



**TECHNOLOGY**  
**IN ACTION**  
**INTRODUCTORY**  
**THIRTEENTH EDITION**

**Alan Evans • Kendall Martin • Mary Anne Poatsy**



# **Technology in Action**

This page intentionally left blank



# Technology in Action

## INTRODUCTORY

**13TH 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 São Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

**VP, Editorial Director:** Andrew Gilfillan  
**Executive Acquisitions Editor:** Jenifer Niles  
**Production and Program Team Lead:** Laura Burgess  
**Project Manager:** Holly Haydash  
**Program Manager:** Emily Biberger  
**Editorial Assistant:** Michael Campbell  
**Development Editor:** Shannon LeMay-Finn  
**Director of Marketing:** Maggie Waples  
**Marketing Coordinator:** Susan Osterlitz  
**Operations Specialist:** Diane Peirano  
**Director of Digital Studio, Worforce Readiness:** Blaine Christine

**Digital Strategy:** Eric Hakanson  
**Media Project Manager, Production:** John Cassar  
**Art Director:** Diane Ernsberger  
**Cover Design:** Studio Montage  
**Cover Art:** Tomas Jasinskis/Shutterstock  
**Full-Service Project Management:** Lumina Datamatics, Inc.  
**Composition:** Lumina Datamatics, Inc.  
**Printer/Binder:** Courier/Kendalville  
**Cover Printer:** Lehigh-Phoenix Color/Hagerstown  
**Text Font:** 9/11 Helvetica Neue LT W1G

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.

---

**Copyright © 2016, 2015, 2014 Pearson Education, Inc., publishing as Prentice Hall.** All rights reserved. Manufactured in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. To obtain permission(s) to use material from this work, please submit a written request to Pearson Education, Inc., Permissions Department, 1 Lake Street, Upper Saddle River, New Jersey, 07458.

Many of the designations by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed in initial caps or all caps.

Library of Congress Control Number: 2015040435

10987654321

**PEARSON**

ISBN 10: 0-13-447450-3  
ISBN 13: 978-0-13-447450-2



# Contents at a Glance

## Chapter 1

Using Technology to Change the World ..... 2

## Chapter 2

Looking at Computers: Understanding the Parts..... 28

## Chapter 3

Using the Internet: Making the Most of the Web's Resources ..... 74

### Technology in Focus

The History of the Personal Computer ..... 112

## Chapter 4

Application Software: Programs That Let You Work and Play..... 122

## Chapter 5

System Software: The Operating System, Utility Programs, and File Management ..... 160

### Technology in Focus

Information Technology Ethics ..... 202

## Chapter 6

Understanding and Assessing Hardware: Evaluating Your System ..... 222

## Chapter 7

Networking: Connecting Computing Devices..... 258

### Technology in Focus

Under the Hood..... 296

## Chapter 8

Digital Devices and Media: Managing a Digital Lifestyle..... 308

## Chapter 9

Securing Your System: Protecting Your Digital Data and Devices ..... 346

### Technology in Focus

Careers in IT ..... 396

Glossary ..... 408

Index ..... 419

This page intentionally left blank



# Contents

## Chapter 1

<b>Using Technology to Change the World .....</b>	<b>2</b>
<b>How Will You Put Technology in Action?.....</b>	<b>4</b>
<b>Learning Outcome 1.1</b> You will be able to discuss the impact of technology on global and national issues.	
<b>Technology on the World Stage .....</b>	<b>4</b>
Political Issues .....	4
<b>Objective 1.1</b> <i>Recognize how becoming proficient with technology can help you understand and participate in political issues in the world at large.</i>	
Other Global Issues .....	5
<b>Objective 1.2</b> <i>Describe how technology affects social issues in different societies.</i>	
<b>Technology and Our Society.....</b>	<b>7</b>
Technology Impacts How We Think.....	7
<b>Objective 1.3</b> <i>Describe how technology is changing our cognitive processes.</i>	
Technology Impacts How We Connect .....	7
<b>Objective 1.4</b> <i>Explain how technology is expanding the ways we collaborate.</i>	
Technology Impacts How We Consume .....	8
<b>Objective 1.5</b> <i>Summarize how technology has impacted the way we choose and consume products and services.</i>	
<b>TRY THIS:</b> Skyping Around the World.....	10
<b>MAKE THIS:</b> MAKE: A Virtual Assistant .....	11
<b>How Will Technology Improve Your Life? .....</b>	<b>12</b>
<b>Learning Outcome 1.2</b> You will be able to discuss personal impacts technology can have on your life and your career.	
<b>Technology at Home.....</b>	<b>12</b>
Computer Literacy .....	12
<b>Objective 1.6</b> <i>Characterize computer literacy, and list some of its benefits.</i>	
<b>ETHICS IN IT:</b> Ethics and Technology.....	14
<b>Technology and Your Career .....</b>	<b>15</b>
Impact of Computer Literacy on Your Career .....	15
<b>Objective 1.7</b> <i>Characterize the impact computer literacy has on a variety of careers.</i>	
<b>DIG DEEPER:</b> Augmentative and Virtual Realities .....	19
<b>SOLVE THIS:</b> How Technology Is Used on the World Stage and in My Personal Life .....	27

## Chapter 2

<b>Looking at Computers: Understanding the Parts .....</b>	<b>28</b>
<b>Understanding Digital Components .....</b>	<b>30</b>
<b>Learning Outcome 2.1</b> You will be able to describe the devices that make up a computer system.	
<b>Understanding Your Computer .....</b>	<b>30</b>
Computers Are Data Processing Devices .....	30
<b>Objective 2.1</b> <i>Describe the four main functions of a computer system and how they interact with data and information.</i>	



Bits and Bytes: The Language of Computers.....	31
<b>Objective 2.2</b> Define bits and bytes, and describe how they are measured, used, and processed.	
Types of Computers .....	31
<b>Objective 2.3</b> List common types of computers, and discuss their main features.	
<b>Input Devices .....</b>	<b>34</b>
Keyboards and Touch Screens .....	34
<b>Objective 2.4</b> Identify the main types of keyboards and touch screens.	
Mice and Other Pointing Devices.....	36
<b>Objective 2.5</b> Describe the main types of mice and pointing devices.	
Image and Sound Input .....	37
<b>Objective 2.6</b> Explain how images and sounds are input into computing devices.	
<b>DIG DEEPER:</b> How Touch Screens Work .....	38
<b>Output Devices .....</b>	<b>41</b>
Monitors.....	41
<b>Objective 2.7</b> Name common types of monitors, and identify important aspects of their quality.	
Printers.....	43
<b>Objective 2.8</b> Describe various types of printers, and explain when you would use them.	
Sound Output .....	45
<b>Objective 2.9</b> Discuss options for outputting sound from your computing devices.	
<b>TRY THIS:</b> What's Inside My Computer? .....	48
<b>MAKE THIS:</b> MAKE: A Mobile App .....	49
<b>Processing, Storage, and Connectivity .....</b>	<b>50</b>
<b>Learning Outcome 2.2</b> You will be able to describe how computers process and store data and how devices connect to a computer system.	
<b>Processing and Memory on the Motherboard.....</b>	<b>50</b>
The Motherboard and Memory .....	50
<b>Objective 2.10</b> Define motherboard and RAM.	
Processing .....	51
<b>Objective 2.11</b> Explain the main functions of the CPU.	
<b>Storing Data and Information.....</b>	<b>52</b>
Hard Drives .....	52
<b>Objective 2.12</b> List the various types of hard drives.	
Cloud Storage.....	52
<b>Objective 2.13</b> Define cloud storage, and explain how to use it.	
Portable and Optical Storage Options.....	52
<b>Objective 2.14</b> Describe the various portable and optical storage options.	
<b>ETHICS IN IT:</b> What Is Ethical Computing?.....	53
<b>Connecting Peripherals to the Computer .....</b>	<b>55</b>
Computer Ports.....	55
<b>Objective 2.15</b> List the common types of ports used today.	
<b>TRENDS IN IT:</b> Green Computing (Green IT) .....	56
Adding Ports: Expansion Cards and Hubs .....	58
<b>Objective 2.16</b> List the options for adding ports to your device.	
<b>Power Controls and Ergonomics .....</b>	<b>59</b>
Power Controls.....	59
<b>Objective 2.17</b> Describe how to manage power consumption on your computing devices.	
Setting It All Up: Ergonomics .....	59
<b>Objective 2.18</b> Define ergonomics, and discuss the ideal physical setup for using computing devices.	
<b>TRENDS IN IT:</b> Innovations in Printing .....	63
<b>SOLVE THIS:</b> Technology Wish List.....	73

## Chapter 3

### Using the Internet: Making the Most of the Web's Resources..... 74

#### Working and Playing on the Web .....76

**Learning Outcome 3.1** You will be able to explain how the Internet works and how it is used for collaboration, communication, commerce, and entertainment purposes.

#### The Internet and How It Works..... 76

The Origin of the Internet ..... 76

**Objective 3.1** Describe how the Internet got its start.

How the Internet Works ..... 77

**Objective 3.2** Explain how data travels on the Internet.

#### Collaborating and Communicating on the Web..... 79

Collaborating with Web 2.0 Tools..... 79

**Objective 3.3** Discuss the tools and technologies used to collaborate and communicate on the web.

Communicating over the Web ..... 83

**Objective 3.4** Summarize how e-mail and instant messaging are used to communicate over the web.

#### Business and Entertainment on the Web ..... 85

Types of E-Commerce ..... 85

**Objective 3.5** Describe the different types of e-commerce.

E-Commerce Safeguards ..... 86

**Objective 3.6** Summarize precautions you should take when doing business online.

Web Entertainment..... 87

**Objective 3.7** Describe the types of multimedia files found on the web.

**TRY THIS:** Create a OneDrive Account to Store and Share

Your Files in the Cloud ..... 90

**MAKE THIS:** MAKE: A Web-Capable App ..... 91

#### Using the Web Effectively .....92

**Learning Outcome 3.2** You will be able to describe the tools and techniques required to navigate and search the web.

#### Accessing and Moving Around the Web ..... 92

Web Browsers..... 92

**Objective 3.8** Explain what web browsers are, and describe their common features.

URLs, Protocols, and Domain Names..... 93

**Objective 3.9** Explain what a URL is, and discuss its main parts.

Navigating the Web ..... 94

**Objective 3.10** Describe tools used to navigate the web.

Favorites, Live Bookmarks, and Tagging..... 96

**Objective 3.11** Describe tools used to mark websites for future use.

**DIG DEEPER:** Discovering the Semantic Web..... 97

#### Searching the Web Effectively..... 98

Using Search Engines ..... 98

**Objective 3.12** Describe the types of tools used to search the web, and summarize strategies used to refine search results.

Evaluating Websites..... 100

**Objective 3.13** Describe how to evaluate a website to ensure it is appropriate to use for research purposes.

**TRENDS IN IT:** Doing Business on a Shoestring—Thanks to the Internet..... 101

**Using the Web Ethically** ..... 102  
 Intellectual Property and Cyberbullying..... 102  
**Objective 3.14** *Demonstrate an understanding of intellectual property and cyberbullying.*  
 Privacy and Geolocation ..... 103  
**Objective 3.15** *Demonstrate an understanding of the ethical issues regarding privacy and geolocation.*  
**ETHICS IN IT:** Plagiarism and Copyright Violation: What Can You  
 Borrow from the Internet?..... 104  
**SOLVE THIS:** Create a Report: Conducting Research on the Web ..... 111

**TECHNOLOGY IN FOCUS**

**The History of the Personal Computer..... 112**

**Chapter 4**

**Application Software: Programs That Let You  
Work and Play ..... 122**

**Programs That Let You Work ..... 124**

**Learning Outcome 4.1** You will be able to describe the basic ways to access and use software and identify the main types of productivity and business software.

**The Nuts and Bolts of Software ..... 124**

Software Basics..... 124

**Objective 4.1** *Describe the differences between application and system software.*

Basic Types of Apps and Software..... 124

**Objective 4.2** *List different types of apps and software you can use on your computing devices.*

**TRENDS IN IT:** Mobile Payment Apps: The Power of M-Commerce..... 125

**Productivity and Business Software ..... 126**

Productivity Software..... 126

**Objective 4.3** *List the types of applications included in productivity software suites, and describe their uses and features.*

Personal Financial Software ..... 133

**Objective 4.4** *List software that individuals use to manage their finances.*

Business Software ..... 134

**Objective 4.5** *List common types of software that large and small businesses use.*

**TRY THIS:** Citing Website Sources ..... 138

**MAKE THIS:** MAKE: A More Powerful App ..... 139

**Programs That Let You Play ..... 140**

**Learning Outcome 4.2** Describe the different types of multimedia and educational software available, and discuss how best to manage your software.

