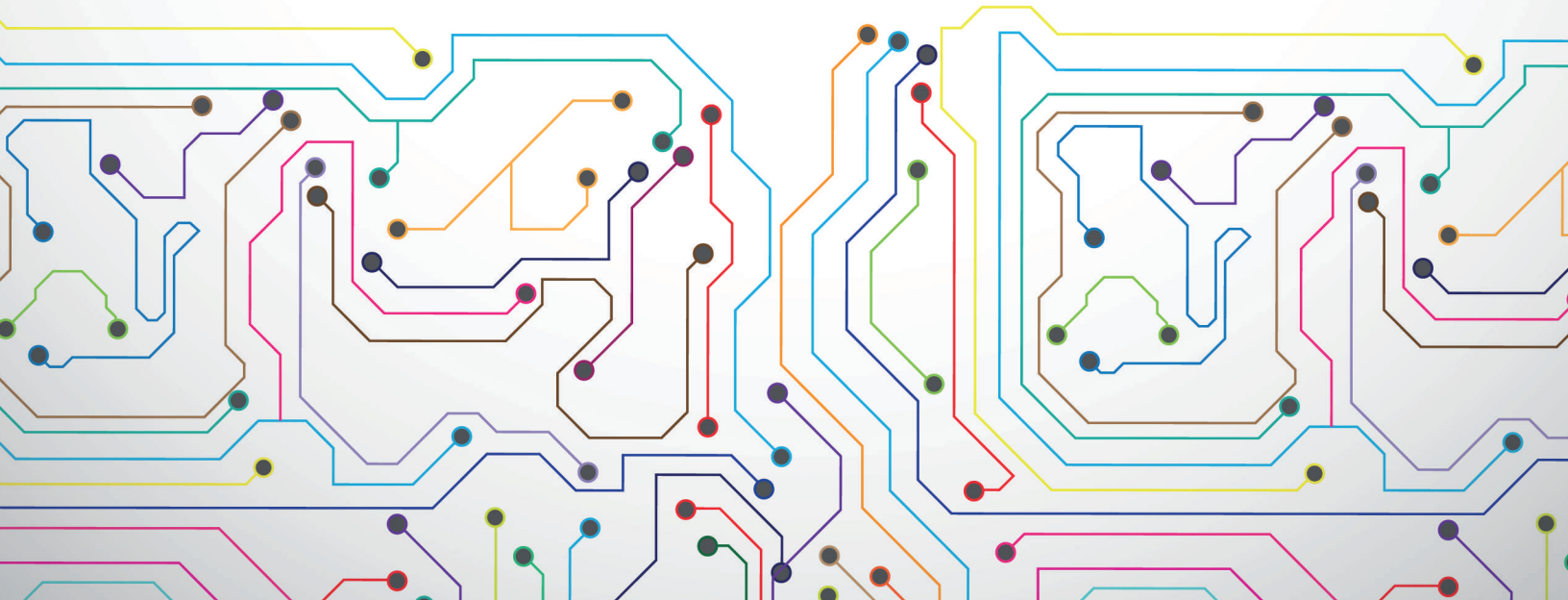
Technology in Action, Complete

ELEVENTH EDITION

Alan Evans • Kendall Martin • Mary Anne Poatsy



ALWAYS LEARNING

PEARSON

TECHNOLOGY in Action

Premium Media Site Access Code

Improve your grade with hands-on tools and resources!

You can access the following Premium Resources using your Access Code. Register now to get the most out of ***Technology in Action!***

- Practice what you learn with interactive Active Helpdesk Calls*
- Use the Sound Byte lessons to practice your skills*
- Experience real-world computer situations with Simulations*
- *Check Your Understanding* section
- *Replay* videos from the authors provide a video review of each chapter Part in an easy-to-use format you can use on your phones, tablets, or computers!*

*Access code required for these premium resources

Your Access Code is:

Note: If there is no silver foil covering the access code, it may already have been redeemed, and therefore may no longer be valid. In that case, you can purchase online access using a major credit card or PayPal account. To do so, go to **www.pearsonglobaleditions.com/Evans,** select your book cover, click on "Buy Access" and follow the on-screen instructions.

To Register:

- To Start you will need a valid email address and this access code.
- Go to **www.pearsonglobaleditions.com/Evans** and scroll to find your text book.
- Once you've selected your text, on the Home Page, click the link to access the Student Premium Content.
- Click the Register button and follow the on-screen instructions.
- After you register, you can sign in any time via the log-in area on the same screen.

System Requirements

Windows 7 Ultimate Edition; IE 8
Windows Vista Ultimate Edition SP1; IE 8
Windows XP Professional SP3; IE 7
Windows XP Professional SP3; Firefox 3.6.4
Mac OS 10.5.7; Firefox 3.6.4
Mac OS 10.6; Safari 5

Technical Support

http://247pearsoned.custhelp.com

Photo credits: Goodluz/wrangler/Elena Elisseeva/Shutterstock

11TH EDITION

Technology in Action

COMPLETE

GLOBAL EDITION

11TH EDITION

Technology in Action

COMPLETE

GLOBAL EDITION

Alan Evans | Kendall Martin | Mary Anne Poatsy

PEARSON

Boston Columbus Indianapolis New York San Francisco Hoboken
Amsterdam Cape Town Dubai London Madrid Milan Munich Paris Montréal Toronto
Delhi Mexico City Sâo Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

Editor in Chief: Michael Payne
Executive Acquisitions Editor: Jenifer Niles
Production Team Lead: Laura Burgess
Program Team Lead: Scott DiSanno
Project Manager: Rhonda Aversa
Editorial Assistant: Melissa Davis
Development Editor: Shannon LeMay-Finn
Head of Learning Asset Acquisition, Global Editions: Laura Dent
Assistant Acquisitions Editor, Global Editions: Aditee Agarwal
Assistant Project Editor, Global Editions: Amrita Kar
Director of Marketing: Maggie Moylan Leen
Marketing Coordinator: Susan Osterlitz
Marketing Assistant: Jeremiah Drozd
Operations Specialist: Maura Zaldivar-Garcia
Director of Digital Development: Taylor Ragan
Editor, Digital Learning & Assessment: Eric Hakanson
Media Project Manager, Production: John Cassar
Art Director: Jonathan Boylan
Cover Design: Lumina Datamatics, Inc.
Cover Art: © mistery/Shutterstock
Full-Service Project Management: Lumina Datamatics, Inc.
Composition: Lumina Datamatics, Inc.
Printer/Binder: Courier/Kendalville
Cover Printer: Courier/Kendalville
Text Font: 9/11 Helvetica Neue LT Std

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear on the appropriate page within the text.

Microsoft and/or its respective suppliers make no representations about the suitability of the information contained in the documents and related graphics published as part of the services for any purpose. All such documents and related graphics are provided "as is" without warranty of any kind. Microsoft and/or its respective suppliers hereby disclaim all warranties and conditions with regard to this information, including all warranties and conditions of merchantability, whether express, implied or statutory, fitness for a particular purpose, title and non-infringement. In no event shall Microsoft and/or its respective suppliers be liable for any special, indirect or consequential damages or any damages whatsoever resulting from loss of use, data or profits, whether in an action of contract, negligence or other tortious action, arising out of or in connection with the use or performance of information available from the services.

The documents and related graphics contained herein could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Microsoft and/or its respective suppliers may make improvements and/or changes in the product(s) and/or the program(s) described herein at any time.

Microsoft® and Windows® are registered trademarks of the Microsoft Corporation in the U.S.A. and other countries. This book is not sponsored or endorsed by or affiliated with the Microsoft Corporation.

Pearson Education Limited
Edinburgh Gate
Harlow
Essex CM20 2JE
England

and Associated Companies throughout the world

Visit us on the World Wide Web at: www.pearsonglobaleditions.com

© Pearson Education Limited 2015

The rights of Alan Evans, Kendall Martin and Mary Anne Poatsy to be identified as the authors of this work have been asserted by them in accordance with the Copyright, Designs and Patents Act 1988.

Authorized adaptation from the United States edition, entitled Technology in Action, Complete, 11th edition, *ISBN 978-0-133-80296-2, by Alan Evans, Kendall Martin and Mary Anne Poatsy, published by Pearson Education © 2015*.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without either the prior written permission of the publisher or a license permitting restricted copying in the United Kingdom issued by the Copyright Licensing Agency Ltd, Saffron House, 6–10 Kirby Street, London EC 1N 8TS.

All trademarks used herein are the property of their respective owners. The use of any trademark in this text does not vest in the author or publisher any trademark ownership rights in such trademarks, nor does the use of such trademarks imply any affiliation with or endorsement of this book by such owners.

