1 Information and Communication Technology

In this chapter you will learn:

- how to identify data and information
- what a system is
- the systems we come across in our day to day activities
- characteristics of quality information
- Information and Communication Technology
- applications of Information and Communication Technology
- evolution of the computer

1.1   Data and Information

The numbers, words, images and symbols which do not bear a meaning, when standing alone are called data.While we can arrive at meaningful information by arranging and processing data, we can use them to make decisions also.

Submitting data for processing is called "Input" and the result we get after processing is called "Output." We can call the collection of all these components above a "System." Hence the purpose of a system is to receive data, process and store them and provide the results when required.

Example 1
It will be difficult to get an idea about the subjects and marks if names and marks are written separately on term test results.

Ravi 78, 90, 79, 67, 76, 98   Rizwan 87, 70, 80, 75, 80, 80   Krishan 76, 78, 67, 80, 79, 76

But these names and marks can be tabulated as follows:

Name	Language	Mathematics	Science	History	Health	English
Ravi	78	90	79	67	76	78
Saman	76	78	67	80	79	76
Rizwan	87	70	80	75	80	80

This table shows some information about the marks of students. However in order to arrive at some meaningful conclusion, this may not be sufficient:

Marks that were tabulated can be subjected to calucation.

Name	Language	Maths	Science	History	Health	English	Total	Average	Rank
Ravi	78	90	79	67	76	78	468	78	2
Saman	76	78	67	80	79	76	456	76	3
Rizwan	87	70	80	75	80	80	472	78.66	1

You can see that the teacher is able to get the required information using this table (i.e. the total score of each student, their average scores, individual skill of each student, the rank etc). The information gathered in this manner is useful for the teacher to take important decisions.

Example 2

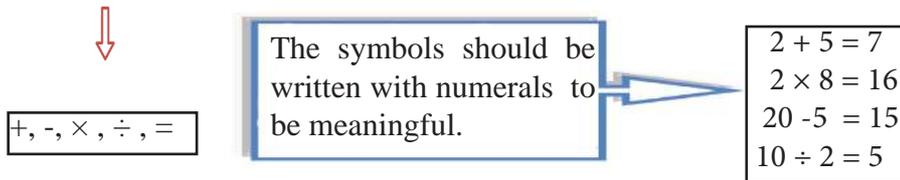To identify this difference, let us consider the following Figures;
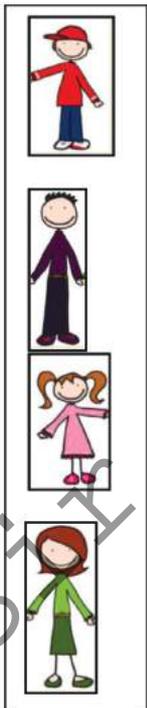
When we take each image separately, it does not convey a meaning. But when properly arranged as on the right hand side, one can understand these are the members of one family.
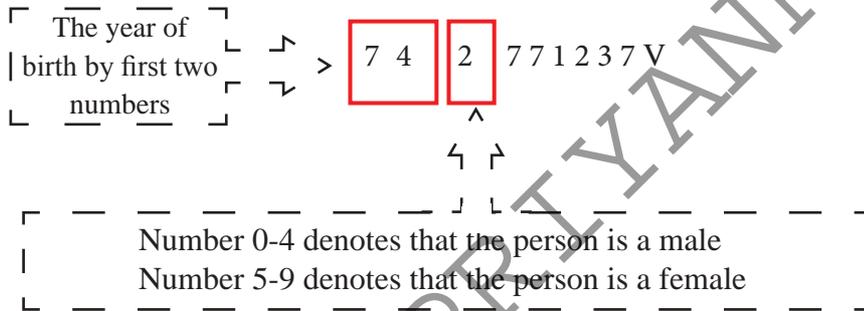
Figure 1.2 - Family

Figure 1.1 - Human figures

Observe these symbols below:

| + , - , × , ÷ , = | | The symbols should be written with numerals to be meaningful. | | $2 + 5 = 7$
$2 \times 8 = 16$
$20 - 5 = 15$
$10 \div 2 = 5$ |

Take a look at the numbers in a National Identity Card. At once it looks as if it is just a number. But when you analyze it you can obtain some meaningful information.

Example 3

The year of birth by first two numbers

> 7 4 | 2 | 7 7 1 2 3 7 V

Number 0-4 denotes that the person is a male
Number 5-9 denotes that the person is a female

Activity

Provide more other examples for data and information.

1.2 The Components of a System

Once, man used to process data using a pen, pencil or other devices. But today the computer has become man's data processor. A system is a combination of components that work together to fulfil a task.

According to the figure 1.3 a computer processes the data that we input, according to the commands and provide us with the required information in the desired form. Therefore, we call the computer a 'System'.
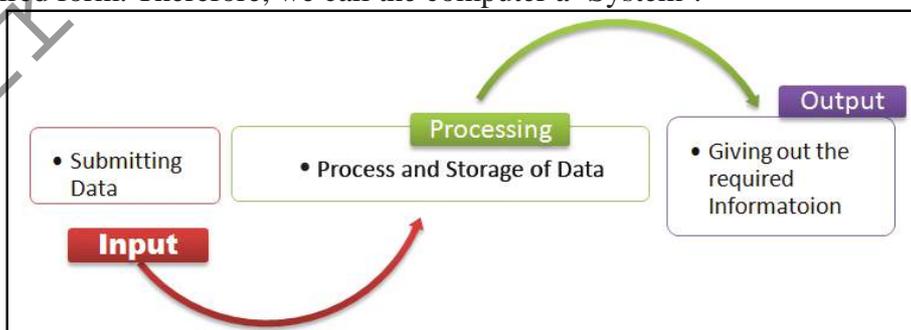

Figure 1.3 - Components of a computer system

We use many such systems in our day today activities. Let us consider some of the examples:

Example 1 - ATM Automatic Teller Machine

When the bank ATM card is inserted to ATM machine, data is processed and information regarding the account is given.
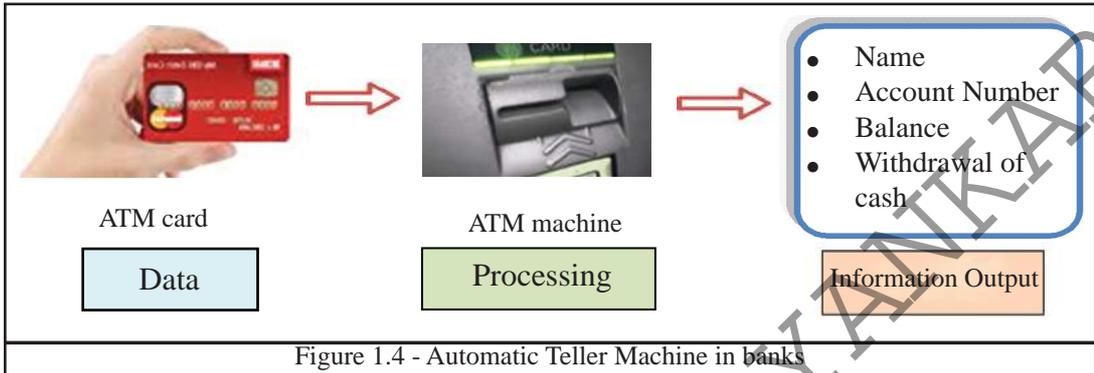

ATM card

ATM machine

- Name
- Account Number
- Balance
- Withdrawal of cash

| Data | Processing | Information Output |

Figure 1.4 - Automatic Teller Machine in banks

Example 2 - Finger print reader to record the attendence of organization

- Time of arrival
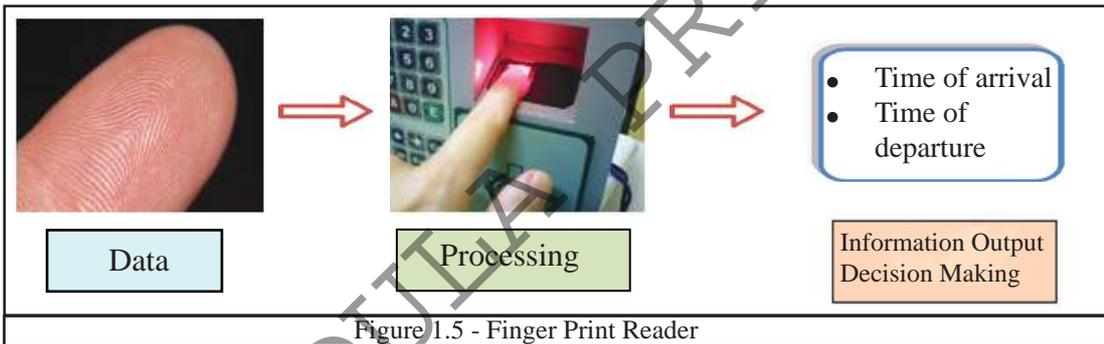- Time of departure

| Data | Processing | Information Output Decision Making |

Figure 1.5 - Finger Print Reader

Example 3 - QR Code used in newspapers and magazines

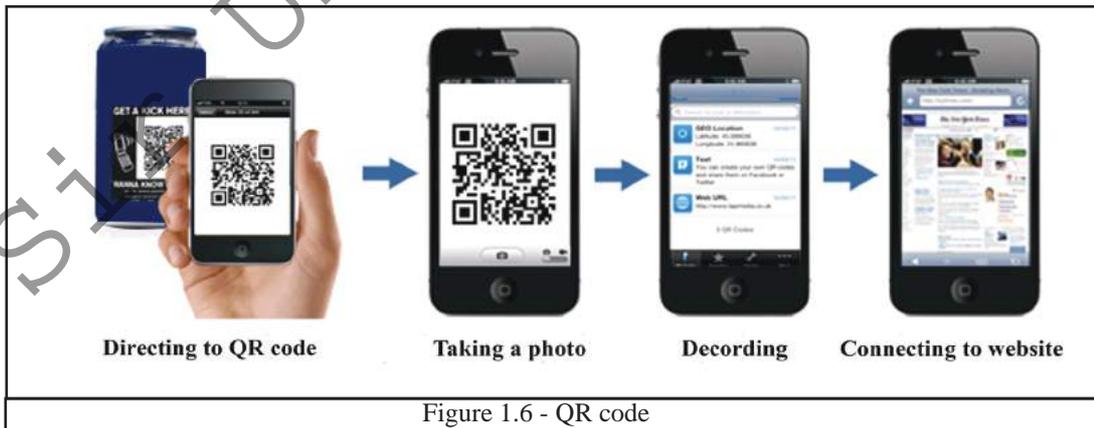Directing to QR code   Taking a photo   Decording   Connecting to website

Figure 1.6 - QR code

After scanning the QR code by a smart phone and connecting to the internet, further informantion can be obtained from the website of the relevant item.

Example 4 - Processing business information

| Data | | Processing | Information | Decision Making |

Figure 1.7 - Processing business information
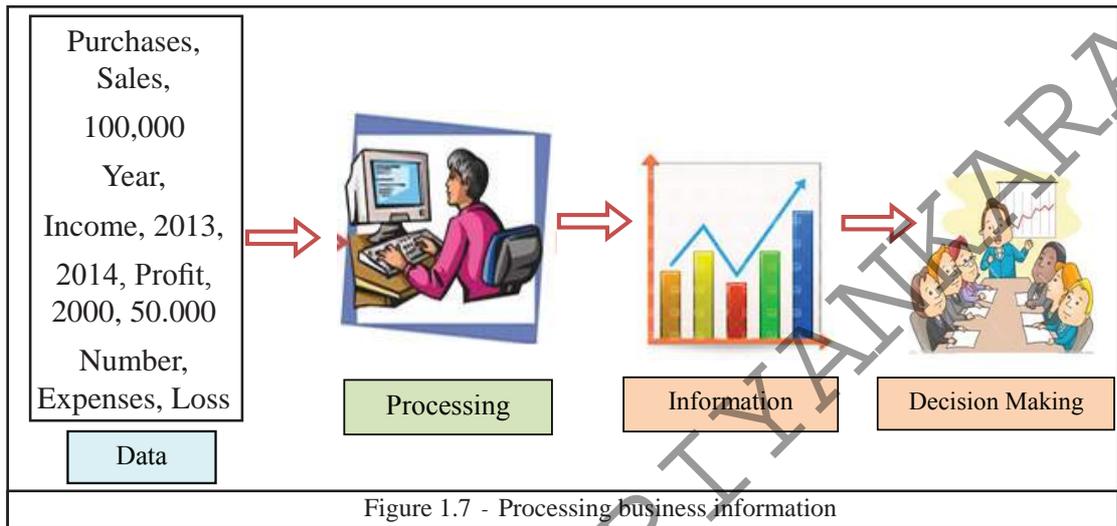
A computer or computerized equipment is used to process the data and we make decisions based on the information we get as output.