**Multimedia and Educational Software..... 140**

Digital Image-Editing, Video-Editing, and Drawing Software ..... 140

**Objective 4.6** *Describe the uses and features of digital image-editing, video-editing, and drawing software.*

Digital Audio Software ..... 142

**Objective 4.7** *Describe the uses and features of digital audio software.*

**DIG DEEPER:** How Cloud Computing Works ..... 143

App Creation Software ..... 144

**Objective 4.8** *Describe the features of app creation software.*

Educational and Reference Software ..... 145

**Objective 4.9** *Describe common types of educational and reference software and their features.*

<b>Managing Your Software.....</b>	<b>146</b>
Getting Software .....	146
<b>Objective 4.10</b> <i>Describe where to obtain the main types of software.</i>	
Software Licenses .....	148
<b>Objective 4.11</b> <i>Explain how software licenses function.</i>	
<b>ETHICS IN IT:</b> Can I Borrow Software That I Don't Own? .....	149
Getting the Right Software for Your System .....	150
<b>Objective 4.12</b> <i>Describe how to ensure software you purchase will work on your device.</i>	
Installing and Uninstalling Software.....	150
<b>Objective 4.13</b> <i>Describe how to install and uninstall software.</i>	
<b>SOLVE THIS:</b> Analyzing Benchmark Data.....	159

## Chapter 5

### System Software: The Operating System, Utility Programs, and File Management..... 160

#### Understanding System Software ..... 162

**Learning Outcome 5.1** You will be able to explain the types and functions of an operating system and explain the steps in the boot process.

<b>Operating System Fundamentals.....</b>	<b>162</b>
Operating System Basics .....	162
<b>Objective 5.1</b> <i>Discuss the functions of the operating system.</i>	
Operating Systems for Machinery, Networks, and Business .....	163
<b>Objective 5.2</b> <i>Explain the different kinds of operating systems for machines, networks, and business.</i>	
Operating Systems for Personal Use.....	164
<b>Objective 5.3</b> <i>Explain the most common operating systems for personal use.</i>	
<b>What the Operating System Does.....</b>	<b>167</b>
The User Interface .....	167
<b>Objective 5.4</b> <i>Explain how the operating system provides a means for users to interact with the computer.</i>	
Hardware Coordination.....	168
<b>Objective 5.5</b> <i>Explain how the operating system helps manage hardware such as the processor, memory, storage, and peripheral devices.</i>	
<b>ETHICS IN IT:</b> The Great Debate: Is Mac OS X Safer Than Windows?.....	171
Software Application Coordination.....	172
<b>Objective 5.6</b> <i>Explain how the operating system interacts with application software.</i>	
<b>Starting Your Computer .....</b>	<b>172</b>
The Boot Process.....	172
<b>Objective 5.7</b> <i>Discuss the process the operating system uses to start up the computer and how errors in the boot process are handled.</i>	
<b>TRY THIS:</b> Using Virtual Desktops in Windows 10.....	176
<b>MAKE THIS:</b> MAKE: A Notification Alert.....	177
<b>Using System Software.....</b>	<b>178</b>
<b>Learning Outcome 5.2</b> You will be able to describe how system software is used, including managing the user interface, file management, and utility programs.	
<b>The Windows Interface .....</b>	<b>178</b>
Using Windows 10 .....	178
<b>Objective 5.8</b> <i>Describe the main features of the Windows interface.</i>	
<b>File Management.....</b>	<b>181</b>

Organizing Your Files ..... 181  
**Objective 5.9** Summarize how the operating system helps keep your computer organized.  
**TRENDS IN IT:** Open Source Software: Why Isn't Everyone Using Linux? ..... 182  
Working with Files and Folders ..... 184  
**Objective 5.10** Summarize how to view, sort, name, and manage files and folders.  
File Compression..... 187  
**Objective 5.11** Summarize how file compression works.  
**Utility Programs ..... 189**  
Windows Administrative Utilities..... 189  
**Objective 5.12** Outline the tools used to enhance system productivity.  
**DIG DEEPER:** How Disk Defragmenter Utilities Work ..... 191  
File and System Backup Utilities ..... 192  
**Objective 5.13** Summarize the utilities used to backup and restore files and the computer system.  
Accessibility Utilities..... 192  
**Objective 5.14** Describe the assistive technology utilities used to make using the computer system easier.  
**SOLVE THIS:** Mobile Operating Systems: Changing Market Share ..... 201

**TECHNOLOGY IN FOCUS**

**Information Technology Ethics ..... 202**

**Chapter 6**

**Understanding and Assessing Hardware:  
Evaluating Your System..... 222**

**Evaluating Key Subsystems ..... 224**

**Learning Outcome 6.1** You will be able to evaluate your computer system's hardware functioning.

**Your Ideal Computing Device ..... 224**  
Moore's Law ..... 224  
**Objective 6.1** Describe the changes in CPU performance over the past several decades.  
Select a Computing Device ..... 225  
**Objective 6.2** Compare and contrast a variety of computing devices.  
**Evaluating the CPU Subsystem..... 226**  
How the CPU Works ..... 226  
**Objective 6.3** Describe how a CPU is designed and how it operates.  
Measuring CPU Performance ..... 228  
**Objective 6.4** Describe tools used to measure and evaluate CPU performance.  
**Evaluating the Memory Subsystem ..... 230**  
Random Access Memory ..... 230  
**Objective 6.5** Discuss how RAM is used in a computer system.  
Adding RAM..... 232  
**Objective 6.6** Evaluate whether adding RAM to a system is desirable.  
**Evaluating the Storage Subsystem ..... 233**  
Types of Storage Drives ..... 233  
**Objective 6.7** Classify and describe the major types of nonvolatile storage drives.  
**DIG DEEPER:** How Hard Drives Work..... 235  
Storage Needs ..... 236  
**Objective 6.8** Evaluate the amount and type of storage needed for a system.

**TRY THIS:** Measure Your System Performance ..... 240

**MAKE THIS:** MAKE: A Location-Aware App ..... 241

**Evaluating Other Subsystems and Making a Decision** ..... 242

**Learning Outcome 6.2** You will be able to evaluate your system’s reliability and decide whether to purchase a new system or upgrade an existing one.

**Evaluating the Media Subsystems** ..... 242

Video Cards ..... 242

**Objective 6.9** Describe the features of video cards.

**TRENDS IN IT:** USB 3.1 and USB-C ..... 244

Sound Cards ..... 245

**Objective 6.10** Describe the features of sound cards.

**Evaluating System Reliability and Moving On**..... 247

Maintaining System Reliability ..... 247

**Objective 6.11** Describe steps you can take to optimize your system’s reliability.

Getting Rid of Your Old Computer ..... 248

**Objective 6.12** Discuss how to recycle, donate, or dispose of an older computer.

**ETHICS IN IT:** Free Hardware for All ..... 250

**SOLVE THIS:** Laptop Alternatives ..... 257

## Chapter 7

### Networking: Connecting Computing Devices ..... 258

#### How Networks Function ..... 260

**Learning Outcome 7.1** You will be able to explain the basics of networking, including the components needed to create networks, and describe the different ways you can connect networks to the Internet.

**Networking Fundamentals**..... 260

Understanding Networks ..... 260

**Objective 7.1** Explain what a network is and the pros and cons of having one.

**Network Architectures** ..... 262

Network Architectures Defined by Distance ..... 262

**Objective 7.2** Discuss how networks are defined by distance.

Network Architectures Defined by Levels of Administration ..... 263

**Objective 7.3** Discuss how networks are classified by levels of administration.

Ethernet Protocols ..... 264

**Objective 7.4** Describe the Ethernet protocols for wired and wireless networks.

**Network Components** ..... 265

Transmission Media ..... 265

**Objective 7.5** Describe the types of transmission media used in networks.

Basic Network Hardware ..... 267

**Objective 7.6** Describe the basic devices necessary for networks.

Network Software ..... 268

**Objective 7.7** Describe the type of software necessary for networks.

**ETHICS IN IT:** Ethical Challenges of the Internet of Things ..... 269

**Connecting to the Internet**..... 269

Wired Broadband Internet Connections ..... 269

**Objective 7.8** Compare and contrast the broadband options available to access the Internet.

Wireless Internet Access ..... 271

**Objective 7.9** Explain how to access the Internet wirelessly.

Dial-Up Connections .....	272
<b>Objective 7.10</b> Summarize the pros and cons of dial-up connections.	
<b>TRY THIS:</b> Testing Your Internet Connection Speed .....	274
<b>MAKE THIS:</b> MAKE: Networked Devices .....	275
<b>Your Home Network</b> .....	<b>276</b>
<b>Learning Outcome 7.2</b> You will be able to describe what you need to install and configure a home network and how to manage and secure a wireless network.	
<b>Installing and Configuring Home Networks</b> .....	<b>276</b>
Planning Your Home Network .....	276
<b>Objective 7.11</b> Explain steps you should take before creating a home network.	
Connecting Devices to a Network .....	277
<b>Objective 7.12</b> Describe what you need in order to connect devices to a network.	
Specialized Home Networking Devices .....	278
<b>Objective 7.13</b> Describe specialized devices you can add to a home network.	
Configuring Software for Your Home Network .....	281
<b>Objective 7.14</b> Summarize how to configure home network software.	
<b>TRENDS IN IT:</b> How Smart Is Your Home? .....	284
<b>Managing and Securing Wireless Networks</b> .....	<b>285</b>
Troubleshooting Wireless Network Problems .....	285
<b>Objective 7.15</b> Describe the potential problems with wireless networks and how to avoid them.	
Securing Wireless Networks .....	285
<b>Objective 7.16</b> Describe how to secure a wireless home network.	
<b>SOLVE THIS:</b> Home Networking Guide .....	295

## TECHNOLOGY IN FOCUS

<b>Under the Hood</b> .....	<b>296</b>
-----------------------------	------------

## Chapter 8

<b>Digital Devices and Media: Managing a Digital Lifestyle</b> .....	<b>308</b>
--	------------

<b>Mobile Devices</b> .....	<b>310</b>
-----------------------------	------------

**Learning Outcome 8.1** You will be able to discuss the nature of digital signals and how mobile computing devices are designed and operated.

<b>Digital Basics</b> .....	<b>310</b>
Digital Convergence .....	310
<b>Objective 8.1</b> Describe how digital convergence has evolved.	
Digital vs. Analog .....	311
<b>Objective 8.2</b> Explain the differences between digital and analog signals.	
<b>The Power of Smartphones</b> .....	<b>313</b>
Cellular Technology .....	313
<b>Objective 8.3</b> Describe the technologies used to communicate across cellular networks.	
Using Smartphones and Keeping Them Secure .....	317
<b>Objective 8.4</b> Explain how to effectively use cellular devices and mobile Internet access and how to keep your devices secure.	
<b>Mobile Computing</b> .....	<b>321</b>
Variety of Devices .....	321



**Objective 8.5** *Demonstrate an understanding of the range of different mobile computing devices.*  
 Selecting a Device ..... 322

**Objective 8.6** *Describe how to evaluate which mobile device is appropriate for a specific user.*  
**TRY THIS:** Creating and Publishing a Movie..... 324  
**MAKE THIS:** MAKE: A Video-Playing App ..... 325

**The Impact of Digital Information ..... 326**

**Learning Outcome 8.2** **You will be able to describe how digital technology is used to produce and distribute digital texts, music, and video.**

**Digital Publishing ..... 326**  
 E-Readers ..... 326  
**Objective 8.7** *Describe e-readers, and discuss the different types of e-readers that are available.*  
 Using e-Texts..... 327  
**Objective 8.8** *Explain how to purchase, borrow, and publish e-texts.*

**Digital Music ..... 328**  
 Creating and Storing Digital Music ..... 328  
**Objective 8.9** *Describe how digital music is created and stored.*  
**TRENDS IN IT:** NFC Chips: Do You Have a Digital Wallet? ..... 329  
 Distributing Digital Music ..... 331  
**Objective 8.10** *Summarize how to stream and publish digital music.*  
**DIG DEEPER:** P2P File Sharing ..... 332

**Digital Media ..... 333**  
 Digital Photography ..... 333  
**Objective 8.11** *Explain how best to create, print, and share digital photographs.*  
 Digital Video ..... 334  
**Objective 8.12** *Describe how to create, edit, and distribute digital video.*  
**ETHICS IN IT:** Managing Your Copyrights: Copyleft Might Simplify Your Life..... 338  
**SOLVE THIS:** Estimating Cellular Data Usage ..... 345

## Chapter 9

### Securing Your System: Protecting Your Digital Data and Devices ..... 346

#### Threats to Your Digital Assets..... 348

**Learning Outcome 9.1** **You will be able to describe hackers, viruses, and other online annoyances and the threats they pose to your digital security.**

**Identity Theft and Hackers ..... 348**  
 Identity Theft ..... 349  
**Objective 9.1** *Describe how identity theft is committed and the types of scams identity thieves perpetrate.*  
 Hacking..... 349  
**Objective 9.2** *List and describe the different types of hackers.*  
 Hacking Tools and Attack Types ..... 350  
**Objective 9.3** *Describe the various tools hackers use and the types of attacks they might launch against computers.*

**Computer Viruses..... 353**  
 Virus Basics..... 353  
**Objective 9.4** *Explain what a computer virus is, why they are a threat to your security, how a computing device catches a virus, and the symptoms it may display.*  
 Types of Viruses ..... 353  
**Objective 9.5** *List the different categories of computer viruses, and describe their behaviors.*