ISBN 10: 1-292-08235-6
ISBN 13: 978-1-292-08235-6

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

10 9 8 7 6 5 4 3 2 1

Typeset by Lumina Datamatics, Inc.

Printed and bound by Courier/Kendalville

PEARSON

Contents at a Glance

Chapter 1
Using Technology to Change the World 32

Chapter 2
Looking at Computers: Understanding the Parts 58

Chapter 3
Using the Internet: Making the Most of the Web's Resources 104

Technology in Focus
The History of the Personal Computer 142

Chapter 4
Application Software: Programs That Let You Work and Play 152

Chapter 5
System Software: The Operating System, Utility Programs, and File Management 188

Technology in Focus
Information Technology Ethics 232

Chapter 6
Understanding and Assessing Hardware: Evaluating Your System 252

Chapter 7
Networking: Connecting Computing Devices 288

Technology in Focus
Under the Hood 328

Chapter 8
Digital Devices and Media: Managing a Digital Lifestyle 340

Chapter 9
Securing Your System: Protecting Your Digital Data and Devices 376

Technology in Focus
Careers in IT 424

Chapter 10
Behind the Scenes: Software Programming 436

Chapter 11
Behind the Scenes: Databases and Information Systems 478

Chapter 12
Behind the Scenes: Networking and Security in the Business World 520

Chapter 13
Behind the Scenes: How the Internet Works 560

Glossary 594
Index 613

EDITION eleventh 11

Contents

Chapter 1

Using Technology to Change the World 32

How Will You Put Technology in Action? 34

Technology on the World Stage 34
Political Issues 34
Other Global Issues 35
ETHICS in IT: The Digital Divide and the Mobile Bridge 37

Technology and Our Society 38
Technology Impacts How We Think 38
Technology Impacts How We Connect 38
Technology Impacts How We Consume 39
TRY THIS: Skyping Around the World 42

How Will Technology Improve Your Life? 44

Technology at Home 44

Technology and Your Career 46
Retail: Working in a Data Mine 46
Arts: Ink, Paints, and a Laptop? 46
Education: Teaching and Learning 47
Law Enforcement: Put Down That Mouse—You're Under Arrest! 49
Medicine: The Chip Within 49
DIG DEEPER: Making Reality Even More Real 50
Science: Simulating Reality 51
Psychology: Computerized Coach 51

Chapter 2

Looking at Computers: Understanding the Parts 58

Understanding Digital Components 60

Understanding Your Computer 60
Computers Are Data Processing Devices 60
Bits and Bytes: The Language of Computers 61
Types of Computers 61

Input Devices 65
Keyboards 65
Mice and Other Pointing Devices 67
Image Input 69
DIG DEEPER: How Touch Screens Work 70
Sound Input 70
ETHICS in IT: What Is Ethical Computing? 72

Output Devices **73**
Monitors 73
Printers 76
Sound Output 77
TRY THIS: What's Inside My Computer? 80

Processing, Storage, and Connectivity **82**

Processing and Memory on the Motherboard **82**
Memory 83
Processing 83
Storing Data and Information **84**
Hard Drives 84
Cloud Storage 84
Portable Storage Options 84
Optical Storage 86
Connecting Peripherals to the Computer **87**
High-Speed and Data Transfer Ports 87
Connectivity and Multimedia Ports 87
Adding Ports: Expansion Cards and Hubs 88
Power Controls **89**
Setting It All Up **91**
TRENDS in IT: Innovations in Printing 94

Chapter 3

Using the Internet: Making the Most of the Web's Resources 104

Working and Playing on the Web **106**

The Internet and How It Works **106**
The Origin of the Internet 106
How the Internet Works 107
Communicating and Collaborating on the Web **109**
Social Networking 109
E-Mail 109
Instant Messaging 111
Wikis 111
Blogs 113
Podcasts and Webcasts 113
Web Entertainment **115**
Conducting Business Over the Internet: E-commerce **117**
E-Commerce Safeguards 117
DIG DEEPER: Discovering the Semantic Web 120
TRY THIS: Create a OneDrive Account to Store and Share Your Files in the Cloud 122

Using the Web Effectively 124

Accessing and Moving Around The Web 124
Web Browsers 124
URLs, Protocols, and Domain Names 125
Hyperlinks and Beyond 127
Favorites, Live Bookmarks, and Tagging 128
TRENDS in IT: Doing Business on a Shoestring—Thanks to the Internet 129

Searching the Web Effectively 130
Using Search Engines Effectively 130
Evaluating Websites 133
ETHICS in IT: Plagiarism and Copyright Violation: What Can You Borrow from the Internet? 134

TECHNOLOGY IN FOCUS
The History of the Personal Computer 142

Chapter 4

Application Software: Programs That Let You Work and Play 152

Programs That Let You Work 154

The Nuts and Bolts of Software 154
TRENDS in IT: Mobile Commerce: What Have You Bought with Your Phone Lately? 155

Productivity and Business Software 156
Bundled Productivity Software 156
Word Processing Software 156
Spreadsheet Software 158
Presentation Software 159
Database Software 160
Note-Taking Software 161
Personal Information Manager Software 162
Microsoft Office Productivity Software Features 163
Personal Financial Software 163
ETHICS in IT: Can I Borrow Software That I Don't Own? 164
Small Business Software 165
Software for Large and Specialized Businesses 165
TRY THIS: Citing Website Sources 168

Programs That Let You Play 170

Multimedia and Entertainment Software 170
Digital Image- and Video-Editing Software 170
DIG DEEPER: How Cloud Computing Works 172
Digital Audio Software 173
Gaming Software 174

Educational and Reference Software 174
Drawing Software 174
Managing Your Software 176
Getting Software 176
Software Licenses 177
Getting the Right Software for Your System 178
Installing and Uninstalling Software 179

Chapter 5

System Software: The Operating System, Utility Programs, and File Management 188

Understanding System Software 190

Operating System Fundamentals 190
Real-Time Operating Systems 191
Operating Systems for Networks, Servers, and Mainframes 191
Operating Systems for Mobile Devices 192
Operating Systems for Personal Computers 192
What the Operating System Does 196
The User Interface 196
Processor Management 196
Memory and Storage Management 197
Hardware and Peripheral Device Management 199
ETHICS in IT: The Great Debate: Is Mac OS X Safer than Windows? 200
Software Application Coordination 201
The Boot Process: Starting Your Computer 202
Step 1: Activating BIOS 202
Step 2: Performing the Power-On Self-Test 203
Step 3: Loading the OS 203
Step 4: Checking Further Configurations and Customizations 203
Handling Errors in the Boot Process 203
TRY THIS: Organizing Tiles on the Start Screen in Windows 8 206

Using System Software 208

The Windows Interface 208
TRENDS in IT: Open Source Software: Why Isn't Everyone Using Linux? 213
Organizing Your Computer: File Management 214
Organizing Your Files 214
Viewing and Sorting Files and Folders 215
Naming Files 216
Working with Files 218
Utility Programs 219
Display Utilities 219
The Programs and Features Utility 219
File Compression Utilities 220

System Maintenance Utilities 221
System Restore and Backup Utilities 222
DIG DEEPER: How Disk Defragmenter Utilities Work 223
Accessibility Utilities 224

TECHNOLOGY IN FOCUS
Information Technology Ethics 232

Chapter 6

Understanding and Assessing Hardware: Evaluating Your System 252

Evaluating Key Subsystems 254
Your Ideal Computing Device 254
Evaluating the CPU Subsystem 256
How the CPU Works 256
CPU Factors 257
Measuring the CPU 258
Evaluating the Memory Subsystem 260
The RAM in Your System 260
Adding RAM 262
Evaluating the Storage Subsystem 263
Mechanical Hard Drives 263
Solid-State Drives 263
DIG DEEPER: How a Hard Drive Works 264
Optical Drives 265
Your Storage Capacity and Needs 266
TRY THIS: Measure Your System Performance 270
Evaluating Other Subsystems and Making a Decision 272
Evaluating the Video Subsystem 272
Video Cards 272
TRENDS in IT: Thunderbolt: The New Standard for Data Transfer 275
Evaluating the Audio Subsystem 276
Evaluating System Reliability 278
Making a Final Decision 280
Getting Rid of Your Old Computer 280
ETHICS in IT: Free Hardware for All 281