Activity

Observe the Image 1 and 2 below:

(A)

This is an image you could see on the items we buy at the market. This is called Barcode. This barcode is scanned at the cashier by a Barcode Reader.

Image 1

(B)

ISBN 978-1-61364-960-2

9 781613 649602

This image is seen at the back page of some books you buy. This is called ISBN Code.

Image 2

Find out the details of the item or the book purchased, by analyzing their barcodes separately.

We understand that we can get information by processing data and this information can be used to arrive at decisions. However, not all information is suitable for making decisions. Information obtained should be of good quality. There are many characteristics of quality information. A few of them are given below:

Quality of information	Example
a) Relevancy	It is not needed to submit all the academic information from Grade 1 onwards, when the requirement is to submit only the highest educational qualification.
b) Completeness	Taking information from only a small group of people in order to arrive at the PCI (Per Capita Income) of a country is not sufficient. Incomplete information could lead to drawing wrong conclusions.
c) Accuracy	If a doctor gets wrong information about the patient's health, it could be harmful to the patient.
d) Timeliness	The information must always be updated. Today's weather report may not be suitable to decide on tomorrow's weather.
e) Cost Effectiveness	If an organization spends money more than the profits to collect some information in order to increase profits, it would be a business loss to the organization.

Activity

Write another example each for the above (a) - (e).

1.3   Information and Communication Technology

We learned that we can get information by processing data and that information can be used to make decisions and arrive at conclusions. When we exchange the information among different people or among different systems, it is called communication of information.

Man has been processing and exchanging information since ancient times. But he has had to face many difficulties and obstacles in data communication. But today it has become an easy task with the advancement of technology.

Technology today is used in various ways to convert data into information and then to exchange them. This is called Information and Communication Technology (ICT).

1.4   Applications of Information and Communication Technology

Today, you could hardly come across any person or a place that does not use Information and communication Technology in day to day activities. Some examples are illustrated below:
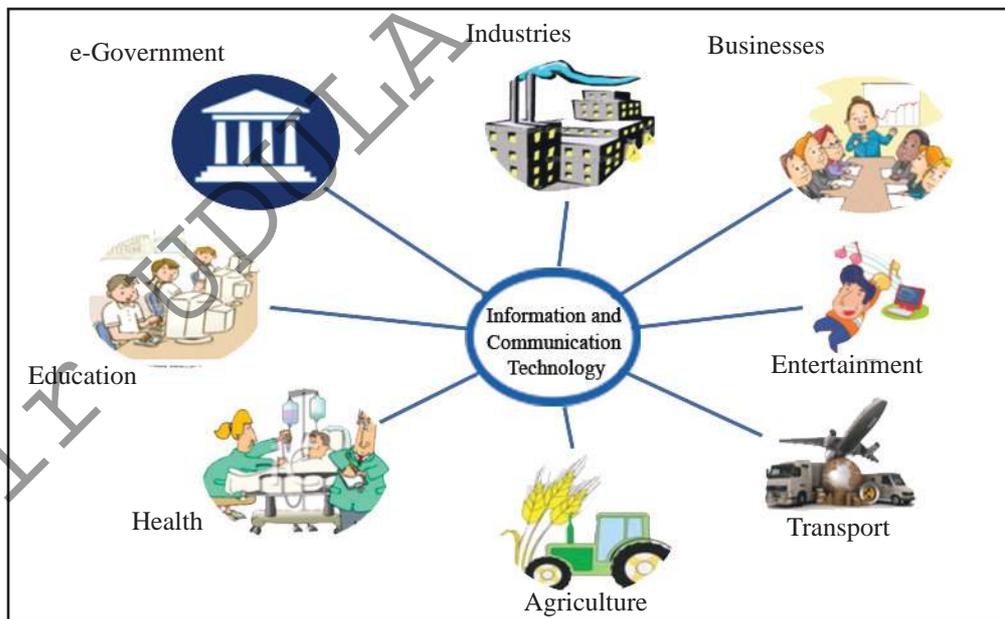

Figure 1.8 - Applications of Information and Communication Technology

1.4.1 e - Government

When a government communicates with its citizens, companies, Government and Non-Government Organizations and with other Governments (of different countries) using ICT, it is called e-Government.

There are numerous web sites such as official web portal of the government of Sri Lanka, Government Information Center, ICTA (Information Communication Technology Agency) etc for e-Government activities. The difficulties in communicating with the Government and obtaining Government information have been overcome by these.

