SHELLY CASHMAN SERIES®

Teachers DISCOVERING COMPUTERS

Integrating Technology in a Changing World

EIGHTH EDITION

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Glenda A. Gunter
Randolph E. Gunter

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Teachers Discovering Computers
Integrating Technology in a Changing World, Eighth Edition
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Teachers Discovering Computers Integrating Technology in a Changing World

Eighth Edition

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Teachers Discovering Computers Integrating Technology in a Changing World

Eighth Edition

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Preface

The Shelly Cashman Series® offers the finest textbooks in computer education. We are proud of the fact that our previous *Teachers Discovering Computers* books have been so well received by instructors and students. The previous edition's popularity was due to (1) the integration of the Web, (2) the currency of the materials, (3) readability, (4) extensive exercises, (5) supplements, and (6) the ancillaries that allow an instructor to teach the way he or she wants to teach.

This latest edition of *Teachers Discovering Computers: Integrating Technology in a Changing World, Eighth Edition* continues with the innovation, quality, and reliability you have come to expect from this series. The eighth edition of *Teachers Discovering Computers* includes:

- A continued emphasis on technology integration and on teaching and reaching today's digital generation, as well as extensive information on using and integrating tablet computers (tablet-based learning) and apps (app-based learning)
- A New Critical Thinking section that gives your students the opportunity to explore, reflect, and research complex issues that are currently impacting K–12 education. In each chapter, Critical Thinking Exploration will present a different issue that is a topic of ongoing and important discussions by professors and their students in teacher preparation programs, and by teachers, administrators, and other stakeholders in K–12 schools.

Distinguishing Features

Teachers Discovering Computers: Integrating Technology in a Changing World, Eighth Edition includes the following distinguishing features:

A Proven Pedagogy

More than six million students have learned about computers using the Shelly Cashman Series computer concepts textbooks. With Web integration and interactivity, extraordinary visual drawings and photographs, unprecedented currency, and the Shelly Cashman Series approach, this book will make your introductory educational technology course for educators exciting and dynamic — an experience your students will remember as a highlight of their educational careers. Students and course instructors will find this to be the finest textbook they have ever used.

Web Integration

Teachers Discovering Computers continues the Shelly Cashman Series tradition of innovation with its extensive integration of the Web. The purpose of integrating the Web into the book is to (1) offer students additional infomation and currency on topics of importance; (2) make available alternative learning techniques with Web-based curriculum-specific content, learning games, practice tests, and videos; (3) underscore the relevance of the Web as a basic information tool that can be used in all facets of K-12 education and society; and (4) offer instructors the opportunity to organize and administer their campus-based or distance education-based courses on the Web. The Computer Concepts CourseMate for *Teachers Discovering Computers* works hand-in-hand with the text in three central ways:

- End-of-chapter assignments and many of the Special Features in the book have Web components. While working on an end-of-chapter assignment, students can go to the Computer Concepts CourseMate for *Teachers Discovering Computers* to look up key terms, explore the vast resources the Web has for education, or get an alternative point of view. The Computer Concepts CourseMate for *Teachers Discovering Computers* provides students with hundreds of links to additional sources of information on a chapter-by-chapter basis. These sources have been evaluated for appropriateness and are maintained by a team of educators.
- Computer Concepts CourseMate for *Teachers Discovering Computers* provides a rich multimedia learning experience. Students can watch informational videos to learn about new technologies, reinforce their learning by playing interactive games, and explore new integration concepts like blogs, podcasts, wikis, and screen-casts. In addition, an interactive timeline steps students through the major computer technology developments of the past 70 years, including the most recent advances.
- Throughout the text, marginal annotations titled Web Info provide suggestions on how to obtain additional information via the Web about an important topic

- Revised End of Chapter exercises and features, including a completely revised Apps Corner that will present app integration ideas and resources for the different categories of apps available in the market today.
- Updates to chapter content to cover new technologies and trends in educational technology.
- An updated References page, which contains information about all the references used to write this book.

covered on the page. The Computer Concepts CourseMate for *Teachers Discovering Computers* provides links to these additional sources.

This textbook, however, does not depend on Web access to be used successfully. The Web access adds to the comprehensive treatment of topics within the book.

A Visually Appealing Book that Maintains Student Interest

The latest technology, pictures, drawings, and text have been artfully combined to produce a visually appealing and easy–to–understand book. Many of the figures show a step-by-step pedagogy, which simplifies the more complex computer and educational technology concepts. Pictures and drawings reflect the latest trends in computer and educational technology. In addition, three marginal elements are included: Integration Strategies, FAQs, and ePortfolio Ideas. Integration Strategies boxes contain ideas and suggestions for integrating various end-of-chapter segments and special features related to topics presented in the text. Frequently asked questions (FAQ) boxes offer common questions and answers about subjects related to the topic at hand. The ePortfolio Idea icon identifies topics or technologies that students can include in their personal ePortfolio. Finally, the text was set in two columns, which research shows is easier for students to read. This combination of pictures, step-by-step drawings, and tested text layout sets a new standard for education textbook design.

Latest Educational Technology and Computer Trends

The terms and examples of educational technology described in this book are the same ones your students will encounter when using computers, especially tablet computers, in the school setting and at home. The latest educational software packages as well as apps for tablet computers and other mobile devices are shown throughout this book.

Macs and PCs

Unlike many businesses, both Macs and PCs are used in the K-12 school environment. This textbook addresses both computer platforms and describes the appropriateness and use of educational software for both Macs and PCs.

End-of-Chapter Activities

Unlike other books on educational technology fundamentals, a major effort was undertaken in *Teachers Discovering Computers* to offer exciting, rich, and thorough end-of-chapter materials to reinforce the chapter objectives and assist you in making your course the finest ever offered. As indicated earlier, each and every one of the end-of-chapter pages is stored as a Web page on the Computer Concepts CourseMate to provide your students in-depth information and alternative methods of preparing for examinations.

The content of the textbook and the Computer Concepts CourseMate Web site also have been enhanced to allow for curriculum-specific learning by all K-12 educators. That is, students using the *Teachers Discovering Computers* textbook will be able to learn both how to use, and more importantly, how to integrate technology into their current or future classroom curriculum. In addition, this eighth edition of *Teachers Discovering Computers* has been updated to address the ever-changing learning needs of the digital generation and to provide instructional strategies with techniques to address these needs.