Chapter 7

Networking: Connecting Computing Devices 288

How Networks Function 290
Networking Fundamentals 290
Network Architectures 292

Network Architectures Defined by Distance 292
Network Architectures Defined by Levels of Administration 293
Ethernet Protocols 294
Network Components 295
Transmission Media 295
Basic Network Hardware 297
Network Software 298
Connecting to the Internet 299
Wired Broadband Internet Connections 299
Wireless Internet Access 301
Dial-Up Connections 302
TRY THIS: Testing Your Wired and Wireless Internet Connection Speeds 304
Your Home Network 306
Installing and Configuring Home Networks 306
Planning Your Home Network 306
Connecting Devices to a Router 307
Network-Attached Storage Devices 309
TRENDS in IT: Where Should You Store Your Files? The Cloud Is Calling! 310
Home Network Servers 311
Digital Entertainment Devices on a Network 311
Specialized Home-Networking Devices 313
Configuring Software for Your Home Network 314
Troubleshooting Wireless Network Problems 316
ETHICS in IT: Sharing Your Internet Connection with Your Neighbors: Legal? Ethical? Safe? 317
Securing Wireless Networks 318

TECHNOLOGY IN FOCUS
Under the Hood 328

Chapter 8

Digital Devices and Media: Managing a Digital Lifestyle 340

Mobile Devices 342
Digital Convergence 342
Telephony: Smartphones and Beyond 343
Smartphone Basics 343
Smartphone Components 343
How Cell Phone Technology Works 345
Synchronizing 346
Text Messaging 346
Mobile Internet 347
Smartphone Security 349

VoIP 349
Smartphone GPS 350
Tablets, Netbooks, and Ultrabooks 351
Tablets 351
Netbooks 351
Ultrabooks 351
Making a Choice 352
TRY THIS: Creating and Publishing a Movie 354
The Digital Information Age 356
Digital Defined 356
TRENDS in IT: NFC Chips: Do You Have a Digital Wallet? 358
Digital Media 359
Digital Publishing 359
Digital Music 361
Digital Photography 363
DIG DEEPER: The Shift to Digital Music: A Bumpy Ride 364
Digital Video 366
ETHICS in IT: Managing Your Copyrights: Copyleft Might Simplify Your Life 368

Chapter 9

Securing Your System: Protecting Your Digital Data and Devices 376

Major Threats to Your Digital Assets 378
Cybercrime and Identity Theft 378
Computer Viruses 380
Catching a Virus 380
Boot-Sector Viruses 380
Logic Bombs and Time Bombs 380
Worms 380
Script and Macro Viruses 381
E-Mail Viruses 381
Encryption Viruses 381
Additional Virus Classifications 381
Virus Symptoms 382
Preventing Virus Infections 383
Antivirus Software 383
Software Updates 385
Understanding Hackers 386
Problems Hackers Can Cause 386
Trojan Horses and Rootkits 387
Denial-of-Service Attacks 387
How Hackers Gain Computer Access 387
Restricting Access to Your Digital Assets 390
Firewalls 390
Types of Firewalls 390

How Firewalls Work 391
Knowing Your Computer Is Secure 391
Password Protection and Password Management 392
Creating Passwords 392
Managing Your Passwords 393
Anonymous Web Surfing: Hiding from Prying Eyes 394
Biometric Authentication Devices 396
TRY THIS: Testing Your Network Security 398

Protecting Your Digital Property from Yourself 400

Managing Online Annoyances 400
Malware: Adware and Spyware 400
Spam 401
DIG DEEPER: Computer Forensics: How It Works 402
Cookies 403
ETHICS in IT: You're Being Watched … But Are You Aware You're Being Watched? ... 405
Keeping Your Data Safe 406
Protecting Your Personal Information 406
Backing Up Your Data 406
Social Engineering 411
Phishing and Pharming 411
Scareware 412
TRENDS in IT: Computers in Society: Spear Phishing: The Bane of Data Breaches 413
Protecting Your Physical Computing Assets 414
Environmental Factors 414
Power Surges 414
Deterring Theft 415
Keep Them Safe: Alarms 415
Keeping Mobile Device Data Secure 415
Software Alerts and Data Wipes 415

TECHNOLOGY IN FOCUS
Careers in IT 424

Chapter 10

Behind the Scenes: Software Programming 436

Understanding Software Programming 438

The Importance of Programming 438
The Life Cycle of an Information System 439
The System Development Life Cycle 439
The Life Cycle of a Program 441
Describing the Problem: The Problem Statement 441
Making a Plan: Algorithm Development 443
Developing the Algorithm: Decision Making and Design 444

Top-Down Design 445
Object-Oriented Analysis 446
DIG DEEPER: The Building Blocks of Programming Languages: Syntax, Keywords, Data Types, and Operators 448
Coding: Speaking the Language of the Computer 450
Compilation 453
Coding Tools: Integrated Development Environments 454
Debugging: Getting Rid of Errors 455
Testing and Documentation: Finishing the Project 456
TRY THIS: Programming with Corona 458

Programming Languages 460

Many Languages for Many Projects 460
Selecting the Right Language 461
ETHICS in IT: When Software Runs Awry 462
Exploring Programming Languages 463
Visual Basic 463
C and C++ 463
Java and C# 464
Objective C 464
HTML 464
JavaScript and VBScript 465
ASP, JSP, and PHP 465
AJAX and XML 466
Mobile Applications 467
TRENDS in IT: Emerging Technologies: Unite All Your Video Game Design Tools 469
The Next Great Language 470

Chapter 11

Behind the Scenes: Databases and Information Systems 478

Database Basics 480

Database Building Blocks 480
Databases Versus Lists 480
Advantages of Using Databases 483
Database Management Systems 484
Database Terminology 484
Planning and Creating the Database 485
Using Primary Keys 487
Database Types 488
Relational Databases 488
Object-Oriented Databases 489
Multidimensional Databases 489

Database Functions **490**
Inputting Data 490
Data Validation 490
Viewing and Sorting Data 492
Extracting or Querying Data 493
DIG DEEPER: Structured Query Language (SQL) 494
Outputting Data 496
TRY THIS: Using Excel's Database Functions 498

How Businesses Use Databases **500**

Data Warehousing and Storage **500**
Data Warehouses 500
TRENDS in IT: Emerging Technologies: Can Your Business Partner Deliver the Goods? Enhanced Databases Can Help You Decide! 501
Populating Data Warehouses 502
Data Staging 503
Data Marts 503

Business Intelligence Systems **504**
Office Support Systems 504
Transaction-Processing Systems 504
Management Information Systems 505
Decision Support Systems 506
Enterprise Resource Planning Systems 508
TRENDS in IT: Computers in Society: User-Populated Databases 509

Data Mining **510**
ETHICS in IT: Data, Data Everywhere—But Is It Protected? 511

Chapter 12

Behind the Scenes: Networking and Security in the Business World 520

Client/Server Networks and Topologies **522**

Client/Server Network Basics **522**
Networking Advantages 522
Comparing Client/Server and Peer-to-Peer Networks 522
Types of Client/Server Networks 524

Servers **527**
Authentication and File Servers 527
Print Servers 528
Application Servers 528
Database Servers 528
E-Mail Servers 528
Communications Servers 528
Web Servers and Cloud Servers 528
TRENDS in IT: Virtualization: Making Servers Work Harder 529

Network Topologies **530**
Bus Topology 530
Ring Topology 531
Star Topology 532
Comparing Topologies 534
TRY THIS: Sharing Folders on a Home Network 536
Setting Up Business Networks **538**
Transmission Media **538**
Wired Transmission Media 538
Twisted-Pair Cable 539
Coaxial Cable 539
Fiber-Optic Cable 539
Wireless Media Options 539
Comparing Transmission Media 539
Network Adapters **541**
Network Navigation Devices **543**
MAC Addresses 543
Switches and Bridges 544
Routers 544
Network Operating Systems **545**
DIG DEEPER: The OSI Model: Defining Protocol Standards 546
Client/Server Network Security **548**
Authentication 548
Access Privileges 548
Physical Protection Measures 549
ETHICS in IT: How Should Companies Handle Data Breaches? 550
Firewalls 551

Chapter 13

Behind the Scenes: How the Internet Works 560

Inner Workings of the Internet **562**
The Management of the Internet **562**
Internet Networking **563**
Internet Data Routes 563
The Network Model of the Internet 564
Data Transmission and Protocols **565**
Circuit Switching 565
Packet Switching 565
TCP/IP 566
Internet Identity: IP Addresses and Domain Names **567**
IP Addresses 567
DIG DEEPER: Connection-Oriented Versus Connectionless Protocols 568
Domain Names 571

TRY THIS: Ping Me 574

Coding and Communicating on the Internet 576

HTML, XML, and Other Web Building Blocks 576

HTML 576
XML and JSON 578
Web Browser Protocols 578
Server-Side Applications 578
Client-Side Applications 579

Communications Over the Internet 581

E-Mail 581
E-Mail Security: Encryption 582
ETHICS in IT: Web Browsing: Not as Private as You May Think 583
Instant Messaging 585
TRENDS in IT: Crowdsourcing: Harnessing the Power of Social Networks 586

Glossary 594
Index 613

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

What's New
Technology in Action, 11th Edition

We are delighted for you to explore the Eleventh 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 end-of-chapter exercises have been updated throughout the book.

