

CHAPTER 1

In

Focus

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HEALTHY COMPUTING

Working with computers involves more than just using software and hardware. This chapter focuses on aspects that must be considered to ensure that employees' working conditions are both safe and healthy.

In this session you will:

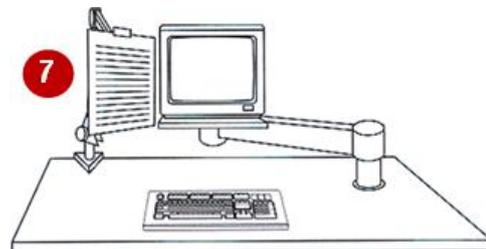
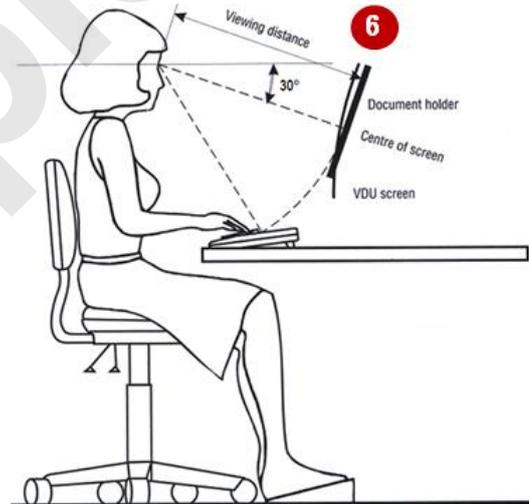
- ✓ gain an understanding of how to set up a workstation ergonomically
- ✓ gain an understanding of exercises you can do while working at a computer
- ✓ gain an understanding of anti-glare and radiation reduction monitors
- ✓ gain an understanding of what constitutes a good computing work environment
- ✓ gain an understanding of social problems that are associated with computer addiction.

SETTING UP AN ERGONOMIC WORKSTATION

Many of the office-based injuries to the neck, the arm, and the wrist can be prevented by having a properly set up workstation. This section presents some guidelines for you to work with in setting up

a safe work computer workstation. However, common sense must always prevail and if you feel any pain or discomfort as a result of using a computer you should stop immediately.

- 1 Chair** The chair should be a gas-adjustable type chair. Adjust the height of the chair so that feet are comfortably flat on the floor, the thighs are approximately horizontal and the lower legs approximately vertical. Position the backrest to the curve of the back – if not comfortable, lower the height several centimetres and try this position.
- 2 Arm Rests** Arm rests are usually not recommended unless they are well out of the way.
- 3 Desk** Having adjusted the chair as above, adjust the height of the desk (where available) so that the top surface is just above elbow height. Ensure that there is ample clearance under the desk and that the desk is not too cluttered.
- 4 Keyboard** The common and preferred setting for the keyboard is where the feet (under the keyboard) are lowered so that the keyboard sits flat on the desk. Place the keyboard as close to the front of the desk as is comfortable so that the top half of the arms are approximately vertical.
- 5 Mouse** Place the mouse directly beside the end of the keyboard. Your forearm should rest on the desk when your hand is on the mouse. Try to use the mouse both left-handed and right-handed and change hands regularly.
- 6 Screen** Position the screen after you have positioned the chair and desk. The top of the screen should be level with or slightly lower than your eyes. It should be at an arm's length away from the user. Position the screen to avoid reflective glare from windows and lights.
- 7 Document Holder** Try to place documents so that they are at eye level and just to the side of the screen.
- 8 Laptop Computer** If you use a laptop for more than 2 hours per day connect a separate mouse and LCD screen and position both as directed above.



WorkSafe Victoria publishes an excellent handbook for office workplaces titled *Officewise: A Guide to Health and Safety in the Office*. You can download a copy from the download link on the home page of **WorkSafe Victoria** (<http://www.worksafe.vic.gov.au>).

