# **Technology for Success: Computer Concepts**

# **Module 1: The Impact of Digital Technology**

# **A Guide to this Instructor’s Manual:**

We have designed this Instructor’s Manual to supplement and enhance your teaching experience through classroom activities and a cohesive module summary.

This document is organized chronologically, using the same lesson in **red** that you see in the textbook. Under each lesson you will find (in order): Lecture Notes that summarize the section, Figures and Boxes found in the section, if any, Teacher Tips, Classroom Activities, and Lab Activities. Pay special attention to teaching tips and activities geared toward quizzing your students, enhancing their critical thinking skills and encouraging experimentation within the software.

In addition to this Instructor’s Manual, our Instructor’s Resources also contain PowerPoint Presentations, Test Banks, and other supplements to aid in your teaching experience.

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# **Module Objectives**

Students will have mastered the material in Module 1 when they can:

* Explain the evolution of society’s reliance on technology.
* Develop personal uses for technology to help with productivity, learning, and future growth.
* Explain the role of technology in the professional world.

**Lesson 1: Explain the Evolution of Society’s Reliance on Technology**

LECTURE NOTES

* Outline the History of Computers
  + First generation—used vacuum tubes, cylindrical glass tubes that controlled the flow of electrons. Their use and availability were limited due to their large size, amount of power they consumed, the heat they generated, and how quickly they wore out. (Figure 1-1: Electronic digital computer with vacuum tubes)
  + Next generation—replaced vacuum tubes with transistors, which were smaller, cheaper, and more reliable. They contained many components still in use today (disk storage, memory, operating systems, and stored programs).
  + 1960s—integrated circuits, which packed the equivalent of thousands of vacuum tubes or transistors into a silicon chip (thumb-sized).
  + 1971—microprocessor, the “brains” of a computer, a chip that contains a central processing unit. It is faster, smaller, and less expensive than integrated circuits.
  + 1970s and 1980s—the personal computer (pc) gained popularity
    - 1978: Steve Jobs and Steve Wozniak of Apple Computer Corporation introduced the Apple II, a preassembled computer with color graphics (Figure 1-2: Apple II computer)
    - 1981: IBM introduced its personal computer
* Explain the Impact of the “Internet of Things” and Embedded Computers
  + Internet of Things (IoT)—processors are embedded in many products (smart devices), which communicate via the Internet or wireless networks
    - Automated teller machines (ATMs)
    - IoT at Home (webcams, thermostats, wearable fitness trackers), (Figure 1-3: Smart devices use IoT to control home functions, such as a thermostat and Figure 1-4: Some of the embedded computers designed to improve safety, security, and performance in today’s vehicles)
    - IoT in Business (sensors to monitor processes and increase the quality of finished goods)
  + Embedded computers
    - Have a specific purpose
    - Are small and have limited hardware but enhance the capabilities of everyday devices
* Discover Uses for Artificial Intelligence
  + Artificial intelligence (AI)—the technological use of logic and prior experience to simulate human intelligence
  + Capabilities
    - Speech recognition
    - Virtual reality
    - Logical reasoning
    - Creative responses
* Explore the Impact of Virtual Reality
  + Virtual reality (VR)—the use of computers to simulate a real or imagined environment that appears as a three-dimensional (3-D) space
  + Augmented reality (AR)—A type of VR that uses an image of an actual place or things and adds digital information to it

FIGURES and TABLES

Figure 1-1: Electronic digital computer with vacuum tubes

Figure 1-2: Apple II computer

Figure 1-3: Smart devices use IoT to control home functions, such as a thermostat

Figure 1-4: Some of the embedded computers designed to improve safety, security, and performance in today’s vehicles

Figure 1-5: IoT-enabled devices can help you with daily tasks such as grocery shopping

Figure 1-6: Manufacturers can use a tablet to control a robotic arm

Figure 1-7: Augmented reality combines real images with digital information

TEACHER TIP

Have students use their own smart devices to illustrate the concepts in the lesson.

CLASSROOM ACTIVITIES

1. Classroom activity 1: List the items in the classroom that are embedded computers. List the items in your household that are embedded computers and compare them with the group. Discuss how IoT can be used in households and in business settings.

2. Classroom activity 2: The term “digital divide” is used to describe the gap between those who have access to technology and those who do not. Discuss the impact that not having access to technology can have in one’s daily life, in the classroom, and in business. Brainstorm ways that corporations, non-profits, educational institutions, and government agencies can narrow the digital divide. Conduct research to find current program examples.

3. Quick Quiz:

Put the following computer history terms in the correct order:

Microprocessors

The personal computer

Transistors

Integrated circuits

Vacuum tubes

Answer:

Vacuum tubes

Transistors

Integrated circuits

Microprocessors

The personal computer

4. Critical Thinking: Discuss how embedded computers and IoT have impacted your daily life. What are the possible security risks with IoT and what precautions can we take to overcome them? Is society as a whole benefitted from the use of IoT?