COMPLETELY UPDATED AND ENHANCED media offerings including:

- **Sound Bytes:** These multimedia lessons help demystify computer concepts with audio and video presentations. All of the Sound Bytes have been updated to provide timely and accurate information.
- **Active Helpdesk Calls:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via phone, live chat, FAQ searches, and so on. Students play the role of the staff answering technology questions using these various approaches**.**
  - A virtual supervisor provides support to the student throughout calls.
  - Assessment questions after each call provide instructors with a tool to gauge and track students' progress.

All chapters 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.

Chapter 2: Looking at Computers: Understanding the Parts

- Throughout the chapter, text, figures, and photos have been updated.
- Gesture technology is now covered in the "How Cool Is This?" feature.
- The Keyboard section has been redesigned to reflect the shift from physical keyboards to touch screens.
- Enhanced coverage of transparent OLED displays has been added.
- Coverage of cloud storage solutions has been augmented to reflect student needs and trends.
- The "Try This: What's Inside My Computer?" activity has been updated to reflect Windows 8.1 changes.

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

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on the Screenleap.com screen sharing app.
- NEW Bits & Bytes on HTML5 vs Flash, Maxthon, and Outlook.com.
- Streaming audio and streaming video have been condensed to discuss streaming media in general.

Technology in Focus: The History of the PC

- This Tech in Focus has been updated throughout.

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

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

- All screen images of Microsoft Office applications have been updated to Office 2013; and discussion of new features of Office 2013 have been included in the text.
- "Bits & Bytes: Alternatives to PowerPoint" has been revised to include additional alternatives.
- NEW "Bits & Bytes: Mirror, Mirror . . ." has been added, replacing PDF Bits & Bytes on video file formats for portable media players from the previous edition.
- Media Management Software has been removed, with important pieces of the information mentioned in other places in the chapter.

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 and OS X Mavericks.
- NEW "How Cool Is This?" feature has been added on Google Chrome syncing.
- NEW Ethics in IT feature has been added—"The Great Debate: Is Mac OS X Safer than Windows?"
- NEW "Try This: Organizing Tiles on the Start Screen in Windows 8" activity has been added.
- "The Windows Interface" section has been revised and updated to reflect changes in Windows 8.1.
- NEW "Bits & Bytes: Save Files to the Cloud Right from Your Apps" has been added.

Technology in Focus: Information Technology Ethics

- This Tech in Focus has been updated throughout.
- The "Using Computers to Support Ethical Conduct" section has been updated to cover Google Crisis Response.

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.
- NEW "How Cool Is This?" feature has been added on the Arduino microcontroller project.
- NEW "Bits & Bytes: The Haswell Boost" has been added replacing the "Bits and Bytes: Not Much Power at All."
- All references to operating system utilities have been updated to reflect changes in Windows 8.1.
- Summary table figures have been redesigned for increased clarity.
- Emphasis has been shifted from desktop computers toward mobile devices.

Chapter 7: Networking: Connecting Computing Devices

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on Karma WiFi.
- A new "Bits & Bytes: Mesh Networks—An Emerging Alternative" has been added, replacing "Wake Up Your Mac Remotely."
- NEW Bits & Bytes: "Connecting to Wireless Networks on the Road? Beware of 'Evil Twins'!" moved to this chapter from Chapter 9, and replaces "Blazingly Fast Wireless Connections on the Horizon."
- The content from the removed "Bits & Bytes: Blazingly Fast Wireless Connections on the Horizon" has been incorporated into the chapter content.

Technology in Focus: Under the Hood

- This Tech in Focus has been updated throughout, with many new photos.
- The "Bits and Bytes: Today's Supercomputers: The Fastest of the Fast" has been updated to reflect the newest supercomputers.
- NEW "Bits and Bytes: Forget CPUs: SoC Is the Future for Mobile Devices!" has been added.

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

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on 3D printing.
- NEW "Bits & Bytes: Talking to Yourself" has been added.
- NEW "Bits & Bytes: Want to Read That Voicemail?" has been added, replacing Bits & Bytes on Billshrink.
- NEW "Bits & Bytes: The Fabulous Phablet" has been added.

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 Windows 8.1.
- NEW "Bits & Bytes: I Received a Data Breach Letter . . . Now What?" has been added.
- The Biometric Authentication Devices section has been updated for the new iPhone 5 features.
- NEW "Bits & Bytes: Can't Remember Passwords? Try a Passphrase Instead!" has been added.

Technology in Focus: Careers in IT

- This Tech in Focus has been updated throughout.

Chapter 10: Behind the Scenes: Software Programming

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on the Open Data initiatives of major cities.
- NEW "Bits and Bytes: Competitive Coding" detailing collegiate and civic hackathons has been added, replacing "Bits and Bytes: My Algorithm Can Beat Your Algorithm."
- NEW "Bits & Bytes: Coding for Zombies" has been added, featuring Rails for Zombies from Code Academy.
- NEW "Bits & Bytes: The Best Résumé" has been added, replacing "Bits & Bytes: Want to Learn? Work for Free," and details the use of gitHub as a resume component.

Chapter 11: Behind the Scenes: Databases and Information Systems

- Throughout the chapter, text has been updated, and figures, screenshots, and photos have been updated to reflect changes in Microsoft Access 2013.
- NEW "How Cool Is This?" feature has been added on the DrawAFriend app.
- "Ethics in IT: Data, Data Everywhere—But Is It Protected?" section has been updated with a new example.

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

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "How Cool Is This?" feature has been added on secure social collaboration tools.
- NEW "Bits & Bytes: Go Green with Mobile Apps" has been added.
- NEW "Bits & Bytes: US Military Brings Its Own Network . . . By Plane!" has been added.

Chapter 13: Behind the Scenes: How the Internet Works

- Throughout the chapter, text, figures, and photos have been updated.
- NEW "Bits & Bytes: Server in the Cloud" has been added, highlighting Google App Engine.
- The "Bits & Bytes: Gmail Features You Should Know About" has been updated.
- NEW "How Cool Is This?" feature on MOOC courses for learning has been added.

About the Authors

Alan Evans, MS, CPA

aevans@mc3.edu

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 giving presentations at technical conferences and meets regularly with faculty and administrators from other colleges to discuss curriculum development and new methods of engaging students.

Kendall Martin, PhD

kmartin@mc3.edu

Kendall is an Associate Professor at Montgomery County Community College with teaching experience at both the undergraduate and graduate levels at a number of institutions, including Villanova University, DeSales University, Ursinus College, and Arcadia University.

Kendall's education includes a BS in electrical engineering from the University of Rochester and an MS and a PhD in engineering from the University of Pennsylvania. She has industrial experience in research and development environments (AT&T Bell Laboratories), as well as experience with several start-up technology firms.

Mary Anne Poatsy, MBA

mpoatsy@mc3.edu

Mary Anne is a senior faculty member at Montgomery County Community College, teaching various computer application and concepts courses in face-to-face and online environments. She enjoys speaking at various professional conferences about innovative classroom strategies. She holds a BA in psychology and education from Mount Holyoke College and an MBA in finance from Northwestern University's Kellogg Graduate School of Management.

Mary Anne has been in teaching since 1997, ranging from elementary and secondary education to Montgomery County Community College, Gwynedd-Mercy College, Muhlenberg College, and Bucks County Community College, as well as training in the professional environment. Before teaching, she was a vice president at Shearson Lehman Hutton in the Municipal Bond Investment Banking Department.

Acknowledgments

First, we would like to thank our students. We constantly learn from them while teaching, and they are a continual source of inspiration and new ideas.

We could not have written this book without the loving support of our families. Our spouses and children made sacrifices (mostly in time not spent with us) to permit us to make this dream into a reality.

Although working with the entire team at Pearson has been a truly enjoyable experience, a few individuals deserve special mention. The constant support and encouragement we receive from Jenifer Niles, Executive Acquisitions Editor, and Michael Payne, Editor in Chief, continually make this book grow and change. Our heartfelt thanks go to Shannon LeMay-Finn, our Developmental Editor. Her creativity, drive, and management skills helped make this book a reality. We also would like to extend our appreciation to Rhonda Aversa, our Editorial and Production Project Manager, who works tirelessly to ensure that our book is published on time and looks fabulous. The timelines are always short, the art is complex, and there are many people with whom she has to coordinate tasks. But she makes it look easy!

