, computers can now facilitate much more streamlined communication with parents, administrators, and in some instances students. However, the power of computers can go far beyond supporting the many administrative tasks a teacher faces. Much of the enthusiasm for technology in education is directed towards student uses of computers.

Of course the teacher plays a pivotal role in establishing the environment that is conducive to learning and thus must be comfortable with the technology. We know that not all teachers enter classrooms ready to integrate technology. Most teachers progress through several phases of use before they are able to integrate technology effectively. Much of our understanding of teacher development comes from research conducted very early in the history of the personal computer through the Apple Classrooms of Tomorrow project. Apple computers outfitted a large number of schools, classrooms, and homes with personal computers to investigate how they would impact the learning environment. The researchers found that teachers moved through five phases of varying sophistication in terms of how to use the integrated technology. Early phases such as *entry* and *adoption* are characterized by familiarization with the technology and implementation with rote tasks such as drill and practice software. Teachers in advanced stages such as *appropriation* were more likely to use technology supported strategies that included collaboration and projects.[3]

The proper artistic response to digital technology is to embrace it as a new window on everything that's eternally human, and to use it with passion, wisdom, fearlessness and joy.

Philip Greenspun

Outside the Classroom

Technology for many teachers has become an instrumental part of their teaching within and beyond the classroom. Many teachers are introduced to the potential of technology in endeavors that are unrelated to their professional life. Using email to communicate with family and friends has quickly become a common way for much of our society to keep in touch. Similarly, using the Internet has become the tool to plan travel, conduct research for a car purchase, and solicit restaurant recommendations. Once teachers see the value of technology in their personal lives they quickly look for opportunities to utilize it in support of their classroom goals.

iPods and similar devices can be used for more than listening to one's favorite music. They are now being used by teachers for instructional purposes and their own professional development.

TEACHER–FAMILY COMMUNICATION

Email is often referred to as the *killer app* in technology circles. This is due to its tremendous usefulness that quickly rendered it an application we could not live without. Teachers have also found tremendous value in this tool. Teachers may use email to communicate with other educators within and beyond their school. This has helped many educators overcome the isolation of being physically separated from colleagues for much of the day.

Teachers also find online discussion forums, weblogs (or **blogs**), and **podcasts** to be useful tools for communicating with colleagues throughout the world. Online discussion forums can be very valuable for new teachers as a place to post questions and find new ideas. Blogs are now easily established and thus more and more teachers are using them to chronicle their ideas, experiences, and challenges regarding life as a teacher. In addition, there are a number of potential applications of these tools with students.

Regular and consistent communication with parents has long been considered vital to the success of students. In the past, teachers were dependent upon mail, phone, and students to facilitate this communication. Internet technologies augment these standard tools in some exciting ways. The most common example of parent communication in use today is the school or classroom website. Even the most basic of websites can provide valuable information for parents and students. Contact information and a staff directory can be very helpful. In addition, schools find that providing significant information on their website reduces the number of phone calls to school staff for frequently asked questions (also known as FAQs).

Providing basic information regarding the school is only the beginning of what the Internet may provide in terms of parent communication. Some school districts are now making homework assignments available via the web. This can give the parent up-to-date information regarding the activities of their child. Some schools are also utilizing the Internet to share students' grades with parents.

CROSS-REFERENCE
Chapter 11 examines the assessment of student learning.

TRACKING STUDENT LEARNING

Student assessment is also being supported by technology. A critical and often missing component of an effective lesson is addressing the individual needs of students. Inevitably, teachers are faced with a very diverse class of students in terms of their understanding of any particular concept. Many schools now have database systems that collect and report student assessment results in a format that is easy to access. For example, teachers can view reports of their students that list how each student performed on assessment items specific to a standard or topic on recent district or state assessments. This information can then be used to guide decisions such as where the lesson should begin and what sort of student groupings might be most appropriate.

Many schools and school districts are purchasing database services to help them manage and retrieve all of the data that had been stored in file cabinets and unique databases set-up by teachers or school administrators. They are purchasing assessment systems from companies such as Northwest Evaluation Association (NWEA), Plato Learning, and Tungston Learning, which allow teachers to regularly assess students against state and district standards. Some schools test their students monthly, using systems that make performance data available immediately to teachers. Sophisticated systems are able to track student growth from year to year.[4] These assessments and their instantaneous feedback are allowing teachers to intervene in the learning

blog
A chronological publication on the Internet of personal thoughts about a subject to which participants contribute the content online. It is sometimes called a weblog.

podcasts
Multimedia files such as audio programs or music videos that are available on the Internet for playback on personal computers and mobile devices such as the iPod.

These elementary teachers are reviewing reports of how their students performed on the most recent district assessment. They have decided to do some team teaching with different groups of students to ensure students learn the concepts and skills on which they did not perform well.

process to assist students in improving their academic performance. These assessments can also be designed to test other knowledge and skills such as critical thinking and problem solving that may not be assessed on the state tests.

LESSON PLANNING

Computer-based technologies have become essential components of efficient and effective lesson planning. When you consider the tasks that need to be accomplished in planning a lesson, it is clear that computer software and the Internet can be invaluable contributors. The teacher must first clearly describe the goal(s) of the lesson in terms of student outcomes, which often are derived from national, state, and local standards. Although teachers are likely given a copy of these standards when they begin teaching, it is much more convenient to utilize electronic versions of these documents when building lessons. The standards may be available on the web via the school or district home page. These same sites may also provide links to sample lessons that address a particular standard or group of standards.

Lesson plan ideas are plentiful on the web. The problem is finding plans that are effective and appropriate to one particular situation. Teachers will find that the sites that are the most valuable to them for this purpose provide more than just a listing and categorization of lessons; they also include some mechanism for evaluation and/or rating.

Teachers also utilize the web to a great degree to gather information about lesson topics, including the discovery of different media to support instruction. A number of sites now provide access and rights to images, sound, and video files that can be used to develop documents and presentations. As with lesson ideas, you will find sites that provide quick access to media resources that are of high quality and have undergone some level of evaluation or rating. Additionally, it is vital that the media author has granted the appropriate rights for teachers to use the media.

CROSS-REFERENCE
No Child Left Behind and its expectations for students to meet standards at their grade level is discussed in greater detail in Chapter 11.

