Syllabus outcomes

5.3.1 Justifies responsible practice and ethical use of information technology.

Overview

It is important to consider the ways in which information technology is affecting people and some of the issues that are causing concern. In this chapter we categorised issues as legal, ethical, social and industrial. This topic includes issues such as copyright, piracy, privacy, nature of work and ergonomics.
5.1 Legal issues

Society uses laws to ensure the correct use of information technology. Legal issues include copyright, software piracy and computer viruses.

Copyright and licensing

Copyright is the right to use, copy or control the work of authors and artists, including software developers. It is often indicated by the © symbol. Copyright is protected by law. It is against the law to use or copy the work of another person without their permission. There are some exceptions. For example, you are allowed to reproduce a small amount of someone’s work for the purposes of study, criticism or review. However, it is always necessary to acknowledge the creator of the work.

Information published on the Internet is protected by copyright. However, it presents a problem. Websites are available for people all over the world to view and copy. It is important that writers and web publishers are rewarded for their efforts. Text and images obtained from a website should not be reproduced without acknowledgement. Images should not be downloaded and used for other purposes without permission. When citing an Internet source it is important to include the following information (see Figure 5.1):

- the author’s surname and initial or organisation’s name
- the title of the completed work or web page
- the URL of the web page—in this case www.hi.com.au
- the date of document or web page publication
- the download date.

Figure 5.1 Information from hi.com.au
The copyright issue is particularly highlighted with music files. It is legal to transfer songs from standard audio to MP3 music from your own CDs provided that it is for your own personal use. It is also legal to download music from websites where the artists own the rights. However, playing or distributing any other music files is breaking the copyright law. The copyright law aims to protect the original artist for creating the piece of music.

When you are buying a piece of software you are actually purchasing a software licence not the software itself. A licence is a legal document written by the software company that defines how you can use the software. It usually appears on the screen during installation. Most licences include limitations on your right to copy disks, install software on hard drives, and transfer information to other users.

- **Site** licences permit an organisation to use the software on any number of computers on the same site. A site can refer to a number of buildings, such as a school.
- **Network** licences allow people to use a program on a network for a specified number of users.
- **Shareware** is software that is provided free and can be copied and distributed, but the licence agreement requires users to pay for the shareware they use. It is much cheaper than commercial software packages as there are fewer costs associated with marketing, and it is not always rigorously tested.
- **Freeware** or public domain software can be freely distributed and used. Shareware and freeware are often distributed using the Internet or through computer magazines. However, the code may not be altered and used for personal gain.

**Piracy**

Software piracy (or pirating) is the illegal copying and/or distribution of software. Software piracy costs software developers billions of dollars each year and results in higher prices for software. Software developers are protected by copyright so that they receive money for their time, effort and investment spent in developing a program. Software developers are using many different methods to reduce software piracy. It is common for software applications to be purchased with a code. Software is locked and cannot be used until the user has entered the code.

Software piracy is also an ethical issue. Is it right to copy software without the permission of the author? Software piracy is a computer crime. Software authors spend hundreds of hours developing the

It is estimated that more than one-third of all software in use is illegally copied.
software and deserve returns for their efforts. The fact that it is relatively easy for anyone with a computer to make copies of software is irrelevant. If people infringe copyright, authors are not getting royalties and they will be reluctant to spend time developing and maintaining good software.

On the other hand, some people argue that they are forced to copy software. They believe software is too expensive and they cannot afford to buy it. If software companies reduced their prices, people would not infringe copyright and they would increase their sales. This would result in a greater return to the software authors. Software authors are not losing royalties because they would not buy the software in the first place. Has the cost of software decreased in recent years? Has there been a corresponding decrease in software piracy?

**Intellectual property**

*Intellectual property* is the original creative work of a person that can be legally protected. It includes the ideas developed by writers, musicians, film-makers, scientists and inventors. Intellectual property laws aim to reward and encourage people with innovative ideas (see Figure 5.2). Ideas are easy to copy. Most existing copyright and patent laws that evolved in the age of print and mechanical inventions are inadequate for current information technology. The legal system is updating intellectual property laws. It is struggling with difficult issues about innovation, property, freedom and the rate of change in information technology. Is a teenager who copies music files from the Internet a computer criminal? What about a student who posts a video file containing part of a movie on their website? How about a musician who
takes a 30 second sample from another recording artist and adds another instrument? It is not always easy to define and protect intellectual property.

