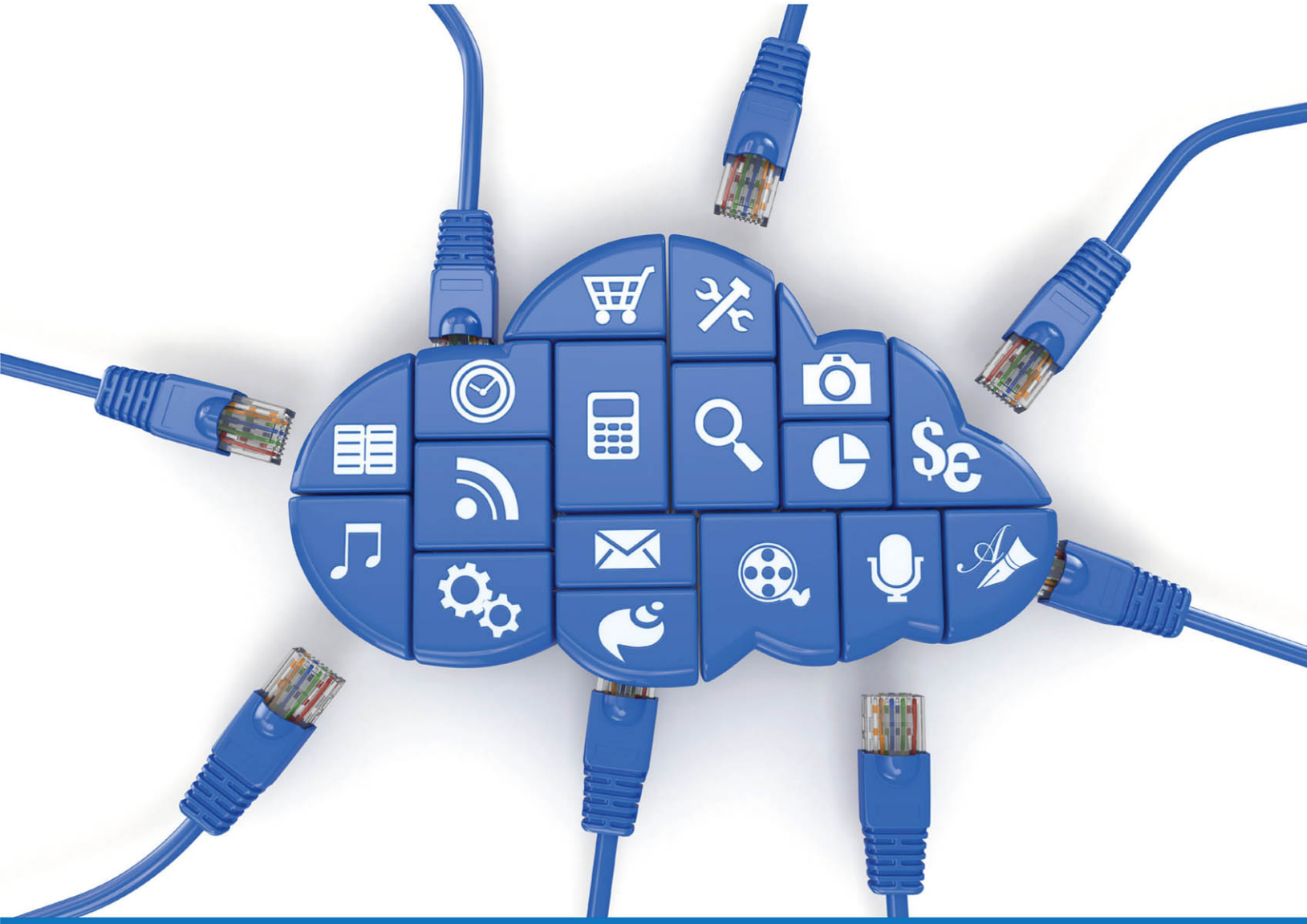
GLOBAL EDITION

Technology in Action

Complete

TWELFTH EDITION

Alan Evans • Kendall Martin • Mary Anne Poatsy



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What's New
Technology in Action, 12th Edition

We are delighted for you to explore the Twelfth Edition of *Technology in Action*!

Explore, discover, and experience technology with the immersive and adaptive ***Technology in Action****—the book that uses technology to teach technology!*

Technology in Action is a learning system that pushes the envelope of what is possible in technology, and what is helpful in teaching. It is a system that fits the way students are learning today and uses rich companion media to engage students in and out of the classroom while providing essential training on computer concepts.