There are many people whom we do not meet in person at Pearson and elsewhere who make significant contributions by designing the book, illustrating, composing the pages, producing multimedia, and securing permissions. We thank them all. We would also like to thank the supplement authors for this edition: Wanda Gibson, Julie Boyles, Terri Holly, Stephanie Emrich, Doug Courter, Lori Damanti, Tony Nowakowski, Sara Buscaino, Sharon Behrens, Sue McCrory, Linda Pogue, and Stacy Everly.

And finally, we would like to thank the reviewers and the many others who contribute their time, ideas, and talents to this project. We appreciate their time and energy, as their comments help us turn out a better product each edition.

Pearson would like to thank and acknowledge S.H. Chung (Wawasan Open University) for his contribution to the Global Edition, and Arup Bhattacharjee (RCC Institute of Technology), Soumen Mukherjee (RCC Institute of Technology) and Shaligram Prajapat (Devi Ahilya University) for reviewing the Global Edition.

11th Edition Reviewers

Pearson and the authors would like to thank the following people for their help and time in making this book what it is. We couldn't publish this book without their contributions.

A.C. Chapin	Harford Community College
Adeleye Bamkole	Passaic County Community College
Adnan Atshan	Passaic County Community College
Afi Chamlou	NOVA Alexandria
Afrand Agah	West Chester
Alexis Stull	Fairmont State University
Ali Soleymani	NOVA Alexandria
Allyson Kinney	Gateway Community College
Amy Roche	Northampton Community College
Amy Rutledge	Oakland University
Andrew Hobbs	Delaware State University
Anita Girton	PA College of Technology
Ann-Marie Smith	Delaware City Community College
Annette Kerwin	College of DuPage
Ann Ford Tyson (coordinator)	Florida State University
Ann Taff	Tulsa Community College
Barb Garrell	Delaware City Community College
Barbara Fogle, Stuhr	Trident Tech
Barbara Garrell	Delaware County Community College
Barbara Hotta	Leeward Community College
Barry Andrews	Mt. SAC
Becky Curtain	William Rainer Harper College
Ben Martz	Northern KY
Ben Stonebraker	Ivy Tech
Benjamin Marrero	Ivy Tech
Betsy Jenaway	Macomb Community College
Beverly Fite	Amarillo
Bill Barnes	Catawba Valley Community College
Billie Williams	San Diego City
Blanca Polo	Leeward Community College
Blankenstein	Nashua Community College
Bobbie Hyndman	Amarillo
Bob Lingvall	Southwestern
Brenda Nielsen	Mesa Community College
Brent Hussin	Wisconsin-Green Bay
Brian Powell	West Virginia University
Bunny Howard	SJRCC (St. John's River)
Burton Borlongan	Mesa Community College
Carol Fletcher	Louisiana Delta College
Carolyn Barren	Macomb Community College
Carolyn Borne	Louisiana State University
Casey Wilhelm	North Idaho College
Cathy Glod	Mohawk Valley Cmty College
Charles Dessasure	Tarrant SE
Charles R. Whealton	Delaware Technical and Community College
Charles Whealton	Del Tech & Community College-Dover
Cheryl Sypniewski	Macomb Community College
ChongWoo Park	Georgia Gwinnett College
Chris Belcher	CCAC-South
Christie Jahn Hovey	Lincoln Land Community College
Clarence Kennedy	Louisiana Delta College
Cliff Sherrill	Yavapai College
Cynthia Collings	Central AZ
Cynthia Wagner	McLennan
Dale Craig	Fullerton College
Darrell Lindsey	SJRCC (St. John's River)
Darrell Riddell	Ivy Tech
Dave Burgett	McLennan
Dave Surma	IU South Bend
David Kerven	Georgia Gwinnett College
David Lange	Grand Valley
David R. Surma	Indiana University South Bend
Debbie Christenberry	Randolph Community College
Debbie Holt	KCTCS-Bluegrass-Cooper-CIT 105
Deb Fells	Mesa Community College
Debra Grande	Community College of Rhode Island
Deena White	Grayson
Deidre Grafel	Chandler-Gilbert Community College
Denise Nearing	Indian River State College
Denise Sullivan	Westchester Community College
Dennis Stewart	NOVA Alexandria
Desmond Chun	Chabot College
Diane Bittle	HACC
Diane Puopolo	Bunker Hill Community College
Dick Schwartz	Macomb Community College
Diedre Grafel	Chandler Gilbert Community College
Donald Humphrey	Columbia Basin College
Don Dershem	Mt View
Don Holcomb	KCTCS-Bluegrass-Cooper-CIT 105
Don Lafond	SJRCC (St. John's River)
Donald Riggs	Schenectady County Community College
Donna Earhart	Genesee Community College
Don Riggs	Schenectady County Community College
Doreen Nicholls	Mohawk Valley Cmty College
Dottie Sunio	Leeward Community College
Doug Medin	Western New Mexico University
Dr. Kate LeGrand	Broward College
Duane Johnson	Ivy Tech
Duane Lintner	Amarillo
Earl Latiolas	Delgado Cmty Clg
Ed Bushman	Yavapai College
Ed Delean	NOVA Alexandria
Ed Eill	Delaware City Community College
Elise Bell	CCSF

Ellen Glazer	Broward Community College, South
Ellen Kessler	HACC-Wildwood
Emily Shepard	Central Carolina Community College
Enoch Damson	Akron
Eric Cameron	Passaic County Community College
Ernest Proctor	LA Trade
Ernie Gines	Tarrant SE
Faye Tippey	Ivy Tech
Francis Seidel	Frederick Cmty College
Fred Hills	McLennan
Gabriel Viera	South TX College
Garland Berry	Columbia College
Gene Carbonara	Long Beach Community College
Gene Carbonaro	Long Beach City College
Gerald Burgess	Western New Mexico University
Gina Bowers-Miller	HACC-Wildwood
Gina Jerry	Santa Monica College
Glendora Mays	SJRCC (St. John's River)
Glen Grimes	Collin Cty
Glenn Carter	Sonoma State
Greg Hanson	Ivy Tech
Gretchen Douglas	SUNY at Cortland
Guarav Bansal	Wisconsin-Green Bay
Hal Broxmeyer	IUPUI
Helen Ortmann	CCAC-South
Helen Sheran	East LA
Hillary Miller	Kingwood
Holly Gould	Ivy Tech
Hon-Chung Kwok	CCSF
Ian Gibbons	Hillsborough Community College-Ybor
Jack Alanen	CSU-Northridge
Jaime Hicks	Ivy Tech
James Dang	Tarrant SE
James Fabrey	West Chester
James McBride	Eastern AZ
James R. Anthos	South University-Columbia
James Taggart	Atlantic Cape Community College
Janet Gelb	Grossmont Community College
Janet Laubenstein	Northampton Cmty Coll
Janine Tiffany	Reading Area Comm College
Jean-Claude Ngatchou	New Jersey City Univ.
Jeanette Dix	Ivy Tech
Jeff Bowker	Montco
Jennifer Ivey	Central Carolina Community College
Jennifer Pickle	Amarillo
Jenny Maurer	PA College of Technology
Jerry Gonnella	Northern KY
Jessica Helberg	Northern Virginia Community College
Jessie Saldana	Cypress
Jill Canine	Ivy Tech
Jim Hughes	Northern KY
Jim Poole	Honolulu Community College
Joan Heise	Ivy Tech
John Carlisle	Nashua Community College
John Dawson	IUPUI
John Enomoto	East LA
John Mayhorne	Harford Community College
John Messer	PA College of Technology
Joni Catanzaro	Louisiana State University
Jo Stephens	University of AR Community College @ Batesville
Joyce Thompson	Lehigh Carbon Community College
Judy Duff	Louisiana Delta College
Judy Scheeren	Duquesne
Juliana Cypert	Tarrant County College
Juliana.P. Cypert	Tarrant County College-NE
Julie Bell	Delgado Cmty Clg
Kae Cooper	BCTC/KCTCS
Kam Kong	Delaware State University
Karen Allen	Community College of Rhode Island
Karen Weil	McLennan
Kari Meck	HACC
Kari Walters	Louisiana State University
Kate LeGrand	Broward Community College, South
Kathie Richer	Edmonds Community College
Kathy Kelly	Montco
Kathy Olson	Ivy Tech
Kay Johnson	Community College of Rhode Island
Keith Noe	Ivy Tech
Kemit Grafton	Oklahoma State University–Oklahoma City
Ken Schroeder	Ivy Tech
Kevin Cleary	SUNY at Buffalo
Kevin Gentry	Ivy Tech
Kourosh Behzadnoori	Tarrant SE
Krista Lawrence	Delgado Cmty Clg
Kristen Hockman	Univ of Missouri-Columbia
Laura Hunt	Tulsa Community College
Laurene Hutchinson	Louisiana State University
Laurie Wallmark	Raritan Valley Community College
Leasa Richards	Columbia College
Lili Shashaani	Duquesne
Linda Arnold	HACC
Linda Moulton	Montco
Lisa Hawkins	Frederick Community College
Lisa Jackson	Phoenix College
Lisa Simpson-Kyle	Yavapai College
Lois Scheidt	Ivy Tech
Lori Laudenbach	St. Cloud State
Lorraine Sauchin	Duquesne
Lou Ann Stroup	Ivy Tech
Lucy Parker	CSU-Northridge
Lydia Macaulay	Tarrant SE
Lydia Mata	Eastern AZ
Lynne Lyon	Durham College
Lynne Stuhr	Trident Tech
Marcia Schlafmitz	New Jersey City Univ.
Marcus Butler	West LA
Marie Harlein	Montco
Marjorie Feroe	Delaware City Community College
Mark Connell	SUNY at Cortland
Marvin Daugherty	Ivy Tech
Mary Ann Zlotow	College of DuPage