Security and protection

Organisations are collecting data about you everyday. Can you be sure that this data is secure? In Chapter 3 we outlined the need for data security and some basic security methods. Computer crime is increasing. Law enforcement is finding it difficult to keep computer crime under control. One example of this problem is the spread of computer viruses.

Viruses are a serious threat. They have caused a great deal of damage, such as deleting personal data, removing system files and blocking email. Viruses have cost organisations billions of dollars in lost productivity. The Internet is a great environment for a virus to spread as emailing and exchanging files is common practice. There are many types of infection:

• A **virus** is a small program that attaches itself to an application. Each time the application is started the virus is activated.

• An **email virus** attaches itself to an email message. It spreads by automatically mailing itself to each contact in the user’s address book.

• A **worm** has the ability to copy itself from machine to machine. Worms normally move around and infect other machines through computer networks.

• A **Trojan horse** is simply a computer program. It claims to be one thing, such as a computer game, but will cause damage when the program is started.

Many people believe creating and introducing destructive viruses is a computer crime. Data that has been infected by a virus is often costly to repair or impossible to replace. Viruses are very frustrating because the lost productivity has been the intention of an unknown person. By contrast, some people argue that even though the people creating the viruses are unethical, viruses are having a positive effect on the computer industry. Their reasoning is linked to the copyright issue and software piracy. Viruses are programs that are added onto an application program. If that program is copied, the virus is also
copied and in this way spread between computer systems. If people stop making illegal copies of software for fear of catching a virus, then viruses are serving the computer industry. Viruses are reducing the amount of software piracy.

An *anti-virus* program is used to scan a file or disk for a range of well-known viruses. There is no guarantee that an anti-virus program will stop every virus, as new viruses are always appearing. However, if users download the latest virus definition files and regularly use the anti-virus program it will minimise the problem. It is also important for users not to open email attachments from unknown people. If an email has a virus it will not be activated until the email is opened. Emails with viruses should be deleted.

**Legislation**

Legislation is the creation of laws to protect individuals and to ensure that society is equitable and fair. There are laws protecting people trying to gain employment and also to protect them in their daily work.

- **The Anti-Discrimination Act** promotes the equality of opportunity between all persons. Discrimination is the unfair treatment of people on the basis of race, sex, age, religion, sexuality or disability. Organisations are required by law to ensure that their work practices are non-discriminatory.
- **The Equal Employment Opportunity Act** (EEO) provides all workers with an equal chance to seek and obtain jobs. It aims to eliminate all forms of discrimination in recruitment, selection, training and conditions of employment. EEO protects employees from all types of harassment, including electronic harassment. Email could be used to abuse, threaten or harass other workers.
- **Occupational Health and Safety Act** (OH&S) requires employers to maintain a safe working environment and protect workers against foreseeable risks. Ergonomic principles and industry standards for information technology are discussed in Section 5.4.

The Internet has created confusion about your rights against online crime, privacy and intellectual property. For example, if a person in South Africa defrauds an Australian citizen by using their website that operates from a server in Germany, where has the crime been committed? If the country does not have a law covering the fraud, then the criminal cannot be prosecuted. Clearly, we need uniform laws to protect people online.
Exercise 5.1

1 What am I?
   a The illegal copying of software.
   b Software that can be freely distributed and used.
   c A small program that attaches itself to an application.
   d A program that scans a file or disk for a range of well-known viruses.

2 True or false?
   a Information published on the Internet is protected by copyright.
   b A software licence is a legal document that defines how you can use the software.
   c A Trojan horse infects other machines through computer networks.
   d The Anti-Discrimination Act requires employers to maintain a safe working environment and protect workers against foreseeable risks.

3 Copy and complete the following by replacing the letter in brackets with a suitable term:
   (a) is the right to use, copy or control the work of authors and artists. Text and (b) obtained from a website should not be reproduced without (c). Internet sources must be correctly (d).