ACTIVITY – ERGONOMIC WORKSTATIONS



Individual
Activity



Group
Activity

Setting Up An Ergonomic Workstation

Have a think about the workstation components listed below and circle whether you think they're ergonomic or not.

	Workstation Component	Ergonomic?
1.	If you use a document holder, it should be placed just to the side of the monitor at eye level	Yes – No
2.	The mouse should be placed on the desk approximately above your knee	Yes – No
3.	Position the keyboard as close to the front of your desk as possible	Yes – No
4.	When you look at the centre of your monitor, your eyes should be looking down at an angle of approximately 30°	Yes – No
5.	The best office chairs are gas-adjustable and include arm rests	Yes – No
6.	If you're using a laptop for more than 2 hours per day, connect a separate mouse, LCD monitor and keyboard	Yes – No
7.	It doesn't matter which side you position a document holder as long as it is positioned just to the side of your monitor	Yes – No
8.	Get the position of your monitor correct and then position the chair and desk	Yes – No
9.	It is good to use the mouse both left-handed and right-handed even if you are right-handed	Yes – No
10.	Adjust the height of your chair until your thighs are angled at approximately 30° below horizontal	Yes – No
11.	Position the monitor so that it avoids reflective glare from windows and overhead lights	Yes – No
12.	Adjust the backrest of your chair so that it is positioned in the curve of your back	Yes – No
13.	The correct height of your desk places its top surface just above elbow height	Yes – No
14.	When you sit at your desk, your top half of your arms and lower legs should be approximately vertical	Yes – No

BREAKS AND EXERCISES

Prevention is definitely better than cure when it comes to any form of illness or injury. Here are a number of suggestions for rest breaks and stretching exercises for you to try while working

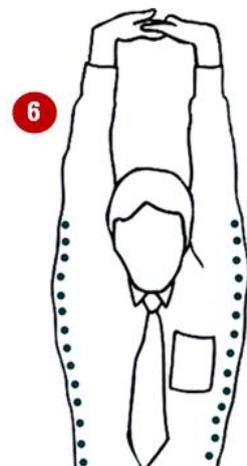
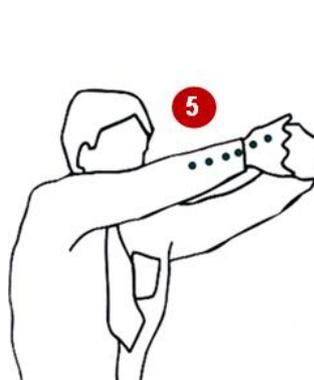
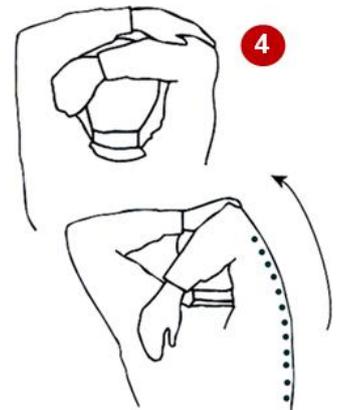
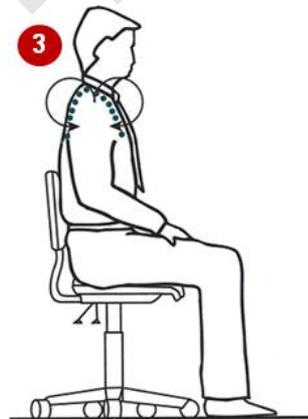
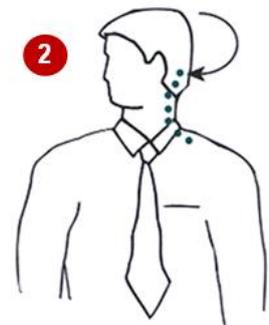
at the computer. Make sure that you relax and perform the exercises gently. You should stop immediately if you feel any discomfort.