EDITION eleventh 11

Mary Dermody	Chabot College
Mary Johnson	Kingwood
Mary Zegarski	NorthHampton Community College
Matthew Trotter	South TX College
Meg Kletke	Oklahoma State University
Melanie Williamson	KCTCS-Bluegrass–Cooper–CIT 105
Mel Tarnowski	Macomb Community College
Meng Has	Burlington County College
Meshack Osiro	Ivy Tech
Michael Swafford	Tulsa Community College
Michele Smolnik	Columbia College
Michelle Beets	Iowa Central Community College
Michelle Reznick	Oakton Community College
Mike Kelly	Community College of Rhode Island
Mike Puopolo	Bunker Hill Community College
NAME	SCHOOL
Nancy Evans	Indiana University-Purdue University Indianapolis
Nancy Grant	CCAC-South
Natalia Grigoriants	Pierce College
Neale Adams	Iowa Central Community College
Neal Stenlund	Northern Virginia Community College
Nelmy Vasquez	Broward Community College, South
Noah Singer	Tulsa Community College
Norma Marler	Catawba Valley Community College
Pam Ellis	PA College of Technology
Pam Uhlenkamp	Iowa Central Community College
Pat Fenton	West Valley
Pat Rahmlow	Montco
Patricia Casey	Trident Tech
Pat Vacca	El Camino College
Paul Addison	Ivy Tech
Paul Dadosky	Ivy Tech
Paul Koester	Tarrant County College, Northwest
Peggy Anderson	SUNY at Cortland
Peter Ross	Univ. of Albany
Pete Vetere	Montco
Phil Moorhead	Ivy Tech
Phil Whitney	Bakersfield College
Rachel Pena	South TX College
Randy Gibson	Indian River State College
Rebecca Giorcelli	Fairmont State University
REBECCA KIRK	Augusta State University
Rich Geglein	Ivy Tech
Ricky Barnes	Catawba Valley Community College
Robert Benavides	Collin Cty
Robert Chirwa	KCTCS-Bluegrass-Cooper-CIT 105
Robert Deadman	IUPUI
Rob Murray	Ivy Tech
Rod Waller	Indian River State College
Roger Young	Ivy Tech
Ronald Kizior	Loyola University Chicago
Ron Enz	Chattahoochee Tech
Rose LaMuraglia	San Diego City
Rosie Inwang	Olive Harvey
Sabum Anyangwe	Harford Community College
Saeed Molki	South TX College
Sally Dixon	Skagit Valley Community College
Scott Rosen	Santa Rosa Junior College
Scott Russell	Eastern AZ
Sharon Karonias	Northampton Cmty Coll
Shelly Ota	Leeward Community College
Sherri Clark	Ivy Tech
Stacia Dutton	SUNY Canton
Stacy Johnson	Iowa Central Community College
Stacy Ward	Grafton High School
Steve Carver	Ivy Tech
Steve Hustedde	South Mountain
Steven Battilana	West Chester
Steve Singer	Kapiolani Community College
Steve St. John	Tulsa Community College
Steve Stepanek	CSU-Northridge
Sue Heistand	Iowa Central Community College
Susan Barkalow	St. Cloud State
Susan Fry	Boise State University
Susan Hoggard	Tulsa Community College
Susan LaBrie	Northampton Community College
Susie Viars-Thomas	Grayson
Sylvia Emerson	Rock Valley College
Tammy Jolley	University of AR Community College @ Batesville
Ted Allen Reasoner	IUPUI
Terri Helfand	Chaffey Community College
Terry Holleman	Catawba Valley Community College
Terry Rigsby	Hill College
Tiffany Johnson	Tulsa Community College
Thomas Liu	New Jersey City Univ.
Thomas Yip	Passaic County Community College
Timothy Hinz	Genesee Community College
Toby Gustafson	UCR
Todd Schultz	Augusta State University
Tom Foster	Chandler Gilbert Community College
Tom Ryan	SJRCC (St. John's River)
Tony Basilico	Community College of Rhode Island
Valerie Golay	Ivy Tech
Vicki Brooks	Columbia College
Virginia Huegel	Western New Mexico University
Wade Graves	Grayson
Wayne Phillips	Chabot College
Wei Liu	Georgia Gwinnett College
Will Smith	Tulsa Community College
Xin Xu	Georgia Gwinnett College
Yi Li Zhuang	Macomb Community College

Letter from the Authors

Our 11th 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. In the 11th edition of *Technology in Action*, we have responded with mobile device media, interactive ebook technology, and updated video supports. We continue to strive to make *Technology in Action* a learning system that pushes the envelope of what is possible in technology, and what is helpful in teaching. In short: we have worked hard to build a text that fits the way students are learning now.

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.

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:

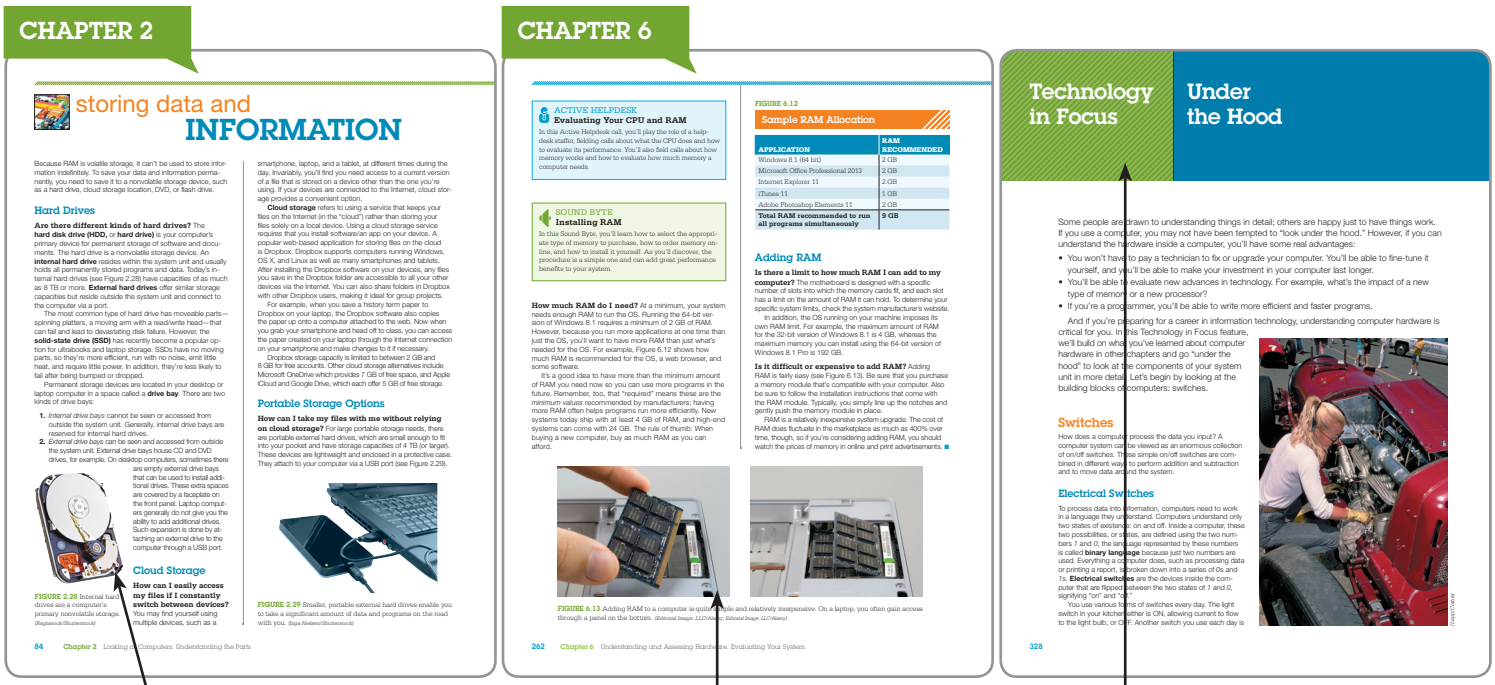
- The **Helpdesk training content**, created specifically for *Technology in Action*, enables students to take on the role of a helpdesk operator and work through common questions asked by computer users. These have been updated this edition to reflect the way in which users access help today.
- Exciting **Sound Byte multimedia**—fully updated and integrated with the text—expand student mastery of complex topics.