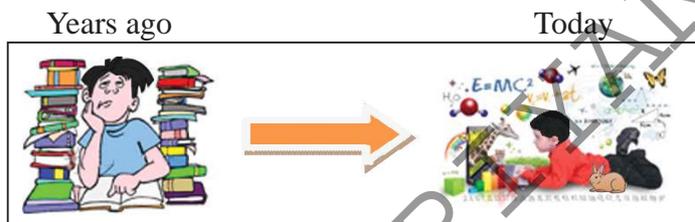★ **E-Government Services (http://www.gov.lk/)**
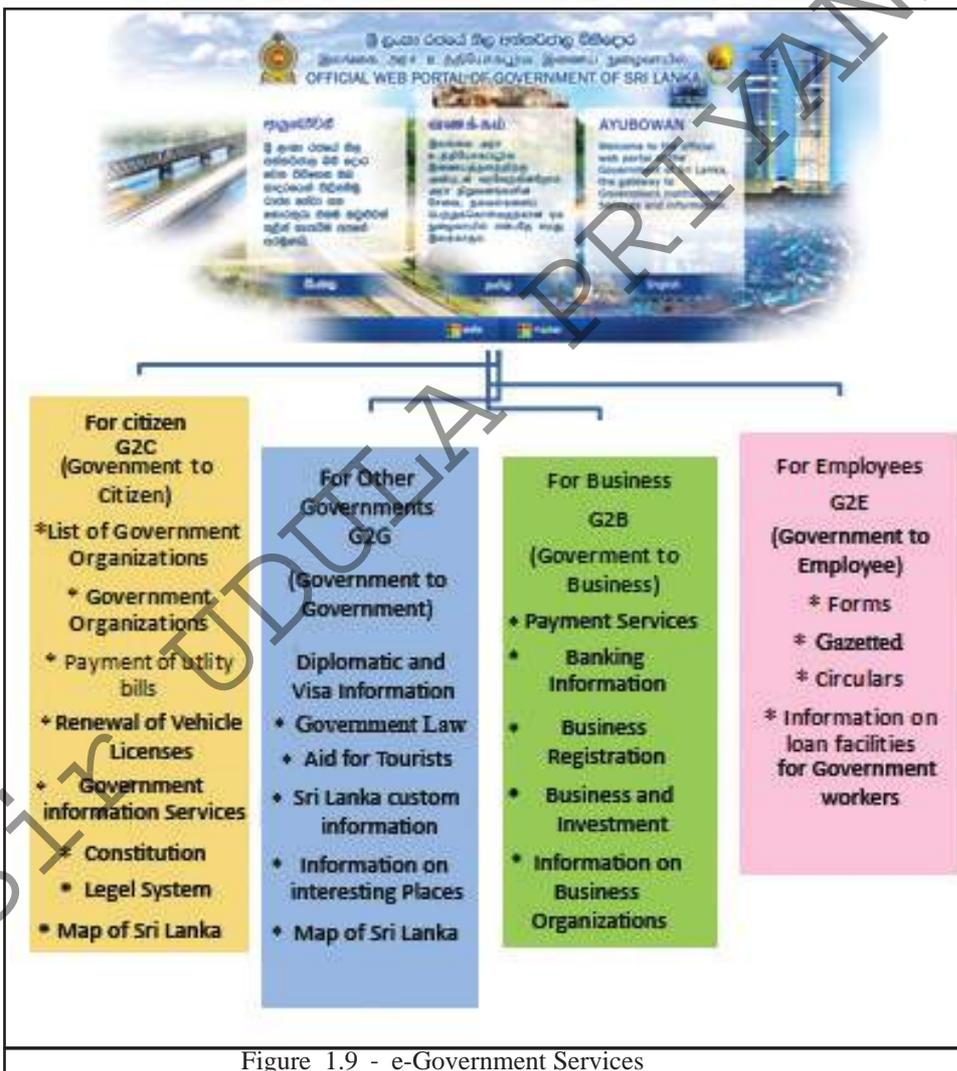
Figure 1.9 - e-Government Services

1.4.2 Applications in the field of education

Years ago   Today

Days are gone when we were stuck among piles of books in order to collect the required information. Today you have the luxury of seeing the entire world at your own convenience, due to all the advancements of ICT.

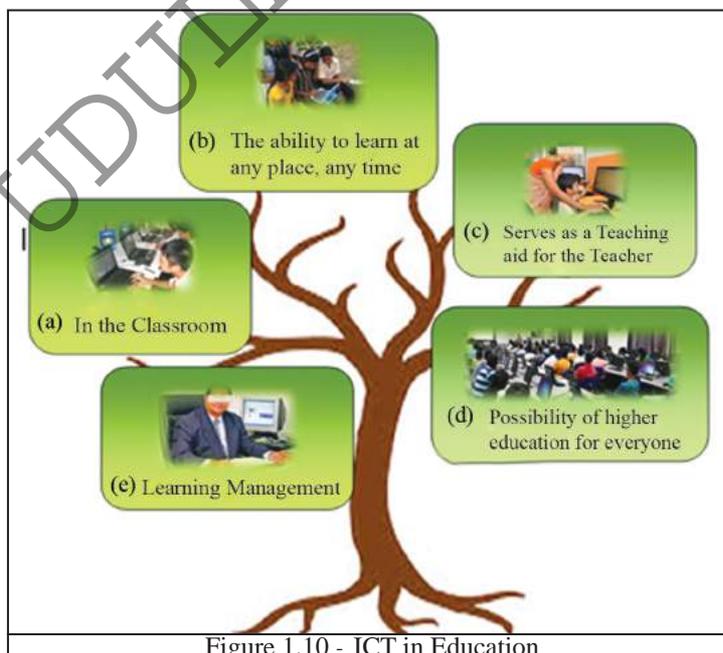There are many ways as to how ICT helps you in your education. Let us look at some of them:

(b) The ability to learn at any place, any time

(c) Serves as a Teaching aid for the Teacher

(a) In the Classroom

(d) Possibility of higher education for everyone

(e) Learning Management

Figure 1.10 - ICT in Education

a) **In the classroom**

There are many ways the computer and the internet are used for education in the classroom:

- For presentations
- Videos on experiments
- Creation of images and video
- Desktop publishing of magazines, letters and documents
- Educational games (Edutainment)
- Learning using the CD-ROM media
- Gathering educational information on the internet

Figure 1.11 - Computer in the Classroom

b) **Education - any where anytime**

If you have a computer with internet connection, you can study while at home or any other convenient place. For this, you can use the following educational websites to do self study and improve your knowledge.

- www.schoolnet.lk
- www.nenasala.lk
- www.e-thaksalawa.moe.gov.lk
- www.edulanka.lk/Web-Patashala
- www.vidumanpetha.com

You can contact with a teacher/trainer via internet. This is called WBT (Web based Training). While you can do further studies using WBT, it helps in minimizing the difficulties of travelling and related expenses also. At the same time, it helps save time and money.