Objectives of This Textbook

Teachers Discovering Computers: Integrating Technology in a Changing World, Eighth Edition is intended for use in a one-quarter or one-semester undergraduate or graduate-level introductory computer course for educators. Students will finish the course with a solid understanding of educational technology, including how to use computers, how to access and evaluate information on the Web, and how to integrate computers and educational technology into classroom curriculum. This book also can be used for in-service training workshops that train teachers, administrators, and counselors how to use and effectively integrate educational technology. The objectives of this textbook are to:

- Present practical, efficient ways to integrate technology resources and technology-based methods into everyday curriculum-specific practices
- Provide students with an understanding of the concepts and skills outlined in the new International Society for Technology in Education Standards for Students (ISTE Standards•S) and Standards for Teachers (ISTE Standards•T)
- Present the fundamentals of computers and educational technology in an easy-to-understand format
- Make use of the Web as a repository of the latest information and as an educational resource and learning tool for K-12 education
- Provide information about both Macs and PCs
- Give students an in-depth understanding of why computers are essential to society, the business world, and K-12 education
- Provide students with the knowledge of how to use educational technology with diverse K–12 student populations
- Offer numerous examples of how to use educational technology in various subject areas and with K–12 students who have special needs
- Provide students with knowledge of responsible, ethical, and legal uses of technology, information, and software resources
- Provide students with knowledge of technology to enhance their personal and professional productivity

Visual Walkthrough of the Book

Current. Relevant. Innovative. Teaching the Significance of Today's Digital World.

Integrating Educational Technology into the Curriculum

Objectives

After completing this chapter, you will be able to do the following:
[ISTE Standards•T 1 a-c; 2 a-c; 3 a-c; 4 a-b, d; 5 b, d]

- Define curriculum-specific learning
- Explain the difference between computer, information, and integration literacy
- Explain why it is necessary to change instructional strategies from traditional to new learning environments
- Describe the evolution of computers and digital media
- Differentiate among the various categories of computers
- Explain why computer technology and digital media are important for education
- Describe the International Society for Technology in Education Standards for Teachers (Standards•T) and Students (Standards•S)
- Explain why 21st century skills need to be incorporated in K-12 curriculum
- Describe the characteristics of today's digital students
- Describe six categories of what today's students need to know
- Provide examples of how computers are changing the way people teach and learn
- Describe why it is so important for every teacher to have a current *ePortfolio*

Computer technology and mobile devices play an essential role in how individuals work, live, play, and, more importantly, learn. Organizations of all sizes — even the smallest schools and businesses — rely on technology to help them operate more efficiently and effectively. At home, work, and school, computers help people work faster, more accurately, and, in most cases, in ways that previously were not possible. People use computers and other technologies at home for education, entertainment, information management, and business purposes. They also use computers as tools to access information and to communicate with others around the world. In the classroom, computers and computer-related technologies are having a profound influence on the way teachers teach and students learn. Even the activities that are part of your daily routine — typing a report, driving a car, paying for goods and services with a credit card, sending e-mail on your smartphone, or using an ATM — involve the use of computer technology.

Chapter Objectives
Before reading the chapter, carefully read through the Objectives to familiarize yourself with what you will learn in each chapter.

Step Figures
Step figures present complex computer concepts using a step-by-step pedagogy.

How the Internet Works 67

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6

Figure 2-13 How data might travel the Internet using a cable modem connection at home.

INTERNET ADDRESSES

The Internet relies on an addressing system much like that of the postal system to send data to a computer at a specific destination. Each computer's location on the Internet has a specific numeric address consisting of four groups of numbers. Because these all-numeric computer addresses are difficult to remember and use, the Internet supports the use of text-based names that represent the numeric address. The text version of a computer address is called a **domain name**. Figure 2-14 shows both the numeric address and the domain name of the Google Web site. The components of a domain name are separated by periods, each of which is referred to as a dot.

For domestic Web sites, the rightmost portion of the domain name contains a domain type label that identifies the type of organization that maintains the Web site. The rightmost portion of a university Web site, for example, is .edu, which denotes it as a site operated by an educational institution. The domain names for some K-12 school sites include the label .k12 followed by the abbreviation for the school's state. For international Web sites, the domain name also includes a country code, such as .us for the United States and .uk for the United Kingdom. Figure 2-15 on the next page lists common domain type labels, as well as several country code abbreviations.

numeric address: 72.14.207.99
domain name: www.google.com

Figure 2-14 The numeric address and domain name for the Google Web site.

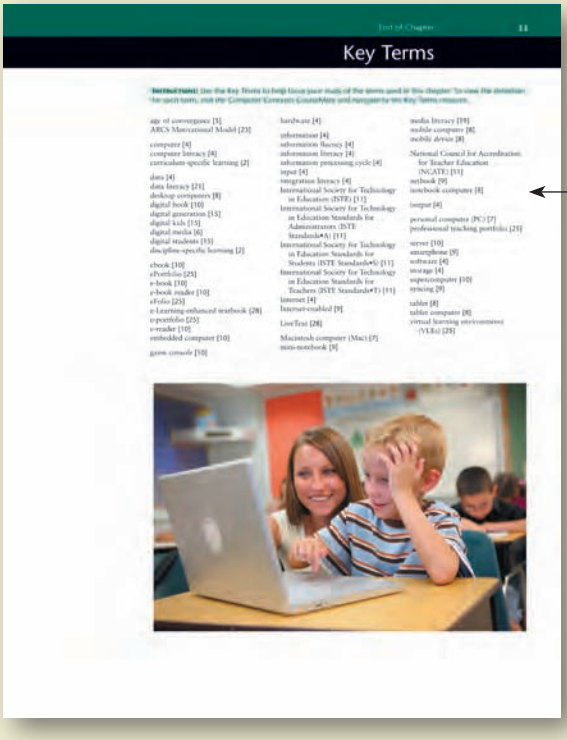
FAQs
FAQ (frequently asked questions) boxes offer common questions and answers about subjects related to the topic at hand.

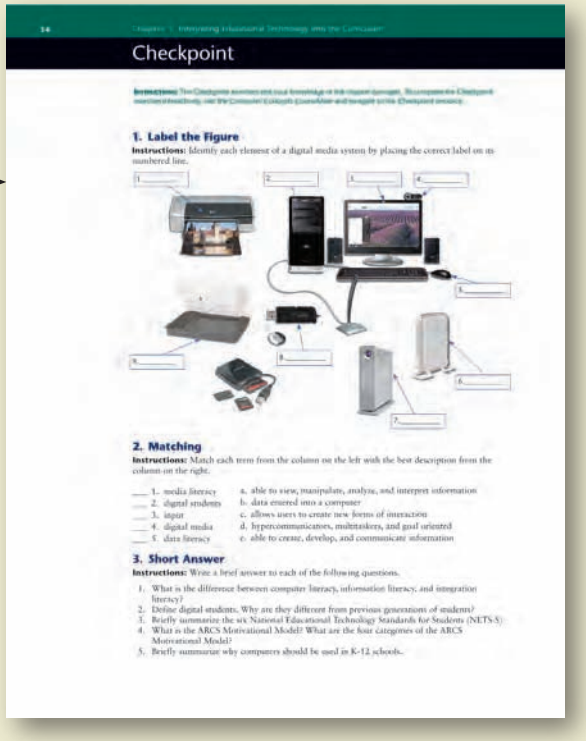
Web Info
These marginal annotations provide suggestions on how to obtain additional information via the Web about an important topic covered on the page.