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 11 years to present and explain new technologies to students, and to show them the rapidly growing importance of technology in our world.

Visual Walk-Through

Topic Sequence

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



Hardware First Introduced

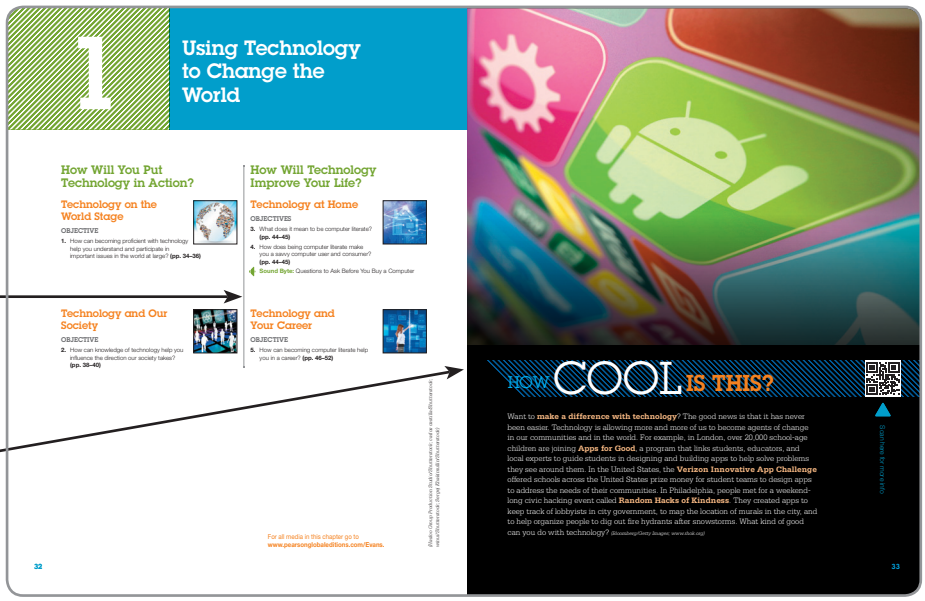
Chapter 2 is the first time students read about introductory hardware. It's covered at the beginning level because this is students' experience level at this point of the book.

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.

EDITION eleventh 11

Student Textbook

ethics in IT

The Digital Divide and the Mobile Bridge

FIGURE 1.5 Can we bridge the digital divide through mobile devices? Should we? (©Jon Feingersh/Alamy)

The digital divide, the gap between those with easy access to technology and those with little to no access (see Figure 1.5), is a problem that leads to complex social issues. For those who lack access to the Internet and computers, it is difficult to develop computer skills, which are very often critical to future success. Less familiarity with the Internet can also lead to a lower level of active, engaged citizenship. So how should we attack the problem of the digital divide in the United States?

Recent studies from the University of Michigan show that without Internet access at home, teens from low-income households (family income under $30,000 a year) are more likely than their wealthier counterparts to use their cell phones to go online. So the widening penetration of cell phones might be the answer to ending the digital divide. Or is it?

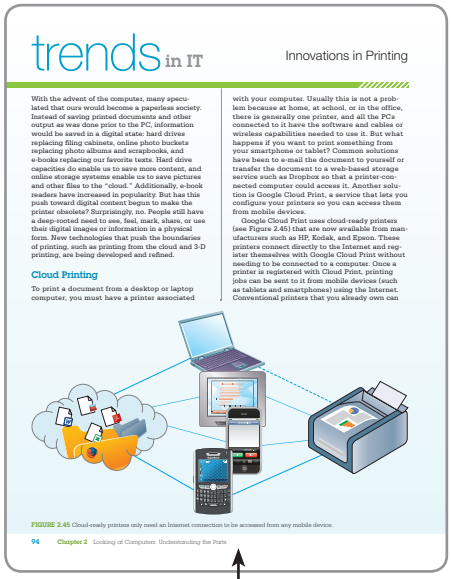
Going online using a cell phone plan is the most expensive of all options, and data transfer speeds are often slow. So teens with the least money are likely paying the most to get the slowest online experience. And they are more likely paying for it themselves, as opposed to teens from wealthier households in which, according to the same University of Michigan study, the teens are more likely to be on family plans paid for by someone else.

In addition, teen cell phone usage is limited to managing online social networks, playing games, or listening to music. Computer tasks and skills that could lead to economic advancement, like filling out job applications or running a business, are not yet handled easily on mobile devices. So by not having free Internet access available, is our society placing those groups least able to afford access at an unfair disadvantage?

Will the increasing penetration of smartphones and faster cellular Internet access eliminate the digital divide in the United States? Should our government intervene and make sure there is sufficient free Internet access for all? Is it ethical to deprive the poorer segment of our society of a needed commodity? Answering challenging questions like these is part of being an informed citizen.

Ethics in IT 37

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


trends in IT

Innovations in Printing

With the advent of the computer, many speculated that ours would become a paperless society. Instead of saving printed documents and other output as was done prior to the PC, information would be saved in a digital state: hard drives replacing filing cabinets, online photo buckets replacing photo albums and scrapbooks, and e-books replacing our favorite texts. Hard drive capacities do enable us to save more content, and online storage systems enable us to save pictures and other files to the "cloud." Additionally, e-book readers have increased in popularity. But has this push toward digital content begun to make the printer obsolete? Surprisingly, no. People still have a deep-rooted need to see, feel, mark, share, or use their digital images or information in a physical form. New technologies that push the boundaries of printing, such as printing from the cloud and 3-D printing, are being developed and refined.

Cloud Printing

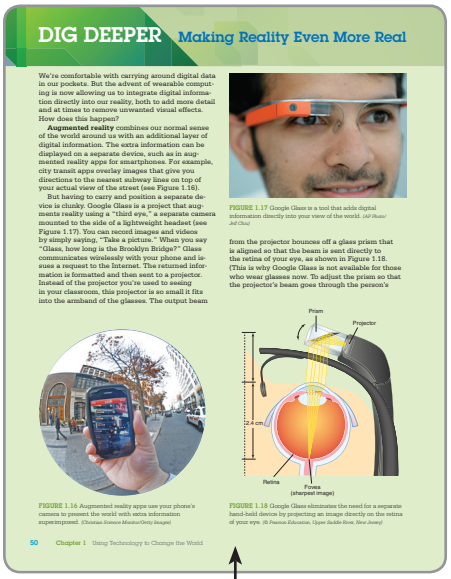
To print a document from a desktop or laptop computer, you must have a printer associated with your computer. Usually this is not a problem because at home, at school, or in the office, there is generally one printer, and all the PCs connected to it have the software and cables or wireless capabilities needed to use it. But what happens if you want to print something from your smartphone or tablet? Common solutions have been to e-mail the document to yourself or transfer the document to a web-based storage service such as Dropbox so that a printer-connected computer could access it. Another solution is Google Cloud Print, a service that lets you configure your printers so you can access them from mobile devices.

Google Cloud Print uses cloud-ready printers (see Figure 2.45) that are now available from manufacturers such as HP, Kodak, and Epson. These printers connect directly to the Internet and register themselves with Google Cloud Print without needing to be connected to a computer. Once a printer is registered with Cloud Print, printing jobs can be sent to it from mobile devices (such as tablets and smartphones) using the Internet. Conventional printers that you already own can

FIGURE 2.45 Cloud-ready printers only need an Internet connection to be accessed from any mobile device.

94 Chapter 2 Looking at Computers: Understanding the Parts

Trends in IT
Boxes explore hot topics in computing.