Figure 1.12 - Education Anywhere any time

Activity

- Visit the Websites mentioned above and list the areas which you can use to support your knowledge.
- List out the advantages compared to traditional teaching methods visiting G.C.E. (O/L) section on BBC Bitsize (www.bbc.co.lk/education).

c) **Serves as a teaching aid for the teacher**

ICT is used mostly as a teaching aid in schools.

- Using pictures, animations and audio-visuals to explain subjects that are difficult to explain.

- To make the lessons interesting using presentations.

- To organize lessons using the computer.

- To obtain the information which are relevant to the subjects.

Figure 1.13 - ICT as a teaching aid

d) **Learning Management**

In many countries it has become a common practice to use a Learning Manage the System (LMS) to manage school system or higher education system. We need an internet connection to link with the LMS. A person has to register himself/herself on the official website to access LMS of a school or any other education institutions. According to the picture 1.14, teachers and students can get many services from LMS.
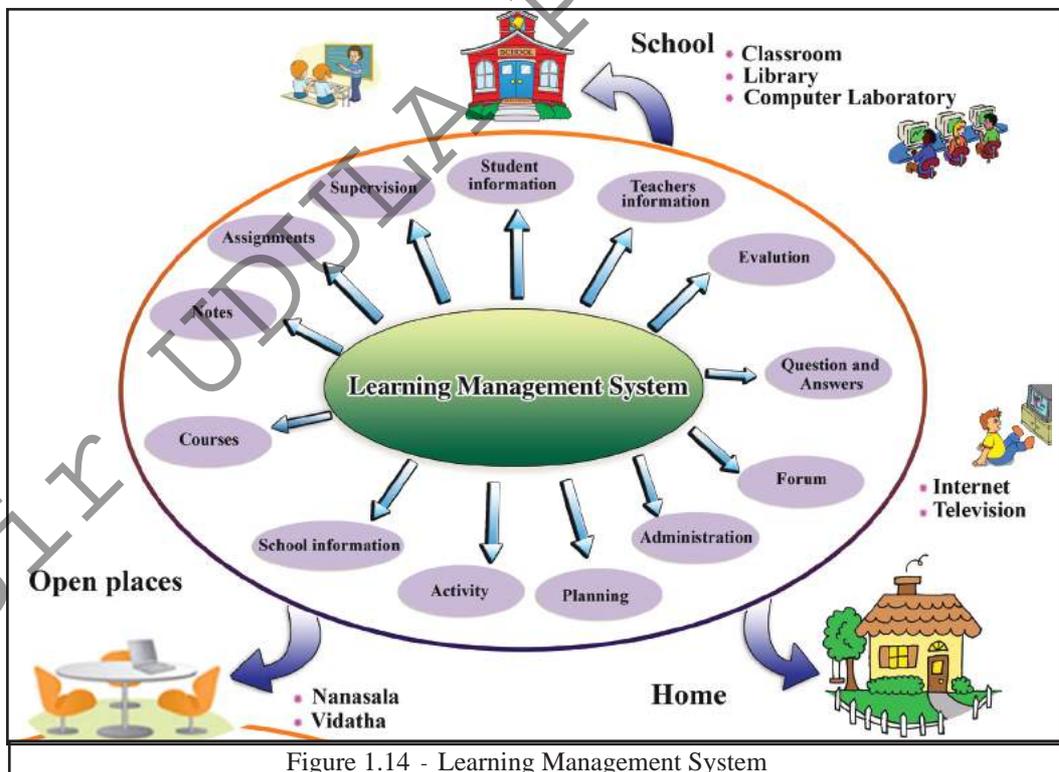

Figure 1.14 - Learning Management System

Some services provided by Learning Management System.

For a Student	For the Management
The ability to use the learning units at any-time and anywhere at school, at home or any other convenrant place.	The ability to add quality learning materials
The ability to upload the assignments completed at home	Supervision of activities and publishing of results
The ability to submit queries, getting replies and submitting comments through Forums	Maintaining updated information of the students, teachers and school
Ability to participate in the co-curricular activities via video.	Submitting questions, getting replies and providing comments through Forums Using automatic ringing systems (Bells) to announce the end of periods
The parents can monitor from home the progress of their children.	Sending and receiving necessary information by e-mail to parents, school development committee and other school officials.

e) **Higher education for everyone**

With the development of ICT, today a person from any country can connect with a university or any other learning center of his choice and pursue higher education at a considerably low cost. This is called Online Distance Learning.

Figure 1.15 - Distance Learning

Features of Distance Learning:

- No daily time tables, provide the facility to learn at your convenience.
- Digital library facility on joining a course.
- Online assignments and quizes.
- Contact with a teacher online.
- Easy to obtain teacher consultations.

1.4.3 ICT in Health Sector

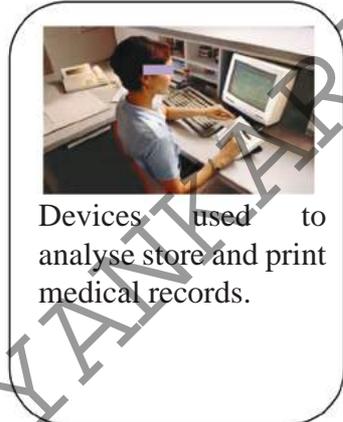Many of the difficult processes in the medical field have become efficient with through the use of modern equipment.

There are surgical devices with cameras which can record the surgical procedures while surgery is carried out.

Devices and appliances which are used in the practical training of doctors and nurses.

Devices used to analyse store and print medical records.