What's New?

- All content has been updated as needed to ensure coverage of the most current technology, and updated end-of-chapter exercises are included throughout the book, including a NEW end-of-chapter quiz and updated versions of the Check Your Understanding reviews.
- **NEW Make This** projects address the hot area of mobile app creation! Mobile app creation skills are already highly valued in the workplace. The Make This projects are a fun way to engage your students while helping them develop cutting-edge skills. Each chapter includes a *Make This* mobile app project, most of which use App Inventor. By the end of the course, students will have completed 13 small app projects that provide them with new skills they can use to create their own apps. And if they don't have an Android device, they can use the emulator and still learn the skills.
- **NEW Solve This** projects put the concepts students are learning into action through real-world problem solving using a Microsoft Office application or other technology tool!

UPDATED AND ENHANCED media offerings including:

- **Sound Bytes:** These multimedia lessons help demystify computer concepts with audio and video presentations. All Sound Bytes have been reviewed and updated as needed to provide timely and accurate information. This edition also includes two NEW Sound Bytes: "Using the Arduino Microcontroller" and "Programming with the Processing Language."
- **Active Helpdesk:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via live chat, FAQ searches, etc. at a helpdesk. Students play the role of a helpdesk staffer answering technology questions using these various approaches**.** All Helpdesks have been reviewed and updated as needed.
  - A virtual supervisor provides support to the student throughout the activity.
  - Assessment questions after each Helpdesk provide instructors with a tool to gauge and track students' progress. This edition includes three NEW or completely revised Helpdesks: "Evaluating Websites," "Working with Smartphones," and "Keeping Your Data on Hand."
- **UPDATED *Replay* Videos:** The *Replay* Videos provide an author-narrated video review of each chapter part in an easy-to-use format students can view on their phones, tablets, or computers.
- **With Tech Bytes Weekly, every week is new!** This weekly newsfeed provides two timely articles to save instructors the prep time required for adding interesting and relevant news items to their weekly lectures. Tech Bytes Weekly also features valuable links and other resources, including discussion questions and course activities.
- **Jeopardy! Game and Crossword Puzzles:** These engaging games give students a fun way to challenge their knowledge.

In addition to these changes, all chapters have been updated with new images, current topics, and state-of-the art technology coverage. Some of the chapter changes are listed here:

Chapter 1: Using Technology to Change the World

- Throughout the chapter, text, figures, and photos have been updated.
- A new example of social networking tools used in political context has been added.
- The Ethics in IT, "The Digital Divide and the Mobile Bridge" has been updated.
- The Try This has been updated to reflect Skype site content changes.
- The concept of Big Data has been introduced in the section on data mining.
- The end-of-chapter Ethics Project has been replaced with a new project on big data, "Can Big Data Predict Your Grade?"
- NEW Bits & Bytes "Compute Me a Picture" on generative design using the free tool Processing has been added, replacing the previous edition Bits & Bytes, "NASA Wants You to Learn."

Chapter 2: Looking at Computers: Understanding the Parts

- Throughout the chapter, text, figures, and photos have been updated.

- Next generation gesture technology is now covered in the "How Cool Is This?" feature.
- NEW Bits & Bytes "Forget HDTV...Here Comes Ultra HD!" has been added, replacing the previous edition Bits & Bytes "Testing and Calibrating Your PC Monitor."
- NEW Bits & Bytes "Green Computing" has been added, replacing the previous edition Bits & Bytes "Taking Care of Flash Drives."
- Throughout the chapter, text and figures have been updated to reflect Windows 8.1 changes.
- The end-of-chapter Team Time project has been replaced with a new project, "Data Storage Options."

Chapter 3: Using the Internet: Making the Most of the Web's Resources

- Throughout the chapter, text, figures, and photos have been updated.
- Updated Bits & Bytes on HTML5 versus Flash.
- Revised Bits & Bytes "Making Safe Online Payments" to include Apple Pay.
- Try This has been updated to reflect Microsoft Office Online changes.
- NEW "Evaluating Websites" Helpdesk has been added, replacing the "Using Subject Directories and Search Engines" Helpdesk.

Technology in Focus: The History of the PC

- This Tech in Focus has been updated as needed.

Chapter 4: Application Software: Programs That Let You Work and Play

- Throughout the chapter, text, figures, and photos have been updated.
- "How Cool Is This?" feature on eye-tracking software has been updated.
- "Trends in IT: Mobile Commerce: What Have You Bought with Your Phone Lately?" has been updated.
- New Alternative Note-Taking Applications have been added to Figure 4.12.