Rests and Breaks

- Take a rest break away from the computer for 5 to 10 minutes every hour.
- Active rest during a break with some other type of activity, such as walking or stretching, is more beneficial than passive rest – get up off your chair and walk to the printer to collect those print jobs!
- Vary activities where possible interspersing computer tasks with non-computer tasks.
- Try to limit computer time to 5 hours per day – break this time up into segments.

Exercises

- 1 Head Rolls** Gently lower ear to shoulder and hold for 10 seconds. Slowly roll chin to chest and up to other shoulder and hold chin for 10 seconds. Repeat several times and be careful not to extend your neck back too far.
- 2 Head Turns** Turn head to look over left shoulder and hold for 10 seconds. Turn head the other way and hold for 10 seconds. Repeat several times.
- 3 Shoulder Rolls** Circle shoulders forward several times, then backwards. Repeat 3 to 5 times.
- 4 Shoulder Stretch** Stretch arm above head, cradle elbow with hand and gently pull elbow behind head. Hold for 10 seconds and repeat several times.
- 5 Wrist Stretch** Interlace fingers, palms outwards, and straighten arms in front. Hold for 10 seconds and repeat several times.
- 6 Upper and Lower Back Stretch** Interlace fingers and turn palms upward above head, straighten arms then slowly lean slightly from side to side. Repeat movement several times.



For a comprehensive range of exercises for office workers refer to **Appendix B** in *Officewise: A Guide to Health and Safety in the Office* published by **WorkSafe Victoria**. You can download a copy from the download link on the home page of **WorkSafe Victoria** (<http://www.worksafe.vic.gov.au>).

HEALTHIER COMPUTER SCREENS

Two types of computer monitors are currently available: the box-shaped CRT (cathode-ray tube) monitor and the thin, flat-screened LCD (liquid crystal display) monitor. Of these, the LCD

monitors are considered the healthier choice when it comes to minimising radiation exposure and reducing eye fatigue as you'll see here.

Computer Monitors And Radiation

Electromagnetic radiation is all around us. It is emitted from power lines, electrical sub-stations, TVs, and other electrical and electronic appliances such as electric blankets and hair driers.

But if you are a computer user and spend your entire working day sitting in front of a computer screen, the radiation emitted from your computer and its various components may be your largest source of electromagnetic radiation. This could especially be the case if you sit close to and use a **CRT monitor**.

CRT monitors are designed to emit visible radiation (light) to create the display. But as well as emitting light, they also emit small amounts of other types of electromagnetic radiation. This radiation is also emitted (and in greater concentrations) from the sides and back of these monitors as well.

LCD monitors, on the other hand, emit virtually no radiation, either from their fronts or backs.

There are many claims that the electromagnetic radiation emitted from computers can be harmful causing health problems such as eye problems, reproductive problems and cancer. Although these claims are not supported by scientific research findings or reliable epidemiological studies at this time (according to Worksafe's *A Guide to health and safety in the office*), we all know that electromagnetic radiation isn't good for us and that we should try to minimise our exposure to it whenever possible. And when dealing with computer screens, we can!

To minimise your exposure to radiation from your computer, change to using an LCD monitor. But if you still have to use a CRT monitor, move it as far away from you as possible and ensure that you are not located closer to the sides or rear of another user's CRT monitor than you are to your own.

Anti-glare Computer Screens

An anti-glare computer screen is designed to cut down on the amount of light that reflects off the screen. Reflected light (or glare) is very fatiguing to the eyes and reduces the contrast, colours and sharpness of the display. An anti-glare computer screen makes viewing a display more pleasant, reduces eyestrain (general soreness or redness of the eyes) and sharpens the picture.

Most **LCD monitors** come standard with an anti-glare computer screen with either a matte or glossy finish. Both finishes have different advantages and disadvantages.