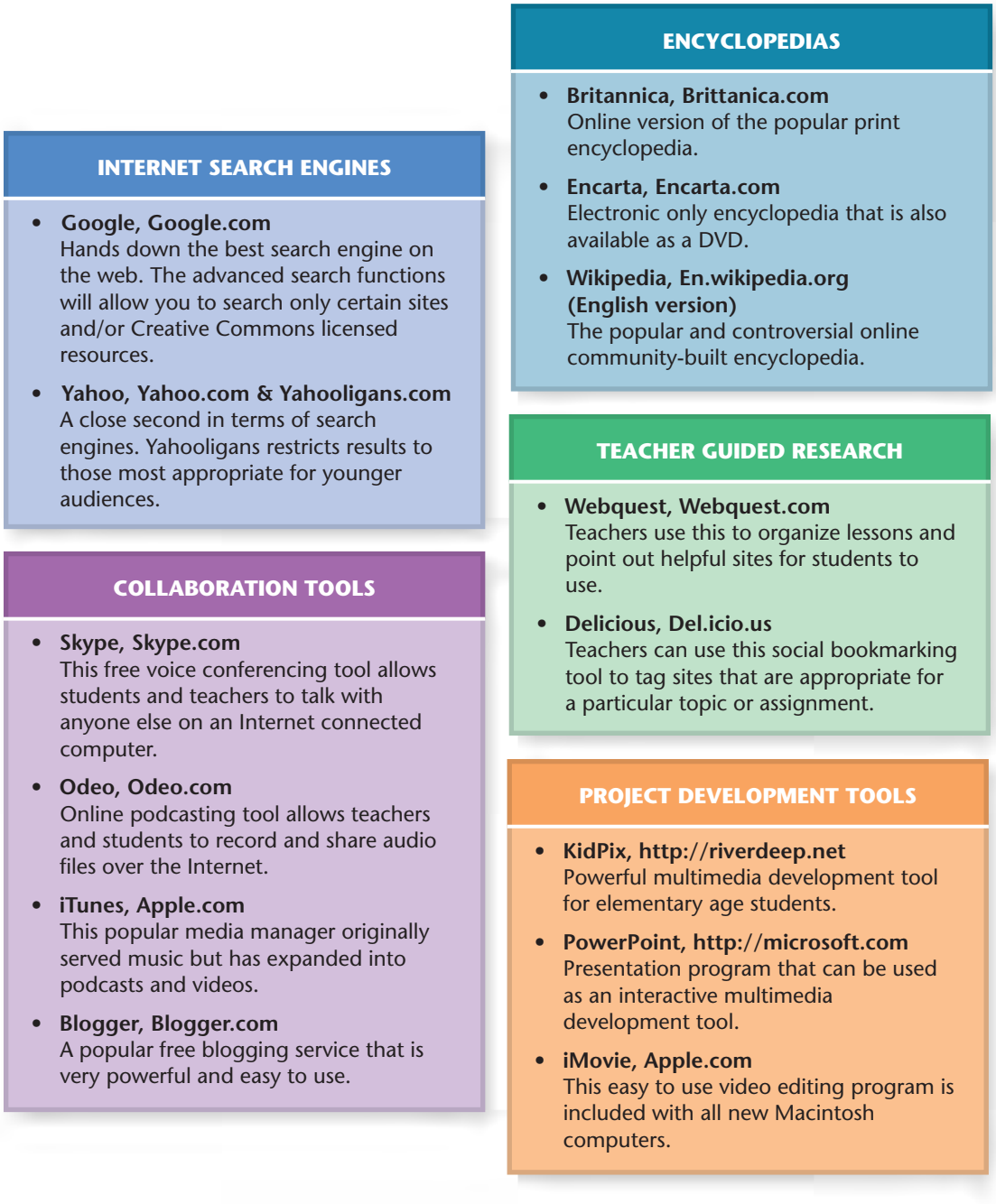
CROSS-REFERENCE
Lesson planning is also discussed in Chapter 12.

Inside the Classroom

The potential for technology to support learning is substantial and a large reason why so many educators are excited about its use. This look at some of the uses of technology in the classroom will use potential tasks as the frame of reference rather

FIGURE 13.1

Classroom Tools on the Web



than the tools themselves. Beginning with the instructional goal in mind rather than the technology may seem obvious but can get lost when educators learn of new and exciting technologies. Examples of online tools for classroom use are found in Figure 13.1.

Research has also supported the value of technology in classrooms but with a very important caveat, which is that the strategies used to integrate technology are

Relevant Research

Social Context in the Use of Computers

STUDY PURPOSE/QUESTION: Do small groups or individual work have a more favorable effect on learning through computer technology?

STUDY DESIGN: This study used a special research method called meta-analysis. Instead of analyzing the data from a single study, with meta-analysis it is possible to summarize the findings of many different studies. In this case, 122 studies involving 11,317 learners were analyzed.

STUDY FINDINGS: The first finding was that social context played an important role when students learn with computer technology (CT). In other words, students who worked in small groups learned more than those students who worked alone. "In general, small group learning with CT had more favorable effects than individual learning with CT on student cognitive, process and affective outcomes" (p. 476).

The results from working in small groups were positive across several types of learning outcomes. "These positive results indicate that when working with CT in small groups, students in general produced substantially better group products than individual products and they also gained more individual knowledge than those learning with CT individually" (p. 476).

There were a number of instructional features that made a positive difference: (a) students had experience in working in groups, (b) students were instructed in specific cooperative learning strategies, (c) the group size was small, and (d) the content was tutorials, practice software, learning computer skills, or social sciences. However, there was a small negative effect when the subject matter involved mathematics, science, or language arts. Also the best group size is two, which probably is as many as can easily see the CT screen at one time.

IMPLICATIONS: The findings from this meta-analysis indicate that teachers should plan carefully and organize instruction differently depending on the number of students, the number of CT stations, and the subject area. Ideally there should be no more than two students per station, and the students should have had prior instruction and experience with doing group work. The subject area being taught could make a difference; however, the meta-analyses seemed to indicate that the negative effects from small group versus individual work was quite small and probably could be offset by better organization and structuring of the tasks. Preparing students to use cooperative learning strategies would appear to be important for a number of different teaching strategies and subject areas, as well as with small group work at CT stations. It probably is worthwhile to teach children skills for cooperative grouping early in the school year.

Source: Based on Yiping Lou, Philip C. Abrami, and Sylvia d'Apollonia, "Small Group and Individual Learning with Technology: A Meta-Analysis," *Review of Educational Research, 71*(3) (Fall 2001), pp. 449–521.

consistent with what we know about student learning. More specifically, when technology is used to actively engage students in learning, applying, and analyzing important concepts, achievement gains result. For example, researchers have found that in classrooms in which computer simulations are used to support higher-level cognitive tasks, subsequent achievement gains can result.[5] The same cannot be said for more rote learning activities where engagement of the learner is less. Keep this important distinction in mind as you review the tools described below and consider how they could be implemented effectively.

INFORMATION RESOURCES

It should not be surprising that gathering information is such an important task in classrooms. Many now refer to our society as a knowledge or information-based economy. Good information was once only accessible by a few. Even the best public libraries, while plentiful, could house only a fraction of the world's books and periodicals. Now, with the Internet, information is plentiful. So plentiful that evaluating information has become a critical skill for students.

Some school districts are providing both teachers and students with computers as part of ubiquitous computing plans to encourage the use of technology in their work.