<b>Online Annoyances and Social Engineering .....</b>	<b>355</b>
Malware: Adware and Spyware .....	355
<b>Objective 9.6</b> <i>Explain what malware is, and list the common types of malware.</i>	
Spam .....	356
<b>Objective 9.7</b> <i>Define spam, and describe strategies to combat it.</i>	
Cookies .....	358
<b>Objective 9.8</b> <i>Explain what cookies are and whether they pose a security threat.</i>	
<b>ETHICS IN IT:</b> You're Being Watched...But Are You Aware You're Being Watched? ....	359
Social Engineering .....	360
<b>Objective 9.9</b> <i>Describe social engineering techniques, and explain strategies to avoid falling prey to them.</i>	
<b>TRENDS IN IT:</b> Computers in Society: Spear Phishing: The Bane of Data Breaches.....	362
<b>TRY THIS:</b> Testing Your Network Security.....	364
<b>MAKE THIS:</b> MAKE: A Password Generator .....	365
<b>Protecting Your Digital Property.....</b>	<b>366</b>
<b>Learning Outcome 9.2</b> <b>Describe various ways to protect your digital property and data from theft and corruption.</b>	
<b>Restricting Access to Your Digital Assets.....</b>	<b>366</b>
Firewalls .....	366
<b>Objective 9.10</b> <i>Explain what a firewall is and how a firewall protects your computer from hackers.</i>	
Preventing Virus Infections.....	368
<b>Objective 9.11</b> <i>Explain how to protect your computer from virus infection.</i>	
Authentication: Passwords and Biometrics.....	370
<b>Objective 9.12</b> <i>Describe how passwords and biometric characteristics can be used for user authentication on computer systems.</i>	
Anonymous Web Surfing: Hiding from Prying Eyes .....	374
<b>Objective 9.13</b> <i>Describe ways to surf the web anonymously.</i>	
<b>Keeping Your Data Safe .....</b>	<b>377</b>
Protecting Your Personal Information .....	377
<b>Objective 9.14</b> <i>Describe the types of information you should never share online.</i>	
Backing Up Your Data .....	377
<b>Objective 9.15</b> <i>List the various types of backups you can perform on your computing devices, and explain the various places you can store backup files.</i>	
<b>Protecting Your Physical Computing Assets .....</b>	<b>382</b>
Environmental Factors and Power Surges.....	382
<b>Objective 9.16</b> <i>Explain the negative effects environment and power surges can have on computing devices.</i>	
Preventing and Handling Theft.....	383
<b>Objective 9.17</b> <i>Describe the major concerns when a device is stolen and strategies for solving the problems.</i>	
<b>DIG DEEPER:</b> Computer Forensics: How It Works .....	385
<b>SOLVE THIS:</b> Computer Security.....	395
<b>TECHNOLOGY IN FOCUS</b>	
<b>Careers in IT.....</b>	<b>396</b>
Glossary .....	408
Index .....	419



# 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 attending 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 a professor of Computer Science 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.



# 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**



# 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 Andrew Gilfillan, VP, Editorial Director, 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 Jonathan Cheung and Holly Haydash, our Editorial and Production Project Managers, who work 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 they have to coordinate tasks. But they make it look easy! We'd like to extend our thanks to the media and MyITlab team: Eric Hakanson, Zach Alexander, and John Cassar for all of their hard work and dedication.

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.

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. A special thanks goes to Elizabeth McBride, a wonderfully talented graphic designer who helped by creating many new graphics for this edition of the text.



# Technology in Action Reviewers

**Pearson and the authors would like to thank the following people for their help and time in making this book what it is over the 13 editions. We couldn't publish this book without their contributions.**

<b>Neale Adams</b>	Iowa Central Community College	<b>Gerald Burgess</b>	Western New Mexico University
<b>Paul Addison</b>	Ivy Tech	<b>Dave Burgett</b>	McLennan
<b>Afrand Agah</b>	West Chester	<b>Ed Bushman</b>	Yavapai College
<b>Jack Alanen</b>	CSU-Northridge	<b>Marcus Butler</b>	West LA
<b>Karen Allen</b>	Community College of Rhode Island	<b>Eric Cameron</b>	Passaic County Community College
<b>Ted Allen Reasoner</b>	IUPUI	<b>Jill Canine</b>	Ivy Tech
<b>Peggy Anderson</b>	SUNY at Cortland	<b>Gene Carbonara</b>	Long Beach Community College
<b>Barry Andrews</b>	Mt. SAC	<b>Gene Carbonaro</b>	Long Beach City College
<b>Lou Ann Stroup</b>	Ivy Tech	<b>John Carlisle</b>	Nashua Community College
<b>Mary Ann Zlotow</b>	College of DuPage	<b>Glenn Carter</b>	Sonoma State
<b>Sabum Anyangwe</b>	Harford Community College	<b>Steve Carver</b>	Ivy Tech
<b>Linda Arnold</b>	HACC	<b>Patricia Casey</b>	Trident Tech
<b>Adnan Atshan</b>	Passaic County Community College	<b>Joni Catanzaro</b>	Louisiana State University
<b>Adeleye Bamkole</b>	Passaic County Community College	<b>Afi Chamlou</b>	NOVA Alexandria
<b>Guarav Bansal</b>	Wisconsin-Green Bay	<b>Robert Chirwa</b>	KCTCS-Bluegrass-Cooper-CIT 105
<b>Susan Barkalow</b>	St. Cloud State	<b>Debbie Christenberry</b>	Randolph Community College
<b>Bill Barnes</b>	Catawba Valley Community College	<b>Desmond Chun</b>	Chabot College
<b>Ricky Barnes</b>	Catawba Valley Community College	<b>Sherri Clark</b>	Ivy Tech
<b>Carolyn Barren</b>	Macomb Community College	<b>Kevin Cleary</b>	SUNY at Buffalo
<b>Tony Basilio</b>	Community College of Rhode Island	<b>Cynthia Collings</b>	Central AZ
<b>Steven Battilana</b>	West Chester	<b>Mark Connell</b>	SUNY at Cortland
<b>Michelle Beets</b>	Iowa Central Community College	<b>Kae Cooper</b>	BCTC/KCTCS
<b>Kourosh Behzadnoori</b>	Tarrant SE	<b>Dale Craig</b>	Fullerton College
<b>Chris Belcher</b>	CCAC-South	<b>Becky Curtain</b>	William Rainer Harper College
<b>Elise Bell</b>	CCSF	<b>Juliana Cypert</b>	Tarrant County College
<b>Julie Bell</b>	Delgado Cmty Clg	<b>Paul Dadosky</b>	Ivy Tech
<b>Robert Benavides</b>	Collin Cty	<b>Enoch Damson</b>	Akron
<b>Garland Berry</b>	Columbia College	<b>James Dang</b>	Tarrant SE
<b>Diane Bittle</b>	HACC	<b>Marvin Daugherty</b>	Ivy Tech
<b>Burton Borlongan</b>	Mesa Community College	<b>John Dawson</b>	IUPUI
<b>Carolyn Borne</b>	Louisiana State University	<b>Robert Deadman</b>	IUPUI
<b>Gina Bowers-Miller</b>	HACC-Wildwood	<b>Ed Delean</b>	NOVA Alexandria
<b>Jeff Bowker</b>	Montco	<b>Mary Dermody</b>	Chabot College
<b>Vicki Brooks</b>	Columbia College	<b>Don Dershem</b>	Mt View

<b>Charles Dessasure</b>	Tarrant SE	<b>Jerry Gonnella</b>	Northern KY
<b>Jeanette Dix</b>	Ivy Tech	<b>Holly Gould</b>	Ivy Tech
<b>Sally Dixon</b>	Skagit Valley Community College	<b>Deidre Grafel</b>	Chandler-Gilbert Community College
<b>Gretchen Douglas</b>	SUNY at Cortland	<b>Diedre Grafel</b>	Chandler Gilbert Community College
<b>Judy Duff</b>	Louisiana Delta College	<b>Kemit Grafton</b>	Oklahoma State University-Oklahoma City
<b>Stacia Dutton</b>	SUNY Canton	<b>Debra Grande</b>	Community College of Rhode Island
<b>Donna Earhart</b>	Genesee Community College	<b>Nancy Grant</b>	CCAC-South
<b>Ed Eill</b>	Delaware City Community College	<b>Wade Graves</b>	Grayson
<b>Pam Ellis</b>	PA College of Technology	<b>Natalia Grigoriants</b>	Pierce College
<b>Sylvia Emerson</b>	Rock Valley College	<b>Glen Grimes</b>	Collin Cty
<b>John Enomoto</b>	East LA	<b>Toby Gustafson</b>	UCR
<b>Ron Enz</b>	Chattahoochee Tech	<b>Greg Hanson</b>	Ivy Tech
<b>Nancy Evans</b>	Indiana University-Purdue University Indianapolis	<b>A.C. Chapin</b>	Harford Community College
<b>James Fabrey</b>	West Chester	<b>Montco</b>	Marie Hartlein
<b>Deb Fells</b>	Mesa Community College	<b>Burlington County College</b>	Meng Has
<b>Pat Fenton</b>	West Valley	<b>Frederick Community College</b>	Lisa Hawkins
<b>Marjorie Feroe</b>	Delaware City Community College	<b>Ivy Tech</b>	Joan Heise
<b>Beverly Fite</b>	Amarillo	<b>Iowa Central Community College</b>	Sue Heistand
<b>Carol Fletcher</b>	Louisiana Delta College	<b>Northern Virginia Community College</b>	Jessica Helberg
<b>Barbara Fogle, Stuhr</b>	Trident Tech	<b>Chaffey Community College</b>	Terri Helfand
<b>Ann Ford Tyson (coordinator)</b>	Florida State University	<b>Ivy Tech</b>	Jaime Hicks
<b>Tom Foster</b>	Chandler Gilbert Community College	<b>McLennan</b>	Fred Hills
<b>Susan Fry</b>	Boise State University	<b>Genesee Community College</b>	Timothy Hinz
<b>Barb Garrell</b>	Delaware City Community College	<b>Delaware State University</b>	Andrew Hobbs
<b>Barbara Garrell</b>	Delaware County Community College	<b>Univ of Missouri-Columbia</b>	Kristen Hockman
<b>Rich Geglein</b>	Ivy Tech	<b>Tulsa Community College</b>	Susan Hoggard
<b>Janet Gelb</b>	Grossmont Community College	<b>KCTCS-Bluegrass-Cooper-CIT 105</b>	Don Holcomb
<b>Kevin Gentry</b>	Ivy Tech	<b>Catawba Valley Community College</b>	Terry Holleman
<b>Ian Gibbons</b>	Hillsborough Community College-Ybor	<b>KCTCS-Bluegrass-Cooper-CIT 105</b>	Debbie Holt
<b>Randy Gibson</b>	Indian River State College	<b>Cathy Glod</b>	Barbara Hotta
<b>Ernie Gines</b>	Tarrant SE	<b>Valerie Golay</b>	
<b>Rebecca Giorcelli</b>	Fairmont State University		
<b>Anita Girton</b>	PA College of Technology		
<b>Ellen Glazer</b>	Broward Community College, South		
	Mohawk Valley Cmty College		
	Ivy Tech		

<b>Ellen Kessler</b>	HACC-Wildwood	<b>Blankenstein</b>	Nashua Community College
<b>Allyson Kinney</b>	Gateway Community College	<b>Denise Nearing</b>	Indian River State College
<b>REBECCA KIRK</b>	Augusta State University	<b>Jean-Claude Ngatchou</b>	New Jersey City Univ.
<b>Ronald Kizior</b>	Loyola University Chicago	<b>Doreen Nicholls</b>	Mohawk Valley Cmty College
<b>Meg Kletke</b>	Oklahoma State University	<b>Brenda Nielsen</b>	Mesa Community College
<b>Paul Koester</b>	Tarrant County College, Northwest	<b>Keith Noe</b>	Ivy Tech
<b>Kam Kong</b>	Delaware State University	<b>Kathy Olson</b>	Ivy Tech
<b>Hon-Chung Kwok</b>	CCSF	<b>Helen Ortmann</b>	CCAC-South
<b>Susan LaBrie</b>	Northampton Community College	<b>Meshack Osiro</b>	Ivy Tech
<b>Don Lafond</b>	SJRCC (St. John's River)	<b>Shelly Ota</b>	Leeward Community College
<b>Rose LaMuraglia</b>	San Diego City	<b>ChongWoo Park</b>	Georgia Gwinnett College
<b>David Lange</b>	Grand Valley	<b>Lucy Parker</b>	CSU-Northridge
<b>Earl Latiolas</b>	Delgado Cmty Clg	<b>Rachel Pena</b>	South TX College
<b>Janet Laubenstein</b>	Northampton Cmty Coll	<b>Wayne Phillips</b>	Chabot College
<b>Lori Laudenbach</b>	St. Cloud State	<b>Jennifer Pickle</b>	Amarillo
<b>Krista Lawrence</b>	Delgado Cmty Clg	<b>Blanca Polo</b>	Leeward Community College
<b>Dr. Kate LeGrand</b>	Broward College	<b>Jim Poole</b>	Honolulu Community College
<b>Kate LeGrand</b>	Broward Community College, South	<b>Brian Powell</b>	West Virginia University
<b>Yi Li Zhuang</b>	Macomb Community College	<b>Ernest Proctor</b>	LA Trade
<b>Darrell Lindsey</b>	SJRCC (St. John's River)	<b>Diane Puopolo</b>	Bunker Hill Community College
<b>Bob Lingvall</b>	Southwestern	<b>Mike Puopolo</b>	Bunker Hill Community College
<b>Duane Lintner</b>	Amarillo	<b>James R. Anthos</b>	South University-Columbia
<b>Thomas Liu</b>	New Jersey City Univ.	<b>David R. Surma</b>	Indiana University South Bend
<b>Wei Liu</b>	Georgia Gwinnett College	<b>Charles R. Whealton</b>	Delaware Technical and Community College
<b>Lynne Lyon</b>	Durham College	<b>Pat Rahmlow</b>	Montco
<b>Lydia Macaulay</b>	Tarrant SE	<b>Michelle Reznick</b>	Oakton Community College
<b>Norma Marler</b>	Catawba Valley Community College	<b>Leasa Richards</b>	Columbia College
<b>Benjamin Marrero</b>	Ivy Tech	<b>Kathie Richer</b>	Edmonds Community College
<b>Ben Martz</b>	Northern KY	<b>Darrell Riddell</b>	Ivy Tech
<b>Lydia Mata</b>	Eastern AZ	<b>Donald Riggs</b>	Schenectady County Community College
<b>Jenny Maurer</b>	PA College of Technology	<b>Don Riggs</b>	Schenectady County Community College
<b>John Mayhorne</b>	Harford Community College	<b>Terry Rigsby</b>	Hill College
<b>Glendora Mays</b>	SJRCC (St. John's River)	<b>Amy Roche</b>	Northampton Community College
<b>James McBride</b>	Eastern AZ	<b>Scott Rosen</b>	Santa Rosa Junior College
<b>Kari Meck</b>	HACC	<b>Peter Ross</b>	Univ. of Albany
<b>Doug Medin</b>	Western New Mexico University	<b>Scott Russell</b>	Eastern AZ
<b>John Messer</b>	PA College of Technology	<b>Amy Rutledge</b>	Oakland University
<b>Hillary Miller</b>	Kingwood	<b>Tom Ryan</b>	SJRCC (St. John's River)
<b>Saeed Molki</b>	South TX College	<b>Jessie Saldana</b>	Cypress
<b>Phil Moorhead</b>	Ivy Tech	<b>Lorraine Sauchin</b>	Duquesne
<b>Linda Moulton</b>	Montco	<b>Judy Scheeren</b>	Duquesne
<b>Rob Murray</b>	Ivy Tech		