Matte This is the most common finish. This anti-glare computer screen works by using a rough matte surface to scatter light, rather than allowing it to reflect off a smooth surface. As a result of this, these screens don't get glare or reflections on them. However, this rough surface also scatters light coming out of the display which means that images will appear with less contrast and brightness and even slightly blurry to the viewer, which in itself is fatiguing to the eyes.

Glossy Glossy screens use a chemical coating over a smooth surface to cut down glare. Because of their smooth high gloss surface, glossy screens have vibrant colours and the highest contrast and brightness. Glossy screens are considered best for viewing movies and photographs and for gaming. However, strong lighting causes glare on these screens which is both annoying and tiring on your eyes if you have to stare at it all of the time. You can also see reflections on these screens.

A good way to choose between matte or glossy anti-glare computer screens is to consider the environment in which you will be using the computer. A glossy screen is probably well-suited for home use where there is mostly ambient light that you can control. In the workplace, where harsh overhead lighting is common, it may be less fatiguing to cut more glare with a matte finish than to maintain a crisper picture with a glossy display that will reflect more light.

Some **CRT monitors** also come with an anti-glare screen. If not, you can purchase an aftermarket anti-glare filter that blocks not only glare, but also harmful ultra-violet (UV) radiation. (UV radiation is not a problem with LCD screens.) Aftermarket anti-glare computer filters are available virtually everywhere computers are sold. Be sure to choose the right size for your display, and if buying for a CRT monitor, look for 100% UV blockage along with anti-glare properties.

A GOOD WORKING ENVIRONMENT

In addition to setting up for good posture at your computer workstation it is important that the environment and the ambience surrounding the workstation are conducive to healthy and safe

computing. Environmental factors include such things as lighting, noise, ventilation, space and storage, equipment safety, and the like.

Lighting and Glare

To avoid excessive reflections and glare a computer user should not be facing an uncovered window. If a window is uncovered the workstation should be positioned at right angles to the window.

With regard to lights, a computer monitor should be positioned to the side of a light source and not underneath it. If the monitor is well away from windows and there are no other sources of bright light you should use a low level of service light of 300 lux. If the room has strongly contrasting light levels then a moderate level of lighting of 400 – 500 lux may be desirable.

Noise

Excess noise can be distracting to a computer user. Excessive noise around a workstation can be filtered out using portable panels and partitions, double glazing on windows, noise cancelling headphones, and the like. You can also download specialist software (such as **ChatterBlocker**) which purports to cancel out peripheral noises by placing sounds similar to the older **Muzac** played in elevators and department stores.

Ventilation, Heating and Cooling

A comfortable working environment leads to better concentration and therefore productivity. Computers and their peripheral devices such as printers can produce fumes and heat. It is important therefore that the workplace has adequate ventilation to prevent these fumes from causing health problems.

A comfortable level of heating and cooling, depending upon the location and season, are also important.

Space and Storage

Your workstation should be able to accommodate all of the items and equipment that you need to do your work. Your desk should have enough space for items such as a keyboard, mouse, document holder, telephone, pens, and other items that you would use during the normal course of your work. If you work from books or document the desk should be large enough for you to work from these without too much clutter. If your desk is not large enough to do this then you could consider having a side table for items that are not used or accessed that frequently.

Keyboarding from Documents

When keyboarding from documents a good document holder should be used. Touch typists should use an A4 document holder placed level with and close to one side of the screen. Non touch typists should use an A3 document holder above the keyboard and in front of the screen.

Computer Radiation

All computer monitors emit low levels of radiation that may affect your health. You should avoid sitting to the side or back of monitors and keep at least 1 metre away. Where possible use liquid crystal display (LCD) monitors as these emit less radiation than older style CRT monitors. If you use an older style CRT monitor use a radiation filter screen over the front of the monitor to reduce the rays emitted. Monitors should be turned off when not in use.