In classrooms, students have always had a variety of needs regarding information. This might be as simple as looking up the spelling of a word in the dictionary or as involved as the development of a report on a large topic such as global warming. Now, with virtually every classroom in the country connected to the Internet, many teachers and students are looking online for information. The ease with which anyone can post information to the Internet has led to an explosion of web pages that presents as many challenges as it does opportunities. One of the greatest challenges for teachers is sifting through the over 11.5 billion web pages[6] to find the most accurate and relevant information. Teachers will often use one of three strategies to help students deal with the tremendous amount of information available online. These strategies include the use of search engines, encyclopedias, and teacher-guided research.

INTERNET SEARCH ENGINES Internet search engines attempt to index web pages in ways that are meaningful to users. The hope is that the search engine can retrieve the most useful pages on the Internet based on a few words supplied by the user. Search engines have improved tremendously over the past few years—mostly due to advances introduced by Google. The most important thing Google introduced was a human element to the ranking of the results. They did this by counting links from one site to another as a *vote* for the site. Not surprisingly, this greatly improved the ranking of results.

Most search engines now have the capability to filter results so that they do not include adult content. Many also feature specialized searches that will only return Creative Commons licensed content. The authors of this content grant certain permissions for further use of the content. This can be valuable for students and teachers who would like to use the content for other purposes.

ENCYCLOPEDIAS Encyclopedias have long been considered an essential component of any school library. Most school encyclopedias are now available via computer through the school network or through an online subscription with a publisher. Traditional encyclopedia companies such as Encyclopedia Britannica offer online versions of their well respected print series. Microsoft has also developed a very popular encyclopedia series entitled Encarta. The online versions

Global Perspectives

China's Filtering of the Internet

Most of us see Internet search engines as assisting us in the organization of the billions of resources available worldwide on the topics in which we are interested. We probably also think that the Internet lets anyone in the world access information that they might not otherwise be able to find, especially if they live in rural or isolated areas of the world. Thus, we were surprised to learn that Chinese officials had negotiated with Cisco Systems, Google, Microsoft, and Yahoo to filter information for the potential 111 million Chinese users by limiting access to material on the Internet. In his annual news conference, Premier Wen Jiabao indicated that available websites should "convey the right message and information." Many advocates of free speech are saying that China has placed a firewall on the Internet to curtail the questioning of government policies and practices by its citizens.[7]

Questions for Reflection

1. Why would companies that provide Internet access agree to filter the information available to users in China?
2. How might such filtering of information accessible on the Internet contribute to oppression and inequality in a country?

have the advantage of access throughout the school (versus only the library) and much easier searching.

A newcomer to the encyclopedia market is Wikipedia. This online encyclopedia is unique in that anyone can contribute content to its pages. By allowing everyone to contribute, Wikipedia has quickly become the world's largest encyclopedia with the English version cataloging over one billion articles. Most of the articles are written by individuals with significant experience in the respective topic and have been discussed, reviewed, and revised hundreds of times. Wikipedia's open nature has also resulted in it being a target for vandalism and sharp criticism, requiring users to cross-check facts for accuracy.

TEACHER-GUIDED RESEARCH Teacher-guided research strategies involve the use of a selected number of sites for students to use in their search on a topic. This strategy can alleviate many of the concerns that arise from the use of other web-based research strategies. One of the strengths of this approach is that it allows the teacher to identify credible and useful resources for students. This can often be more efficient in that the amount of time students spend searching for information is reduced. It also reduces the possibility that students will find inappropriate and/or inaccurate information.

One common model teachers use to develop these types of lessons is the WebQuest. These inquiry-based lessons were conceived by Bernie Dodge as a way to incorporate web-based content into learning activities. The model includes the development of clear learning objectives, specific tasks to be accomplished by the group, and a listing of web-based resources that the students should use in accomplishing the task. One of the many strengths of this model is that it is familiar to many teachers and thus they are able to easily incorporate other teachers' WebQuests into their own classrooms.

Professional Dilemma

Assigning Homework That Uses Technology

Ninety-nine percent of the schools in the United States are wired for the Internet, and most classrooms have one or more computers with software for the subject and grade level being taught. The computers may have graphics capability that allow students to design interesting presentations with audio and video clips. Math teachers have graphic calculators. Students can edit their own videotapes to produce a movie instead of a traditional written paper for a class project. The school district is offering professional development courses on the use of handheld devices and podcasting for instruction. Teachers are being encouraged to communicate with parents and guardians via email and postings on the school's website. Students are excited about having the opportunity to work on the computers. They like the interactivity of many of the software packages. The challenge for teachers is to figure out how best to use the technology for learning, not just for entertainment and fun.

One of the values of the Internet is to search for information about almost any subject. Search engines identify resources from many different sources and multiple perspectives. One of the skills that students should develop is how to sort through multiple sources for the information they need and how to test its accuracy. Students could use the Internet to explore topics and concepts being presented in a unit. Class time can be spent for such research activities, but it may be difficult for all students to spend the time needed, especially if a classroom has a limited number of computers. Thus, a teacher may be tempted to assign homework that requires using the Internet. A problem with assigning homework on the Internet, however, is that not all students have computers at home. Even if an assignment does not require the use of the Internet, those students who have access to it at home have an advantage in completing school projects.

Questions for Reflection

1. What are the problems that could result from assigning homework that requires the use of the Internet?
2. How could a teacher overcome the inequities that exist when some students have computers at home and others do not?
3. What would be the advantage of a program that allows all students access to a laptop? What are the disadvantages?

To answer these questions on-line and e-mail your answers to your professor, go to Chapter 13 of the companion website (www.ablongman.com/johnson14e) and click on Professional Dilemma.

PROJECT DEVELOPMENT TOOLS

Classroom teachers will frequently design project-based activities for students with the outcome being a report or other project. Many are now using educational technology tools to enable students to produce creative multimedia products. Students often find the use of the computer in this manner more motivating than the traditional report. It also gives students the chance to be more creative in the presentation of their work.

Common multimedia development applications include KidPix for elementary age students and PowerPoint for older students. Each of these programs gives students the capacity to incorporate text, sound, images, and movies into presentations (or shows) that can be shared. More recently, teachers are asking students to develop their own topical movies for projects. This has only recently become feasible for the classroom as the required equipment (digital video camera and a powerful computer with movie editing software) has become much more accessible.

An important consideration classroom teachers must make in using these types of projects is how much time will be dedicated to learning the software versus engaging in the desired learning activities. This is an area where collaboration with

other teachers in the school is critical. If teachers can agree on some common tools for project development activities, it reduces the time any one class must spend on learning the tools.

COLLABORATION TOOLS

Classroom teachers are always looking for ways to extend student learning beyond the walls of the classroom. This makes the learning more valuable and motivating for students as they see the connections to their own life. In the past, this goal was met most directly through the use of field trips and possibly guest speakers. Each of these options required significant funding and planning. In addition they were often limited in scope and time. Many have now looked to the Internet as a way to extend the classroom in powerful and authentic ways.