<b>Lois Scheidt</b>	Ivy Tech	<b>James Taggart</b>	Atlantic Cape Community College
<b>Marcia Schlafmitz</b>	New Jersey City Univ.	<b>Mel Tarnowski</b>	Macomb Community College
<b>NAME</b>	SCHOOL	<b>Juliana.P. Cypert</b>	Tarrant County College-NE
<b>Ken Schroeder</b>	Ivy Tech	<b>Joyce Thompson</b>	Lehigh Carbon Community College
<b>Todd Schultz</b>	Augusta State University	<b>Janine Tiffany</b>	Reading Area Comm College
<b>Dick Schwartz</b>	Macomb Community College	<b>Faye Tippey</b>	Ivy Tech
<b>Francis Seidel</b>	Frederick Cmty College	<b>Matthew Trotter</b>	South TX College
<b>Lili Shashaani</b>	Duquesne	<b>Pam Uhlenkamp</b>	Iowa Central Community College
<b>Emily Shepard</b>	Central Carolina Community College	<b>Pat Vacca</b>	El Camino College
<b>Helen Sheran</b>	East LA	<b>Nelmy Vasquez</b>	Broward Community College, South
<b>Cliff Sherrill</b>	Yavapai College	<b>Pete Vetere</b>	Montco
<b>Lisa Simpson-Kyle</b>	Yavapai College	<b>Susie Viars-Thomas</b>	Grayson
<b>Noah Singer</b>	Tulsa Community College	<b>Gabriel Viera</b>	South TX College
<b>Steve Singer</b>	Kapiolani Community College	<b>Cynthia Wagner</b>	McLennan
<b>Ann-Marie Smith</b>	Delaware City Community College	<b>Rod Waller</b>	Indian River State College
<b>Will Smith</b>	Tulsa Community College	<b>Laurie Wallmark</b>	Raritan Valley Community College
<b>Michele Smolnik</b>	Columbia College	<b>Kari Walters</b>	Louisiana State University
<b>Ali Soleymani</b>	NOVA Alexandria	<b>Stacy Ward</b>	Grafton High School
<b>Steve St. John</b>	Tulsa Community College	<b>Karen Weil</b>	McLennan
<b>Neal Stenlund</b>	Northern Virginia Community College	<b>Charles Whealton</b>	Del Tech & Community College-Dover
<b>Steve Stepanek</b>	CSU-Northridge	<b>Deena White</b>	Grayson
<b>Jo Stephens</b>	University of AR Community College -Batesville	<b>Phil Whitney</b>	Bakersfield College
<b>Dennis Stewart</b>	NOVA Alexandria	<b>Casey Wilhelm</b>	North Idaho College
<b>Ben Stonebraker</b>	Ivy Tech	<b>Billie Williams</b>	San Diego City
<b>Lynne Stuhr</b>	Trident Tech	<b>Melanie Williamson</b>	KCTCS-Bluegrass-Cooper-CIT 105
<b>Alexis Stull</b>	Fairmont State University	<b>Xin Xu</b>	Georgia Gwinnett College
<b>Denise Sullivan</b>	Westchester Community College	<b>Thomas Yip</b>	Passaic County Community College
<b>Dottie Sunio</b>	Leeward Community College	<b>Roger Young</b>	Ivy Tech
<b>Dave Surma</b>	IU South Bend	<b>Mary Zegarski</b>	Northampton Community College
<b>Michael Swafford</b>	Tulsa Community College		
<b>Cheryl Sypniewski</b>	Macomb Community College		
<b>Ann Taff</b>	Tulsa Community College		





# Letter from the Authors

## Our 13th 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— the Maker movement, 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 included Make This exercises for each chapter. These exercises gently bring the concepts behind mobile app development to life. In addition, there is 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 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 and learning outcomes 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 strive to structure the book in a way that makes navigation easy and reinforces key concepts. In this edition, we have designed the text around learning outcomes and objectives, making them a more prominent part of the chapter structure. Students will see the learning outcomes and objectives in the chapter opener, throughout the text itself, as well as in the summary so they understand just what they are expected to learn.

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 be 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 13 years to present and explain new technologies to students, and to show them the rapidly growing importance of technology in our world.

This page intentionally left blank



# What's New

## Technology in Action, 13th Edition

Welcome to the Thirteenth Edition of *Technology in Action*!

In this edition, we have paid special attention to incorporating clearly defined and measurable Learning Outcomes and Objectives, so that you know what students will be learning and what they will be prepared to do with this new knowledge. As has always been the case with *Technology in Action*, the quizzes, review materials, and multiple learning resources are all tied to the content and objectives of the chapter. Using the resources in the chapter, you and your students will know that the key learning objectives are being achieved. *So, 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.

The optimal way to experience *Technology in Action* is through MyITLab. All of the instruction, practice, review, and assessment resources are in one place, allowing you to arrange your course easily, and for students to have a consistent learning experience from chapter to chapter.

### Explore the Hallmarks and New Features of *Technology in Action*, 13th Edition

#### INSTRUCTION: Engage all types of learners with a variety of instructional resources

- **Interactive e-Text** provides an environment in which students can interact with the learning resources directly and receive immediate feedback.
- **NEW Preview Videos** provide students with a quick look at what they will learn in the chapter.
- **PowerPoint Presentations** can be used in class for lecture or assigned to students, particularly online students for instruction and review.
- **Audio PowerPoint Presentations** deliver audio versions of the PowerPoint presentations—an excellent lecture-replacement option for online students.
- **TechBytes Weekly** is a weekly newsfeed that keeps your course current by providing interesting and relevant news items. The articles come with ready-to-use discussion questions.
- **Make This! Projects** address the hot area of mobile app creation! Each chapter includes activities where students build programs that run on their mobile devices. Most of the chapters use App Inventor to build Android apps that can be installed on any Android device. Even without an Android device, students can use the emulator and still get creating. By the end of the course they will have built 11 small apps. Each project includes instructions and a how-to video.

An annotated instructor's edition provides teaching tips, homework and assessment suggestions, brief overviews of each chapter's Try This, Make This, and Solve This exercises, as well as select Sound Byte talking points and ethics debate starters.

#### PRACTICE: Hands-on resources and simulations allow students to demonstrate understanding

- **Try This Projects** are hands-on projects that students complete to practice what they are learning and demonstrate proficiency with important topics. Each project is accompanied by a how-to video.
- **Solve This! Projects** put the concepts students are learning into action through real-world problem solving using Microsoft Word, Access, and Excel. There is a grader version available for most projects in the Practice folder.
- **Newly Redesigned Helpdesks** are interactive lessons based on the chapter objectives. Students are fully engaged as they play the role of a helpdesk staffer assisting customers via a live chat, decision-based simulation.
- **Sound Bytes** provide an audio/visual lesson on additional topics related to the chapter, including a brief quiz at the end.
- **IT Simulations** provide 12 individual scenarios that students work through in an active learning environment.
- **Windows 10 high-fidelity training simulations** allow students to explore Windows in a safe, guided environment that provides feedback and Learning Aids (Watch and Practice) to assist them if they need help.

#### REVIEW: Self-check resources keep learning on track

- **Replay Videos** for Parts 1 and 2 of the chapter provide an objective-based review of what students should have learned. Videos have a short quiz and can be accessed from mobile devices for a quick review.

- **Check Your Understanding Quizzes Part 1 and 2** provide a self-check covering objectives in each part of the chapter so that students can see how well they are learning the content.
- **Adaptive Dynamic Study Modules** are adaptive flashcards that provide students with a personalized review based on their strengths and weaknesses.

#### **ASSESSMENT: Measure performance with ready-to-use resources**

- **Chapter Quiz** provides a way for students to test that they have learned the material from the entire chapter.
- **Critical Thinking Questions** require that students demonstrate their understanding through written answers that are manually graded.
- **Testbank Exams** provide customizable prebuilt, auto-graded, objective-based questions covering the chapter objectives.

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**

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated.
- New content on the political impact of technology has been added.
- Content on the use of technology in careers has been updated.
- New “Dig Deeper: Augmentative and Virtual Realities” has been added.
- New ethics section on rules for ethical conduct in a global, Internet-enabled world has been added.

#### **Chapter 2**

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated to reflect Windows 10 changes.
- The section on voice input has been updated to reflect information on the latest intelligent personal assistants (such as Siri and Cortana).
- A new Bits&Bytes, “Save Power and Avoid Eyestrain: Use Blackle,” has been added.

#### **Chapter 3**

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated.
- New content about project collaboration (video conferencing, screen sharing, and project management tools) has been added.
- The Bits&Bytes “Making Safe Online Payments” has been updated by adding in biometric security measures.
- A new Bits&Bytes, “Microsoft Edge: The New Browser,” has been added.
- New content on caret browsing has been added.
- A new Bits&Bytes, “Maintain Privacy while Searching the Web,” has been added.
- A new Bits&Bytes, “Digital Agents and Predictive Search,” has been added.
- A new ethics section on using the web ethically that includes content on intellectual property, cyberbullying, privacy, and geolocation has been added.

#### **Technology in Focus: The History of the Personal Computer**

- Learning Outcomes and Learning Objectives have been integrated throughout the Technology in Focus.
- Throughout the Technology in Focus, text, figures, and photos have been updated.

#### **Chapter 4**

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated.
- Next generation smartphone sensor technology is now covered in the “How Cool Is This?” feature.
- The section on app creation software has been updated.
- Images and text have been updated to reflect Office 2016 changes.

#### **Chapter 5**

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Microsoft HoloLens is now covered in the “How Cool Is This?” feature.
- New “How Cool Is This?” feature has been added on smartwatches.

- The Bits&Bytes “Upgrading Your Operating System” has been updated.
- A new Bits&Bytes, “OS Market Share Battle,” has been added.
- The Try This now covers using virtual desktops in Windows 10.
- A new Bits&Bytes, “The Snipping Tool,” has been added.
- A new Bits&Bytes, “Tips for Better Organized Files,” has been added.
- A new Bits&Bytes, “Save Files in the Cloud Right from Your Apps,” has been added.
- A new Bits&Bytes, “Use Cortana to Find Your Files,” has been added.

#### Technology in Focus: Information Technology Ethics

- Learning Outcomes and Learning Objectives have been integrated throughout the Technology in Focus.
- Throughout the Technology in Focus, text, figures, and photos have been updated.
- A new section, “3D Printing: Who Is Responsible When Things Go Awry?” has been added, replacing the “International Pirates” section.
- A new section, “Human-Implanted Data Chips: Protection or Orwellian Nightmare?” has been added, replacing the “Should Employers Peer into Your Personal Life?” section.
- A new section, “Mining an Asteroid: Who Owns Outer Space?” has been added, replacing the “Geolocation: Who Knows Where You Are?” section.
- A new section, “Hacktivism: Civil Disobedience or Terrorism?” has been added, replacing the “Cyberbullying: Who Should Protect Children from Each Other” section.

#### Chapter 6

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated.
- New coverage of 2-in-1 devices has been added.
- The Dig Deeper content on solid state hybrid drives (SSHDs) has been updated.
- Windows 10 content has been updated.
- New “Trends in IT: USB 3.1 and USB-C” has been added.
- A new Bits&Bytes, “Tower Design,” has been added.

#### Chapter 7

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.

- Throughout the chapter, text, figures, and photos have been updated.
- A new Bits&Bytes, “The Rise of Wearable Technology,” has been added.
- New content on the Internet of Things has been added.
- New “Trends in IT: How Smart Is Your Home” has been added.
- New “Ethics in IT: Ethical Challenges of the Internet of Things” has been added.

#### Technology in Focus: Under the Hood

- Learning Outcomes and Learning Objectives have been integrated throughout the Technology in Focus.
- Throughout the Technology in Focus, text, figures, and photos have been updated.