Equipment Safety

Computers are electrical devices and therefore have cabling associated with them. Cabling can present both a tripping and an electrical hazard at the workplace. All electrical devices, including computers, should be electrically tested periodically to ensure that they are safe and working correctly. Cables should not be placed where they present a tripping hazard – a good electrician will always find a way of re-routing dangerous and exposed cables.

Older style double adaptors should be avoided, as should overloading a powerboard with too many appliances. These pose significant office fire risks.

SOCIAL PROBLEMS OF COMPUTER ADDICTION

While most people find spending some time online to be productive, compulsive internet use can interfere with work, relationships and daily life. When you feel more comfortable with your

online friends than your real ones or you can't stop playing games, gambling or surfing compulsively, even when it has negative consequences in your life, then you may be using the internet too much.

What Is Computer Addiction?

Computer addiction (also known as internet addiction or online addiction) is the name given to a variety of problems including:

- *net compulsions* such as compulsive online gaming (like World Of Warcraft), stock trading or compulsive use of online auction sites such as eBay, often resulting in financial and job-related problems
- *cyber-relationship addiction* such as addiction to social networking, chat rooms and messaging to the point where virtual, online friends become more important than real-life relationships with family and friends
- *computer addiction* such as obsessive playing of offline computer games (like Solitaire or Minesweeper) or obsessive computer programming
- *cybersex addiction* such as compulsive use of internet pornography, adult chat rooms or adult fantasy role-play sites impacting negatively on real-life intimate relationships.

Symptoms Of Computer Addiction

Signs and symptoms of computer addiction vary from person to person, but some general warning signs that your internet use may have become a problem include the following.

- *Losing track of time while online* – Do you frequently find yourself on the internet longer than you intended? Does a few minutes turn into a few hours? Do you get irritated or cranky if your online time is interrupted?
- *Having trouble completing tasks* – Do you find yourself working late more often because you can't complete your work on time? Do you find laundry piling up or no dinner on the table because you've been busy online?
- *Isolation from family and friends* – Is your social life suffering because of the time you spend online? Are you neglecting your family and friends? Do you feel like no one in your 'real' life, even your spouse, understands you like your online friends?
- *Feeling guilty or defensive about your internet use* – Are you sick of your spouse nagging you to get off the computer and spend time together? Do you hide your internet use or lie to your boss and family about the amount of time you spend on the computer and what you do while you're online?
- *Feeling a sense of euphoria while online* – Do you use the internet as an outlet when stressed, sad, or for sexual gratification or excitement? Have you tried to limit your internet time but failed?

How Do People Become Addicted And How Can They Overcome It?

Many people turn to the internet in order to manage unpleasant or overwhelming feelings such as stress, loneliness, depression, anxiety and boredom. Losing yourself online can temporarily make these feelings evaporate into thin air.

But as much comfort as the internet can provide, it's important to remember that there are healthier and more effective ways to keep difficult feelings in check – for example, exercise, meditation, sensory relaxation strategies, and simple breathing exercises. For many people, the best way to overcome internet and computer addiction is to find alternative ways to handle these difficult feelings, such as going to the gym or spending time with friends.

Even when your internet use is back to healthy levels, the painful and unpleasant feelings that may have prompted you to engage in unhealthy internet use in the past will remain. So, it's worth spending some time thinking about different ways that you can deal with stressful situations and the daily irritations that would normally trigger you to log onto the internet.

CHAPTER 2

In

Focus

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HARDWARE

One of the most important things that you'll need to connect to the internet is a computer. A computer is simply a box of wires, nuts, bolts and other sundry bits and pieces that you can touch, hold, pull apart, and even throw in times of desperation. The physical items that make up a computer are known as the computer's **hardware**.

In addition to the actual components comprising a computer, there are other hardware components, or peripheral devices, which you can also use to connect to the internet.

In this session you will:

- ✓ gain an understanding of the different types of computers
- ✓ gain an overview of the main parts of a personal computer
- ✓ gain an understanding of computer peripherals
- ✓ gain an understanding of how peripherals are connected
- ✓ gain an understanding of how peripherals are wirelessly connected.