**Lesson 2: Develop Personal Uses for Technology to Help with Productivity, Learning, and Future Career Growth**

LECTURE NOTES

* Use Technology in Daily Life
  + Artificial intelligence—some of the practical uses of AI include virtual assistants, video games, navigation apps, security, etc.
  + Natural language processing—computers interpret and digitize spoken works and commands (digital assistants, for example); (Figure 1-8: Smart device provide you with assistance, answers, and more)
* Use Technology to Enhance Productivity and Learning
  + Robotics
    - Useful in situations where it is impractical, dangerous, or inconvenient to use a human (Figure 1-9: Robot used to detect weeds and spray chemicals)
    - Robotic arms and cameras can assist surgeons
  + Enterprise computing—each department of a company uses technology specific to its function (Table 1-1: Enterprise functional units)
* Use Technology to Assist Users with Disabilities
  + Laws
    - Americans with Disabilities Act (ADA): requires companies with 15 or more employees to make reasonable attempts to accommodate the needs of physically challenged workers
    - Individuals with Disabilities Education Act (IDEA): requires that public schools purchase or acquire funding for adaptive technologies
  + Technologies
    - Screen readers: use audio output to describe the contents of the screen
    - Alternative text (alt text): descriptive text added to an object. The screen reader will read the alt text so that the user understands the image and its purpose. (Figure 1-12: Screen readers use alt text to describe an image)
    - Captioning and speech recognition software
    - Input devices for people with physical disabilities
* Apply Green Computer Concepts to Daily Life
  + Green computing—reducing electricity and environmental waste generated from technology
    - ENERGY STAR® program (Figure 1-13, The United States Department of Energy [DOE] and the United States Environmental Protection Agency [EPA] developed the ENERGY STAR program to help reduce the amount of electricity used by computers and related devices)
    - Recycling products (electronics, paper, toner and ink cartridges)
    - Paperless communications
    - Telecommuting

FIGURES and TABLES:

Figure 1-8: Smart device provide you with assistance, answers, and more

Figure 1-9: Robot used to detect weeds and spray chemicals

Figure 1-10: You can use apps to find information about public transit options

Figure 1-11: A Braille printer

Figure 1-12: Screen readers use alt text to describe an image

Figure 1-13: Look for the ENERGY STAR® logo when purchasing appliances or devices

Table 1-1: Enterprise functional units

TEACHER TIP

Students can research the impact of computer product waste on the environment and what steps are being taken to curtail it.

CLASSROOM ACTIVITIES

1. Classroom activity 1: Enterprise Computing. Identify a company and the different departments within its organization. Next, discuss the different technology components that could be used within each department. Table 1-1 can serve as guidance.

2. Classroom activity 2: Divide students into groups, with each group focused on a different type of disability (visual, hearing, learning, physical). Each group will research technologies that can be used to assist with their disability type and then these technologies will be presented to the class as a whole.

3. Quick Quiz: (True or False) The ENERGY STAR® program encourages manufacturers to recycle computer components.

Answer: False

4. Critical Thinking: How do we as a society help contribute to the problem of computer waste and what efforts can we put in place to reduce it? Discuss five reasons why green computing is an important part of the environmental effort. List ten ways that you can apply green computing to your daily life.