#### Chapter 8

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, text, figures, and photos have been updated.
- A new “How Cool Is This?” feature on continuous liquid interface production has been added.
- A new Bits&Bytes, “Photo Edit on Your Phone,” has been added.
- A new Bits&Bytes, “Fly-By Drone Video,” has been added.
- NFC content has been updated.
- New coverage of 2-in-1 devices has been added.
- New content on the Internet of Things has been added.

#### Chapter 9

- Learning Outcomes and Learning Objectives have been integrated throughout the chapter and in the Chapter Review.
- Throughout the chapter, images and text have been updated to reflect Windows 10 changes.
- The chapter has been reorganized so that all types of digital threats are covered in Part 1 and all mitigation techniques are covered in Part 2.

#### Technology in Focus: Careers in IT

- Learning Outcomes and Learning Objectives have been integrated throughout the Technology in Focus.
- Throughout the Technology in Focus, text, figures, and photos have been updated.



# Visual Walk-Through

## Topic Sequence

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

### CHAPTER 2

#### storing data and INFORMATION



Because RAM is volatile storage, it can't be used to store information indefinitely. To save your data and information permanently, you need to save it to a nonvolatile storage device, such as a hard drive, cloud storage location, DVD, or flash drive.

#### Hard Drives

**Objective 2.1.2** List the various types of hard drives.

**Are there different kinds of hard drives? The hard disk drive (HDD) or hard drive is your computer's primary device for permanent storage of software and documents.** The hard drive is a nonvolatile storage device. An **internal hard drive** resides within the system unit and usually holds all permanently stored programs and data. Today's internal hard drives (see Figure 2.20) have capacities of as much as 16 TB or more. **External hard drives** offer similar storage capacities but reside outside the system unit and connect to the computer via a port.

The most common type of hard drive has movable parts—spinning platters and a moving arm with a read/write head—that can fail and lead to devastating data failures. However, the **solid-state drive (SSD)** has recently become a popular option for desktops and laptop storage. SSDs have no moving parts, so they're more efficient, run with no noise, aren't too hot, and require little power. In addition, they're less likely to fail after being bumped or dropped.

Permanent storage devices are located in your desktop or laptop computer in a space called a **drive bay**. There are two kinds of drive bays:

1. **Internal drive bays** cannot be seen or accessed from outside the system unit. Generally, internal drive bays are reserved for internal hard drives.
2. **External drive bays** can be seen and accessed from outside the system unit. External drive bays house DVD

and Blu-ray drives, for example. On desktop computers, sometimes there are empty external drive bays that can be used to install additional drives. These extra spaces are connected by a location on the front panel. Laptop computers generally do not give you the ability to add additional drives. Such expansion is done by attaching an external drive to the computer through a USB port.

#### Cloud Storage

**Objective 2.1.3** Define cloud storage, and explain how to use it.

**How can I easily access my files if I constantly switch between devices? You may find yourself using multiple devices, such as a smartphone, laptop, and a tablet, at different times during the day. Ideally, you find you need access to a current version of a file that is stored on a device other than the one you're using. If your device is connected to the Internet, cloud storage provides a convenient option.**

**Cloud storage** refers to using a service that keeps your files on the Internet in the "cloud" rather than storing your files solely on a local device. Using a cloud storage service equates to you installing software on an app on your device. A popular web-based application for storing files on the cloud is Dropbox. Dropbox supports computers running Windows, OS X, and Linux as well as many smartphones and tablets. After installing the Dropbox software on your devices, any files you save in the Dropbox folder are accessible by all your other devices via the Internet. You can also share folders in Dropbox with other Dropbox users, making it ideal for group projects.

For example, when you save a group term paper to Dropbox on your laptop, the Dropbox software also copies the paper onto a computer attached to the web. Now when you grab your smartphone and head off to class, you can access the paper based on your laptop through the Internet connection on your smartphone and make changes to it if necessary. Cloud storage capacity is limited to between 1 GB and 18 GB for free accounts. Other cloud storage alternatives include Microsoft OneDrive and Google, each of which provide 15 GB of free space, and Apple iCloud, which offers 5 GB of free storage.

#### Portable and Optical Storage Options

**Objective 2.1.4** Describe the various portable and optical storage options.

**How can I take my files with me without relying on cloud storage? For large portable storage needs, there are portable external hard drives, which are small enough to fit into your pocket and have storage capacities of 4 TB.**



**Figure 2.20** External hard drives (options have open—usually, they are sealed) are a convenient, primary nonvolatile storage. (Image courtesy of iStockphoto.com)

52 Chapter 2 Looking at Computers: Understanding the Parts

### CHAPTER 6

#### Memory Hierarchy Interactive

In this Sound Byte, you'll learn about the different types of memory used in a computer system.

#### ACTIVE HELPDESK

##### Evaluating Your CPU and RAM

In this Active Helpdesk, you'll play the role of a helpdesk analyst, leading questions about what the CPU does and how to evaluate its performance. You'll also build questions about how memory works and how to evaluate how much memory a computer needs.

future. Remember, too, that "equated" means these are the minimum values recommended by manufacturers; having more RAM often helps programs run more efficiently. As noted above, new systems today ship with at least 4 GB of RAM. High-end systems can come with 24 GB of RAM. The rule of thumb: When buying a new computer, buy as much RAM as you can afford.

#### Adding RAM

**Objective 6.4** Evaluate whether adding RAM to a system is desirable.

**Is there a limit to how much RAM I can add to my computer? The motherboard is designed with a specific number of slots into which the memory cards fit, and each slot has a limit on the amount of RAM it can hold. To determine your specific system limits, check the system manufacturer's website.**

In addition, the OS running on your machine imposes its own RAM limit. For example, the maximum amount of RAM for the 64-bit version of Windows 10 is 4 GB, whereas the maximum memory limit using the 64-bit version of Windows 10 Pro is 12 GB.

**Is it difficult or expensive to add RAM? Adding RAM is fairly easy (see Figure 6.14). Be sure that you purchase a memory module that's compatible with your computer. Also be sure to follow the installation instructions that come with the RAM module. Typically, you simply lift up the notches and gently push the memory module in place.**

RAM is a relatively inexpensive system upgrade. The cost of RAM does fluctuate in the marketplace as much as 40% over time, though, so if you're considering adding RAM, you should watch the price of memory in online and print advertisements.

#### Table: Sample RAM Allocation

APPLICATION	RAM RECOMMENDED
Windows 10 (high resolution)	2 GB
Microsoft Office Professional 2016	2 GB
Microsoft Edge	1 GB
Chrome 16	2 GB
Adobe Photoshop Elements 13	2 GB
<b>Total RAM recommended to run all programs simultaneously</b>	<b>9 GB</b>

332 Chapter 6 Understanding and Assessing Hardware: Evaluating Your System

### Technology Under the Hood

#### Learning Outcome 78.1

You will be able to list the various number systems used in computers, explain how binary numbers and are represented in computing devices, describe the basic steps in the CPU machine cycle, and explain technologies that make CPUs work faster.

Some people are drawn to understanding things in detail; others are happy just to have things work. If you use a computer, you may not have been tempted to "look under the hood." However, if you can understand the hardware inside a computer, you'll have some real advantages:

- You won't have to play a technician to fix or upgrade your computer. You'll be able to fix things yourself, and you'll be able to make your investment in your computer last longer.
- You'll be able to evaluate new advances in technology. For example, what's the impact of a new type of memory or a new processor?
- If you're a programmer, you'll be able to write more efficient and faster programs.

And if you're preparing for a career in information technology, understanding computer hardware is critical for you. In the Technology in Focus feature, we'll build on what you've learned about computer hardware in other chapters and go under the hood to look at the components of a system and in more detail. Let's begin by looking at the building blocks of computer switches.

#### Switches and Number Systems

How does a computer process the data you input? A computer system needs an electrical or optical switch to convert an input signal into a form the system can understand. To move data around the system.



**Electrical Switches**

**Objective 78.1** Describe the different types of technologies that have been used as representations of the binary language in computing devices.

To process data into information, computers need to work in a language they understand. Computers use between only two states of existence: on and off. Inside a computer, these two possibilities, or states, are defined using the terms **on** and **off**, the language represented by these terms is called **binary language** (also just the number system). Each **electrical switch** on the device inside the computer that flips between the two states of **on** and **off** is applying **ON** and **OFF**.

You use various forms of switches every day. The light switch in your kitchen is either **ON**, allowing current to flow to the light bulb, or **OFF**. Another switch you use each day is a water faucet. As shown in Figure 1, shifting off the faucet so that no water flows could represent the value 0, whereas turning it on could represent the value 1.

Computers are built from a huge collection of electrical switches. The history of computers is really a story about creating smaller and faster sets of electrical switches so that more data can be stored and manipulated quickly.

**Figure 1** Water faucets can be used to illustrate binary switches.

206

**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.

**Clearly Defined Learning Objectives and Outcomes**  
Provide measurable goals for instructors and students.

**Multimedia Cues**  
Visual integration of multimedia resources, including the Helpdesks, Sound Bytes, Preview, and Replay Videos.

### Using Technology to Change the World

**How Will You Put Technology in Action?**

**Learning Outcome 1.1** You will be able to discuss the impact of technology on global and national issues.

**Technology on the World Stage 4**

**Objective 1.1** Recognize how becoming proficient with technology can help you understand and participate in political issues in the world of today.

**Objective 1.2** Describe how technology affects social issues in different countries.

**Technology and Our Society 7**

**Objective 1.3** Describe how technology is changing our cognitive processes.

**Objective 1.4** Explain how technology is changing the global economy.

**Objective 1.5** Suggest how technology has impacted the way we choose and consume products and services.

**How Will Technology Improve Your Life?**

**Learning Outcome 1.2** You will be able to discuss personal impacts technology can have on your life and your career.

**Technology at Home 12**

**Objective 1.6** Recognize how becoming proficient with technology can help you understand and participate in all aspects of your life.

**Sound Byte: Question to Ask Before You Buy a Computer**

**Technology and Your Career 15**

**Objective 1.7** Characterize the impact computer literacy has on a variety of careers.

**Make This! MAKE A Visual Assistant on page 11**

All media accompanying this chapter can be found in MyLab. For an overview of the chapter, watch the **Preview** video.

### HOW COOL IS THIS?

Want to make a difference with technology? The good news is that it has never been easier. Technology is allowing more and more of us to become agents of change in our communities and in the world. In London, over 20,000 school children used **Inventory Apps for Good**, a program that links students, educators, and local experts to guide students in designing and building apps to help solve problems they see around them. The **Verticon Innovative App Challenge** led students to develop apps to customize levels for students with disabilities and apps to help outreach people with causes they wanted to support with volunteer time.

Once backing events, like one called **Random Acts of Kindness** are helping people create apps to track habits to get them to get involved in their city, and to help organize people to dig out fire hydrants after snowstorms.

What kind of good can you do with technology? [www.cengage.com](#)

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

# Student Textbook

### ethics in IT

Should there be rules for conduct in a virtual world? If so, what should they be? What does plagiarism mean in a world where people can easily copy, paste, and upload content of all kinds? Should websites be allowed to monitor their employees' computing activities without their knowledge? Should websites be allowed to capture data related to what visitors do on their sites and analyze and sell that data? Should financial institutions be responsible for their software malfunctions and leads to personal injury or financial loss? Should Internet access be provided for free by communities to their citizens who cannot afford it? Are implausible devices that teach the rehabilitation of children and vulnerable adults a good thing, or a slippery slope to breaches of privacy? There are the sorts of actual questions and challenges that exist just a few years ago.

As the reach of technology continues to spread, these are questions that more and more societies must face and develop their own answers to.

And have different ethically to address issues. It response more an copy right parties in content. States of best what access? Figure 2-40. Any related citizen. technology the between being a citizen.

14 Chapter 1 Using Technology to Change the World

### trends in IT

"Going green" is a goal for many modern businesses. Green computing (or green IT) is a movement to encourage environmentally sustainable computing. The main goal is to reduce the overall carbon footprint of a company through the strategic use of computing resources and environmentally friendly computing devices. A business's carbon footprint is the total amount of greenhouse gases produced directly and indirectly to support the activities of the business. Carbon footprints are expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>), the main greenhouse gas that is contributing to global warming. Reduction of greenhouse gas emissions is critical to sustaining a healthy environment.

The main goals of green computing are:

1. Reducing the use of hazardous processes or materials in the production of computing equipment.
2. Promoting the use of recyclable or biodegradable materials to facilitate safe disposal of products.
3. Buying products that use energy efficiently.
4. Using technology to reduce employees' travel.

5. It is different (become) (difficult) (Piper)

FIGURE 2-34 Green Computing Problems and Solutions

ISSUE	ELECTRICITY	COMPUTING
<b>Problems</b>	Electricity is often generated using fossil fuels, which produce greenhouse gas emissions. There are not many energy-efficient alternatives.	Clear generate greenhouse. Many people consume too much energy.
<b>Solutions</b>	Buy energy-efficient computing equipment with Energy Star ratings. Turn off computers, printers, and other devices when not in use. Use surge protectors to save power when unplugging devices.	Use technology to reduce your job. Use teleconferencing, which uses less energy than traveling. Use a green vehicle (car or van) for your commute.