4a List the information displayed when citing an Internet source.

b Why do software developers need to be protected by copyright?

c What is the purpose of intellectual property laws?

d Why is the Internet a great environment for a virus?

Development

5 How would you respond to a request from a friend for a copy of a software program that you have just purchased for $450? Justify your answer.

6 Viruses are a serious threat. Investigate the recent viruses that have caused a major problem. Write a report of your investigation.

7 Napster was a website that provided an opportunity for people to break copyright. The owners of Napster were prosecuted. Do research to find information on Napster. Summarise the results of your investigation.
5.2 Ethical issues

Ethical issues are a set of beliefs about what is right and wrong. Information technology provides us with many new and exciting opportunities. However, there are risks. Information technology must be used wisely. We must strive to live up to an ethical standard of reference.

Code of practice and conduct

A code of practice and conduct is required in the use of information technology in the workplace (see Figure 5.3). It is the responsibility of each user for the professional standard of their communication and the material displayed on their screen. A code of conduct should state what the employee is not allowed to do, such as illegal activities, unauthorised access to business data and participation in activities that are regarded as offensive. Offensive material includes pornography, racist statements, sexist statements, violence, promoting drug misuse and cruelty.

A code of conduct also needs to address some of the uncertain areas such as sending private email, typing résumés, personal Internet banking and downloading software. Is everything stored or created using the business computer owned by the business? What electronic documents need to be stored to meet government regulations? Are employees allowed to borrow any of the information technology? What will be the penalties if an employee breaks the code of practice and conduct? The use of email has additional problems.

Email in the workplace should be for business use. It could be the subject of legal proceedings in the same way as a letter. Email should not be used to promote discrimination, for harassment or contain material that may be considered offensive. It is also
Inappropriate to use email to insult or spread rumours about other people. Finally, you should not attempt to read, delete, copy or modify the emails of other users.

There are also uncertain areas in the use of emails. What happens to an employee’s email when they are on holiday? Are you allowed to read a person’s email when they are absent? Who has access to each employee’s email password? How long are you required to keep emails? Who is responsible when employees do not reply to their email? What happens to a person’s email if they leave the business? If employees are conducting business using their private email this could be a major problem.

**Privacy and security**

*Privacy* is the ability of an individual to control their personal data. Organisations are collecting a huge amount of data about our personal lives and attitudes on various issues. Every time you fill out a form, use a transaction card, or ‘surf the Net’, data is collected. Is this data secure? Is it possible for people to access this data and combine it? This combined information would provide a very accurate picture of you. It could provide details of your income, lifestyle and health. This information would be of great value to retailers and advertising people. Furthermore, what if you completed an application to build a house and somebody accessed this data and sold it to a bricklayer? Your privacy has been invaded and sold.

Privacy is invaded when an email from an unknown organisation is sent to your email address. How did this organisation get your email address? Was your email address sold to this organisation? Privacy laws require websites to provide disclaimers stating that any information provided will not be used for other purposes. However, the security measures used by some organisations may be inadequate. There is also the potential for administrators of email systems to eavesdrop on conversations.

*Streaming video* raises the issue of privacy. Digital video cameras are being located in streets and streamed live on the Internet. People who are walking down the street are not aware of this, nor have they given permission, to be on the video. Is personal privacy being invaded? Will all aspects of our lives, such as work, be streamed onto the Internet? How can our privacy be protected from this development?
Inappropriate use

Hackers and computer crime are examples of the inappropriate use of information technology. These are growing problems and pose difficult ethical issues. Computer crime was discussed in Chapter 3. Offensive material on the Internet, such as pornography, cruelty and violence, is also a concern. The Internet allows children to access any material they wish, either deliberately or unintentionally. It is also distressing that paedophiles are using the Internet to find potential children for their hideous crime. Should offensive material be banned from the Internet? Is banning any material compromising our free society? Governments and law enforcement bodies around the world have made many unsuccessful attempts to censor material on the Internet.