Figure 1.16 - Mordern Health Equipment

There are plenty of areas where ICT is used in the health sector for our well being. Let us consider some of them;

1. **Use of ICT in diagnosis**

Today, there are numerous high tech machines which help us in the diagnosis and treatment of diseases. Diseases can be diagnosed at the early stages and the patients can be given treatment accordingly. Some examples of these machines are:

Example 1 - CAT - Computerized Axial Tomography Machine

Using this machine three dimensional (3D) images of different parts of body can be made. These images are helpful in the diagnosis of diseases.
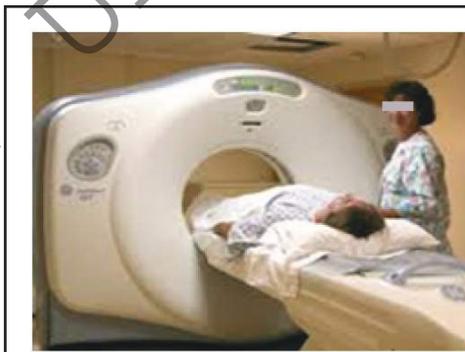

| Figure 1.17 - CAT Machine | Figure 1.18 - 3D Image |

Example 2 - MRI (Magnetic Resonance Imaging Machine)

This machine can create digitalized images of internal organs of the body by using strong magnetic fields and radio waves. These images are very helpful in the detection and deciding on treatment of diseases.
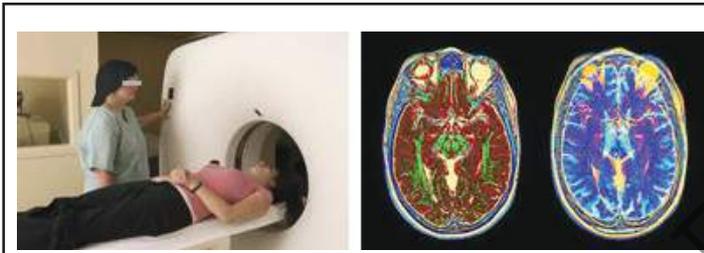

Figure 1.19 - MRI Machine   Figure 1.20 - Detailed Images

Example 3 - ECG - Electrocardiogram Machine

This machine is used to monitor the heart beat. When the heart pumps blood to different parts of the body some electrical impulses are produced. This machine records the electrical impulses.

Figure 1.21 - ECG Machine   Figure 1.22 - ECG Graph

Example 4 - Cardiac Screening Machine

This machine displays the physiology of the heart and it displays the movements inside the heart. Through this machine it is possible to diagnose problems of the heart such as thinning of vains and then recommend treatment.

Figure 1.23 - Cardiac Screening Machine   Figure 1.24 - Cardiac Screening Display

Example 5 - EEG (Electro-encephalography)

This machine is used to record the activities of the brain. The small electrical probes attached to the head receive the electrical impulses of the brain and display them on a computer screen. This device can retrieve the data in both states where a patient is awake or asleep.
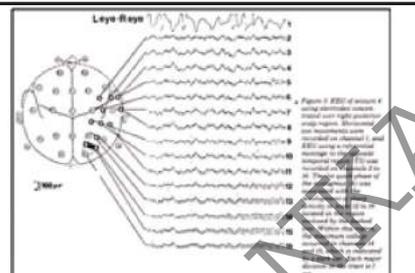

Figure 1.25 - EEG Machine   Figure 1.26 - EEG Display

Example 6 - Blood Sugar Testing Machine

This device would analyze a sample of blood and determine the blood glucose level.
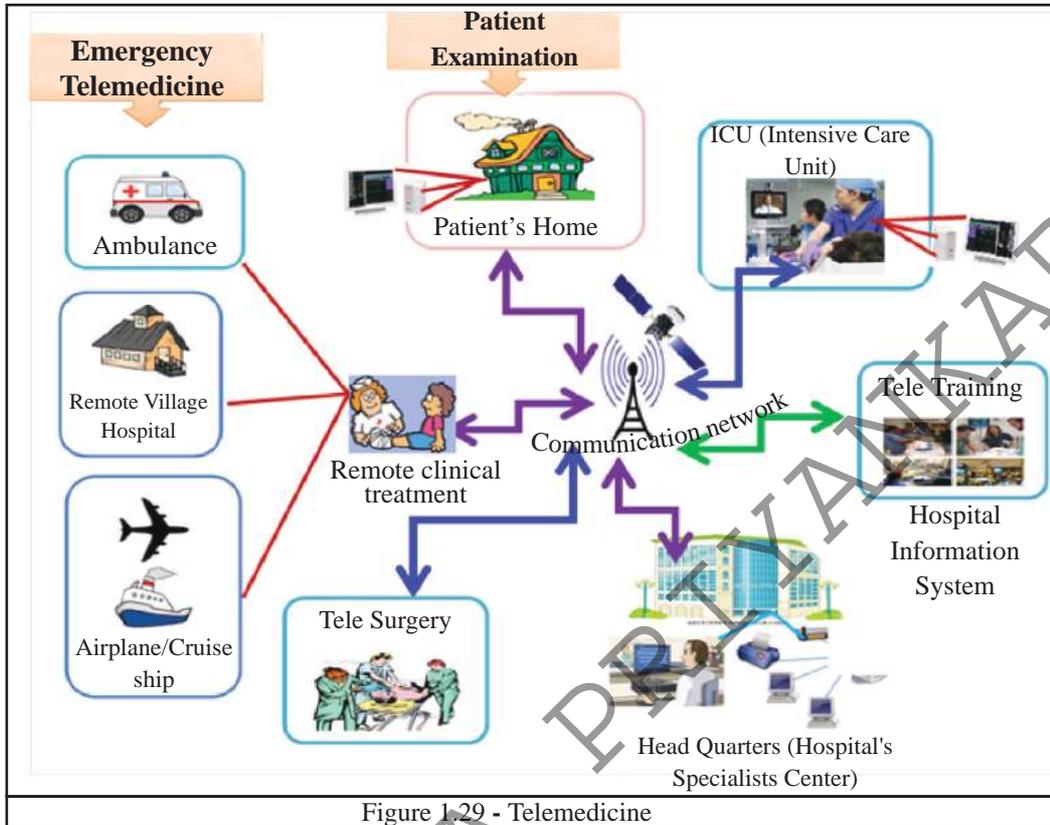

Figure 1.27 - Blood Test

Example 7 - Blood Pressure Measuring Machine

This device which is worn as wrist band can measure the blood pressure of a person at rest and when he/she is involved in some physical activity.