Chapter 5: System Software: The Operating System, Utility Programs, and File Management

- Throughout the chapter, text, figures, and photos have been updated.
- Content throughout has been updated to include coverage of Windows 8.1 update and OS X Yosemite.
- NEW "How Cool Is This?" feature has been added on smartwatches.
- "The Windows Interface" section has been revised and updated to reflect changes in Windows 8.1 update.
- UPDATED Sound Byte, "File Management," to reflect Windows updates.
- UPDATED Sound Byte, "Customizing Windows," to reflect Windows updates.

Technology in Focus: Information Technology Ethics

- This Tech in Focus has been updated throughout.
- A new section "Who Sets the Ethics for Robots?" has been added, replacing the "Brain Technology: Creating Cyborgs" section.

Chapter 6: Understanding and Assessing Hardware: Evaluating Your System

- Throughout the chapter, text has been updated to match current hardware standards, and figures and photos have been updated.
- All references to operating system utilities have been updated to reflect changes in Windows 8.1.
- UPDATED Sound Byte, "Installing RAM," to show RAM being added to a laptop computer.
- NEW Sound Byte, "Installing an SSD Drive," has been added, replacing the Sound Byte "Installing a Blu-Ray Drive."

Chapter 7: Networking: Connecting Computing Devices

- Throughout the chapter, text, figures, and photos have been updated.
- NEW Bits & Bytes "The Internet of Things" has been added, replacing "How Do You Find Your WiFi?"
- NEW Bits & Bytes "Analyzing Network Problems" has been added, replacing "Want to Use Your Phone as a Remote Control?"
- The content on Network-Attached Storage Devices has been updated to include Apple AirPort Time Capsule.
- The Trends in IT: "Where Should You Store Your Files: The Cloud Is Calling" has been updated.

Technology in Focus: Under the Hood

- This Tech in Focus has been updated throughout, with several new photos.
- Bits & Bytes "Forget CPUs: SoC Is the Future for Mobile Devices!" has been updated to reflect current trends in SoC.

Chapter 8: Digital Devices and Media: Managing a Digital Lifestyle

- Throughout the chapter, text, figures, and photos have been updated.
- NEW Bits & Bytes "Bluetooth and LE Beacons" has been added, replacing Bits & Bytes on mobile speech recognition.

- NEW "Working with Smartphones" Helpdesk has been added, replacing the "Using Portable Media Players" Helpdesk. This new Helpdesk uses much of the information previously found in the "Keeping Data on Hand" Helpdesk.
- REVISED "Keeping Your Data on Hand" Helpdesk to include coverage of cloud computing.
- UPDATED Sound Byte, "Smartphones Are Really Smart" for currency.
- UPDATED Sound Byte, "Connecting with Bluetooth," to include other uses of Bluetooth.

Chapter 9: Securing Your System: Protecting Your Digital Data and Devices

- Throughout the chapter, text, figures, and photos have been updated.
- Screenshots throughout have been updated to reflect changes in the Windows 8.1 update.
- NEW "How Cool is This?" on biometric authentication using vein scanning technology has been added.
- NEW Bits & Bytes "Multifactor Authentication: Don't Rely Solely on Passwords" has been added, replacing "Can't Remember Passwords? Try a Passphrase Instead!"
- UPDATED Sound Byte, "Installing a Personal Firewall," to cover wireless connections and Windows updates.

Technology in Focus: Careers in IT

- This Tech in Focus has been updated throughout.
- NEW Bits & Bytes "Cool New Jobs on the Horizon" has been added, replacing Bits & Bytes "Matching a Career to Your Skills."

Chapter 10: Behind the Scenes: Software Programming

- Throughout the chapter, text, figures, and photos have been updated.
- Updated "How Cool Is This" on open data initiative.
- NEW Bits & Bytes "Hackathons" detailing collegiate and civic hackathons has been added, replacing Bits & Bytes "Competitive Coding."
- NEW coverage of the Swift programming language for iOS mobile development has been added.
- NEW Sound Byte, "Programming with the Processing Language," has been added, replacing the "Looping Around the IDE" Sound Byte.
- NEW Sound Byte, "Using the Arduino Microcontroller," has been added, replacing the "3D Programming the Easy Way" Sound Byte.

Chapter 11: Behind the Scenes: Databases and Information Systems

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on the SHADOW app.
- NEW Bits & Bytes "Google's Knowledge Vault" replaces "iTunes Smart Playlists—They're Just Queries!"