Integration Strategies
These boxes contain ideas and suggestions for integrating various end-of-chapter segments and special features related to topics presented in the text.

ePortfolio Idea
The ePortfolio Idea icon identifies topics or technologies that students can include in their personal ePortfolio.

End-of-Chapter Student Activities





Key Terms
This list of the key terms with page references will aid students in mastering the chapter material. A complete summary of all key terms in the book, together with their definitions, appears in the index at the end of the book.

Checkpoint
Matching and short-answer questions, together with a figure from the chapter that can be labeled, are used to reinforce the material presented within the chapter.


Teaching Today

1. Online vs. Printed Newspapers

2. Social Networking

3. Health-related Information Online

4. mLearning

Teaching Today
This section is designed to help students gain an appreciation of the value that technology and the World Wide Web have for K-12 education by visiting exciting educational Web pages and completing suggested curriculum integration tasks. The Web pages provide links to challenge students further on a vast array of interesting teacher-related topics.


Education Issues

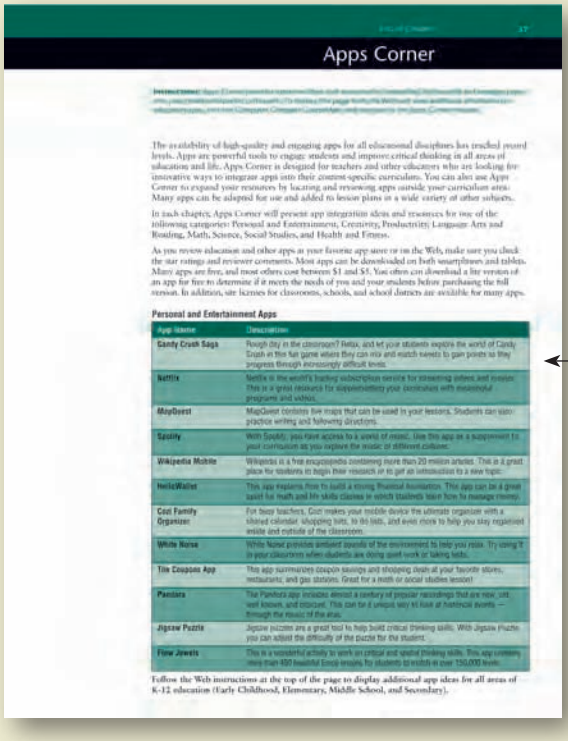
1. School Violence

2. Possible Child Abuse

3. Reality or Fantasy

4. Possible Cheating

Education Issues
The use of computers and other technologies in education are not without controversy. At the end of each chapter, several scenarios are presented that challenge students to critically examine the use of technology in K-12 education and society in general. Other non-technology related scenarios allow students to explore many current controversial issues in education, such as school violence.


Apps Corner

Personal and Entertainment Apps

App Name	Description
Candy Crush Saga	
Netflix	
MapQuest	
Spotify	
Wikipedia Mobile	
HelloWallet	
Cozi Family Organizer	
White Noise	
The Coupons App	
Pandora	
Jigsaw Puzzle	
Flow Jewels	

Follow the Web instructions at the top of the page to display additional app ideas for all areas of K-12 education (Early Childhood, Elementary, Middle School, and Secondary).

Apps Corner
This innovative section provides extensive ideas and resources for integrating apps into your classroom-specific curriculum. In each chapter, Apps Corner presents app integration ideas and resources for one of the following categories: Personal and Entertainment, Creativity, Productivity, Language Arts and Reading, Math, Science, Social Studies, and Health and Fitness.


Digital Media Corner

1. WebBlender

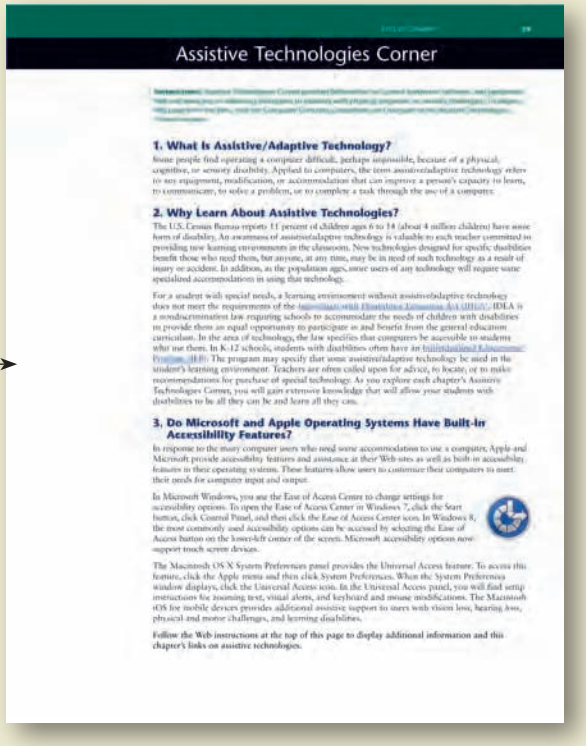
2. Prezi

3. Audacity

4. Timeliner XE

Digital Media Corner
Today's K-12 digital students need their learning to be meaningful and relevant to their lives. Digital Media Corner provides links to videos, ideas, and examples of how students can use digital media to enhance their teaching as well as the learning of their K–12 students.