Email is the most commonly used method for collaborating with others. It is easy to use and does not require any specialized software. Teachers can partner with classrooms to learn more about other countries, collaborate on projects, or simply exchange messages. In addition to text, email can be used to exchange pictures and other files. In some instances, email is giving way to real-time (or synchronous) tools such as instant messaging and voice or video conferencing. As computers become more powerful, the Internet connections become faster and the necessary software becomes more easily accessible.

Home computers are being called upon to perform many new functions, including the consumption of homework formerly eaten by the dog.

Doug Larson

Podcasting and Blogs are two more recent technologies that have been utilized by classroom teachers to facilitate collaboration among students. New technologies on the web (specifically Really Simple Syndication or RSS) have made it possible for students to publish their podcasts and subscribe to the podcasts of others. Apple's iTunes software and iPod music players have helped to make this technology very popular. However, one only needs an Internet-connected computer to develop, distribute, and listen to podcasts.

Blogs are being used to streamline collaboration via the Internet. Blogs are content-rich sites that are easy to setup and contribute to. Most of them make it easy for novice computer users to submit postings to a website that can then be read by anyone. Readers can also comment on postings. The posting and subsequent comments can frequently generate meaningful discussions around the original topic. Blogger.com is one example of many free services that allow anyone to start a blog.

Distance Education

Distance education typically describes learning experiences in which the teacher and student are geographically separate. While distance education has experienced a recent resurgence in popularity, it is not a recent phenomenon. Correspondence courses have long been popular options for individuals seeking postsecondary learning opportunities when they did not have easy access to higher education. Military personnel and people living in rural areas often benefit from educational opportunities that do not require *face-to-face* classroom meetings. While distance education is most commonly associated with learning beyond high school, there are examples of students using distance education to meet goals such as earning a high school diploma. Nebraska's Independent Study High School has been offering courses since 1929.

Advances in computer and communications technologies are largely responsible for the renewed interest in distance education. The Internet in particular has dramatically increased the communications opportunities between teachers and students. Email alone was a tremendous advance over the use of postal mail. More recent advances in Internet communication tools such as instant messaging and audio conferencing have also contributed to the increased interest in distance education.

distance education
Learning experiences in which the teacher and student are geographically separate.

Thirty-eight percent of all U.S. public high schools offered distance education courses during the 2002–2003 academic year.[8] Over 325,000 students were

enrolled in these courses.[9] The vast majority of these schools are delivering courses electronically. While definitive data are difficult to come by, there is little doubt that these offerings are expanding rapidly. Some states and districts have expanded their online distance education offerings to include the entire curricula. According to one estimate, as many as 2,400 **virtual schools** were operating in 2005.[10]

There are a number of reasons high schools are offering distance education courses. One of the most common is to provide more opportunities to students. Schools can offer a wider variety of courses to students if they can combine enrollments from multiple locations. For example, while a Russian language class may not draw enough interest from students in one high school, offering it as a distance education course that can be taken by students in any high school in that school district (or beyond) may make the offering more feasible.

Educators have different perspectives on the appropriateness of distance education, especially for younger students. Certainly, today's students are becoming more and more accustomed to socializing through electronic tools such as cell phones and instant messaging programs. However, there is little doubt that some degree of face-to-face interactions among teachers and students can be valuable.

Distance education has also become an important means for many teachers to continue their learning while teaching. These experiences range from short professional development workshops to entire graduate degree programs. Most school districts now take advantage of web-based learning to provide some proportion of their professional development programs to teachers. Most colleges and universities provide graduate courses in education; they offer either courses or entire graduate programs through the Internet. Classroom teachers find the flexibility inherent in distance education very helpful in their efforts to continue their education.

Journal for Reflection

1. How could immediate access to how students have performed on standards-based assessments be helpful to a teacher?
2. How could a teacher use email for instructional purposes?
3. What would teaching in a virtual school be like? How would you get to know your students? Why (or why not) would you be interested in such a teaching assignment?

Issues Related to the Use of Technology

Up to this point, this chapter has painted a rather optimistic picture of the potential of technology to support teaching and learning. In many ways the optimism is justified. Of course, that optimism must be balanced with some professional skepticism. Each of the opportunities described earlier in the chapter present significant challenges to classroom teachers, administrators, parents, and students. Many of these issues cut across all of the technology-related topics. This section will briefly address five of the social, ethical, legal, and human issues that educators are being faced with as a result of technology in our quickly changing world.

Equality in Access

Although the number of Internet users is growing exponentially each year, most of the world's population do not have access to computers or the Internet. People in developing nations have limited access to what most of us would consider a basic communications necessity—the telephone. In fact, the disparity across nations in telephone, cell phone, and computer access is quite great as shown in Figure 13.2 (p. 449). Countries in Africa and Southeast Asia are least likely to have phones and computers.[11] In many parts of the world cell phones are becoming the cheaper and faster way to expand communication systems. "Between 1997 and 2002 the number of telephone lines [in the world] grew by 40% and the number of cell phone

virtual schools
Schools in which all of the curriculum is delivered via distance learning.

TEACHER PERSPECTIVES

Should School Computer Labs Be Phased Out?

As technologies develop and their applications expand, educators try to determine the best way to integrate them into daily teaching and learning. This debate focuses on one question that arises from such attempts to use technology effectively in education.

YES

Barbara Barr *is a K–1 teacher at Brookside Elementary School in Nicholasville, Kentucky. This twenty-four-year teaching veteran teaches nearly all lessons using classroom computers. In the fall, Barr will work in her district's technology office training teachers to integrate computers into the curriculum.*

Computers belong in all classrooms, not held captive in the computer lab and taught as a specialized subject area at a scheduled time.

All staff and students need to learn how to effectively use this instrument. This can most realistically happen when computers are conveniently accessible in a classroom.

Computer labs have a number of drawbacks. In a lab setting, the computer is learned apart from other subjects and activities. It is much more difficult to integrate technology into other areas of the curriculum within the lab setting. The computer becomes a separate course or activity, rather than a tool used to enhance learning in other areas.

Time limits are another disadvantage to computer labs. Most educators have an assigned time to use the lab. This restricted access limits activities a teacher can conduct with students.

The time limits affect students, too. For example, a student doing a research project on World War II using computers in the classroom has instant access to major databases and can use the Internet to get resources. Research can be performed instantly and on an ongoing basis.

Scheduled time to conduct research in a lab a few times a week doesn't allow ample time to work on projects like this.

Even the physical location of computer labs causes problems in many schools. It is just too inconvenient to have educators take away from their classroom time to shuttle students down the hall or to another part of the school building. Once they get to the lab, there is no access to regular classroom materials.

NO

Ferdi Serim *taught computer lab at John Witherspoon Middle School in Princeton, New Jersey, until his recent move to New Mexico. Serim is coauthor of the book* NetLearning: Why Teachers Use the Internet *and editor of* MultiMedia Schools Magazine.

