Chapter 7

Health, Access, and the Environment
Objectives

1. Understand the potential risks to physical health resulting from the use of computers.

2. Describe some possible emotional health risks surrounding the use of computers.

3. Explain what is meant by the term “digital divide.”

4. Discuss the impact that factors such as income, race, education, and physical disabilities may have on computer access and use.
Objectives (cont’d)

5. List some types of assistive hardware that can be used by individuals with physical disabilities.

6. Suggest some ways computer users can practice green computing and properly dispose of computer equipment.
Staying Healthy at Home and On the Job

• Computers can pose a threat to a user’s physical and mental well-being.

• Physical health – includes avoiding physical injuries and creating a safe and comfortable workspace.

• Emotional health – includes alleviating/avoiding stress, information overload, and Internet addiction.
Physical Health

- Common physical conditions caused by computer use include:
  - Carpal tunnel syndrome (CTS)
  - Repetitive stress injury (RSI)
  - Computer vision syndrome (CVS)

- A proper work environment and good habits can prevent many physical problems caused by computer use.
What Is Ergonomics?

• **Ergonomics** – the science of fitting a work environment to the people who work there.

• **Involves:**
  ▪ Designing a safe and effective workspace.
  ▪ Using ergonomic hardware when needed.
  ▪ Using good habits.
Example of an Ergonomic Workspace

**Figure 7-1**

- **Tilt-and-swivel monitor**: Adjusts for a comfortable viewing angle; top of screen should be no higher than 3” above the user’s eyes.
- **Document holder**: Keeps documents close to the monitor so the user doesn’t have to turn his or her head.
- **Proper user position**: Sit straight with shoulders back, about 24 inches away from the monitor; keep forearms, wrists, and hands straight; keep forearms and thighs parallel to the floor.
- **Adjustable table/desk**: Optimal height is between 25 and 29 inches tall.
- **Footrest**: Can be used, if needed, to keep legs properly positioned.
- **Adjustable chair**: Height is adjustable and has support for the lower back.
Workspace Design for Notebook and Tablet PC Users

• To more comfortably use a portable PC at home, options include:
  ▪ **Docking station** – connects a portable PC to conventional hardware; the user only needs to plug in the PC in order to use the attached hardware.
  ▪ **Notebook stand** – allows the notebook’s screen to be used instead of an external monitor and raises the screen to an appropriate height.
Example of a Docking Station and Notebook Stand

Hardware is permanently attached to the docking station and can be used with the notebook PC when it is connected to the docking station.

Hardware (like the wireless keyboard shown here) can be temporarily connected to the notebook PC to be used while the PC is in the notebook stand.

Figure 7-2

Docking station

Notebook stand
## Ergonomic Tips for Notebook PC Users

<table>
<thead>
<tr>
<th>Occasional Users</th>
<th>Full-Time Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Those who use a notebook PC while traveling)</td>
<td>(Those who use a notebook PC full-time instead of a desktop PC)</td>
</tr>
<tr>
<td>Sit with the notebook on a table and position it for comfortable wrist posture</td>
<td>Sit with the notebook on a desk or table and position it for comfortable wrist posture</td>
</tr>
<tr>
<td>Adjust the screen to a comfortable position, so you can see the screen as straight on as possible</td>
<td>Elevate the notebook so the screen is at the proper height, or connect the PC to a stand-alone monitor instead of using the notebook’s built-in monitor; consider using a docking station or notebook stand</td>
</tr>
<tr>
<td>Consider bringing a travel keyboard and mouse to use with the notebook PC, when possible</td>
<td>Use a separate keyboard and mouse, either attached directly to the PC or to a docking station</td>
</tr>
<tr>
<td>When purchasing a notebook, pay close attention to the total weight of the system (PC, batteries, power supply, additional drives, etc.); purchase a lightweight system to avoid neck and shoulder injuries when carrying the notebook from one location to another</td>
<td>When purchasing a notebook, pay close attention to the size and clarity of the monitor, unless you will be using a separate stand-alone monitor, and pay close attention to the keyboard design, unless you will be using a separate keyboard</td>
</tr>
</tbody>
</table>

Figure 7-3
Ergonomic Hardware

- **Ergonomic hardware** – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - **Ergonomic keyboards.**

Figure 7-4
Ergonomic Hardware

• Ergonomic hardware – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - Ergonomic mice.
Ergonomic Hardware

- **Ergonomic hardware** – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - Keyboard drawers.
Ergonomic Hardware

- **Ergonomic hardware** – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - Document holders.