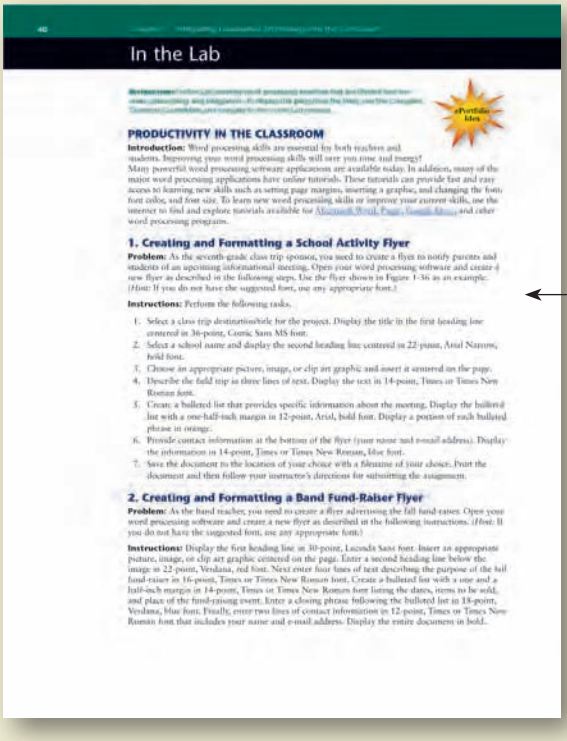
Assistive Technologies Corner
This new section provides information on current hardware, software, and peripherals that will assist students using this text in delivering instruction to their K-12 students with physical, cognitive, or sensory challenges. The Web pages provide extensive additional information and links to dozens of current and emerging assistive technologies.


Assistive Technologies Corner

1. What Is Assistive/Adaptive Technology?

2. Why Learn About Assistive Technologies?

3. Do Microsoft and Apple Operating Systems Have Built-in Accessibility Features?


In the Lab

PRODUCTIVITY IN THE CLASSROOM

1. Creating and Formatting a School Activity Flyer

2. Creating and Formatting a Band Fund-Raiser Flyer

In the Lab

These exercises are divided into two areas: productivity and integration. Students can use the productivity exercises to improve their software-specific skills in using word processing, spreadsheets, database, desktop publishing, curriculum and Web page development, and other productivity software programs. They can use the integration ideas for incorporating these programs into their classroom-specific curriculum. The Web pages provide links to tutorials, productivity ideas, integration examples and ideas, and more.


Critical Thinking Exploration

Let's Explore...
TEACHER PERFORMANCE, EVALUATION, AND ACCOUNTABILITY

Introduction

Delving Deeper

Critical Thinking Exploration

Critical Thinking Exploration provides students the opportunity to explore, reflect, and research complex issues that are currently impacting K–12 education. In each chapter, Critical Thinking Exploration presents a different issue that is a topic of ongoing and important discussions by professors and their students in teacher preparation programs, and by teachers, administrators, and other stakeholders in K–12 schools. Further Exploration questions allow students to use the resources presented in the text and their critical thinking skills to delve deeper into the issue.

Special Features

Guide to Professional, State, and Federal Web Sites This special feature following Chapter 1 contains more than 30 popular professional educational organizations, over 25 federal government agencies, as well as links to the departments of educations for all 50 states and the District of Columbia; these links are also updated and described at the Computer Concepts CourseMate for this textbook.

Learning Theories and Educational Research The special feature following Chapter 5 provides information about educational learning theories and research. This feature introduces students to educational terms, learning theories and theorists, educational research, and learning strategies.

A World without Wires — Tablets, Apps, and More This new and innovative special feature following Chapter 6 presents an overview of the wireless revolution and covers the latest information on and features of tablet computers. Also included is extensive information on apps and app-based learning.

Timeline — Milestones in Computer History Visit the Computer Concepts CourseMate for this book to view an interactive, colorful, and highly informative timeline of the history of computers from 1937 to the present. The timeline contains dozens of links to extensive supplemental information, including historical audio segments, animations, videos, and much more.

Guide to World Wide Web Sites, Searching Techniques, and Search Tools for Education Visit the Computer Concepts CourseMate for this book to view a multi-page listing with updated links and information on more than 150 popular Web sites. These Web sites are organized into general categories, such as Entertainment, Health and Medicine, Government and Politics, Shopping, and more. This feature also provides links to numerous popular education search tools.

Buyer's Guide: How to Purchase Computers and Mobile Devices Visit the Computer Concepts CourseMate for this book to view a multi-page guide that introduces students to purchasing a personal computer, desktop computer, notebook/netbook computer, and tablet computers and other mobile devices.

Appendix The appendix lists the various books, articles, and other sources of information used in developing Teachers Discovering Computers that are not referenced at the Computer Concepts CourseMate for this book.

Instructor Resources

Available on the Instructor Companion site, these Instructor Resources include both teaching and testing aids.

Instructor's Manual Includes lecture notes summarizing the chapter sections, figures and boxed elements found in every chapter, teacher tips, classroom activities, lab activities, and quick quizzes in Microsoft Word files.

Syllabus Easily customizable sample syllabi that cover policies, assignments, exams, and other course information.

Figure Files Illustrations for every figure in the textbook in electronic form.

Solutions to Exercises Includes solutions for all end-of-chapter exercises.

PowerPoint Presentations A multimedia lecture presentation system that provides slides for each chapter. Presentations are based on chapter objectives.

Cognero® Cengage Learning Testing Powered by Cognero is a flexible, online system that allows you to: author, edit, and manage test bank content from multiple Cengage Learning solutions; create multiple test versions in an instant; and deliver tests from your LMS, your classroom or wherever you want.

Computer Concepts CourseMate

The Computer Concepts CourseMate for *Teachers Discovering Computers* goes beyond the book to bring your course concepts to life! The content in the CourseMate site is integrated into the pages of the text, giving students easy access to current information on important topics, reinforcement activities, and alternative learning techniques. Integrating the Computer Concepts CourseMate into the classroom keeps today's students engaged and involved in the learning experience.

For each chapter in the text, students can access a variety of interactive quizzes and learning games, exercises, Web links, videos, and other features that specifically reinforce and build on the concepts presented in the chapter. This digital solution encourages students to take learning into their own hands and explore related content on their own to learn even more about subjects in which they are especially interested.

All of these resources on the Computer Concepts CourseMate for *Teachers Discovering Computers* enable students to get more comfortable using technology and helps prepare students to use the Internet as a tool to enrich their lives.