**Lesson 3: Explain the Role of Technology in the Professional World**

LECTURE NOTES

* Explore Technology Careers
  + Software and apps - develop and support programs for computers and the Web, and manufacture computing and mobile devices
  + Technology equipment - manufacturers and distributors of computers, mobile devices, and other hardware
  + IT departments—most medium and large businesses have an Information Technology (IT) department, which is responsible for ensuring that all computer operations, mobile devices, and networks run smoothly (Table 1-2: IT responsibilities)
  + Technology service and repair—provides preventative maintenance, component installations, and repair services to customers
  + Technology sales—must possess a general understanding of technology, as well as specific knowledge of the product they are selling
  + Technology education, training, and support—provide technology-related education and training at schools, colleges, universities, and companies
  + IT consulting—typically has gained experience in one or more areas, such as software development, social media, or network configuration, and provide technology services to clients based on their specific area of expertise
  + System development—Analyze and create software, apps, databases, websites, and web-based development platforms, cloud services, and networks
  + Web marketing and social media—require one to be familiar with marketing strategies, web-based platforms, and social media apps
  + Data storage, retrieval, and analysis—must be knowledgeable about collecting, analyzing, storing, and reporting data from databases or the web (Figure 1-15: Web analytic data measures web site traffic patterns)
  + Information and systems security—require knowledge about potential threats to a device or network
* List Ways that Professionals Might Use Technology in the Workplace
  + Working remotely
    - Telecommuting—working from home
    - Use of smartphones, the Internet, the cloud
  + Intelligent workplace—uses technology to enable workers to connect to the company’s network, communicate with each other, use productivity software and apps, meet via web conferencing, and more
  + Some companies use a BYOD (bring your own device) policy.
  + Online collaborative productivity software allows employees to share documents and make edits or comments.
* Explain the Ways that Teachers Might Use Technology in K-12 Education
  + Social networking can be used to
    - Promote school events
    - Work cooperatively on group projects
    - Teach concepts, such as anti-bullying
  + Intelligent classroom—technology is used to facilitate learning and communication
* Explain How Various Transportation Services Utilize Technology to their Advantage
  + Packing tracking (Figure 1-14: The transportation industry uses code scanning to track packages)
  + Drivers use GPS technology to avoid traffic and hazardous conditions.
  + Automated vehicles—increase independent transportation options for people with disabilities
* Explain the Ways that Technology Assists the World of Healthcare
  + Physicians use computers to monitor patients’ vital signs and research symptoms and diagnoses.
  + Mobile health (mHealth)
    - Healthcare professionals—access patient health records stored in the cloud
    - Patients—monitor conditions and treatment
  + Medical monitoring devices—collect vital signs and send to the specialist
  + 3-D printers—manufacture skin for patients, prosthetic devices and casts
* Describe the Ways that Technology Has Impacted the World of Manufacturing
  + Computer-aided manufacturing (CAM)—streamlines production and allows for shipping products more quickly
    - Robots perform work that is too dangerous, detailed, or monotonous for people.
    - Part ordering can be done more efficiently through the use of computers.
  + Monitor assembly lines and equipment with machine-to-machine (M2M communications)
* Explain the Ways that Professions Might Use Technology in Higher Education
  + Learning Management System (LMS)—web-based training allows students to:
    - Check progress on a course
    - Take practice tests
    - Exchange messages with instructors or other students
    - Take classes and earn degrees online
  + Ebooks—students can access content, including videos, from mobile devices
* Explore How You Might Prepare for a Career in Technology
  + Professional online presence—do not use humorous or informal names; include a photo that shows your best self; upload a PDF of your resume; include links to videos, publications, or digital content you have created
    - Upload resume (PDF)
    - Proofread everything
    - Professional social networks (Figure 1-16: LinkedIn is a career-based social networking site)
  + Enable privacy settings on personal accounts and never post anything you would not want a potential employer to see.
  + Certifications
    - Demonstrate knowledge in a particular area (software, hardware, operating systems, etc.). Some tests are multiple-choice, while others are skill-based.
    - Requires a commitment of time and money
    - Some areas that offer certifications include: application software; data analytics, database, and web design; hardware; networking; operating systems; programming; cybersecurity

FIGURES and TABLES:

Figure 1-14: The transportation industry uses code scanning to track packages.

Table 1-2: IT responsibilities

Figure 1-15: Web analytic data measures web site traffic patterns.

Figure 1-16: LinkedIn is a career-based social networking site.

TEACHER TIP

Have students find examples of companies/positions in each of the categories of IT careers and determine the required skills and education for these jobs.

CLASSROOM ACTIVITIES

1. Assign a project: Create an online profile. This should include: (a) a professional name, (b) a resume, (c) a photograph, and (d) an explanation of which professional social network you would use and why.

2. Classroom activity: Take a poll of students in the classroom and what their desired technology-related profession is. Why are they interested in this position and what particular skills will be necessary to obtain it?

3. Quick Quiz: The \_\_\_\_\_\_\_ trend refers to healthcare professionals using smartphones or tablets to access health records stored in the cloud, and patients using digital devices to monitor their conditions or treatment.

Answer: mobile health (mHealth)

4. Critical Thinking: What are the pros and cons of a BYOD (bring your own device) policy in the workplace, as opposed to providing necessary equipment to employees?

**End of Module Material**

* + - **Module Summary** materials reinforce module content.
    - **Key Terms** present the terms from the text to help students prepare for tests and quizzes. Students should know each Primary Term (shown in bold-black characters in the module) and be familiar with each Secondary Term (shown in italic characters in the module).
    - **Review Questions** provide Multiple-Choice and True/False exercises to reinforce understanding of the topics presented in the module.
    - **Discussion Questions** call on students to relate concepts to their own lives, both personally and professionally, as well as provide collaboration opportunities.
    - **Critical Thinking Activities** provide opportunities for creative solutions to the thought-provoking activities presented in each module. They are constructed for class discussion, presentation, and independent research, and are designed for a team environment.

# **Glossary of KEY Terms**

* Key Terms included here.

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