Chapter 12: Behind the Scenes: Networking and Security in the Business World

- Throughout the chapter, text, figures, and photos have been updated.
- Bits & Bytes "Go Green with Mobile Apps" has been updated to include more information on green apps.

Chapter 13: Behind the Scenes: How the Internet Works

- Throughout the chapter, text, figures, and photos have been updated.
- The Bits & Bytes "Gmail Features You Should Know About" has been updated.
- NEW "How Cool Is This?" feature on the Ruby on Rails web application development platform has been added.

About the Authors

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Alan is currently a faculty member at Moore College of Art and Design and Montgomery County Community College, teaching a variety of computer science and business courses. He holds a BS in accounting from Rider University and an MS in information systems from Drexel University, and he is a certified public accountant. After a successful career in business, Alan finally realized that his true calling is education. He has been teaching at the college level since 2000. Alan enjoys attending technical conferences and meets regularly with faculty and administrators from other colleges to discuss curriculum development and new methods of engaging students.

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Dedication

For my wife, Patricia, whose patience, understanding, and support continue to make this work possible . . . especially when I stay up past midnight writing! And to my parents, Jackie and Dean, who taught me the best way to achieve your goals is to constantly strive to improve yourself through education. **Alan Evans**

For all the teachers, mentors, and gurus who have popped in and out of my life. **Kendall Martin**

For my husband, Ted, who unselfishly continues to take on more than his fair share to support me throughout this process, and for my children, Laura, Carolyn, and Teddy, whose encouragement and love have been inspiring. **Mary Anne Poatsy**

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Letter from the Authors

Our 12th Edition—A Letter from the Authors

Why We Wrote This Book

The pace of technological change is ever increasing. In education, we have seen this impact us more than ever in the past year—MOOCs, touch-screen mobile delivery, and Hangouts are now fixed parts of our environment.

Even the most agile of learners and educators need support in keeping up with this pace of change. We have responded by integrating material to help students develop skills for web application and mobile programming. We see the incredible value of these skills and their popularity with students, and have introduced Make This exercises for each chapter. These exercises gently bring the concepts behind mobile app development to life. In addition, we have added a Solve This exercise in each chapter that reinforces chapter content while also reinforcing Microsoft Office skills. These projects help to promote students' critical thinking and problem-solving skills, which employers highly value.

Our combined almost 50 years of teaching computer concepts have coincided with sweeping innovations in computing technology that have affected every facet of society. From iPads to Web 2.0, computers are more than ever a fixture of our daily lives—and the lives of our students. But although today's students have a much greater comfort level with their digital environment than previous generations, their knowledge of the machines they use every day is still limited.

Part of the student-centered focus of our book has to do with making the material truly engaging to students. From the beginning, we have written *Technology in Action* to focus on what matters most to today's student. Instead of a history lesson on the microchip, we focus on tasks students can accomplish with their computing devices and skills they can apply immediately in the workplace, the classroom, and at home.

We strive to keep the text as current as publishing timelines allow, and we are constantly looking for the next technology trend or gadget. We have augmented the text with weekly technology updates to help you keep your classroom on top of the latest breaking developments and continue to include a number of multimedia components to enrich the classroom and student learning experience. The result is a learning system that sparks student interest by focusing on the material they want to learn (such as how to integrate computing devices into a home network) while teaching the material they need to learn (such as how networks work). The sequence of topics is carefully set up to mirror the typical student learning experience.

As they read through this text, your students will progress through stages of increasing difficulty:

1. Thinking about how technology offers them the power to change their society and their world
2. Examining why it's important to be computer fluent
3. Understanding the basic components of computing devices

4. Connecting to and exploring the Internet
5. Exploring software
6. Learning the operating system and personalizing their computer
7. Evaluating and upgrading computing devices
8. Understanding home networking options and keeping computing devices safe from hackers
9. Going mobile with smartphones, netbooks, tablets, and laptops
10. Going behind the scenes, looking at technology in greater detail

We continue to structure the book in a "spiraling" manner, intentionally introducing on a basic level in the earlier chapters concepts that students traditionally have trouble with and then later expanding on those concepts in more detail when students have become more comfortable with them. Thus, the focus of the early chapters is on practical uses for the computer, with real-world examples to help the students place computing in a familiar context.