Figure 7-4
Ergonomic Hardware

- **Ergonomic hardware** – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - Antiglare screens.

*Figure 7-4*
Ergonomic Hardware

- **Ergonomic hardware** – used to avoid physical problems due to extensive PC use or to help alleviate discomfort of an already existing condition.
  - Wrist rests.

*Figure 7-4*
Good User Habits and Precautions

• Can use finger and wrist exercises.

• Take frequent breaks and rotate tasks.

• Using good posture.

• Close drapes or blinds to reduce glare.

• Eyeglass wearers should discuss any eye discomfort with their eye doctors.
Emotional Health

• Common emotional conditions caused by computer use include:
  ▪ Stress and burnout.
  ▪ Computer and Internet addiction.

• Stress has been linked to a variety of health concerns.
Stress

• Stress of our ever-changing society:
  ▪ More jobs today require computer use than before.
  ▪ Many workers must regularly learn new skills to keep up-to-date.
  ▪ The ongoing battle to stay current creates stress for many individuals.
Stress

- Impact of our 24/7 society:
  - Benefit is one never has to be out of touch.
  - Can also be a source of great stress
  - Finding a balance between work time and personal time is important for good emotional health
Stress

- Information overload:
  - Although the amount of information available through the Internet is a great asset, it can also be overwhelming at times.
  - Efficiently managing your incoming e-mail is one way to help avoid information overload.
  - Filtering, clipping services, and other tools can help alleviate the stress of an overflowing Inbox.
Stress

• **Burnout** – a state of fatigue or frustration brought about by overwork.
  - Is often born from good intentions.
  - Signs include a feeling of emotional and physical exhaustion, no longer caring about a project, feelings of resentment, etc.
  - Reevaluating your schedule and priorities can help; so can taking a break, maintaining a healthy lifestyle, and asking for help when needed.
Computer and Internet Addiction

- **Computer addiction** or **Internet addiction** – when an individual overuses, or is unable to stop using, a computer or the Internet.
  - Can affect people of any age.
  - Can cause problems at home or on the job.
  - Is a global ailment and seems to be growing.

- Treatment includes counseling and, sometimes, medication.
Symptoms of Computer Addiction

- You need to use the computer in order to experience pleasure, excitement, or relief.
- You lose control when not on the computer, becoming anxious, angry, or depressed.
- You have overwhelming thoughts about the computer before you power it up, while it is on, and after you have turned it off.
- You crave the newest hardware or software, and you are never satisfied with what you have.
- You need to spend increasing amounts of time or money on computer activities in order to get the same effect.
- You lie to everybody about the amount of time spent on the computer and where you are spending that time.
- You risk the loss of relationships with your family and friends because of your compulsive computer use.
- You face financial ruin because of excessive computer use.
- You repeatedly fail at efforts to stop your compulsive computer use.
- Your physical health suffers because you miss meals, don’t exercise, and neglect personal hygiene.
- You experience repetitive stress injuries, backaches, dry eyes, migraines, and changes in sleep patterns as a result of excessive computer use.

Figure 7-9
Is There Equal Access to Technology?

• A concern of many individuals about the increased integration of computers and technology into our lives is whether or not technology is accessible to all individuals.

• Access issues include:
  ▪ Age, race, gender, income, and so forth.
  ▪ Physical disabilities/challenges.
The Digital Divide

- **Digital divide** – the gap between those who have access to information and communications technology and those who do not.

- Groups and individuals trying to eliminate the digital divide are working toward providing real access to technology so that it can be used to improve people’s lives.

- Divide can be viewed within a country and worldwide.
The U.S. Digital Divide

• There is indication that the U.S. digital divide has begun to shrink in the last few years.

• Because the U.S. is such a technologically advanced society, many believe reducing—and trying to eliminate—the digital divide is extremely important to ensure that all citizens have an equal chance to be successful in this country.

• In addition to overall use, these same factors affect the type of use.
Key U.S. Internet Use Statistics

**Figure 7-10**

- **Gender:**
  - Male: 68%
  - Female: 61%

- **Income:**
  - <$30,000: 44%
  - $30,000-50,000: 69%
  - $50,000-75,000: 81%
  - >$75,000: 89%

- **Race:**
  - White, Non-Hispanic: 67%
  - Black, Non-Hispanic: 43%
  - Hispanic: 59%

- **Age:**
  - 18-29: 76%
  - 30-49: 74%
  - 50-64: 60%
  - 65+: 25%

- **Highest level of education obtained:**
  - <High school: 32%
  - High school diploma: 52%
  - Some college: 75%
  - College+: 88%

- **Geographic location:**
  - Rural: 56%
  - Suburban: 68%
  - Urban: 62%
The Global Digital Divide

• An estimated one billion people are online globally—only about 15% of the world’s population.