The Internet Industry Association (IIA) represents the Australian Internet service providers (ISPs). It has released a code of conduct that deals with censorship of online content. The code requires ISPs to remove offensive content from their servers and block access to classified material hosted on overseas websites. The federal government has passed a law requiring ISPs to subscribe to the IIA’s code. The difficulty with censorship is the enormous number of websites and the fact that thousands of new websites are published daily. Monitoring websites on a global basis is impossible. Clearly there needs to be international agreement on offensive material. However, this agreement may be difficult to obtain and regulate.

Accuracy, validity and bias of data

Accuracy of data is the extent it is free from errors. Inaccuracies can be caused by mistakes in gathering or entering the data, by a mismatch of the data, or the information being out-of-date. In the past it was easier to check the accuracy of information because there was less of it. Today, there is a huge amount of information and this makes it difficult to check it in a reasonable amount of time. What opportunities exist to check and change personal data if it is wrong?

It is easy to publish data on the Internet with no guarantee that the information is accurate. Organisations are providing access to information to those who are not the creators of the information. This causes a difficult issue. Who is responsible for the accuracy of information? Is the creator the only person responsible for the accuracy of the data? Do organisations that provide access to
information have a responsibility to verify its accuracy? Clearly, it is necessary to compare data from a number of sources and determine which data is accurate and relevant.

In addition to the issue of responsibility there are concerns about ethics of altering data. For example, photographs can be edited by adding, changing, or removing images (see Figure 5.4). A person can be taken out of the photograph and another person inserted. Is it acceptable to improve a photograph by slightly altering the data? What is wrong with making a person’s teeth white or changing the colour of their eyes? Do you think it is acceptable to alter a photograph if its meaning has not changed?

Data collected is used to solve problems, meet needs, or make decisions. The accuracy of the data must be checked before it is processed into information. This is called data validation. This involves ensuring that the data is up-to-date, current, complete and correctly entered. Data validation can be built into the software:

- A range check is used if the data is restricted to a small range of particular values. For example, when the data is entered in the format 21/2/2005 the software checks whether the first two digits are in the range of 1 to 31, and the second two digits are in the range of 1 to 12.
- A list check is used when the data can be compared to a set of accepted data. For example, when data entered is an Australian state then NSW would be accepted but NSX would not.
- A type check is used to determine whether the data type is correct. For example, when data is entered for a person’s family...
name the software will check if the data is text. It would not accept a ‘date’ for a person’s name.

• A check digit is a digit calculated from the digits of a code number and then added to that number as an extra digit. For example, the ISBN 0 85859 921 4 has a check digit of 4 and it is calculated from 0 85859 921.

Bias means that the data is unfairly skewed or gives too much weight to a particular result. One common fault that leads to bias is if the person collecting the data has some benefit to gain from the outcome. This is called a vested interest (for example, if a doctor from a tobacco company conducts medical research into the effects of smoking). Data can be displayed in a biased way using tables and charts. For example, tables can be constructed without all the relevant data and the scales chosen on a chart may distort a trend. Bias becomes an ethical issue when the relevant information is knowingly misrepresented.

Exercise 5.2

1 Copy and complete the following sentences:
   a _____ issues are a set of beliefs about what is right and wrong.
   b Email should not be used to promote _____, for sexual
     harassment or contain offensive material.
   c A _____ is a type of data validation to determine whether the
     data type is correct.
   d Bias becomes an ethical issue when relevant information is
     knowingly _____.

2 What am I?
   a The ability of an individual to control their personal data.
   b The extent data is free from errors.
   c A type of data validation that compares data to a set of
     accepted data.
   d Data that is unfairly skewed or gives too much weight to a
     particular result.

3 Unjumble these words:
   a teraemsd ovdie
   b tdaa vlitdaanio
   c eytp ckehc

4 a How can the use of email be an invasion of privacy?
   b What are some of the problems with the IIA’s code?
   c List four ways of collecting inaccurate data.
   d What is the purpose of data validation?
5.3 Social issues

The effect of information technology on the nature of work and the equality of access to information technology are important social issues.