I call this the "right shoe vs. left shoe" debate. You need both kinds of shoes to get anywhere. In an ideal world, computers belong on every student's lap. But rather than focusing on where we put them, we need to focus on how the computers will be used. Once we know that, we can make better decisions about how they'll be deployed.

For the past ten years, I've worked as an educator in computer labs, in two different districts. I've seen labs used well, and I've seen them used in ways that make me cringe. There is indeed a push by some to get rid of labs. Computer labs should not be phased out. Rather, they should be used in ways that make educational sense.

There is great value in having spaces where entire classes can use technology at the same time, whether it's a computer lab or a library/media center.

Computer labs are effective places to give all students adequate access to technology to perform meaningful work.

A good example of this is when Shannon Dahl, an eighth-grade language arts teacher at my school, had her kids create books using the computer. Students gathered autobiographical information, pictures, and relics. They used a range of desktop publishing technologies to print, bind, and produce these one-of-a-kind heirlooms. The project ended in an "author's breakfast" for 125 kids, their families, and the community.

It took Shannon Dahl three weeks to complete the project using the computer lab. If she had only two computers in her room, the project would take all year. Having six machines would

(continued)

TEACHER PERSPECTIVES

(continued)

YES

Having computers located within an educator's classroom setting has a number of advantages. With just one computer in the classroom, we can:

- Create a spreadsheet of students' names and have each student enter data for daily attendance, lunch count, and records of monies received.
- Use a scrolling marquee screen saver for spelling words, new vocabulary, announcements, or information.
- Replace messy chalk boards or overheads with PowerPoint presentations or a simple text program using enlarged fonts.
- Instantly access encyclopedia programs, museums, libraries, and universities.

Not only are computers convenient, they are the only teaching instrument that can handle all subjects on every developmental level and still keep up with the latest information. When the student is ready to learn, the classroom computer is there!

Teachers must become comfortable with computers in order to use them effectively. This will happen when computers are available in the classroom on a consistent daily basis.

In my 24 years teaching, I've seen programs come and go with varying degrees of success. Never have I found one simple item that added so much to instruction, while instilling a passion for knowledge in students. Why limit this tremendous tool to scheduled sessions in a room at the other end of the building?

NO

have allowed her to complete it in 15 weeks. That doesn't make educational sense.

Before getting rid of labs and putting more computers in classrooms, educators should consider these additional benefits of computer labs:

- Most classroom computers are not networked to other school computers. Computer labs allow teachers and students to make projects and information available for collaboration via the school network.
- Classroom computers don't often allow for projection devices to support group activity.

When teachers used my lab, I'd make "housecalls" to other computers with my laptop and an LCD panel for wider viewing by groups of students. The teachers I worked with would rather have a machine that let "everybody" observe a demonstration than five or six machines that only served a fraction of their class.

I will say that simply having a computer lab within a school is not enough. The spectre of the empty, locked lab is responsible for much of the impulse to do away with labs and put the machines back into the classroom.

The lab must be viewed as a shared resource for both the classroom teacher and the computer lab teacher. Computer labs will only work when there are people who know how to use them, and who are empowered to make them serve educators' needs.

Source: "Should School Computer Labs Be Phased Out?" *NEA Today* (September 1999), p. 11. Reprinted by permission of the National Education Association.

WHAT IS YOUR PERSPECTIVE ON THIS ISSUE?

Should school computer labs be phased out?

To give your opinion, go to Chapter 13 of the companion website **(www.ablongman.com/johnson14e)** and click on Teacher Perspectives.

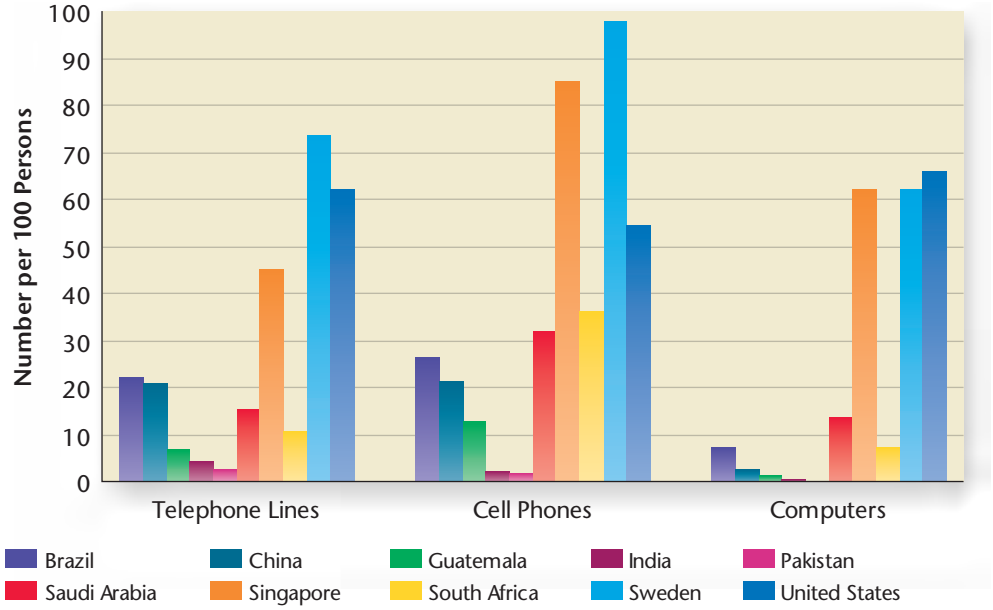
users grew by 547%."[12] The move to wireless connections may eliminate the need for telephone lines, but it does not remove the barrier of equipment costs.

Sixty-two percent of U.S. students have access to personal computers at home and 55 percent have Internet access.[13] Who has these technologies depends on a

FIGURE 13.2

Telephones and Computers by Country in 2003

Source: U.S. Census Bureau, *Statistical Abstract of the United States: 2006,* 125th edition. Washington, DC: U.S. Government Printing Office, 2006, Table 1364.



number of factors. Fifty-one percent of households with incomes less than thirty thousand dollars a year have a computer. Ninety-six percent of households with incomes greater than seventy-five thousand dollars have a computer. Similar disparities exist in terms of race: 87 percent of white, non-Hispanic, households have a computer compared to 54 percent of African Americans and 55 percent of Latinos. Rural households are less likely to have access to high-speed Internet connections such as cable and DSL. Twenty-four percent of Internet connected rural households have highspeed connections as compared to 40 percent of urban households.[14]

The **digital divide** between the populations who have access to the Internet and information technology tools and those who don't is based on the same factors. Children in 68 percent of the families with an income over $75,000 connect to the Internet at home as compared to 31 percent of the children in families with incomes under $20,000. Over 60 percent of children with parents who are college graduates use the Internet at home as compared with 40 percent of those whose parents have finished high school but not attended college. Only 24 percent of students with parents who dropped out of high school connect to the Internet at home.[15] Differences are also found among households and families from different racial and ethnic groups. Fifty-seven percent of white children, 28 percent of African American children, and 27 percent of Latino children have access to the Internet.[16]

Another problem that exacerbates these disparities is that African Americans, Latinos, and American Indians hold few of the jobs in information technology. Twenty-seven percent of the people working in professional computer and mathematical occupations are women.[17] African Americans and Latinos are also underrepresented in this field as shown in Figure 13.3. Women receive only 28 percent of the bachelor's degrees in computer and information science—a figure that has doubled since 1971.[18] The result is that women and members of the most oppressed ethnic groups are not eligible for these jobs, which offer among the highest salaries at graduation.