For example, we introduce basic hardware components in Chapter 2, and then we go into increasingly greater detail on some hardware components in Chapter 6 and in the "Under the Hood" Technology in Focus feature. The Behind the Scenes chapters venture deeper into the realm of computing through in-depth explanations of how programming, networks, the Internet, and databases work. They are specifically designed to keep more experienced students engaged and to challenge them with interesting research assignments.

In addition to extensive review, practice, and assessment content, each chapter contains several problem-solving, hands-on activities that can carried out in the classroom or as homework:

- The Try This exercises lead students to explore a particular computing feature related to the chapter.
- The Make This exercises are hands-on activities that lead students to explore mobile app development.
- The Solve This exercises integrate and reinforce chapter concepts with Microsoft Office skills.

Throughout the years we have also developed a comprehensive multimedia program to reinforce the material taught in the text and to support both classroom lectures and distance learning:

- The **Helpdesk training content**, created specifically for *Technology in Action*, enables students to take on the role of a helpdesk staffer fielding questions posed by computer users. These have been updated to reflect the way in which users access help today.
- Exciting **Sound Byte multimedia**—fully updated and integrated with the text—expand student mastery of complex topics.
- The **Tech Bytes Weekly updates** deliver the latest technology news stories to you for use in your classroom. Each is accompanied by specific discussion topics and activities to expand on what is within the textbook materials.

This book is designed to reach the students of the twenty-first century and prepare them for the role they can take in their own community and the world. It has been an honor to work with you over the past 12 years to present and explain new technologies to students, and to show them the rapidly growing importance of technology in our world.

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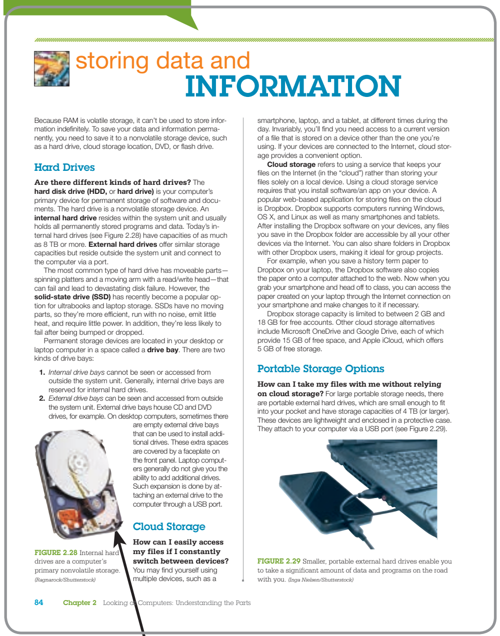
Visual Walk-Through

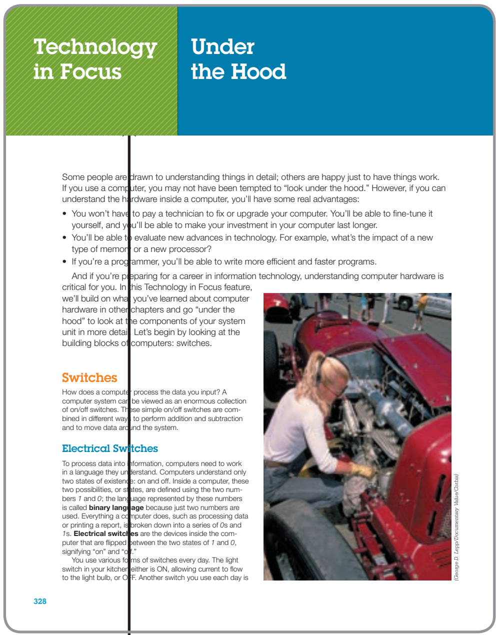
Topic Sequence

Concepts are covered in a progressive manner between chapters to mirror the typical student learning experience.