Nature of work

The introduction of information technology has created significant changes in the workplace. There are increases in part-time work and the use of contracted labour. Employees are required to be multiskilled and undertake ongoing training. It is also likely that people will change jobs many times throughout their careers, which was not common practice twenty years ago. Technology is a major factor to changes in career paths. In the next ten years new jobs will be created and existing jobs changed to reflect developments in technology.

Information technology has led to economic progress, new job opportunities and a more prosperous society. Employment opportunities have been created for workers with the right skills. Most people who use information technology do not find it stressful and enjoy the interaction. However, new developments have cost many workers their jobs and had a negative impact on their work.

Surveillance of employees at work is a concern. Employers can monitor their staff using a video camera (see Figure 5.5). They can also use software that provides information on the number of key strokes a minute, the length of rest breaks, what files were opened and read employees’ email messages. Research has found that workers who are monitored suffer much higher degrees of stress and anxiety than unmonitored workers. Do employees have the right to privacy in the workplace? Is it only a matter of time before surveillance in the workplace is extended to the streets in which you
live? Will the concerns of ‘Big Brother’ presented by George Orwell in his novel 1984 become a reality? Is a computer-controlled society going to end our personal freedom?

Telecommuting allows people to work from home instead of the office. They work on a personal computer at home and use email to communicate with people in the office. Telecommuting provides participants with flexible hours and savings on transport, clothing, food and time. Telecommuting benefits people who are physically impaired or those who are required to look after small children. However, there are problems with telecommuting. First, there is a need for a separate work area to minimise interruptions from family and friends. Second, telecommuters can experience loneliness, isolation and a lack of support.

A videoconference is a meeting that allows people in different locations to see video images of each other on a screen. The least expensive form of videoconferencing is a tiny camera and a 10 centimetre window displayed on a computer screen. In a typical business videoconference people appear on a larger screen. This may require special communication arrangements because of the high bandwidth of video.

**Case study: Telecommuting**

Marc and Tracy are married with a young child. They have recently moved to a 3-hectare property in the Southern Highlands of NSW. Marc is an accountant who works in Sydney but would like to work from home. The problem was solved using the four stages in project development.

- **Define and analyse the problem:** Marc gathered as much information as possible on telecommuting. He interviewed three people who are currently working from home. Each person outlined the advantages and disadvantages of telecommuting.
• **Design possible solutions:** Marc decided to write a proposal requesting more flexible working hours. Telecommuting would result in a clear saving in time. Marc’s proposal involved using this time to complete more work and spend more time with his family. He decided on a solution that involved setting up the home office on a trial basis.

• **Produce the solution:** Marc set up an office at home with a powerful computer, fax machine, fast Internet connection and the same accounting software used at work. Marc’s proposal involved completing most of his work at home and being in constant communication with the office. Documents could be easily transferred as email attachments and he would visit the office for consultations with clients.

• **Evaluate the solution:** Marc submitted a proposal to his manager. The manager agreed to Marc’s proposal on a trial basis for the next six months.

**Tasks**

1. Do research into telecommuting. Write a brief report that summarises your investigation.

2. Would you like a job that provided an opportunity to work at home? Give reasons for your answer.

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**Equity, access and control**

Wealth is a factor that influences a person’s access to information technology. People with high incomes are more likely to have the latest technology and a greater access to the Internet. Some people argue that information technology is widening the gap between the rich and the poor. The rich are getting richer because they are information rich. The gap between the information rich and the information poor is a concern. Does this information gap exist between developed and developing countries? On the other hand, it can be argued that information technology is reducing the information gap between the rich and the poor. The Internet brings information to people all over the world. People in remote places are able to access the latest information and improve their skills using the Internet. Information technology is able to provide people with a higher level of education and improve their standard of living.

It is argued by some people that women are not taking advantage of information technology in the same numbers as men. The highest paid jobs in the information technology industry are dominated by men. There is an image in society that information technology is ‘technical’ and therefore an area more suited to men.
than women. This image is reinforced by advertising in the media that has traditionally targeted men to the exclusion of women. Conversely, it can be argued that the percentage of men and women working in information technology is roughly the same as any other industry. The fact that women are employed in the lowest paid work, such as data entry operators, has nothing to do with information technology. Gender equity is an issue throughout society. For instance, the number of male doctors is much greater than the number of female doctors. Furthermore, there are many examples of women playing leadership roles in information technology (see Figure 5.6).