56 Chapter 2 Linking Computers: Understanding the Parts

### DIG DEEPER Augmentative and Virtual Realities

Reality is reality, right? Or what is augmentative reality? And how is it different from virtual reality? Augmentative reality (AR) is the addition of digital information directly into our reality, rather than to add more data or at times to remove unwanted visual effects. How does this happen? AR combines our natural sense of the world around us with an additional layer of digital information. The extra information can be displayed on a separate device, such as an augmented reality app for smartphones. Displays in stores can augment your image with the clothing you're interested in creating a virtual fitting room (see Figure 1.19). Microsoft has announced a product named the HoloLens that will let you manipulate holographic images as part of your reality (see Figure 1.20). Meanwhile, researcher Stephen Mann at the University of Toronto is working with wearable computers that use "point of eye" (POE) cameras as AR devices. A POE camera is designed so that the camera is positioned directly in front of the eye itself. The ultimate POE camera would be one that is implanted within the eye or eye socket. Mann's research group is exploring this as a way to assist partially sighted or blind people. Instead of adding information to the reality you perceive, virtual reality (VR) replaces it with a different world. Virtual reality creates an artificial environment that is immersive and interactive. VR environments can be as simple as a pair of goggles or as elaborate as entire "rooms" that you walk into (see Figure 1.21). One "leave" (leave automatic)

FIGURE 1.19 This high-tech fitting room uses augmented reality technology to allow shoppers to try on clothes virtually (Photo: Shutterstock/Steve Delaney)

FIGURE 1.20 The Microsoft HoloLens augments your reality by adding holographic images you can manipulate. (Photo: Microsoft/Steve Delaney)

19 Chapter 2 Linking Computers: Understanding the Parts

### BITS & BYTES

#### Save Power and Avoid Eyestrain: Use Blackie

Your computer uses less energy when it displays black as opposed to white (or other lighter colors). Also, bright colors such as white tend to increase eyestrain when viewing a computer screen (see Figure 2.46). For a quick fix for using an alternative search engine called Blackie. blackie.com. Powered by Google, this customized search engine displays a predominantly black screen instead of white. Since most modern monitors don't backlight the black parts of a display, you save a little bit of energy when using this alternative search engine. Yes, it's a small amount of energy—but every little bit helps!

FIGURE 2.45 Want to save energy while reducing eyestrain? Using apps or websites that use less white and more black.

24 Chapter 2 Linking Computers: Understanding the Parts

### Ethics in IT

Boxes examine the ethical dilemmas involved with technology.

### Trends in IT

Boxes explore hot topics in computing.

### Try This and Make This

Hands-on activities 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, click **File Explorer** from the Taskbar or from the Start menu. Then in the navigation pane, click **This PC** to display information about your computer's device. (FIGURE 2.1) Microsoft Corporation

**Step 2** The **File Explorer** This PC screen displays information about internal storage devices (such as internal hard drives), optical storage devices (such as DVD drives), and portable storage devices (such as flash drives and external hard drives). To display the System screen, click the **Computer** tab on the **File Explorer** ribbon and then the **System properties** button. (FIGURE 2.2) Microsoft Corporation

48 Chapter 2 Linking Computers: Understanding the Parts

### MAKE THIS TOOL: App Inventor 2

**MAKE: A Mobile App**

Want to build your own Android app from scratch? You can, with a simple tool called **App Inventor**. To get started, have ready:

1. A computer connected to a Wi-Fi network
2. The Chrome browser
3. A Google account
4. The MIT AI2 Companion app
5. Optional: An Android device connected to the same Wi-Fi network

In this exercise, you'll explore the **App Inventor** tool and begin working with your first sample app. As you do, making your device work for you is so easy, drag and drop with **App Inventor**. MIT App Inventor 2 (Microsoft/Google)

App Inventor is a programming platform used to create apps for Android devices. Using App Inventor, you can easily drag and drop components to design your App's interface and its behavior.

For the instructions for this exercise, go to **MyITLab**.

49 Try This/Make This

### Check Your Understanding

quizzes provide an auto-graded, self-check covering objectives in each part of the chapter.

### Solve This

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

### chapter quiz // assessment

For a quick review to see what you've learned, answer the following questions. Submit the quiz as requested by your instructor. If you are using MyITLab, the quiz is also available there.

**multiple choice**

1. Social media
  - a. prevents two-way dialog between people.
  - b. is incorporated as part of a personal strategy by many politicians.
  - c. cannot be immediate enough to react to quickly developing issues.
  - d. only is useful for personal friendships.
2. Web 2.0 has led to a shift from just consuming content toward:
  - a. spending all our time on leisure activities.
  - b. less sharing of the work we produce.
  - c. new standards for HTML.
  - d. producing content.
3. Examples of crowdsourcing and crowdsourcing include:
  - a. Kickstarter and MatchaVoice.
  - b. Bing and Google.
  - c. Call a Bike and Zipcar.
  - d. Unshabit and Kiva.
4. Being computer literate includes being able to:
  - a. avoid spam, adsware, and spyware.
  - b. use the web effectively.
  - c. diagnose and fix hardware and software problems.
  - d. all of the above.
5. Computer forensics:
  - a. tests computers for hardware malfunction.
  - b. analyzes computer systems to gather potential legal evidence.
  - c. analyzes the design of a computer system.
  - d. is used to create three-dimensional art.
6. Data mining is:
  - a. important now because it is so easy to gather enormous data sets.
  - b. the study of data using algorithms to detect patterns.
  - c. the foundation of Big Data sets into meaningful information.
  - d. all of the above.

**true/false**

1. The move toward access instead of ownership is a sign of collaborative consumption.
2. The Non-Environ Initiative uses the power of supersampling to enhance mathematical education.
3. Virtual reality is the addition of information to your visual field.
4. Web-based databases are being used to help investigators solve criminal cases.

**critical thinking**

1. **What Obscure Your Mind?**  
What do think about as 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 artwork. 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. **Career and Computers**  
This chapter lists many ways in which becoming computer literate is beneficial. Think about what your life will be like once you're started your career. What areas of computing will be most important for you to understand? How would an understanding of computer hardware and software help you in working from home, working with groups in other countries, and contributing your talents?

24 Chapter 1 Using Technology to Change the World

### check your understanding // review & practice

For a quick review to see what you've learned so far, answer the following questions:

**multiple choice**

1. Analyzing computer systems to gather legal evidence is known as the field of:
  - a. crowdsourcing.
  - b. information technology.
  - c. computer forensics.
  - d. simulation theory.
2. The MACRS project allows that:
  - a. there is a digital divide limiting access to computer resources.
  - b. sports performance can be recorded and
  - c. computer technology is used in the arts by integrating it into new works of performance art.
  - d. creating web pages to advertise and sell art.
3. creating multimedia museum tours.
  - a. all of the above.
  - b. all of the above.
  - c. all of the above.
  - d. all of the above.
4. IT is the abbreviation for:
  - a. information training.
  - b. Internet training.
  - c. Internet technology.
  - d. all of the above.

### How Technology Is Used on the World Stage and in My Personal Life

In this activity, you'll use Microsoft Word to reflect on how technology is affecting the world as well as you, personally and professionally. Reflect on the content in Chapter 1 as you work through this exercise.

You will use the following skills to complete this activity:

- Open and Modify a Document; Templates
- Insert Text
- Apply Styles and Advanced Font Formats
- Apply Themes
- Use Footer Banner
- Create a Header and Footer

**Instructions**

1. Start Microsoft Word 2016 and open the **Project design (Blank)** template. Save the document as **TIA\_Ch1\_LaerFirst** using your **Last and First** names.
2. Double-click the **Title placeholder** and type **Technology** then double-click the **Heading placeholder** and type **Introduction**. Follow the remaining placeholder text with the following: **Political and global issues are showing that technology is accelerating change around the world and galvanizing groups of people in new ways. Technology allows us to refine how we connect with each other, and it also impacts our daily personal and professional experiences.** Press **Enter**.



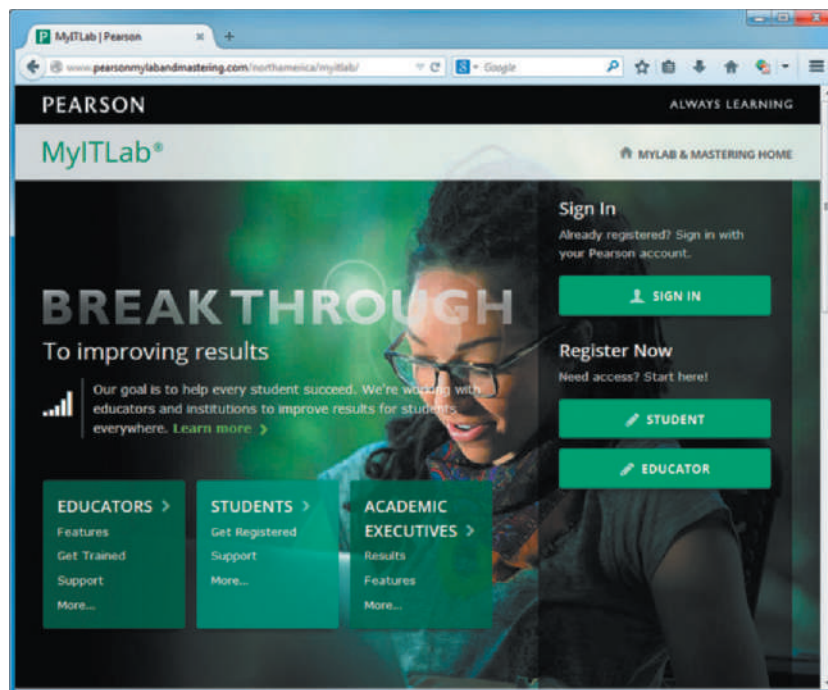
# MyITLab

**MyITLab** for *Technology in Action* with the Enhanced eBook personalizes learning to help your students better prepare and learn—resulting in more dynamic experiences in the classroom and improved performance in the course. Specific features include:

- **Adaptive Learning:** A way to enable personalized learning at scale. Not every student learns the same way and at the same rate. MyITLab with Adaptive Learning continuously assesses student performance and activity in real time, and, using data and analytics, personalizes content to reinforce concepts that target each student's strengths and weaknesses.
- **NEW Adaptive Dynamic Study Modules,** created specifically for *Technology in Action*, 13th Edition, provide students with personalized review based on their strengths and weaknesses.
- **A powerful homework and test manager:** MyITLab lets you create, import, and manage online homework assignments, Helpdesk and Soundbyte activities, quizzes, and tests that are automatically graded. The bottom line: MyITLab means less time grading and more time teaching.
- **Comprehensive online course content:** Filled with a wealth of content that is tightly integrated with your textbook, MyITLab lets you easily add, remove, or modify existing instructional material. You can also add your own course materials to suit the needs of your students or department. In short, MyITLab lets you teach exactly as you'd like.
- **Robust Gradebook tracking:** The online Gradebook automatically tracks your students' results on tests, homework, and practice exercises and gives you control over managing results and calculating grades. And, it lets you measure and document your students' learning outcomes.
- **Easily scalable and shareable content:** MyITLab enables you to manage multiple class sections, and lets other instructors copy your settings so a standardized syllabus can be maintained across your department.

The following media is available in MyITLab, and selected items are also on the companion website.

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 card in the front of the book.



- MyITLab
- **The interactive eText** in MyITLab provides continuous digital learning in an interactive environment that allows students to use technology as they learn. They don't have to stop reading to find the activities such as Helpdesks, Sound Bytes, and Replay Videos—they just click on them and immediately experience the activity.
- MyITLab
- **IT Simulations:** These fully interactive, scenario-based simulations allow students to demonstrate their understanding of the chapter topic in an experiential learning environment.
  - **Adaptive Dynamic Study Modules**, created specifically for *Technology in Action*, 13th Edition, provide students with a personalized review based on their strengths and weaknesses.
- MyITLab
- **Sound Bytes:** These multimedia lessons provide a multimodal approach to instruction in which topics are presented with audio, video, and interactive activities. The topics covered in the Sound Bytes expand on the coverage in the book to dive into newer technology or more depth on a specific subject.
  - **NEWLY REDESIGNED and UPDATED Active Helpdesks:** These highly interactive, engaging activities provide students with a realistic experience of how help is delivered via live chat. Students play the role of a helpdesk staffer answering technology questions. These highly interactive, formative assessments provide students with a realistic, engaging experience of how support is delivered to customers today. Each Helpdesk covers core objectives in the chapter. Students play the role of a support staffer tasked with assisting customers with questions related to the content of the text. This approach allows students to apply what they are learning in a new environment. The assessment questions after each Helpdesk provide instructors with a tool to gauge and track students' progress.
  - **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 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.
  - **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. For Word and Excel projects, there is also a grader version in MyITLab.
  - **NEW Preview Videos:** The Preview Videos provide an author-narrated video preview of each chapter in an easy-to-use format students can view on their phones, tablets, or computers.
  - **UPDATED Replay Videos:** The Replay Videos provide an author-narrated video review of each chapter part.
  - **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.

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

**Transcript button**  
Used to turn transcript on or off

**Technology In Action**  
**Welcome to the Web**

- 1 Introduction
- 2 What We Will Cover
- 3 The New York Times Learning Network
- 4 Microsoft at Home
- 5 How Stuff Works
- 6 Webopedia
- 7 Wrapping Up
- 8 Web Links

**WELCOME TO THE WEB**

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.

**Understanding Bits and Bytes**

Welcome to your shift at the Helpdesk  
You currently have a live chat session waiting. Kabe is in the market for a new computer and needs help understanding some computer terms.

I'm Morris, the supervisor on duty today. I'll be checking on your performance and giving you feedback throughout your chat session.  
Click [Chat with Support Professional](#) to get started. Good luck!