TYPES OF COMPUTERS

Modern, electronic computers have been in commercial use since the mid-1960s. There are many different types of computer ranging from very large and powerful mainframe computers

through to very small and personal hand held computers, such as smartphones which are built on a mobile computing platform. The more common types of computers are detailed below.

Mainframe Computers

Mainframe computers are high performance computers used for large scale computing purposes that require greater availability and security than smaller scale computers can offer. They are normally used by large organisations for processing enormous amounts of information and data.

Mainframe computers consist of a central processing unit, which is usually housed in a highly secure part of a building, and a number of dumb terminals sprinkled around the organisation. A dumb terminal consists of a keyboard to input data and a screen to see the information. Dumb terminals, however, do not have any processing capabilities and all of the input is sent via cables to the central processing unit. A typical example is seen at the check-in counters at an airport – there may be dozens of dumb terminals all connected to the mainframe computer that handles the processing of tickets and flight information.

A mainframe computer may have thousands of dumb terminals connected to it.

Personal Computers

Personal computers are the complete opposite of mainframe computers. They were developed in the late 1970s to help alleviate the pressure that users were placing on mainframe computers.

Personal computers are used by an individual (hence the name personal) and differ from mainframe computers in that they have their own central processing unit. Unlike mainframe computers, where dumb terminals are connected to a remote central processing unit, with a personal computer the terminal and central processing unit are combined into the one installation. Instead of having many users at dumb terminals trying to access one (albeit very large) central processing unit, each personal computer has its own central processing unit handling data requests from only one user.

Network Computers

Network computers are usually personal computers that are connected to other computers. While personal computers offer personal freedom and independence from large mainframe computers, it is often important for users of personal computers to share data and information with other people. To allow this to happen, personal computers can be networked or joined together. This is normally done using either cables running between the computers or with wireless technology where no cables are necessary.

Laptop Computers

Laptop computers are personal computers that are portable and can be moved to and operated in many different locations. The systems unit, monitor and keyboard are combined into one unit for ease of transport. Laptop computers can be powered by a battery or plugged into mains power.

Since most laptop computers can be connected to networks and modems, they have the reach of a desktop computer and a greater versatility by virtue of their portability.

Tablet Computers

A tablet computer (also known simply as a tablet) is a small hand-held device that has the systems unit and flat touch screen built into the same case. The screen allows users to navigate easily and intuitively by touching the screen, and to type using the virtual keyboard which displays on the screen rather than having to use a physical keyboard. Tablets have been made popular by the introduction of the Apple iPad. Because tablets are relatively small (about 25cm), they cannot run complicated desktop software applications.

Smartphones

As well as making phone calls and sending SMS messages, you can use a smartphone, such as an iPhone or Blackberry, to read and send emails, browse the internet, view and take photos, view and record videos, manage your calendar, and more. Because of their small size, smartphones are highly portable, however it also means that they aren't as powerful as other computers and like tablets, they cannot run desktop software applications on them.

MAIN PARTS OF A PERSONAL COMPUTER

A personal computer is normally made up of three main components: the **monitor**, the **keyboard** and the **systems unit**. The keyboard is used to input data (it is sometimes referred to

as an **input** device). The monitor is used to display information that has been processed (it is often referred to as an **output** device). Most computers also have another input device known as a **mouse**.



The Systems Unit

The **systems unit** is the *brain* of the computer. Here data and instructions received from input devices are processed and then sent to output devices for display. The systems unit has a number of core and critical components under the hood as described in the following table.