People with disabilities have the right to access and use information technology. They should not be discriminated against because of their disability. Organisations must try to ensure advances in information technology do not disadvantage disabled people. Software companies such as Microsoft have included special features to provide support to assist people who are disabled (see Figure 5.7). It is important that websites are developed which are accessible by disabled people. This may involve alternatives to text for the sight-impaired person or alternatives for audio information to cater for the hearing-impaired person. Alternate input devices are available for those with physical disabilities. Information
technology has long been used to give people with disabilities an opportunity to more fully participate in society.

Australia is a multicultural society that requires access to high quality and culturally relevant material. People from other cultures should not be excluded from the benefits of information technology. Aboriginal and indigenous people have been discriminated against in the past. We need to ensure that Aboriginal people have access to information technology in the same way as other Australians. People from non-English speaking backgrounds need special assistance to ensure that they can use technology effectively.

Exercise 5.3

1 Copy and complete the following by replacing the letter in brackets with a suitable term:
   Telecommuting provides participants with (a) hours and savings on transport, (b), food and time. Telecommuting benefits people who are (c) or are required to look after small (d).

2 True or false?
   a A person can expect to have many different types of jobs throughout their career.
   b Most people who use information technology find it stressful.
   c Wealth is a factor that influences a person’s access to information technology.
   d People from other cultures should be excluded from the benefits of information technology.

3 What am I?
   a Watching over a person.
   b People who work at home instead of in an office.
   c A meeting that allows people in different places to see video images of each other on a screen.

4 a Describe some of the benefits that have resulted from the introduction of information technology in the workplace.
   b How are employers carrying out surveillance of their staff?
   c What is the least expensive form of videoconferencing?
   d List two ways websites could be developed to make them more accessible for disabled people.

Development

5 ‘People who are information poor will become disadvantaged and the social outcasts of the next century.’ Do research into the effect of information technology on developing countries and then outline your view on this statement.

6 ‘Woman are not taking advantage of information technology in the same numbers as men.’ Do you agree with this statement? Justify your conclusion.
5.4 Industrial issues

The rights and responsibilities of users of information technology and the ergonomic principles for using information technology are important industrial issues.

**Rights and responsibilities**

Workers in all industries have rights and responsibilities. The Office of Industrial Relations outlines your responsibilities as:

- follow ‘reasonable and lawful’ instructions given by your employer—a reasonable instruction is one that an employee is competent and capable of doing, is not illegal and is no threat to health and safety
- obey safety rules and ensure that quality standards are met
- do not discriminate against people because of their age, race or colour—do not engage in any kind of harassment
- be responsible and take the sort of care with the job and your employer’s property that you would if you were looking after your own.

The Office of Industrial Relations outlines your rights as:

- if most of your time is spent on tasks covered by an award or registered agreement, you are entitled to be paid the appropriate rate for that job
- you are entitled by law to a healthy and safe work environment, even if you are on work experience and not being paid
- you are entitled to receive training in your duties
- you have a right to a discrimination free workplace—you have the right to be treated with respect regardless of your age, race or colour.

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**Figure 5.8 Office of Industrial Relations**
**Ergonomics**

Ergonomics refers to the relationship between people and their work environment. It is the process of designing or arranging workplaces, products and systems so that they fit the people who use them. The way a computer is used and the work environment can have an effect on the body (see Figure 5.9). This includes the desk, chair, hardware, software, keyboard technique and indoor climate. The relationship between all these factors affects health and efficiency. The incorrect use of computers can cause health problems, such as eyestrain, headaches, backaches, fatigue, muscle pain and repetitive strain injury (RSI).