Contact Us

The Shelly Cashman Series is dedicated to providing you with all of the tools you need to make your class a success. For information on any of our product offerings, contact your Cengage Learning representative or call one of the following telephone numbers:

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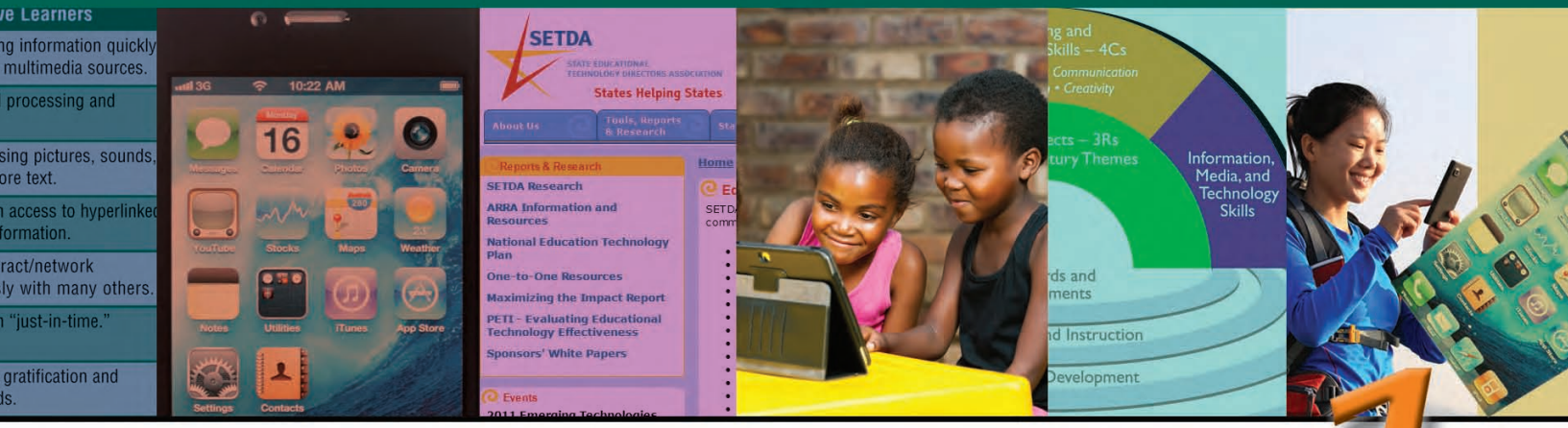
CourseNotes — Technology in a Flash!

Course Technology's CourseNotes are six-panel quick reference cards that reinforce the most important and widely used features of a software application in a visual and user-friendly format. CourseNotes serve as a great reference tool during and after the student completes the course. CourseNotes are available for software applications, such as Microsoft Office 2013, Word 2013, Excel 2013, Access 2013, PowerPoint 2013, and Windows 8. Topic-based CourseNotes are available for Best Practices in Social Networking, Hot Topics in Technology, and Web 2.0. Visit www.cengage.com to learn more!

Acknowledgements

For this eighth edition, the authors would like to thank Dr. Becky Rogers for her professionalism and remarkable attention to detail in making this edition the best TDC textbook ever. Most importantly, a big thank you to the exceptional team at Cengage, especially Sarah Ryan, who day after day answer our questions, address our concerns, and keep this book on track and fabulous.

Glenda A. Gunter, Ph.D.
Randolph E. Gunter, Ph.D.



Integrating Educational Technology into the Curriculum

1

Objectives

After completing this chapter, you will be able to do the following:
[ISTE Standards•T 1 a-c; 2 a-c; 3 a-c; 4 a-b, d; 5 b, d]

- Define curriculum-specific learning
- Explain the difference between computer, information, and integration literacy
- Explain why it is necessary to change instructional strategies from traditional to new learning environments
- Describe the evolution of computers and digital media
- Differentiate among the various categories of computers
- Explain why computer technology and digital media are important for education
- Describe the International Society for Technology in Education Standards for Teachers (Standards•T) and Students (Standards•S)
- Explain why 21st century skills need to be incorporated in K-12 curriculum
- Describe the characteristics of today's digital students
- Describe six categories of what today's students need to know
- Provide examples of how computers are changing the way people teach and learn
- Describe why it is so important for every teacher to have a current ePortfolio

Computer technology and mobile devices play an essential role in how individuals work, live, play, and, more importantly, learn. Organizations of all sizes — even the smallest schools and businesses — rely on technology to help them operate more efficiently and effectively. At home, work, and school, computers help people work faster, more accurately, and, in most cases, in ways that previously were not possible. People use computers and other technologies at home for education, entertainment, information management, and business purposes. They also use computers as tools to access information and to communicate with others around the world. In the classroom, computers and computer-related technologies are having a profound influence on the way teachers teach and students learn. Even the activities that are part of your daily routine — typing a report, driving a car, paying for goods and services with a credit card, sending e-mail on your smartphone, or using an ATM — involve the use of computer technology.

Web Info

For more information about and ideas from teachers integrating technology into their curriculum, visit the Computer Concepts CourseMate Web site at *www.cengagebrain.com,* navigate to the Chapter 1 Web Info resource for this book, and then click Integration Ideas.

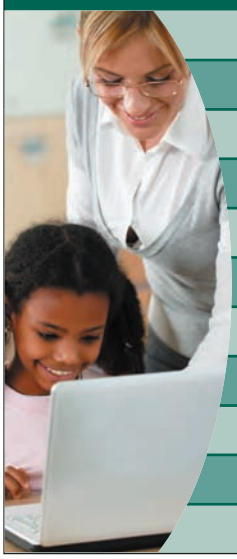
As they have for a number of years, computers and related technologies continue to influence the lives of most individuals. Today, teachers in K-12 schools are educating students who will spend all of their adult lives in a technology-rich society. To help schools better educate students, the federal government, state governments, and school districts have spearheaded massive funding efforts to equip classrooms with computers, with connectivity to networks, and with access to the Internet and the World Wide Web. Teachers in these classrooms must be prepared to utilize both current and emerging technologies.

The purpose of this book is to provide you with the knowledge you need to use and integrate technology into your specific classroom curriculum. Chapter 1 introduces you to basic computer concepts and digital media as well as to how teachers and administrators integrate computer technology and digital media into K-12 education. As you read, you also will begin to understand the vocabulary used to describe computer technology, mobile devices, digital media, and educational technology. Remember that this chapter lays the foundation for you to begin to understand how you can modify your teaching strategies to include the skills that your students will need to be successful and productive citizens.

Curriculum-Specific Learning

As you review the materials and concepts presented in this textbook and the accompanying Web site, continuously ask yourself how you can use and integrate the knowledge you are gaining into your specific curriculum interests. Reflect on three ways you can use your newly acquired knowledge: (1) for your own professional development, (2) for using technology as a productivity tool in your classroom, and, most importantly, (3) for extensively integrating technology, mobile devices, and digital media into your instructional strategies, lessons, student-based projects, and student assessments to improve student learning — in other words, throughout the curriculum. By doing this, you will be involved in **curriculum-specific learning** or **discipline-specific learning**, which is when you are learning how to apply teaching principles, knowledge, and ideas to authentic and practical classroom lessons and projects that can benefit your students.