CHAPTER 2



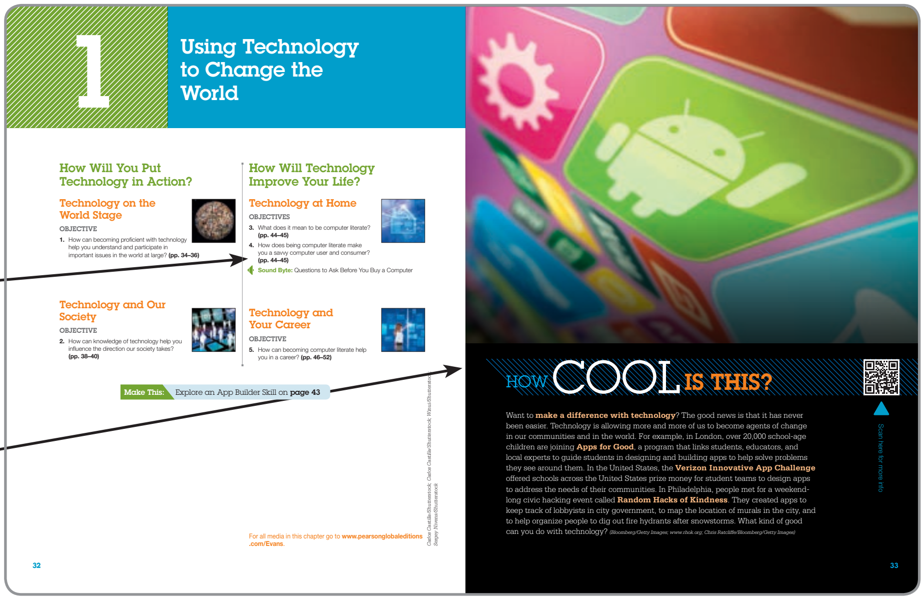
CHAPTER 6



Hardware First Introduced
Chapter 2 is the first time students read about introductory hardware. It's covered at the beginning level because this is students' experience level at this point of the book.

Hardware Taught in More Depth in Additional Chapters
In later chapters, students read about hardware in greater depth because they're more experienced and comfortable working with their computers.

Technology in Focus
Four special features that teach key uses of technology today.



Multimedia Cues
Visual integration of multimedia.

How Cool Is This?
Highlights the latest and greatest websites, gadgets, and multimedia.

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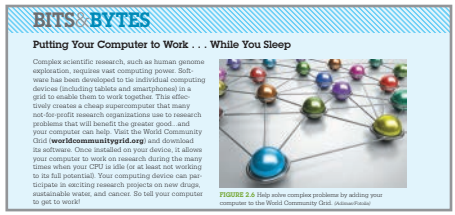
Student Textbook

Ethics in IT
Boxes examine the ethical dilemmas involved with technology.

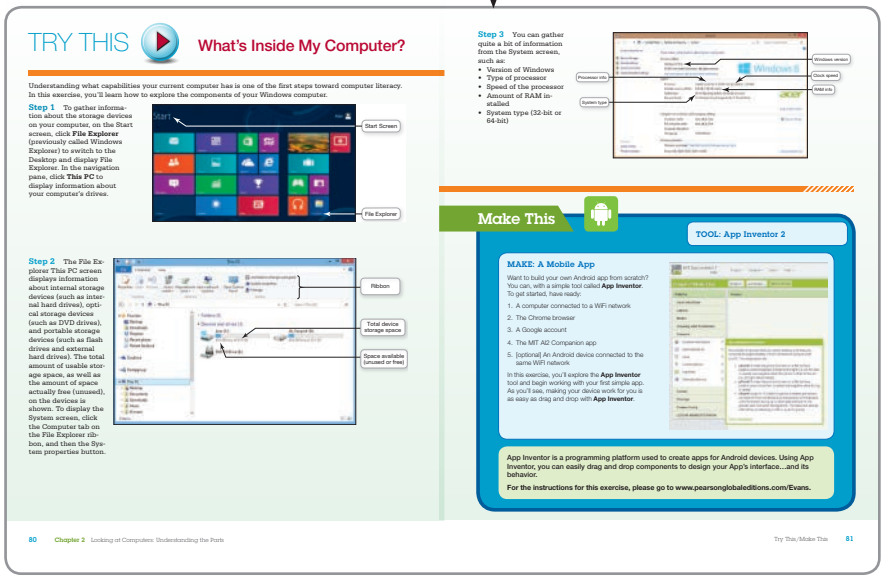
Trends in IT
Boxes explore hot topics in computing.

Dig Deeper
Boxes cover technical topics in depth to challenge advanced students.

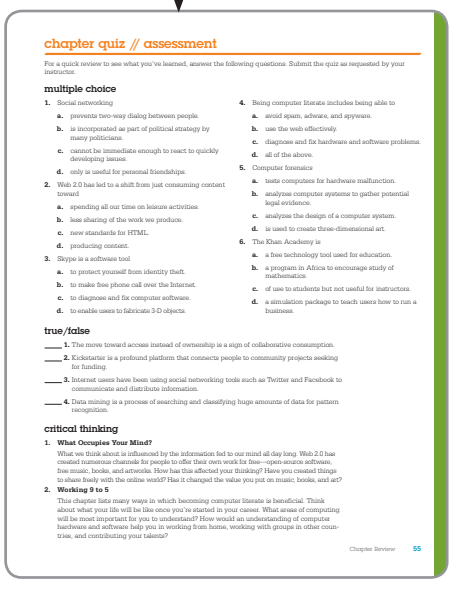


Bits & Bytes
Help make the topics immediately relevant to students' lives.