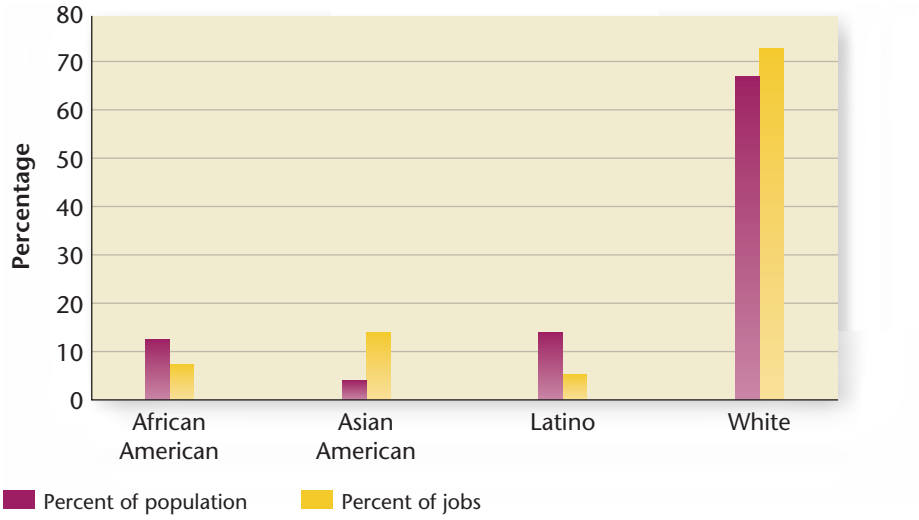
CROSS-REFERENCE
Issues of equality are discussed in greater detail in Chapter 3.

digital divide
The difference in access to technology tools and the Internet between those with economic advantages and those without them.

FIGURE 13.3

Participation in Professional Computer and Mathematical Occupations

Source: U.S. Census Bureau, *Statistical Abstract of the United States: 2006,* 125th edition. Washington, DC: U.S. Government Printing Office, 2006, Tables 14 and 604.



Do similar disparities exist in schools? Almost all schools in the country have Internet access. However, the number of classrooms with Internet connections differs by the income level of students. Using the percentage of students who are eligible for free or reduced-price lunches at a school to determine income level, we find that 95 percent of the schools with more affluent students have wired classrooms as compared to 90 percent of the schools with the highest concentrations of low-income students.[19] Figure 13.4 shows a similar disparity in the number of students per computer in schools with student populations who are students of color or from high poverty areas. Thus, the students who are most likely to have access at home also are more likely to have access in their schools.

Stipulating Student Use

With the tremendous growth in the access to and use of computers in the classroom, a number of concerns arise regarding the use of the Internet by students. One of the obvious and common concerns of parents is the ease of access to inappropriate content. Parents expect schools to closely monitor what students have access to online. Most schools use a number of strategies to address these concerns. The foundation of these strategies is often an Acceptable Use Policy or AUP that delineates what constitutes an acceptable and unacceptable use of school or district computing resources. These policies include guidance about software use, acceptable websites, and the types of activities that the computer resources are intended to support. Also included are acceptable activities for different groups in the school. Expectations for teachers are generally different from the students.

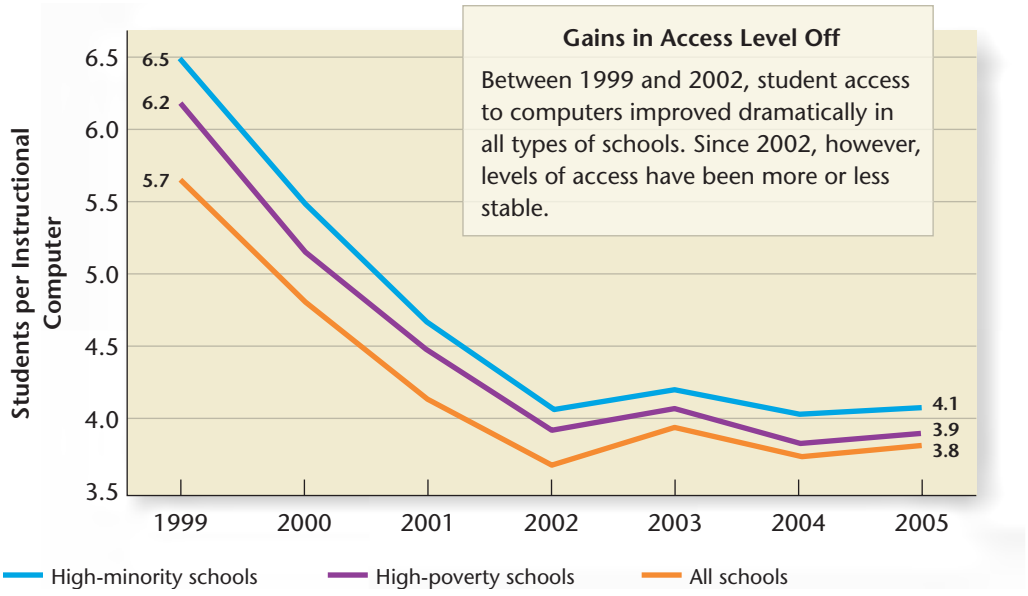
Policies generally include some stipulations regarding when a student can access the Internet. Some schools require direct adult supervision of any student computer

FIGURE 13.4

Student Access to Computers

Note: For this chart, high-poverty schools are those in which more than half the students are eligible for the federal free or reduced-price lunch program. High-minority schools are those in which more than half the students belong to minority racial or ethnic groups.

Source: Christopher B. Swanson, "Tracking U.S. Trends," *Technology Counts 2006: The Information Edge: Using Data to Accelerate Achievement.* Bethesda, MD: *Education Week,* Editorial Projects in Education, 2006, p. 51. Data from Market Data Retrieval public school technology surveys, 1999–2005. Used by permission of MDR, a company of D&B, 1 Forest Parkway, Shelton, CT 06484. www.schooldata.com.



use. Others only allow student Internet use with explicit parental permission. In addition to acceptable use policies, schools employ other technological safeguards to their computer systems. Safeguards that are often used on the computers include tools that restrict the modifications that can be made to a computer system. Think of the havoc that would ensue if students could install their own software onto school machines. Another important safeguard includes the use of filtering software for the Internet. These tools will allow only Internet traffic into the school that comes from approved websites. These restrictions are not without costs. The more stringent the requirements regarding student computer use, the more likely teachers will consider it not worth the effort to introduce students to some of the powerful resources available on the Internet.