To reduce eye strain, focus on a distant object, then focus on a close object – repeat this several times

1. The top edge of the monitor should be at eye level or slightly lower
2. Keep your elbows level with the keyboard and ensure your wrists remain straight at all times
3. Do not lean forward or slouch in your chair – shift positions often and stand up to stretch at least once an hour
4. Use a fully adjustable chair that provides support for your lower back – contoured chair seats relieve pressure on the legs
5. Make sure your feet are flat on the floor

**Figure 5.9** Furniture should be well designed

To reduce these health problems, there have been numerous reports and standards that deal with ergonomics and information technology. The Australian Standard AS3590.2 and the WorkSafe Australia checklist are standards adopted in Australia. These standards can contain slightly conflicting results as they are based on different anthropometric data (body size and shape). The recommendations are outlined below.

Furniture needs to be adjusted to suit each person’s body, otherwise problems may develop in the back, neck, shoulders, arms and legs. The desk and chair needs to be positioned so that these body parts are used effectively without strain and undue fatigue.

- **Desk height** must be between 660 and 680 millimetres for a fixed desk, and between 610 and 720 millimetres for an adjustable desk. The depth of the desk should be 900 millimetres with at least 50 millimetres for the wrists between
the front edge of the desk and the keyboard. This reduces the strain on the forearms when typing.

- **Chairs** must have an adjustable seat height that ranges from 370 to 520 millimetres from the floor. This allows a clearance of 200 millimetres between the seat and the desk. An adjustable backrest must be between 170 to 250 millimetres above the seat and fit snugly into the small of the back. The seat should be flat, well padded, and slanted slightly backwards. This forces the participant to lean against the backrest and maintain good posture.

The hardware and its placement are an important ergonomic factor too. The system unit bought as tower or mini-tower can be placed away from the screen, keyboard and mouse to provide increased desk space. The recommendations for the screen, keyboard and mouse are outlined below.

- The **screen** should be about an arm’s length away with the user looking down on the screen. It should also be between 15 and 30 degrees below the eye level and adjusted so that it is at right angles to the line of sight. Adjustments of angle, brightness, and contrast should be possible, to cater for individual differences.

- The **keyboard** must be detachable and positioned so that the forearms are parallel to the floor. The angle of the keyboard relative to the desk should be between 5 and 18 degrees with the keys requiring a minimum of pressure.

- The **mouse** must fit the hand and be easily moved. The button should require a minimum of pressure. The sensitivity of the mouse should be easily adjusted to suit the operator.

The work environment is affected by factors such as lighting, indoor climate and noise.

- Incorrect **lighting** can cause eyestrain, a burning of the eye, double vision, headaches and can reduce visual powers. Lighting needs to be uniform, and bright enough for all text to be read easily on the screen, keyboard and paper. All parts of the work environment should have non-reflective surfaces to minimise glare. Glare is reduced by using window shades, diffusers on overhead lighting and anti-glare filters on screens.

- If the **climate** of a room is uncomfortable, it can cause weariness, sleepiness, loss of performance and increased errors. The temperature range when a person feels comfortable varies. For a clothed and resting person, the temperature should range between 20 and 23°C. If the relative humidity of the air is between 30 and 70 per cent it will not create any discomfort. Air movements, such as draughts, are unpleasant if they exceed 0.2 metres per second.
• Excessive *noise* in the work environment can be a significant distraction. Noise levels should not exceed 55 decibels, as it makes communication with others difficult and can affect concentration. Protection from noise can be obtained by sound insulating a room, enclosing the source of the noise with sound absorbing materials, or by using headphones, ear plugs and soft music.

**Exercise 5.4**

1 True or false?
   a The recommended height for a desk is between 660 and 680 mm.
   b The screen should be about 30 cm away and adjusted so that it is at right angles to the line of sight.
   c The keyboard must be detachable and positioned so that the forearms are parallel to the floor.
   d Noise levels in the work environment should exceed 55 decibels.

2 Copy and complete the following sentences:
   a ______ is the relationship between people and their work environment.
   b The screen should be between ______ and 30 degrees below the eye level.
   c Incorrect ______ can cause eyestrain, burning of the eye and double vision.
   d A comfortable temperature range for a room is between ______ and 23°C.

3 Unjumble these words:
   a omieonrgcs
   b ajutabdsle rebackst
   c ledehtacab rdkboeya

4 a What are some of the health problems that may occur from incorrect use of computers?
   b What is the recommended height for a chair?
   c Describe the ergonomic recommendations for a keyboard.
   d What are the effects of an uncomfortable climate in a room?