Ask the Community | Check FAQs | Research | Watch a Video | **Chat with Support Professional** | Home

# Annotated Instructor Edition

Provided with each chapter are two divider pages like the ones outlined below.

## FRONT OF CHAPTER TAB

On the front side of each chapter tab, you'll find the following categories:

**IN THE CLASSROOM:** Activities you can use in a classroom or in online classes, including:

- PowerPoint Presentations
- Discussion Exercises
- Active Helpdesks
- Sound Bytes

**HOMEWORK:** Activities used out of class for assessment or preparation for the next chapter, including:

- Web Resource Projects
- Active Helpdesks
- Sound Byte Labs

## ASSESSMENT:

- Blackboard
- WebCT
- TestGen
- myitlab
- Student Text Test Bank
- Sound Byte Test Bank
- Helpdesk Test Bank

The back side of each chapter tab includes notes about that chapter's Try This, Make This, and Solve This exercises.

## ETHICS TAB

On the Ethics tab, you will find the following:

**OPPOSING VIEWPOINTS TABLE:** Outlines ethics topics that you can use to debate in the classroom.

**KEYWORDS:** Provides you with additional words with which to search the Internet for more information related to the ethics topic.

### Chapter 3

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

In the Classroom	
	<b>PowerPoint Presentation (located on the IRC)</b> <small>Chapter 3</small> Consider using the PowerPoint presentation as a lecture guide, weaving it throughout the entire class. You can also customize it with additional art images from the IRC.
	<b>Audio PowerPoint Presentation (located on the IRC)</b> Can be used for online courses. Audio content expands on topics covered in the presentation.
	<b>Clicker PowerPoint Presentations (located on the IRC)</b> Ready interactive PowerPoint presentations
	<b>Discussion Exercise</b> <small>Evaluating Websites</small> After reviewing the online tutorial at <a href="http://www.widener.edu/about/campus_resources/vollgram_library/evaluate">www.widener.edu/about/campus_resources/vollgram_library/evaluate</a> or <a href="http://library.acadsci.ca/tutorials/webevaluation">library.acadsci.ca/tutorials/webevaluation</a> , show students three examples of good websites and three examples of bad websites. Ask them to explain what makes the sites good or bad based on the material in the tutorial.
	<b>Active Helpdesk (located on MyITLab)</b> <small>Evaluating Websites</small> This Helpdesk presents a topic that students need to master: how to evaluate websites as appropriate to use for research. As you run the Helpdesk, have a browser open so that you can expand on what's discussed.
Homework	
	<b>Chapter Assessment</b> <small>Chapter Assessment</small> Check Your Understanding with Multiple Choice Questions, Chapter Summary and Key Terms, Chapter Quiz, Team Time Project, Ethics Project, Solve This Project
	<b>Writing Exercise (located on MyITLab)</b> <small>Making the Transition to ... the Workplace Exercise 1: Online Resume Resources</small> Have your students work through this exercise and discuss their results in class.
	<b>Preparing for the Next Technology in Focus</b> <small>Writing Exercise: Computer Survey</small> Have students conduct a survey of their parents or other family members as to the first computer each person remembers using. Have them ask such questions as, What were the features they most remember, and why? How much did the system cost? How big was the monitor? How much memory did it include? Which of these technologies are now considered to be legacy technologies?
Assessment	
	<b>Test Bank (located on the IRC)</b> To test student comprehension, use the Test Bank questions for Chapter 3 general content. You can include questions from the Helpdesk and Sound Byte Test Banks, as well. This week, design the quiz as a timed, one-attempt quiz with some essay questions included.

## ethics in Action

### How Important Is It to Use Ethical Search Engine Optimization Strategies?

If you take the time to build a website, you want customers to find it. Since many people find websites by using search engines, you want your website to rise to the top when searches are conducted. Search engine optimization (SEO) is using certain techniques and technologies that make search engines rank your site high on their results list when customers or potential customers do a search for your kind of business. Increasing your search engine rankings is not that easy, so most companies incorporate some search engine optimization strategies as a way to help bring customers in through the Internet. Some practices are more ethical than others. Do ethics matter with SEO strategies?

Conduct a debate or discussion using the opposing viewpoints in the table below. Keywords have been supplied to help you search the Internet for more information on the topic.

Proponents of SEO Strategies Argue	Opponents of SEO Strategies Argue
Exploiting SEO strategies can attract more users to your website.	Instituting practices such as stuffing lots of key words into the site's content may turn off users of the site once they do arrive there.
As long as the strategy meets the intent of the search engine guidelines, it's okay to push the boundaries.	Poorly executed SEO strategies can lead to long-term harm to a business's online presence by reducing overall traffic flow.
Just get people to the site by any means at all; then you can deliver an ethical representation of your product.	Manipulating small quirks in search engine strategies shifts the efforts of your company from a basic focus on quality.

search:

engine optimization, white hat SEO, black hat SEO, grey hat SEO, SEO code of ethics

# Instructor Resources

Online Instructor Resources are available in MyITLab or at [pearsonhighered.com/techinaction](http://pearsonhighered.com/techinaction).

- PowerPoint Presentations
- Student Text Test Bank
- Sound Byte Test Bank
- Help Desk Test Bank
- End of Chapter Answer Keys
- Rubrics
- Web Resources
- Image Library
- Sample Syllabi
- Additional Web Projects
- What's New in 13e
- Transition Guide
- TestGen



**Technology In Action  
Complete, 13/E**  
**Alan Evans**  
**Kendall Martin**  
**Mary Anne Poatsy**  
ISBN-10: 0134289102  
ISBN-13: 9780134289106

Contact your local Pearson sales rep to learn more about the *Technology in Action* instructional system.



# **Technology in Action**

# 1

# Using Technology to Change the World

## How Will You Put Technology in Action?

**Learning Outcome 1.1** You will be able to discuss the impact of technology on global and national issues.

### Technology on the World Stage 4

**Objective 1.1** Recognize how becoming proficient with technology can help you understand and participate in political issues in the world at large.



**Objective 1.2** Describe how technology affects social issues in different societies.

### Technology and Our Society 7

**Objective 1.3** Describe how technology is changing our cognitive processes.



**Objective 1.4** Explain how technology is expanding the ways we collaborate.

**Objective 1.5** Summarize how technology has impacted the way we choose and consume products and services.

## How Will Technology Improve Your Life?

**Learning Outcome 1.2** You will be able to discuss personal impacts technology can have on your life and your career.

### Technology at Home 12

**Objective 1.6** Characterize computer literacy, and list some of its benefits.

**Sound Byte:** Questions to Ask Before You Buy a Computer



### Technology and Your Career 15

**Objective 1.7** Characterize the impact computer literacy has on a variety of careers.



**Make This:** MAKE: A Virtual Assistant on page 11

All media accompanying this chapter can be found in MyITLab.

For an overview of the chapter, watch the **Preview Video**. 





## HOW COOL IS THIS?

Want to **make a difference with technology**? The good news is that it has never been easier. Technology is allowing more and more of us to become **agents of change in our communities** and in the world. In London, over 20,000 school-age children are joining **Apps for Good**, a program that links students, educators, and local experts to guide students in designing and building apps to help solve problems they see around them. The **Verizon Innovative App Challenge** led students to develop apps to customize texts for students with dyslexia and apps to help connect people with causes they wanted to support with volunteer time. Civic hacking events, like one called **Random Hacks of Kindness**, are helping people create apps to track lobbyists in government, to map the location of murals in a city, and to help organize people to dig out fire hydrants after snowstorms.

What kind of good can you do with technology? *(Aleciccotelli/Fotolia)*



# How Will You Put Technology in Action?

**Learning Outcome 1.1** You will be able to discuss the impact of technology on global and national issues.

Ask yourself: Why are you in this class? Maybe it's a requirement for your degree, or maybe you want to improve your computer skills. But let's step back and look at the bigger picture.

Technology today is not just a means for career advancement or merely a skill set needed to survive in society. It's a tool that enables us all to make an impact beyond our own lives. We've all seen movies that dangle the dream in front of us of being the girl or guy who saves the world—and gets to drive a nice car while doing it! Whether it's *The Avengers* or *Big Hero 6*, we are drawn to heroes because we want our lives and our work to mean something and to benefit others.

Technology can be your ticket to doing just that, to influencing and participating in projects that will change the world. We'd like to ask you to think about how your talents and skills in technology will let you contribute on a larger scale, beyond the benefits they will bring to you personally.



## technology on the WORLD STAGE

Recent political and global issues are showing that technology is accelerating change around the world and galvanizing groups of people in new ways. Let's look at a few examples.

### Political Issues

**Objective 1.1** Recognize how becoming proficient with technology can help you understand and participate in political issues in the world at large.

### Social Media

**Social media** tools enable the gathering of groups of people to connect and exchange ideas, and they have brought together people facing repression and censorship in many countries. In fact, in 2014, uprisings in the Ukraine were organized using Facebook pages. Managing control of the media is no longer simple for regimes.

Politicians worldwide have also begun to incorporate social media as part of their political strategy. In the United States, politicians like Barack Obama have Twitter and Facebook accounts that they use to communicate with their constituents. In Italy, Beppe Grillo drew the largest vote in a recent election for a single party using mainly Facebook and Twitter in place of television and newspaper ads, and in the United Kingdom politicians post over two million social media updates a year.

Social media has proven to be a very effective way of motivating people to vote. Ireland has a socially conservative heritage, decriminalizing homosexuality as recently as 1993. In the recent vote on same-sex marriage equality, Irish nationals living abroad—many young and with liberal views—were not allowed to mail in a ballot. Thousands traveled back to Ireland to cast



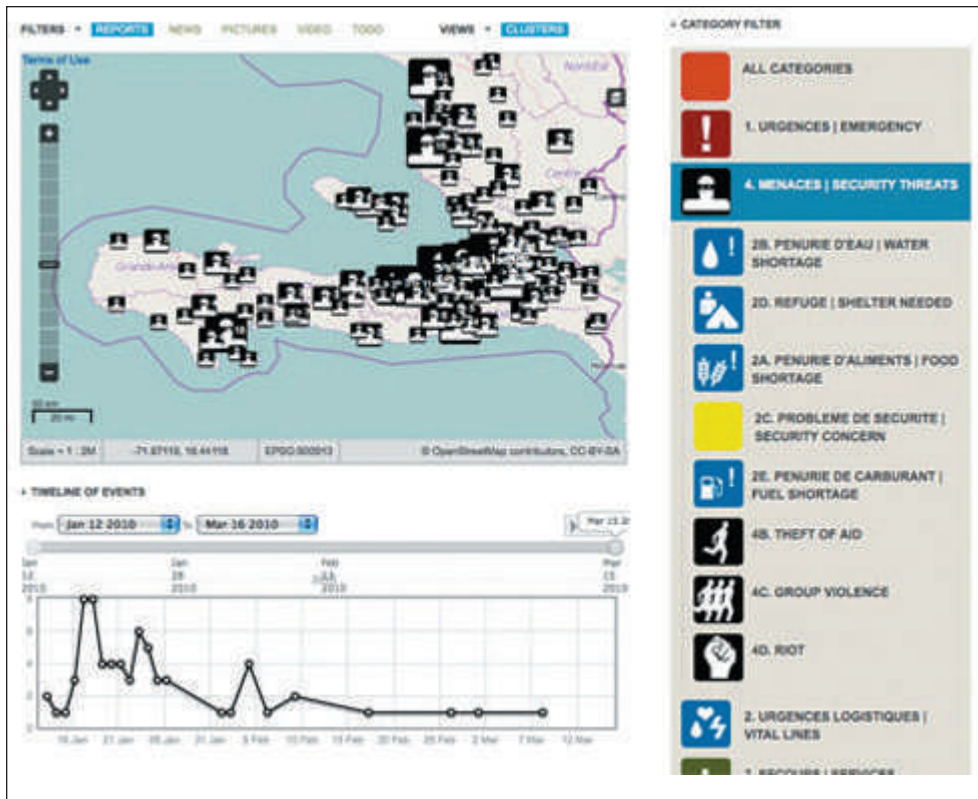
**FIGURE 1.1** The Irish referendum on marriage equality meant many Irish living abroad traveled home just to vote, documenting their trips using #HomeToVote. (Brian Lawless/AP Images)

a “yes” vote in support of same-sex marriage, encouraging each other with a Twitter feed #HomeToVote (see Figure 1.1). Facebook posts for the “Yes Equality” page topped 1.6 million. With a large voter turnout, Ireland became the first country to legalize gay marriage through a popular vote.

Social media tools are providing a level of instant connection and information distribution that is reshaping the world. What can you do with social media tools that will change the future of your community?

### Crisis-Mapping Tool

Another example of the interaction of technology and society is the software tool Ushahidi. Following a disputed election in



**FIGURE 1.2** During a natural disaster in Haiti, Ushahidi crisis-mapping software helped identify areas of violence, helped people locate food and water, and directed rescuers to those in need. (Reprinted with permission of Ushahidi, Inc. [www.usshahidi.com](http://www.usshahidi.com))

Kenya, violence broke out all over the country. Nairobi lawyer Ory Okolloh tried to get word of the violence out to the world through her blog, but she couldn't keep up with the volume of reports. But two programmers saw her request for help and in a few days created Ushahidi (Swahili for "testimony"). It is a **crisis-mapping tool** that collects information from e-mails, text messages, blog posts, and Twitter tweets and then maps them, instantly making the information publicly available. The developers then made Ushahidi a free platform anyone in the world can use (see Figure 1.2). So when earthquakes rocked Haiti, Ushahidi instantly told rescuers where injured people were located. When a tsunami brought Japan to the brink of a nuclear catastrophe, Ushahidi let anyone with a mobile phone find locations with clean water and food. Chile, Syria, Somalia, and the Democratic Republic of the Congo have all used this crisis-mapping software to save lives in times of political upheaval. In what other ways could technology help us face times of crisis?