Plagiarism

Advances in computer technologies in general and the Internet in particular have resulted in an apparent rise in plagiarism. This is due in large part to the ease with which a person can copy one person's work and claim it as their own. Additionally, it is easy to find just the type of content that a person needs to complete an assignment. Like many ethical issues, teachers find that a proactive approach can greatly reduce the frequency with which students engage in inappropriate activities.

The computer has become a primary resource to support learning in today's classrooms.

Presenting students with a variety of scenarios related to using, citing, and quoting sources can help clarify what is and is not ethical when it comes to using works created by others.

While a proactive approach is often effective, there are times when a teacher would like to investigate some suspicious assignments. One strategy that teachers can use is to simply copy small bits of text from an assignment into a search engine (using quotes around the text to search for the entire phrase rather than the specific words). If the text was taken from the Internet, it will likely appear at the top of the search results. More sophisticated tools such as Turn It In (www.turnitin.com) are also available. These services will conduct extensive searches for matching text and return detailed reports regarding the originality of the assignment.

These challenges are not unique to children. You have likely seen media reports related to plagiarism in books and on the Internet. It is important that you model ethical behavior in how you conduct yourself. Classroom teachers often excel at collaborating and sharing powerful ideas. When you are using lesson plans provided by others, acknowledging the contributions of others sends a powerful message to students.

Copyright

As with plagiarism, technological advancements have presented educators with a number of additional challenges as they attempt to conform to current copyright laws. These challenges are nowhere more apparent than the Internet. The very structure of the Internet is based upon copying. When you request a page on the Internet, your browser will copy the requested page (or file) to your computer for viewing. Of course, few people would quarrel with your right to view a page copied to your computer given that this was clearly the intent of the author. However, your rights are not always clear. Can you print out the page that you have just viewed? Can you print it and copy it for your class? These and other questions can be difficult.

In the United States, as in most countries, the intent of copyright law is to encourage authors and artists to produce creative works of value to society. This is done by providing the copyright owner with certain rights regarding how a work can be used. Giving copyright owners control over the use of the work enables them to profit from the work and thus encourages and supports further work. Earlier versions of United States copyright law codified these rights for a limited amount of time, after which the work would become a part of the public domain. Subsequent revisions to copyright law have greatly extended the amount of time copyright owners control the work. Additionally, copyright is now assumed rather than claimed. In other words, it is not necessary for someone to include a copyright statement or symbol on the work for it to be protected.[20]

This poses a number of challenges for educators who are always searching for supporting resources. For example, a lesson on a website that you feel would be appropriate for your class is by default protected from uses other than that explicitly provided by the copyright holder. Thus, if the promising lesson you found does not include a statement that indicates you can copy the lesson for classroom use, you may be violating the rights of the copyright holder. However, the likelihood that someone who posts lesson plans would view that as a violation of their rights is slim.

The determination of whether a use is appropriate can be supported through the application of *fair use guidelines*. Fair use guidelines emerged from court cases involving copyright law in determining whether certain uses violated the rights of copyright holders. Fair use is determined by addressing four questions regarding the nature of the work and its use:

1. The purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes.
2. The nature of the copyrighted work.
3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole.
4. The effect of the use upon the potential market for or value of the copyrighted work.[21]

Responding to each of these considerations involves a certain degree of judgment. Each of these questions must be addressed. A use deemed educational or nonprofit does not alone justify its use. If after reviewing the fair use guidelines the use is not clearly appropriate you should either seek permission of the copyright holder or not use the material.

Globalization

The world is quickly shrinking. While many people predicted this inevitable globalization of our society, few recognized the rapidity with which the media in general and the Internet in particular would have made it a reality. The ramifications for schools are significant. It is as easy to communicate with someone in Bangladesh as is it is with our next-door neighbor. The classroom teacher who integrates the Internet into instruction will be faced with an increasing number of important issues resulting from this shrinking of our world. Imagine your students corresponding (possibly in real time) with students from Bangladesh. The disparities between the two countries in terms of economics, values, and government are tremendous.

Journal for Reflection

1. Why should educators be concerned about equality of access to technology for their students and parents?
2. Why are parents concerned about schools controlling their children's access to some websites?
3. Why does a teacher need to be aware of copyright laws?

A Look Ahead

The past decade has seen tremendous change in terms of the technologies available to classroom teachers and students. However, many feel that the changes we have seen thus far are minimal compared to what lies ahead. Much of this optimism is based upon the promise of **ubiquitous computing** initiatives. Eight percent of U.S. schools indicated that they had such a program in place in 2003. An additional six percent had future plans for a laptop initiative.[22] Once every child has his or her own computer, the context changes dramatically.

Many are also encouraged by the prospect of computers helping teachers better manage the administrative tasks that can detract from instruction time. Attendance records, seating charts, and parent contact information all become much

It would appear that we have reached the limits of what it is possible to achieve with computer technology, although one should be careful with such statements, as they tend to sound pretty silly in 5 years.

John Von Neumann

ubiquitous computing

Initiatives in which students are provided laptops to use during and after school.

Schools must decide how to prevent students from visiting inappropriate websites and from loading their own software onto school computers while still encouraging them to be engaged with computer technology for learning purposes.

easier to access as web-based information systems mature into robust tools. More importantly, teachers will be able to monitor student learning related to standards, compare performance to other students in the school district or state, and access lesson plans for addressing areas in which students are having problems. When teachers are able to commit more time to planning they are better able to develop learning activities that are more engaging and effective.

Technology is allowing school districts and states to track students as they move from school to school. Sophisticated data management systems are including identifiers for both students and teachers so that school officials can match student achievement gains to specific teachers. A growing number of districts may be using the data on student gains to determine salary increments for teachers. For example, the Florida State Board of Education agreed in 2005 to give bonuses to up to 10 percent of the teachers based on the greatest gains in achievement as measured on the state test.[23]

Maybe the most exciting changes ahead are related to communications tools. The prospect of being able to easily communicate with anyone, anywhere has intrigued educators for a long time. The opportunities for learning experiences to be more distributed and less dependent upon everyone meeting in a classroom is quickly becoming commonplace. There is little doubt that the Internet will serve as a catalyst for much of this change.

Journal for Reflection

1. What are the potential advantages of ubiquitous computing? What are the disadvantages or potential problems?
2. How do you feel about having the learning of your students tracked to your teaching? Why?
3. What emerging technologies do you know about? How might they be used in the classroom?

Summary

TECHNOLOGY BASICS. Teachers often learn the fundamental concepts about computer technology as they use it for email, PowerPoint presentations, and other personal needs. The Internet has made it convenient to communicate with people all over the world. For classroom use, it allows students and teachers to easily search for information to which they would have had limited access in the past. Mobile digital devices, wireless connections, and a computer's growing capacity for audio, photo, and video storage are also lending themselves to instructional uses.