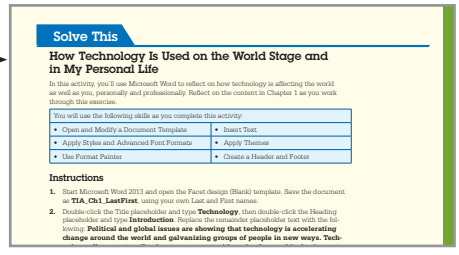
Try This and Make This
Hands-on activities found between Parts 1 and 2 of each chapter.



End of Chapter Quiz
Multiple Choice, True/False, and Critical Thinking questions at the end of each chapter help students assess their comprehension of chapter material.



Solve This
Exercises that put the concepts students are learning into action using a Microsoft Office application



Companion Media

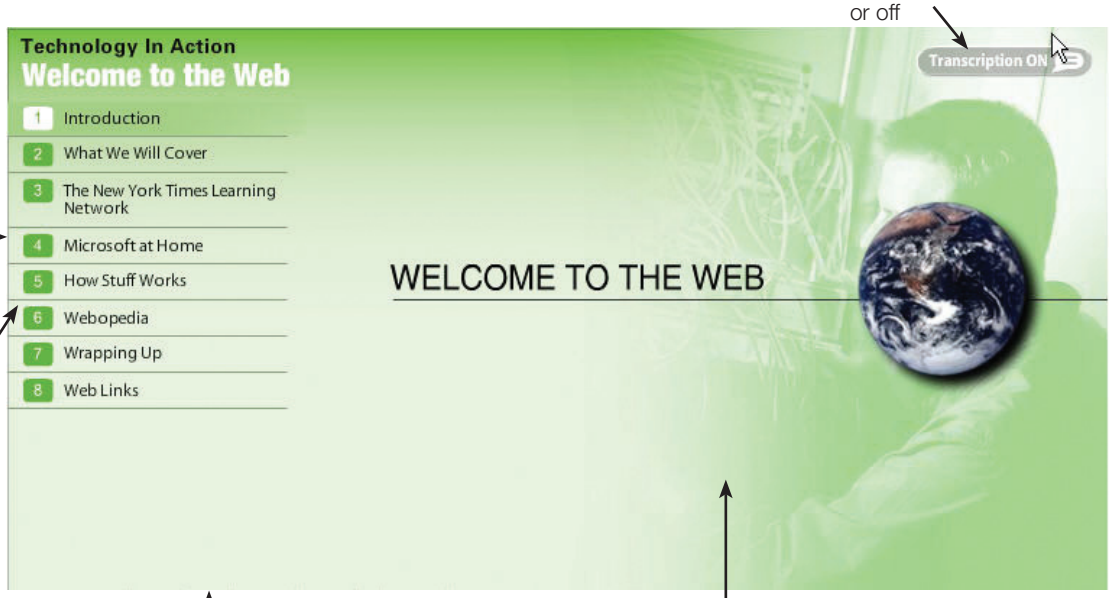
Companion Website for *Technology in Action* includes an interactive study guide, online end-of-chapter material, additional Internet exercises, and much more. Specific features include:

- **UPDATED Sound Bytes:** These multimedia lessons help demystify computer concepts with audio and video presentations. Select Sound Bytes have been updated to provide timely and accurate information. This edition includes two NEW Sound Bytes: "Using the Arduino Microcontroller" and "Programming with the Processing Language."
  - **UPDATED Active Helpdesks:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via live chat, FAQ searches, and so on. Students play the role of a helpdesk staffer answering technology questions using these various approaches**.**
    - A virtual supervisor provides support to the student throughout the activity.
    - Assessment questions after each Helpdesk provide instructors with a tool to gauge and track students' progress. This edition includes three NEW or completely revised Helpdesks: "Evaluating Websites," "Working with Smartphones," and "Keeping Your Data on Hand."
  - **NEW Make This** projects address the hot area of mobile app creation! Each chapter includes a Make This mobile app project, most of which use App Inventor. By the end of the course, students will have completed 13 small app projects that provide them with new skills they can use to create their own apps. And if they don't have an Android device, they can use the emulator and still learn the skills.
  - **NEW Solve This** projects put the concepts students are learning into action through real-world problem solving using a Microsoft Office application or other technology tool.
- **UPDATED Replay Videos:** The Replay Videos provide an author-narrated video review of each chapter part in an easy-to-use format students can view on their phones, tablets, or computers!
- **With Tech Bytes Weekly, every week is new!** This weekly newsfeed provides two timely articles to save instructors the prep time required for adding interesting and relevant news items to their weekly lectures. Tech Bytes Weekly also features valuable links and other resources, including discussion questions and course activities.
- **Jeopardy! Game and Crossword Puzzles:** These engaging games give students a fun way to challenge their knowledge.