• Many believe technology is important for all.

• Devices such as the *Simputer* are designed to help lessen the global digital divide.

*Figure 7-11*
Assistive Technology

• Research has found that people with disabilities tend to use computers and the Internet at rates below the average for a given population.

• Some physical conditions—such as visual impairment, deafness, or limited dexterity—make it difficult to use a conventional computer system.

• **Assistive technology** – hardware and software specifically designed for use by individuals with physical disabilities.
Assistive Input Devices

- **Assistive input devices** – allow for input in a nontraditional manner.
  - Braille keyboards.

Figure 7-12
Assistive Input Devices

- *Assistive input devices* – allow for input in a nontraditional manner.
  - One-handed keyboards.

Figure 7-12
Assistive Input Devices

- *Assistive input devices* – allow for input in a nontraditional manner.
  - Head pointing systems with a puff switch.

Figure 7-12
Assistive Input Devices

- Assistive input devices – allow for input in a nontraditional manner.
  - Head pointing systems without a switch.
Assistive Output Devices

- **Assistive output devices** – allow for output in a nontraditional manner.
  - **Screen reader software.**

*Figure 7-12*
• **Assistive output devices** – allow for output in a nontraditional manner.
  - Braille displays.

*Figure 7-12*
Assistive Output Devices

• Assistive output devices – allow for output in a nontraditional manner.
  ▪ Braille printers.

Figure 7-12
Impact on Web Page Design

• Assistive technology is not compatible with all types of Web content.
  ▪ Screen readers can only read text-based data.
  ▪ Images must have an *alternative text description* in order to be read by a screen reader.
  ▪ Hypertext must be meaningful in order to be understood.
  ▪ Many types of animation is incompatible.

• Accessible Web pages take these factors into consideration and try to make the pages usable for as many individuals as possible.
Example of an Accessible Web Page

Images have alternative text descriptions. (The images shown here are text-based, but they are seen as images, not text, by the browser and would be ignored by screen reading software if alternative text was not included.)

There is a high degree of contrast between the text and the background colors.

In general, multimedia is avoided unless it is absolutely necessary. When it is used, text transcripts and descriptions of the visual effects are included so screen readers can be used to understand the multimedia content.

Hyperlinks make sense when read aloud because they are descriptive instead of saying only “Click here.”

Figure 7-14
Impact on Web Page Design

- Section 508 of the Rehabilitation Act requires all federal Web sites to be accessible.

- Accessibility guidelines are available from a number of organizations.

- Web sites can test for accessibility.

- Another accessibility concern is low literacy levels.
Environmental Concerns

• The increasing use of computers in our society has cause a variety of environmental concerns.

• Concerns include:
  ▪ Amount of energy, paper, and other resources used.
  ▪ Hazardous materials included in PCs and other hardware.
  ▪ Waste and recycling of hardware.
Green Computing

- **Green computing** – the use of computers in an environmentally friendly manner.

- Hardware manufacturers are developing more energy-efficient, and less toxic, hardware.

- **Eco-labels**, such as ENERGY STAR, are used to certify environmentally friendly products.
• Another environmental concern is the amount of trash—and sometimes toxic trash—generated by computer use.

• Computing refuse includes:
  ▪ Paper.
  ▪ Used toner cartridges.
  ▪ Obsolete or broken hardware.
  ▪ Discarded CDs, cell phones, and other products.
Recycling and Disposal of Computing Equipment

- E-trash usually ends up in landfills—often in other countries.

- Some products (such as monitors) are being banned from landfills because of their toxicity.

- Some states are implementing fees on hardware purchases to finance the proper disposal of existing discarded products.

Figure 7-19
Recycling and Disposal of Computing Equipment

- **Product stewardship** – the concept that all parties who have a role in producing, selling, or using a product also have a role in properly disposing of it.

- Proper disposal of computer equipment is difficult because of the materials used, but it is important. Options include:
  - Donate used equipment to nonprofit organizations.
  - Recycle components.
  - Some products, such as used toner cartridges, can be refilled and reused.
Summary

• Staying Healthy at Home and On the Job

• Is There Equal Access to Technology?

• Environmental Concerns