TEACHERS' USE OF TECHNOLOGY. Technology is one of the important resources that today's teachers have. The particular types and the quantity may vary, but most classrooms are supplied with a variety of technologies. The teacher has the major responsibility for seeing that each technology is used effectively with the goal of helping students learn. Technology is allowing teachers more opportunities to interact with families. It also makes it easier to assess student learning and track students' progress at meeting standards.

ISSUES RELATED TO THE USE OF TECHNOLOGY. Bridging the digital divide between students who have access to computers and the Internet and those who do not is one of the challenges faced by educators in providing equity and social justice. Schools also need policies for controlling student use of school computers so that they are used appropriately. Other issues that teachers need to be aware of as they integrate technology into their instruction are plagiarism, copyright, globalization, and the accuracy of the information on the Internet.

A LOOK AHEAD. Knowing how the Internet has changed many of our personal lives and the way we do research for school projects over the past ten years, it is difficult to imagine the technology that will impact the future. Teachers will need to be open to learning the technologies of the future and adapting them appropriately to classroom instruction. The possibilities in our changing world are both limitless and exciting.

Discussion Questions

1. Technology appears to have potential for both improving student learning and making learning more exciting. What do educators mean when they say that "technology is sometimes the content rather than the tool" for instruction?
2. Almost all schools are wired for the Internet and most classrooms have computers. Why then do we hear reports that the computer technology is not being used by teachers? What could change this situation?
3. Many of your future students are likely to be engaged with blogs and Podcasts. How could you integrate their interest in the interactivity of the web into a lesson?
4. The data reported in this chapter indicate that a digital divide exists between white middle-class students and students from low-income families. How can schools help narrow the access gap that could lead to the most underserved students being economically disadvantaged in the future?
5. Based on what you learned in this chapter and know from your own experience, how do you see technology affecting education over the next ten years?

School-Based Observations

1. In one or more of the schools you are visiting, ask the principal and teachers if they have easy access to data on the academic performance of their students. How do they know how students in their school or class are performing on state tests? Are they using any assessment databases that allow them to regularly assess students against benchmarks? If so, which ones and what are they learning from them?
2. Technology can be used in a wide variety of ways in classrooms and within lessons. In classrooms that you are observing, how is technology being used? Which technology supports the teacher? Which have direct uses by the students? In what ways is technology being integrated into the curriculum?

Portfolio Development

1. Teachers need to have skills for using a variety of technologies. Learn to use a technology that you have not used before, or learn a new application of a technology you have used before. Use the technology to develop a teaching product that you might be able to use in student teaching or in your first year of teaching.
2. Technology in classrooms should be used to help students learn. For your portfolio, develop a lesson plan in your subject area that requires students to use the Internet. Be clear about the objectives for the lesson and guidance that you will provide students to assist them in using the Internet effectively.

Preparing for Certification

TEACHERS AND TECHNOLOGY

1. The Praxis II Principles of Learning and Teaching (PLT) test, which assesses a prospective teacher's knowledge about a variety of teaching-related skills, is required in many states. The test covers four broad categories: organizing content knowledge for student learning, creating an environment for student learning, teaching for student learning, and teacher professionalism. Learn more about the PLT test by reviewing the ETS *Test at a Glance* materials at www.ets.org/praxis.
2. Answer the following question, which is similar to items in Praxis and other state certification tests.

   Students in a sixth-grade class are trying to find a way to deal with the problem of wasted paper in the school computer labs. They have invited the director of the local recycling facility to speak with the class. The students are at which of the following steps in the problem-solving process?

   A. Develop criteria to evaluate possible solutions to the problem.
   B. Brainstorm possible solutions to the problem.
   C. Gather facts and information about the problem.
   D. Develop a plan to implement the best solution to the problem.

3. Answer the following short-answer question, which is similar to items in Praxis and other state certification tests. After you've completed your written response, use the scoring guide in the *Test at a Glance* materials to assess your response. Can you revise your response to improve your score?

Reread the chapter-opening case study. The students in Eva Hernandez's school district have access to a wide variety of classroom technologies. How do these technologies affect the teachers in the district? How do these technologies affect student performance in the district? What technology resources will you have access to in your classroom?

Websites

www.edweek.org/techcounts06 Online components that accompany *Education Week's Technology Counts 2006* are available at this website. It also includes reports on the use of technology to collect and manage data in each state.

www.iste.org The website of the International Society for Technology in Education gives information about the society's mission and projects, including technology standards for students and teachers.

www.pbs.org/teachersource The PBS website includes a wide variety of lesson plans and activity suggestions. Many of these are associated with PBS videos although they are not required for most activities.

http://rubistar.4teachers.org This site features a powerful rubric building tool that can be used for assessing a wide variety of student products.

www.readwritethink.org This website includes high quality reading and language arts lessons.

http://school.discovery.com/lessonplans This website provides hundreds of lesson plans categorized by grade and subject. It also includes resources for *Discovery Channel* videos.

http://school.discovery.com/schrockguide This lesson planning website includes a variety of resources including assessment and rubric tools and critical evaluation forms for web resources.

http://webquest.org This website includes a directory of good WebQuests as well as tools to build your own.

Further Reading

Grabe, Mark, and Grabe, Cindy. (2004). *Integrating Technology for Meaningful Learning,* 4th edition. Boston: Houghton Mifflin. An informative text with practical examples of integrated applications of technology.

International Society for Technology in Education. (2000). *National Educational Technology Standards for Students: Connecting Curriculum and Technology.* Eugene, OR: Author. Teacher-created lesson plans that integrate technology with English language arts, foreign language, mathematics, science, and social studies. Each lesson is accompanied by appropriate standards, a narrative by the teacher, and performance indicators.

International Society for Technology in Education. (2006). *National Educational Technology Standards for Students: Resources for Student Assessment.* Eugene, OR: Author. Strategies and tools for measuring students' ability to use technology for learning. It includes guidelines for creating and choosing reliable tests of technology literacy for various grades along with case studies and best practices.

Leu, Donald J., and Leu, Deborah Diadiun. (2000). *Teaching with the Internet Lessons from the Classroom,* 3rd edition. Norwood, MA: Christopher-Gordon. A book filled with interesting ways to use the Internet in instruction. Chapters provide examples of activities to use in different subject areas and applications that work well with students who have special needs.

Technology Counts 2006: The Information Edge: Using Data to Accelerate Achievement. (2006). Bethesda, MD: *Education Week,* Editorial Projects in Education. This report analyzes state and district efforts to manage data of student learning. Articles also address the ways teachers are using these databases to plan instruction.

Go to Allyn and Bacon's MyLabSchool **(www.mylabschool.com)** and complete the following activity for Chapter 13. Click on **Courses;** click on **Foundations/Intro Teaching;** click on **MLS Video Lab;** then click on **Module 8: Technology.**