DIG DEEPER Making Reality Even More Real

We're comfortable with carrying around digital data in our pockets. But the advent of wearable computing is now allowing us to integrate digital information directly into our reality, both to add more detail and at times to remove unwanted visual effects. How does this happen?

Augmented reality combines our normal senses of the world around us with an additional layer of digital information. The extra information can be displayed on a separate device, such as in augmented reality apps for smartphones. For example, city transit apps overlay images that give you directions to the nearest subway lines on top of your actual view of the street (see Figure 1.16).

But having to carry and position a separate device is clunky. Google Glass is a project that augments reality using a "third eye," a separate camera mounted to the side of a lightweight headset (see Figure 1.17). You can record images and videos by simply saying, "Take a picture." When you say "Glass, how long is the Brooklyn Bridge?" Glass communicates wirelessly with your phone and issues a request to the Internet. The returned information is formatted and then sent to a projector. Instead of the projector you're used to seeing in your classroom, this projector is so small it fits into the armband of the glasses. The output beam from the projector bounces off a glass prism that is aligned so that the beam is sent directly to the retina of your eye, as shown in Figure 1.18. (This is why Google Glass is not available for those who wear glasses now. To adjust the prism so that the projector's beam goes through the person's

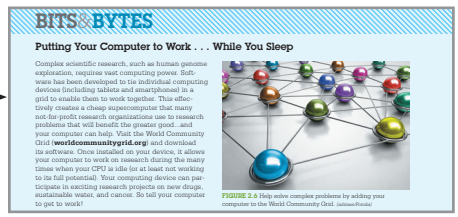
FIGURE 1.16 Augmented reality apps use your phone's camera to present the world with extra information superimposed. (Christian Science Monitor/Getty Images)

FIGURE 1.17 Google Glass is a tool that adds digital information directly into your view of the world. (AP Photo/Jeff Chiu)

FIGURE 1.18 Google Glass eliminates the need for a separate hand-held device by projecting an image directly on the retina of your eye. (© Pearson Education, Upper Saddle River, New Jersey)

50 Chapter 1 Using Technology to Change the World

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


BITS & BYTES

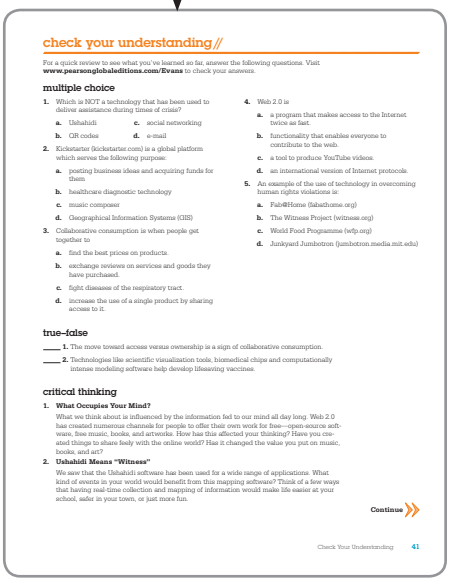
Putting Your Computer to Work . . . While You Sleep

Complex scientific research, such as human genome exploration, requires vast computing power. Software has been developed to tie individual computing devices (including tablets and smartphones) in a grid to enable them to work together. This effectively creates a cheap supercomputer that many not-for-profit research organizations use to research problems that will benefit the greater good...and your computer can help. Visit the World Community Grid (**worldcommunitygrid.org**) and download its software. Once installed on your device, it allows your computer to work on research during the many times when your CPU is idle for at least not working to its full potential). Your computing device can participate in exciting research projects on new drugs, sustainable water, and cancer. So tell your computer to get to work!

FIGURE 2.6 Help solve complex problems by adding your computer to the World Community Grid. (schinwa/Fotolia)

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

Check Your Understanding
Multiple Choice, True-False, and Critical Thinking


check your understanding //

For a quick review to see what you've learned so far, answer the following questions. Visit **www.pearsonglobaleditions.com/Evans** to check your answers.

multiple choice

1. Which is NOT a technology that has been used to deliver assistance during times of crisis?
   a. Ushahidi c. social networking
   b. QR codes d. e-mail
2. Kickstarter (kickstarter.com) is a global platform which serves the following purpose:
   a. posting business ideas and acquiring funds for them
   b. healthcare diagnostic technology
   c. music composer
   d. Geographical Information Systems (GIS)
3. Collaborative consumption is when people get together to
   a. find the best prices on products.
   b. exchange reviews on services and goods they have purchased.
   c. fight diseases of the respiratory tract.
   d. increase the use of a single product by sharing access to it.
4. Web 2.0 is
   a. a program that makes access to the Internet twice as fast.
   b. functionality that enables everyone to contribute to the web.
   c. a tool to produce YouTube videos.
   d. an international version of Internet protocols.
5. An example of the use of technology in overcoming human rights violations is:
   a. Fab@Home (fabathome.org)
   b. The Witness Project (witness.org)
   c. World Food Programme (wfp.org)
   d. Junkyard Jumbotron (jumbotron.media.mit.edu)

true–false

____ 1. The move toward access versus ownership is a sign of collaborative consumption.
____ 2. Technologies like scientific visualization tools, biomedical chips and computationally intense modeling software help develop lifesaving vaccines.

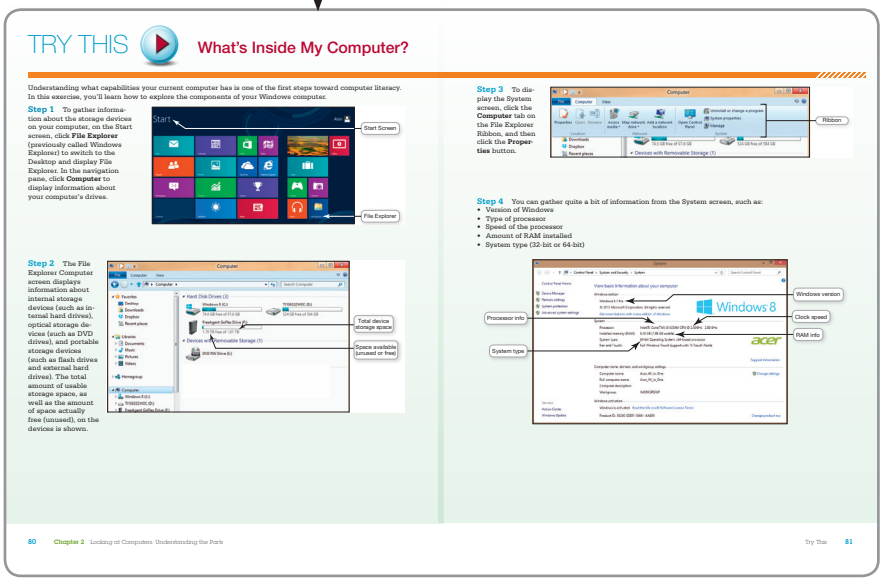
critical thinking

1. **What Occupies Your Mind?**
   What we think about is influenced by the information fed to our mind all day long. Web 2.0 has created numerous channels for people to offer their own work for free—open-source software, free music, books, and artworks. How has this affected your thinking? Have you created things to share freely with the online world? Has it changed the value you put on music, books, and art?
2. **Ushahidi Means "Witness"**
   We saw that the Ushahidi software has been used for a wide range of applications. What kind of events in your world would benefit from this mapping software? Think of a few ways that having real-time collection and mapping of information would make life easier at your school, safer in your town, or just more fun.

Continue

Check Your Understanding 41

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


TRY THIS What's Inside My Computer?

Understanding what capabilities your current computer has is one of the first steps toward computer literacy. In this exercise, you'll learn how to explore the components of your Windows computer.

Step 1 To gather information about the storage devices on your computer, on the Start screen, click **File Explorer** (previously called Windows Explorer) to switch to the Desktop and display File Explorer. In the navigation pane, click **Computer** to display information about your computer's drives.

Start Screen
File Explorer

Step 2 The File Explorer Computer screen displays information about internal storage devices (such as internal hard drives), optical storage devices (such as flash drives and external hard drives). The total amount of usable storage space, as well as the amount of space actually free (unused), on the devices is shown.

Total device storage space
Space available (unused or free)

Step 3 To display the System screen, click the **Computer** tab on the File Explorer Ribbon, and then click the **Properties** button.

Ribbon

Step 4 You can gather quite a bit of information from the System screen, such as:
- Version of Windows
- Type of processor
- Speed of the processor
- Amount of RAM installed
- System type (32-bit or 64-bit)

Windows version
Clock speed
RAM info
Processor info
System type

80 Chapter 2 Looking at Computers: Understanding the Parts

Try This 81

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