Component	Category	Function
CPU	Processing	The Central Processing Unit is an integrated circuit that is plugged into the main electronic board inside the systems unit. Its job is to direct all of the activities within the computer (more about this later) and is where the processing of data takes place. Personal computers are often classified according to the type and speed of the processor they have fitted.
Hard disk	Storage	The hard disk is used to store data and information so that it can be used again at a later time.
RAM	Storage	Random Access Memory is a temporary storage area for data awaiting processing. RAM is cleared when the computer is switched off.
DVD drive	Storage	The DVD drive on the computer is much the same as the DVD you use at home for playing movies. Large programs (especially games) are available on DVD and the DVD drive is normally used to load those programs onto the computer. The DVD drive can also be used to play your audio CDs on the computer and to play movies – providing you have the right software and sound card. Most of the DVD drives can also create (or <i>write</i> as it is known) DVD disks – this is known as <i>burning</i> a disk.
USB port	Storage or device connection	Another important part of a computer are the USB (Universal Serial Bus) ports. In computer jargon a port means a socket or an input. Most computers will have several of these ports because they can be used to do a number of different jobs, sometimes simultaneously. USB ports, for example, can be used to connect a mouse to your computer. They can also be used to connect a temporary storage device known as a <i>USB Stick</i> or <i>Memory Stick</i> to the computer so that you can copy data from the computer to it for safe keeping.

Peripheral Devices

There are a number of other devices that can be attached to a personal computer. These include devices such as printers, scanners for scanning in pictures, digital cameras, joysticks for playing games, and more. These devices are normally attached to special plugs at the back of the computer. Since they are peripheral to the main operation of the computer, they are sometimes known as **peripheral** devices.

COMPUTER PERIPHERALS

A peripheral device is a device that is attached to the computer and which usually performs some form of input or output task. Some of the more typical peripherals are listed below. **Output**

devices receive data from the computer (e.g. printer, monitor, speaker), while **input** devices are used to send data and information to the computer (e.g. scanner, mouse, microphone, webcam).

Printer



A **printer** is required if you wish to print your letters, lists, budgets, photos, or whatever else you have on your computer. There are two main types of printers available – laser and ink-jet.

Multifunction Centres



A **multifunction centre** is a device that combines a number of different devices – such as a fax, printer, photocopier and a scanner – in the one unit. They can be used to scan images and text into the computer, print from the computer, send and receive faxes, and photocopy.

External Hard Disk



An **external hard disk** allows you to store data files away from the computer itself. This may be done to create a backup of your valuable data or just as a means of freeing up more space on the main hard disk in the computer.

Speakers



Computers are more and more becoming almost total media centres offering you the ability to hear your favourite songs, watch your favourite DVDs, and even watch television. To enjoy the experience offered by the computer you will need to have a good set of external **speakers**.

Modem



A **modem** is a device that enables a computer to transmit data to and from the internet via telephone lines or cables.

USB Dongle



A **USB dongle** is a small device that plugs into a computer's USB port. They are used for two main reasons. A USB dongle, commonly known as a USB flash drive, is used to store and transport files. Other USB dongles let you wirelessly connect a computer to peripherals such as a mouse or keyboard. Others let you wirelessly connect a computer to the internet by using the mobile phone network.

Media Players



Media players, like the universal iPod, are considered peripheral devices because they are connected to a computer. The computer is used to manage the songs, podcasts, and other downloads available for the iPod and facilitates the main way for content to be sent to the iPod.

Digital Camera



Digital cameras can be used to input photos and images directly to the computer. Uses for digital camera technology vary. You could, for example, input photo snaps via a memory chip in the camera or perhaps connect directly to the computer to conduct video conferencing or send video via email.

Webcam



A **webcam** is a small video camera that attaches to a computer typically via a USB port or that is built into a laptop or desktop screen. It lets you broadcast real-time video over the internet.

Microphone



A **microphone** can be used for broadcasting real-time audio over the internet using internet telephony services such as Skype. You may also use a microphone to record words on the computer possibly for dictating messages or letters, recording tutorials and meetings.

Headphones



Headphones are used so that only you will hear the sounds are coming from the computer. Headphones are used when listening to music, watching DVDs and television.