Figure 1.28 - Measuring Blood Pressure

2. **Telemedicine**

Figure 1.29 - Telemedicine

The use of Information Communication Technology to examine and or provide healthcare to a patient who is far away from the hospital is called Telemedicine. This is made possible by remotely connecting the patient with hospital's specialist unit or specialist doctors. Telemedicine has several advantages such as:

Example 1 - Emergency Telemedicine

Emergency telemedicine is the process of providing emergency care by a trained person in consultation with a specialist in a hospital via telecommunication network and treating him when a patient (who lives in a remote village or flying in a plane or cruising in a ship) can not reach a hospital.

Figure 1.30 - Telemedicine

Example 2 - Home health medicine

Keeping the patient at home and monitoring his/her condition using networked home monitoring system. The home monitoring of the health condition helps to decide when to transfer the patient to hospital.

Figure 1.31 - Home Health Medicine

Example 3 - Telemedicine Consultation

Seeking medical consultation of a specialist at the Emergency Treatment Unit (ETU) when he/she is not physically available at site.

Figure 1.32 - Medical Consultation

Example 4 -   Telesurgery (Remote Surgery)

Remote surgery is the ability of a doctor to perform surgery on a patient in consultation with a specialist (who is not physically present at the same location but in a far away town or abroad) by the use of Telecommunication Technologies.

Figure 1.33 - Telesurgery

Example 5 - Medical Teletraining

Specialists' consultation and training can be used to obtain the services of a medical professional at a remote place by the use of telecommunication technologies.

Figure 1.34 - Medical Teletraining

1.4.4 ICT in Agricultural Industry

ICT has created a new revolution in the field of agriculture. Today ICT is extensively used in agriculture, animal husbandry and fisheries industries.

ICT for farming:

A range of automatic machines are available today to ease the work of the farmer who worked hard in the field. These machines not only reduce the work of a farmer but also enables him to produce high quality yields.

Below is a some of the machines used in developed as well as developing countries.

Example 1 - Meteorological Devices

These devices are helpful in assessing the weather, climatic changes, rainfall, wind direction etc. Such data are useful in deciding on the crop cultivation and harvesting times.
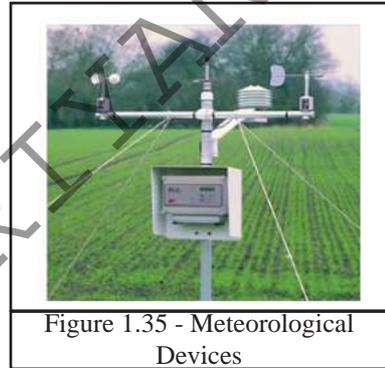

Figure 1.35 - Meteorological Devices

Example 2 - Automated Insect Control Devices

With the help of this device we can minimize the harmful effects caused by insects. It displays on screen the density of insect population, its growth and movement.

Figure 1.36 - Automated Insect Control Devices

Example 3 - Field conditions measuring devices

These devices help in measuring various parameters such as fertility and humidity levels of soil which aid in the determination of cultivation activities.

Figure 1.37 - Field conditions measuring devices

Example 4 - Drip irrigation

These devices control the supply of water as per the data fed. Wastage of water and destruction of crops due to lack of water supply are minimized by the use of these devices.

Figure 1.38 - Automated Water Supply Systems

Example 5 - Automatic Weed remover

This machine runs through the field and removes the weeds as per instructions provided by identifying crops and weeds separately.

Figure 1.39 - Automatic Weed Remover

Example 6 - Seedlings planter using Robotics

These robotic machines are used in large fields to carry seedlings across the field and to plant them in an orderly manner.

Figure 1.40 - Seedlings planter using Robotics

Example 7 - Crop harvesting using Robots

Robotic machines are used to monitor plant growth levels, record them and harvesting in large scale farm lands. These machines help us overcome difficulties in managing large farm lands.

Figure 1.41 - Crop harvesting using Robo

Example 8 - Greenhouse

The Greenhouse is the best solution to protect crops from natural disasters (too much sun shine, rain, heat, cold, pests, epidemics etc). ICT is used to control light, moisture and air inside the greenhouse. Hence, farmers are able to make high quality products of rare crops to the market.

Figure 1.42 - Greenhouses

1.4.5 ICT in management of farmhouse

Example 1 - RFID – Radio Frequency Identification Device

The RFID help in identifying and counting the number of animals and also in locating the animals in a large area.

Figure 1.43 - Radio Frequency Identification Device

Example 2 - Automated milking and examination of cows

This machine which is programmed to function automatically is helpful in monitoring the health status of the cows and the quality of milk. This also helps in milking cows.

Figure 1.44 - Automated milking and examination of cows

Example 3 - For Security (Closed Circuit TV CCTV)

CCTV is employed to protect farm from the animals and thieves. When the cameras are connected by Wi-Fi (Wireless Fidelity) the farm can be monitored far away from the farm.

Figure 1.45 - Closed circuit TV

Example 4 - Farm Management

Today's farmer uses various computer applications in portable computers such as laptops, tabs, smart phones to keep track of information on his farm, to calculate profits and losses, to save employees salary details etc. Using this portable device which has internet connectivity, he is capable of monitoring the market rates, get updated on latest business information and exchange information.
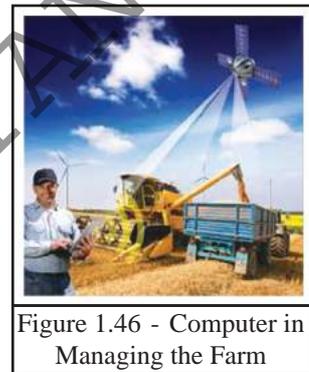
Figure 1.46 - Computer in Managing the Farm

1.4.6 In Fishing Industry

Sensors are placed in different parts of the sea. These sensors convey information on fish concentration in the sea to the computers in fishing trawlers via internet.
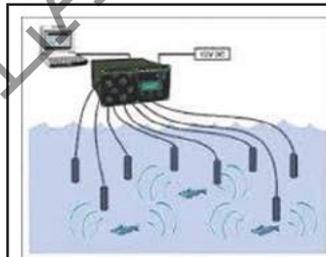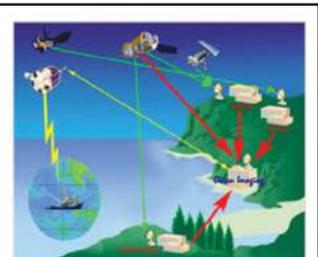

Figure 1.47 - Sensors under sea

Figure 1.48 - Transfer of information

1.4.7 ICT in Manufacturing Industry and Business

ICT is used in manufacturing high quality products and reduce the cost of production by minimizing the use of human labour in many industries and businesses. Since high quality products are manufactured at low cost, people can buy good quality products at a relatively low price.