Traditional 20th century educational practices will no longer provide you with the skills you need to teach your students effectively how to become productive citizens in today's high-tech, global workplace. Figure 1-1 lists characteristics representing traditional approaches to learning and corresponding strategies associated with



Establishing New Learning Environments by Incorporating New Strategies

Traditional Learning Environments	New Learning Environments
Teacher-centered instruction	*Student-centered learning*
Single-sense stimulation	*Multisensory stimulation*
Single-path progression	*Multipath progression*
Single media	*Multimedia*
Isolated work	*Collaborative work*
Information delivery	*Information exchange*
Passive learning	*Active/exploratory/inquiry-based learning*
Factual, knowledge-based learning	*Critical thinking and informed decision making*
Reactive response	*Proactive/planned action*
Isolated, artificial context	*Authentic, real-world context*

Source: International Society for Technology in Education (ISTE)

Figure 1-1 This chart shows the characteristics that represent traditional approaches to learning and corresponding strategies often associated with new learning environments for K-12 students.

new learning environments for K-12 students. As you continue to integrate educational technology, mobile devices, and digital media, you will find yourself transitioning from using traditional teaching and learning strategies to using many new and exciting technology-enriched teaching and learning strategies. Refer to Figure 1-1 often as you learn how to integrate technology, mobile devices, and digital media into your curriculum and practice using these new teaching strategies.

Another important issue is that teachers no longer have the time to create their various lesson plans and other documents from scratch, or in other words, constantly reinvent the wheel. The primary reason for extensively eLearning-enhancing this textbook is to provide you with hundreds of outstanding curriculum-specific resources and integration ideas that you can modify for use in your classroom curriculum. These resources are organized so you can choose the best curriculum-specific content to improve your students' learning. We encourage you to interact with the curriculum-specific content that works for you, and then adopt and modify the content and other information, integrating it into your classroom curriculum.

Computer, Information, and Integration Literacy

Today, the vocabulary of computing is all around you. Before the advent of computers, memory was an individual's mental ability to recall previous experiences; storage was a place for all your extra stuff; and communication was the act of exchanging opinions and information through writing, speaking, or sign language. In today's world, these words and countless others have taken on new meanings as part of the vocabulary used to describe computers and their uses.

When you hear the word "computer," initially you may think of computers used in schools to perform activities such as creating flyers, memos, and letters; managing student records and calculating grades; or tracking library books. In the course of a day or week, however, you encounter many other computers. Your home, for instance, contains a myriad of electronic devices, such as wireless telephones, DVRs, DVD players, handheld video games, digital cameras, and mobile devices (such as portable computers, e-book readers, iPads, and so on).

Computers help you with your banking when you use automatic teller machines (ATMs) to deposit or withdraw funds. When you buy groceries, a computer tracks your purchases and calculates the amount of money you owe; it may even generate custom coupons based on your buying patterns. Even your car is equipped with numerous computers that operate the electrical system, control the temperature, run sophisticated antitheft devices, and much more.

Today, most occupations involve the use of computers on a daily basis (Figure 1-2). As the world of computers and computer-related technologies

Integration Strategies

To access dozens of integration ideas specific to your classroom curriculum, visit the Computer Concepts CourseMate Web site at *www.cengagebrain.com*, navigate to the Chapter 1 Apps Corner resource for this book, and then navigate to your grade-level corner.

Figure 1-2 Computer technology, digital media, and mobile devices are present in every aspect of daily living — in the workplace, at home, in the classroom, and for entertainment.

advances, it is essential that you gain some level of **computer literacy**; that is, you must have current knowledge and understanding of computers and their uses.

Information literacy, also known as **information fluency**, means knowing how to find, analyze, use, and communicate information. Information literacy is the ability to gather information from multiple sources, select relevant material, and organize it into a form that will allow the user to make decisions or take specific actions.

Students must learn to make informed decisions based on information obtained in all areas of their lives. For example, suppose you decide to move to a new city and need a place to live. You could find a home by driving around the city looking for a house or apartment within your price range that is close to school or work. As an information literate person, however, you might search for a home using the **Internet**, which is a global network of computers that contains information on a multitude of subjects. Using Internet resources to locate potential homes before you leave will make your drive through the city more efficient and focused.

How does computer technology relate to information literacy? They relate because information on housing, cars, and other products, as well as information on finances, school systems, travel, and weather, is increasingly accessible by using computers. For example, with communications equipment, you can use a computer to connect to the Internet to access information on countless topics. After you have accessed the desired information, computers can help you analyze and use that information.

Computer and information literacy are very important for educators because today's teachers also must use computers as a tool to facilitate learning. Teachers must be able to assess technology resources and plan classroom activities using available technologies. These skills are part of **integration literacy**, which is the ability to use computers, mobile devices, digital media, and other technologies combined with a variety of teaching and learning strategies to enhance students' learning. Integration literacy means that teachers understand how to match appropriate technology to learning objectives, goals, and outcomes. A solid foundation of computer and information literacy is essential to understanding how to integrate technology into the classroom curriculum successfully.

As an educator, technology will affect your work and your life every day — and will continue to do so in the future. Today, school administrators use technology to access and manage information, and teachers use computers to enhance teaching and learning. The computer industry is continually developing new uses for computers, mobile devices, and digital media, while also making improvements to existing technologies. Learning about computers, mobile devices, digital media, and other technologies will help you function effectively in society and become a better facilitator of learning.

Web Info

For more information on information fluency, visit the Computer Concepts CourseMate Web site at *www.cengagebrain.com*, navigate to the Chapter 1 Web Info resource for this book, and then click Information Fluency Ideas.

FAQ

Is data singular or plural?

With respect to computers, it is accepted and common practice to use the word data as either singular and plural as long as you are consistent in how you use it.

What Is a Computer and What Does It Do?

In basic or traditional terms, a **computer** is an electronic device that operates under the control of instructions stored in its memory, accepts data, processes the data according to specified rules, produces results, and stores the results for future use. In other words, a computer is a computational device.

Data is a collection of unorganized facts. Computers manipulate and process data to create information. **Information** is data that is organized, has meaning, and is useful. Examples of information are reports, newsletters, receipts, pictures, invoices, or checks. As shown in Figure 1-3, for example, computers process lots of data to provide a student grade report.