## Other Global Issues

**Objective 1.2** Describe how technology affects social issues in different societies.

Political crises are not the only arena in which technology is enabling global change. Technology is impacting social issues in different countries around the world.

### Health Care

Infectious diseases account for about one-fifth of all deaths worldwide. Researchers say the odds of a flu pandemic

occurring in the next century are nearly 100%. Could technology help us develop and deliver vaccines in a way that saves lives? With newer scientific visualization tools, scientists are developing antibodies for flu viruses and even HIV, viruses that are difficult to target because they continually change shape. Computationally intense modeling software is helping researchers increase the pace of vaccine production, saving lives.

Retinal prosthetics are another example of global health concerns being addressed with technology. Macular degeneration and retinitis pigmentosa are two diseases that destroy the retina; they account for the majority of blindness in developing nations. Sheila Nirenberg of Cornell University is working on a microchip that can replace the function of the retina, translating incoming light into the electrical pulses the brain needs for vision. These biomedical chips could restore quality vision to the blind.

### The Environment

What if every cell phone in the world had built-in atmospheric sensors? Then millions of points of air and water quality data from around the world could be constantly acquired. Tagged with geographical information, the data could alert scientists to new trends in our environment. Ideas like these are being explored by Mark Nieuwenhuijsen of the Center for Research in Environmental Epidemiology in Barcelona, Spain.

Smart Internet-connected water sprinklers are another technology that is saving water in California and other dry areas of the country. The sprinkler system checks the weather forecasts so it won't use water when rain is coming the next

day. It can adjust the watering schedule based on the season and can adjust the times of watering to encourage root growth. The system is showing a 30% reduction in water usage.

Can you think of other ways you could use mobile and wearable technology to improve society?

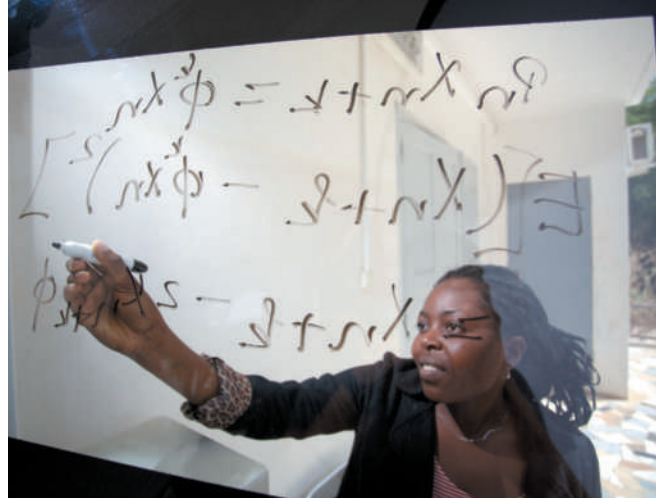
### The Digital Divide

There is a great gap in the levels of Internet access and the availability of technical tools in different regions of the world. The term coined for this difference in ease of access to technology is the **digital divide**. One danger of a digital divide is that it prevents us from using all the minds on the planet to solve the planet's problems. But this challenge created by technology is also being answered by technology.

The Next Einstein Initiative (NEI) is a plan to focus resources on the talented mathematical minds of Africa (see Figure 1.3). By expanding the African Institute for Mathematical Sciences (AIMS) across the continent, the future of Africa can be profoundly changed. Cambridge professor Neil Turok founded AIMS to bring together the brightest young minds across Africa with the best lecturers in the world. The NEI has won funding from Google's Project 10<sup>100</sup>, an initiative to award \$10 million to a set of five projects selected by open public voting. By capturing the enthusiasm of the world with presentations distributed

through TED (**ted.com**) and Project 10<sup>100</sup>, there is now a push to create 15 additional AIMS centers across Africa.

Figure 1.4 shows additional examples of people putting technology into action to impact the world. How will you join them? ■



**FIGURE 1.3** The Next Einstein Initiative (NEI) is rallying the support of the world to identify mathematical genius.

(African Institute for Mathematical Sciences Next Einstein Initiative (AIMS-NEI))

**FIGURE 1.4**

Technology in Action: Taking on Global Problems				
PERSON/ ORGANIZATION	GLOBAL PROBLEM	TECHNOLOGY USED	ACTION	FIND OUT MORE ...
<b>Peter Gabriel/ The Witness Project</b>	Human rights abuses	Video cameras	Provide video documentation of human rights abuses; the project contributed to the arrest of warlords in the Democratic Republic of the Congo for the recruitment of child soldiers	The Witness Project: <b>witness.org</b>
<b>SolaRoad/ Netherlands</b>	The need for a renewable, nonpolluting energy resource	Solar cells	Solar cells are integrated into the asphalt roadway. They collect solar energy and distribute electricity all day	Netherlands' SolaRoad: <b>solaroad.nl</b>
<b>United Nations World Food Programme (WFP)</b>	One in seven people in the world do not get enough food to eat	GIS (geographical information systems) and mobile devices	The WFP can analyze the location and need for food, positioning food where it will help the most	World Food Programme: <b>wfp.org</b>
<b>e-Nable</b>	Need for inexpensive, easily maintained prosthetic hands	3D printing	This group of engineers, parents, and artists work to print and assemble hands for people they may never meet	e-Nable: <b>enablingthefuture.org</b>





# technology and OUR SOCIETY

Technology is also allowing us to redefine very fundamental parts of our social makeup—how we think, how we connect with each other, and how we purchase and consume products.

## Technology Impacts How We Think

**Objective 1.3** Describe how technology is changing our cognitive processes.

### What We Think About

What do you think about in your free time? In the late twentieth century, a common trend was to think about what to buy next—or perhaps what to watch or listen to next. Information and products were being served up at an amazing rate, and the pattern of consumption became a habit. As more and more web applications began to appear that allowed each individual to become a “creator” of the web, a new kind of Internet came into being. It was nicknamed **Web 2.0**, and it had a set of new features and functionality that allowed users to contribute content easily and to be easily connected to each other. Now everyone could collaborate internationally at the click of a mouse.

Web 2.0 has fostered a dramatic shift across the world from simply consuming to having the ability to volunteer and collaborate on projects. In his book *Cognitive Surplus: Creativity and Generosity in a Connected Age*, author Clay Shirky created the term **cognitive surplus** to mean the combination of leisure time and the tools to be creative. The world’s population has an estimated one trillion hours a year of free time. When coupled with the available media tools and the easy connectivity of Web 2.0, and with generosity and a need to share, projects like Ushahidi and the Witness Project (see Figure 1.4) emerge.

But why would anyone bother to work on projects like these in their free time? Modern theories of motivation show that what pushes people to apply their free time in altruistic

causes, for no money, is the excitement of autonomy, mastery, and purpose (see Figure 1.5):

- **Autonomy:** the freedom to work without constant direction and control.
- **Mastery:** the feeling of confidence and excitement from seeing your own skills progress.
- **Purpose:** the understanding that you are working for something larger than yourself.

Together, these three factors play into how we are fundamentally wired and can produce incredibly motivated behavior. The combination of motivation, technology, and a cognitive surplus is leading to powerful projects that are changing the world.

## Technology Impacts How We Connect

**Objective 1.4** Explain how technology is expanding the ways we can collaborate.

### Connecting Through Music

In many societies, people connect intimately by creating and sharing music. Blend (**blend.io**) (see Figure 1.6) is a site that allows people to exchange the songs they have written as well as the electronic data and settings they used to create the song. People can explore different musical styles and techniques on the site and immediately download the components that made a song and begin to modify it. There is also a Blend blogging community that trades musical ideas among its readers. In addition, Blend is a publishing house, distributing and selling its users’ digital music for them through all major outlets like iTunes,



**FIGURE 1.5** Our understanding of human motivation can play a role in our use of technology to impact society. (Bonninturina/Fotolia, Izl/Fotolia, Vadymvdrobot/Fotolia)



**FIGURE 1.6** Blend (**blend.io**) is an example of a community that lets musicians exchange not only songs but the electronic settings and data used to create the songs. (Stuart Hughes/Corbis)

Spotify, and Google Play. If you can get 100 likes from the community for your song, it is qualified for release on the Blend label!

## Connecting Through Business

One of the most profound ways we can connect with each other is to support other people's dreams. Kickstarter ([kickstarter.com](http://kickstarter.com)) helps us connect in this way by allowing people to post their ideas for community projects, games, and inventions and to ask for funding directly. Donors are given rewards for different levels of pledges, such as a signed edition of a book or a special color of a product. This style of generating capital to start a business is known as **crowdfunding**, asking for small donations from a large number of people, often using the Internet. Successful Kickstarter projects have included ice chests with integrated blenders, DNA analysis machines that could inexpensively diagnose disease, and many entertainment projects. In total, almost \$2 billion of funding for businesses has been raised using Kickstarter.

## Technology Impacts How We Consume

**Objective 1.5** Summarize how technology has impacted the way we choose and consume products and services.

Technology is changing all aspects of how we decide what we'll purchase and how we actually buy goods and services—from strategies for convincing you to purchase a certain product to the mechanics of how you buy and own things.

### Marketing



New strategies in marketing are counting on the fact that most people have a cell phone with a camera and Internet access. **QR (quick response) codes** like the one shown here let any piece of print host a link to online information and video content. And studies show 82% of shoppers use their cell phone to go on the Internet before they make a purchase. They are often using so-called location-aware price comparison tools. Apps like ShopSavvy and RedLaser scan the bar code of the item and then compare prices with those of nearby stores and with the best prices available online. Techy shoppers can then get "mobile coupons" (or *mobi coupons*) delivered to their cell phones, thanks to sites like SnipSnap and Coupon Sherpa. The future promises specialized coupons created just for you based on your location and past buying preferences.

Marketers also have to be aware of the phenomenon of **crowdsourcing**—checking in with the voice of the crowd. Consumers are using apps like ScanLife to check people's verdicts on the quality of items. Forward-thinking companies are using this input to improve their products and services. AT&T, for example, has an app that lets customers report locations of coverage gaps.

### Access Versus Ownership

Even the idea of ownership is evolving, thanks to new technologies. Items like cars and bikes can become "subscriptions" instead of large one-time purchases. For example, Zipcar




**FIGURE 1.7** New York City's Citi Bike program uses digital technology to change our lifestyle from one of ownership to one of subscription. Riders are now taking over one million trips per month. (Tim Clayton/Corbis)

allows hundreds of thousands of people to use shared cars. With Zipcar, a phone call or online reservation activates your personal Zipcar. This card allows you to automatically open the door of the car you have reserved, and away you drive. GPS technology is used to track where the car is, whether it has been dropped off at the right location, and how far it has been driven. Call a Bike is a bike-sharing program in Germany. Racks of Call a Bikes are located at major street corners in large cities in the country. Simply call the phone number printed on the bike and it texts you a code to unlock the bike. When you're done riding the bike, simply relock it and you're billed automatically. The New York City version of this program, Citi Bike, has already seen riders take over seven million trips (see Figure 1.7).

These subscription-style business models are spreading now to smaller goods. **Swap.com** helps people trade books, clothes, and video games with one another using the power of peer-to-peer connections—for example, to find those who want to swap used roller blades for a baby crib.

Rachel Botsman and Roo Rogers make the case in their book *What's Mine Is Yours: The Rise of Collaborative Consumption* that the real fuel beneath these services is a shift in our acceptance of sharing. **Collaborative consumption** implies that we are joining together as a group to use a specific product more efficiently. We are so constantly connected with each other that we have again found the power of community. There are increasing opportunities to redistribute the things we have purchased and to share the services a product provides instead of owning it outright. Add in the pressure of mounting environmental concerns and global financial pressures, and we are migrating toward collaborative consumption. ■

**Before moving on to Part 2:**

1. Watch Replay Video 1.1 .
2. Then check your understanding of what you've learned so far.

## check your understanding // review & practice

For a quick review to see what you've learned so far, answer the following questions.

### multiple choice

- Which is NOT a technology that has been used to deliver assistance during times of crisis?
  - Ushahidi
  - blend.io
  - social media
  - e-mail
- Cognitive surplus means that we now find many people with
  - more money than free time.
  - limited access to the Internet.
  - excess time and free tools for collaboration.
  - mobile devices.
- Collaborative consumption is when people get together to
  - find the best prices on products.
  - exchange reviews on services and goods they have purchased.
  - fight diseases of the respiratory tract.
  - increase the use of a single product by sharing access to it.
- Crowdfunding helps start-up businesses by
  - selling stock more easily.
  - gathering financial contributions from supporters.
  - using QR codes to advertise and market products.
  - replacing Web 2.0 technology.
- Social media has been used to
  - increase voter turnout in elections.
  - increase communication between elected officials and their constituents.
  - replace television and radio advertising in political elections.
  - all of the above

**MyITLab**

Go to **MyITLab** to take an autograded version of the *Check Your Understanding* review and to find all media resources for the chapter.

**TECHBYTES WEEKLY**

Stay current with the TechBytes Weekly Newsletter.

Continue 