**Development**

5 The majority of people who use information technology at work are not aware of their rights and responsibilities. Outline your view on the importance of rights and responsibilities in the workplace.

6 ‘Ergonomics is being blamed for many health problems. People have been doing repetitive jobs for centuries without knowing about ergonomics.’ Analyse these statements.
**Part A: Multiple choice questions**
Select the alternative (a), (b), (c) or (d) that best answers each question.

1. Which of the following licences can be freely distributed and used?
   a. Site license
   b. Network license
   c. Shareware
   d. Public domain

2. What do anti-virus programs do?
   a. Scan a file or disk for a range of well-known viruses
   b. Cost organisations billions of dollars in lost productivity
   c. Reduce the amount of software piracy
   d. Guarantee to stop every virus

3. Which of the following laws aim to reward and encourage people with innovative ideas?
   a. Anti-Discrimination Act
   b. Equal Employment Opportunity Act
   c. Occupational Health and Safety Act
   d. Intellectual Property Act

4. A code of conduct would allow participation in which of the following?
   a. Illegal activities
   b. Email
   c. Unauthorised access to data
   d. Offensive material

5. Which of the following does not affect the accuracy of the data?
   a. Bias data
   b. Mistakes in entering the data
   c. Mismatch of data
   d. Out-of-date data

6. Which of the following is not a method of data validation?
   a. Range check
   b. List check
   c. Type digit
   d. Check digit

7. Which of the following does not influence a person's access to information technology?
   a. Culture
   b. Disability
   c. Privacy
   d. Wealth

8. Which of the following statements is incorrect?
   a. Proportions of woman in the workforce have been increasing
   b. Surveillance of employees raises the issue of privacy
   c. Telecommuters can experience loneliness and isolation
   d. Most people find information technology stressful

9. What is the process of ergonomics?
   a. Ensuring equality of access to information technology
   b. Designing workplaces, products and systems so that they fit the people who use them
   c. Checking the accuracy of the data
   d. Monitoring the work of employees

10. Which of the following is not an ergonomic recommendation?
    a. The screen should be at eye level and at right angles to the line of sight
    b. Furniture needs to be adjusted to suit each person's body
    c. The seat of a chair should be flat, well padded and slanted slightly backwards
    d. Lighting needs to be uniform and bright enough for all text to be read easily
Part B: Matching the term

For each of the following statements (1 to 10), select from the list of terms (a to j) the one that most closely fits the statement.

Statements

1. The right to use, copy or control the work of authors and artists.
2. Legal document that defines how you can use the software.
3. The illegal copying of software.
4. The ability of an individual to control their personal data.
5. The extent data is free from errors.
6. Checking the data before it is processed into information.
7. People who work at home instead of the office.
8. Meeting that allows people to see video images of each other on a screen.
9. Relationship between people and their work environment.
10. Health problem caused by the incorrect use of computers.

Terms

a. Copyright
b. Data accuracy
c. Data validation
d. Ergonomics
e. Licence
f. Piracy
g. Privacy
h. RSI
i. Telecommuters
j. Videoconference

Part C: Extended response questions

Write at least one paragraph for each of the following:

1. What is the purpose of copyright? Do you think it is a computer crime to break copyright? Give reasons for your answer.
2. Why are computer viruses a serious threat? Describe four types of infection.
3. What is privacy? Do you think streamed video is an invasion of privacy? Give reasons for your answer.
4. ‘The accuracy of data on the Internet is a difficult issue.’ Explain this statement.
5. Information technology has changed the nature of work. Describe some of the changes in the nature of work over the past twenty years.
6. Is ergonomics an important issue in the workplace? Your answer should outline some of the problems that may arise if ergonomic considerations are ignored.
Project: Issues

Investigate an issue associated with information technology and prepare a report based on this investigation. During this report you need to develop and apply skills in data gathering, data validation and the interpretation of data. Data gathering could include surveys, interviews, books, magazines or the Internet. It is important to distinguish between facts and opinion. Remember that an issue is debatable. The report should contain evidence on both sides of the issue. You should conclude by giving your view.