Data entered into a computer is called **input**. The processed results are called **output**. Thus, a computer processes input to create output. A computer can hold data for future use in an area called **storage**. This cycle of input, process, output, and storage is called the **information processing cycle.**

The electronic and mechanical equipment that makes up a computer is called **hardware**. These components are covered in Chapter 4. **Software** is the series of instructions that tell the hardware how to perform tasks. Software is covered in Chapter 3. Without software, hardware is useless; hardware needs the instructions provided by software to process data into information.

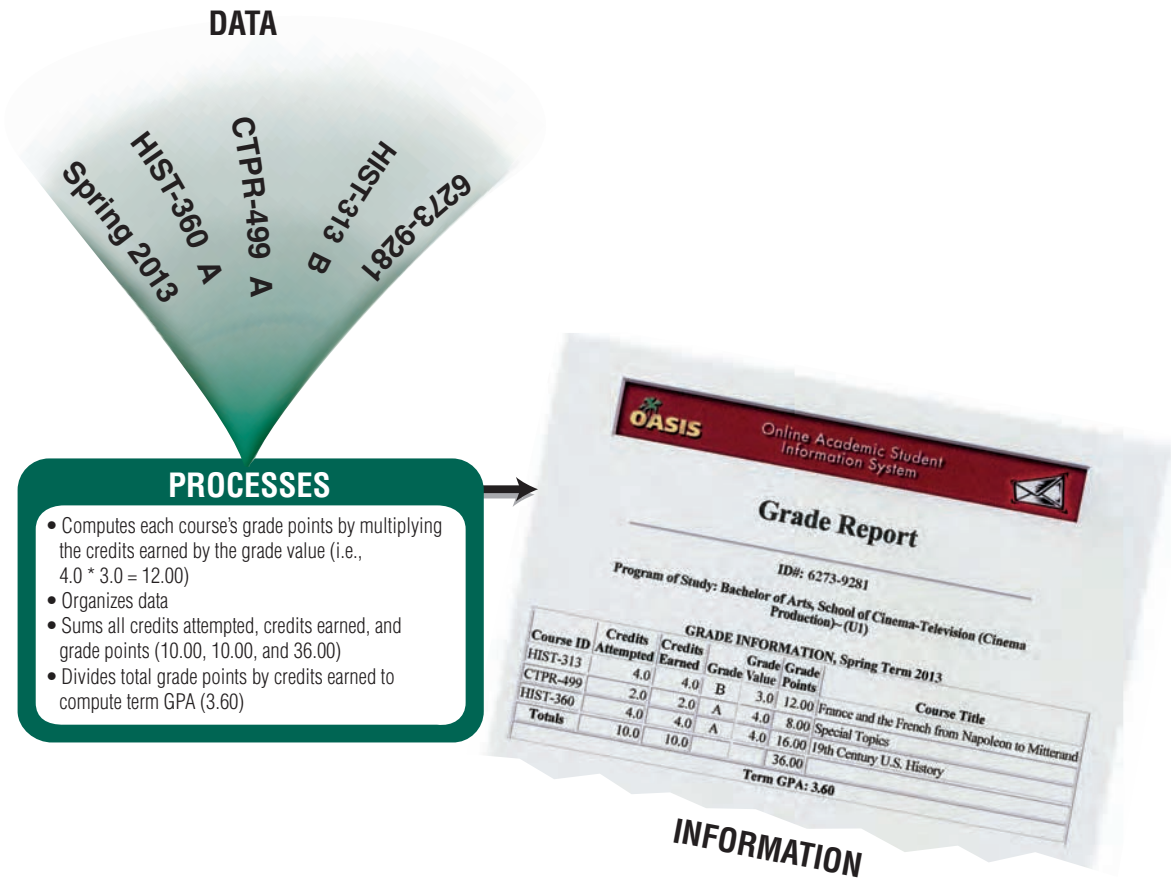


Figure 1-3 A computer processes data into information. In this simplified example, the student identification number, semester, course codes, and course grades all represent data. The computer processes the data to produce the grade report (information).

The Evolution of Computers and Digital Media

The evolution of modern technologies started over 100 years ago, first with the telegraph, then telephones, radios, television, early computers, large and bulky mainframe computers, and, finally, the development of the personal computer in the early 1980s. The enormous popularity of the Internet, in particular the World Wide Web, has resulted in a computer that is more than a simple computational device. In fact, the computer has morphed into a device used for communication, media creation, learning, and so much more.

Recent advancements in technology merge the various forms of communications (the telephone, television, and computers) into effective, interactive, mobile devices. Even though the merging of these technologies into mobile devices continues to evolve, the first decade of the 21st century was known as the **age of convergence**. This age of convergence will continue to evolve in new, exciting, and yet to be determined ways as we live, teach, learn, and work in the second decade of this century. This merging of technologies is possible because significantly faster processors and high-speed wireless networks have been able to capitalize on the advancements made in the areas of digital graphics, video, animation, audio, and online media. Today's personal computer and mobile device architectures take advantage of a computer's individual power, digital media capabilities, and the ability to be interconnected with others in networked environments, also known as social networking. As a result, multimedia technology systems have become increasingly more powerful and better able to handle information rich in visual and aural content.

Web Info

For more information on the age of convergence, visit the Computer Concepts CourseMate Web site at *www.cengagebrain.com*, navigate to the Chapter 1 Web Info resource for this book, and then click Age of Convergence.

Figure 1-4 Common computer hardware components associated with a digital media computer.

The goal of multimedia computing and communications is to assist individuals in organizing and managing vast amounts of information in various types of media. Figure 1-4 above shows the components of a typical digital media computer system that allows the average person to use multiple senses when working and communicating. To see just how far personal computer technology has come in a relatively short period of time, compare this figure to the pictures shown on the next page of personal computers developed by IBM and Apple in the early 1980s.

WHAT IS DIGITAL MEDIA?

Digital media is defined in a variety of ways; however, for the purposes of this book, **digital media** is defined as those technologies that allow users to create new forms of interaction, expression, communication, and entertainment in a digital format. The term digital media has been coined to reflect the evolution of multimedia computing into multisensory communications. The goal of multimedia, and now digital media, is to reproduce as closely as possible the reliability and effectiveness found in face-to-face (f2f) communications, and then emulate that in virtual and online environments, such as social networking, using computers, mobile devices, and other technologies.

In the next few sections, we will briefly review the various categories of computers, including information on mobile computers and mobile devices.

Categories of Computers

Computers can be organized in these general categories: personal computers; mobile computers and mobile devices; game consoles; and servers, supercomputers, and embedded computers. The next few sections briefly cover these categories; all of these types of computers are discussed in detail in later chapters and special features.