Note: To access the premium content, including Helpdesks, Sound Bytes, and Replay Videos from the companion site, students need to use the access code printed on the inside front cover of the book.

Transcript button
Used to turn transcript on or off

Sound Bytes
Multimedia lessons with video, audio, or animation and corresponding labs featuring multiple-choice quizzing.



Navigational tool

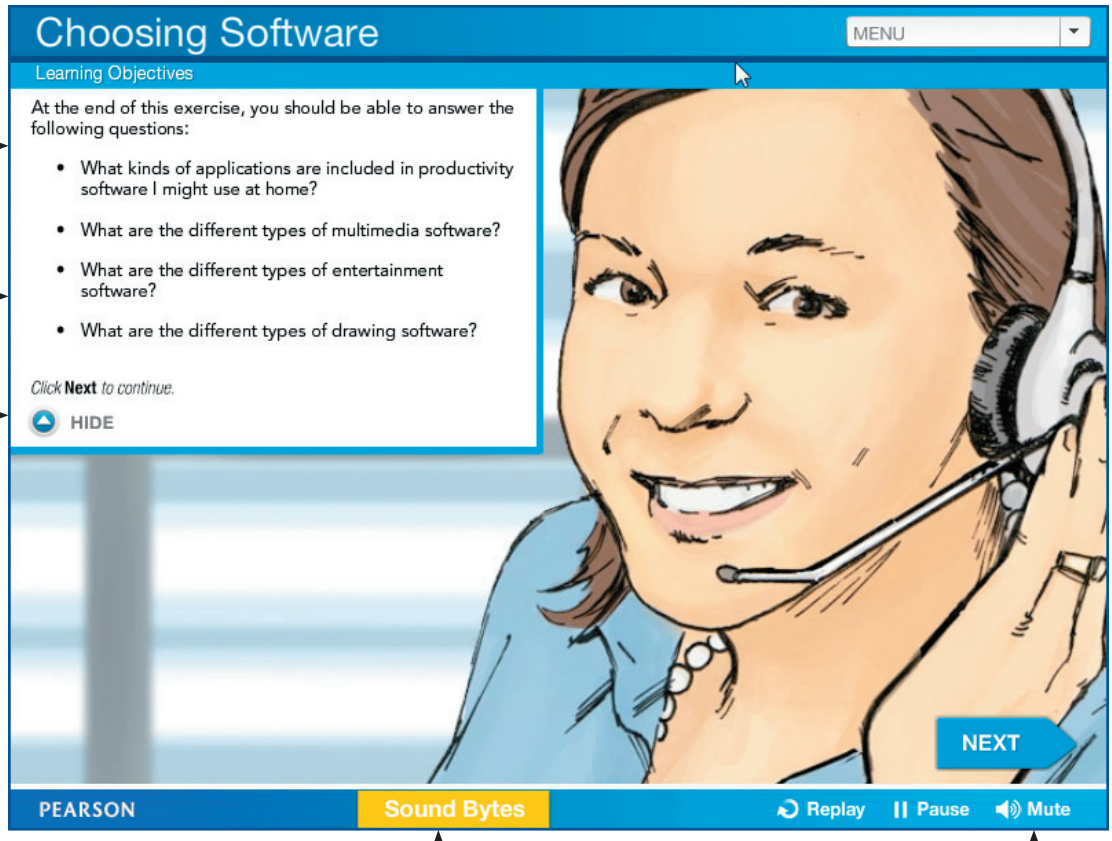
Audio leads students through

Video or animation teaches key concepts

Active Helpdesk
Interactive training that puts the student in the role of a helpdesk staffer fielding questions about technology.

Supervisor available to assist students.

Features textbook references within each Helpdesk and assessment at the end.



Related Sound Bytes are referenced.

Audio on or off.