Personal Computers

A **personal computer**, or **PC**, is a computer that has the capability to perform input, processing, output, and storage activities. A personal computer contains a processor, memory, and one or more input, output, and storage devices.

Many people associate the term personal computer, or PC, with computers that use Microsoft Windows, which is a popular operating system used on many of today's computers. All personal computers, however, do not use Windows. For example, Apple computers use a different operating system, Mac OS, but they still are a type of personal computer. Why the confusion?

The first Apple computer, available for personal use, was built in 1976. Subsequent versions, the Apple II and later the Apple IIe, were immediate successes. These Apple computers were quickly adopted by elementary schools, high schools, and colleges.

In 1981, the IBM Corporation released its first personal computer, the IBM Personal Computer (Figure 1-5). The IBM Personal Computer was an instant business success and quickly became known by its nickname — the PC. For marketing reasons, IBM allowed other companies to copy its computer design; therefore, many companies started making IBM-compatible computers. These computers originally were called IBM-compatible because they used software that was the same as or similar to the IBM PC software. All subsequent IBM computers and IBM-compatible computers were called PCs.

Three years after the introduction of the first IBM PC, the Apple Computer Company introduced the **Macintosh computer,** now known as **Mac** computers or simply Macs (Figure 1-6). In addition to the Mac, Apple also introduced a pointing device called a mouse. Macs could accomplish many of the same tasks as PCs, but they were very different from each other. Macs were incompatible with IBM PCs because they used operating system software different from the IBM and IBM-compatible computers. As a result, a distinction developed between the terms Mac and PC, even though Macs are personal computers. This distinction and confusion between the two types of computers continues today. To avoid confusion,

Web Info

For more information about Apple computers, visit the Computer Concepts CourseMate Web site at *www.cengagebrain.com*, navigate to the Chapter 1 Web Info resource for this book, and then click Apple.

Figure 1-5 The original IBM Personal Computer was introduced in 1981.

Figure 1-6 Apple Computer Company produced the Macintosh computer in 1984.

users often refer to these two types of personal computers as Windows environment or Mac environment.

Today, businesses, homes, and K-12 schools use dozens of different models of Apple and IBM-compatible personal computers. To avoid confusion in this textbook, personal computers that use Microsoft Windows are referred to as PCs and all Apple personal computers are referred to as Apple or Mac computers (Figure 1-7). When this textbook refers to the terms personal computer, desktop computer, or computer, the subject matter being discussed is applicable to Apple, IBM, and IBM-compatible computers. Most of the concepts and terms covered in this textbook are applicable to all types of personal computers.

Personal computers shown in Figure 1-7 also are called **desktop computers** because they are designed so the system unit, input devices, output devices, and any other devices fit entirely on a desk.

Mobile Computers and Mobile Devices

A **mobile computer** is a personal computer that you can carry from place to place. One popular type of mobile computer is the notebook computer. Other popular types include tablet computers and netbooks. A **mobile device** is a computing device small enough to hold in your hand and usually does not have disk drives.

A **notebook computer**, also called a laptop computer, is a portable, personal computer small enough to fit on your lap. Today's notebook computers are thin and lightweight, yet they can be as powerful as the average desktop computer (Figure 1-8).

The **tablet computer**, or simply **tablet**, is a letter-sized notebook computer that you interact with by touching the screen with your finger (Figure 1-9). If preferred, you can use a wireless keyboard and other accessories with a tablet. Apple introduced

[a]

[b]

Figure 1-7 Figure 1-7a shows a typical PC using the Windows OS and Figure 1-7b shows a typical Apple computer using the Mac OS.

[a]

[b]

Figure 1-8 Notebook computers are available in Windows and Mac environments. Shown in Figure 1-8a is a typical PC notebook using Windows; Figure 1-8b shows a MacBook.

FAQ

Are sales for notebook computers and desktop computers declining?

Yes, starting in early 2011, sales of traditional notebook and desktop computers started declining caused primarily by surging tablet (iPads and others) sales — a sure sign that we have entered an era of mobile computing.

Figure 1-9 The iPad is a widely used tablet.

the iPad, one example of a tablet computer, in early 2010, and current sales projections regarding Apple iPads and other tablet computers are approximately one billion by 2015, including millions for use by K-12 students. Tablet computers are covered in later chapters and the special feature that follows Chapter 6.

A **netbook**, also called a **mini-notebook**, is a small, lightweight, and portable computer designed for wireless communication and access to the Internet. The name netbook was derived from the combination of the two words: Internet and notebook.

Mobile devices usually store programs and data permanently in memory chips inside the system unit or in small storage media such as flash memory cards. Many mobile devices are **Internet-enabled**, meaning they can connect to the Internet wirelessly. Often, you can connect a mobile device to a personal computer to exchange information between the computer and the mobile device, which is a process called **syncing**. Popular mobile devices are smartphones and e-book readers (described below); others include portable media players, and digital cameras, which are covered in Chapter 4.

Offering the convenience of one-handed operation, a **smartphone** is an Internet-enabled phone that usually provides personal information management functions such as a calendar, an appointment book, an address book, a calculator, and a notepad. In addition to basic phone capabilities, a smartphone allows you to send and receive e-mail messages and access the Web — usually for an additional fee. Some smartphones communicate wirelessly with other devices or computers. Many also function as a portable media player and include built-in digital cameras so that you can share photos or videos with others as soon as you capture the image. Many smartphones also offer a variety of application software such as word processing, spreadsheet, and games, and the capability of conducting live video conferences.

Many smartphones have keypads that contain both numbers and letters so that you can use the same keypad to dial phone numbers and enter messages. Others have a built-in mini keyboard on the front of the phone or a keyboard that slides in and out from behind the phone. Some have touch screens, which you can use to press icons on the screen to make selections or to enter text through an on-screen keyboard. Figure 1-10 provides examples of two popular smartphones.

[a] **[b]**

Figure 1-10 Figure 1-10a shows Apple's iPhone and Figure 1-10b shows the BlackBerry Bold.

Instead of calling someone's smartphone or cell phone, users often send messages to others by pressing buttons on their phone's keypad, keys on the mini keyboard, or icons on an on-screen keyboard. Types of messages users send with smartphones include text messages, instant messages, picture messages, and video messages.

FAQ

Are tablet computers replacing traditional computers in schools?

Yes, numerous computer companies offer tablets and because of their small size and functionality, tablet computers are quickly becoming mainstream with students in both K-12 and higher education.

FAQ

Why are they called smartphones?

A smartphone can be a telephone and a camera. It can be used to access the Internet for music, news, sports, and more. The manufacturers for these phones also call them intelligent phones because of the many different things they can do.