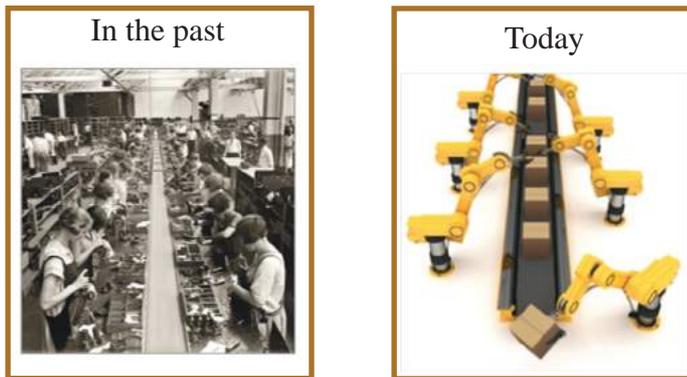Let us see how technology is used in manufacturing;

In the past

Today

Figure 1.49 - Use of ICT in industry

In the past decades a high level of human labour was needed in the manufacturing industry. Today most of the work performed by the human hands are performed by robots.

Benifits of using robots;

24 hour service, Never get tired, Efficiency, Accuracy, Hygeine

Following pictures show how modern technology is used in production

| Figure 1.50 - Computer Manufacturing	Figure 1.51 - Manufacture of Packaging material	Figure 1.52 - Packaging
Figure 1.53 - Car Production	Figure 1.54 - Labeling	Figure 1.55 - Filling bottles

Example 1 - Video Conferencing

This technology has enabled different business communities who are geographically separated to convene face to face meetings while in at their own premises. The advantages of this technology are, no need to convene at a special venue, saves time travelling, reducs travelling expenses etc.

Figure 1.56 - Video Conferencing

Example 2 - Human Resource Managment

The administration of employee activities has become an easy task due to finger print scanner (used to register attendance) and Card Reader (Identity Management). These devices help in recording the times of employees moving in and moving out of the office premises, preparing salaries accordingly, keeping records of leave taking etc. Today, the above devices are not only used in the private sector but also in the public sector in Sri Lanka.

Figure 1.57 - Finger Print Scanner

Figure 1.58 - Card Reader
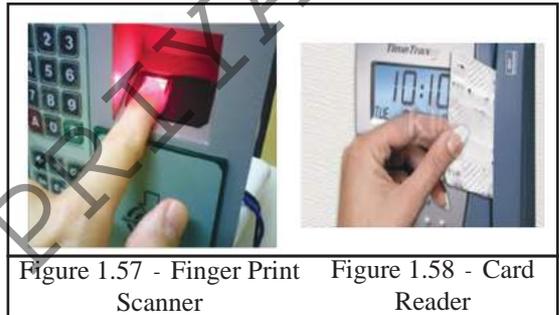
Example 3 - e-Banking System

e-Banking has helped both the business community and all other people to do convenient banking. They are:

- The ability to withdraw cash anytime anywhere at ATM (Automatic Teller Machines) points.
- Since banks are connected via internet, inter banking or transactional activities are made possible even within Sri Lanka or abroad.
- When you are registered in a banking network, it gives one the opportunity to pay utility bills, inter-banking transactions, checking the account balance etc using mobile phones.

Figure 1.59 - e-banking System
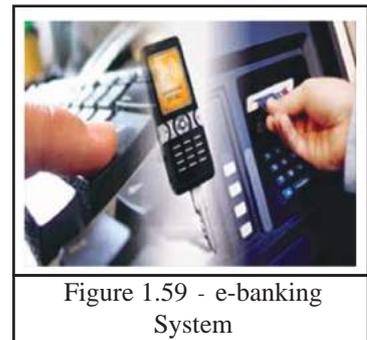
Example 4 - Online Shopping

Online shopping known as electronic commerce which allows foreign or local company to sell its products or services via internet and the ability for a consumer to buy goods and services via internet. A buyer can order goods or services of his choice from a convenient place. The advantages of online shopping are:

Figure 1.60 - Online Shopping

- One can select any global commercial organization which is on the internet.

- Open 24 hours a day.

- able to see things and order at one's convenient place.

- the ability to pay using the electronic payment methods such as credit cards.

- home delivery of goods. Because of these we can save on transport cost and avoid unnecessary travel related exhaustion.

1.4.8 ICT in Transport

We can quote some of the systems which are used to enhance the road traffic by minimizing traffic jams.

Example 1 - Closed Circuit TV (CCTV)

This system which uses the CCTV (Closed Circuit TV) is helpful in monitoring the road traffic, accidents and illegal activities and take appropriate actions accordingly.
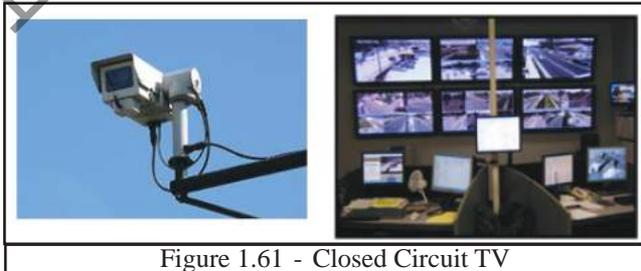

Figure 1.61 - Closed Circuit TV

Example 2 -Traffic Light Control System

These automated lights are positioned at road junctions. These lights are helpful in minimizing accidents by controlling the vehicle traffic and pedestrians.

Figure 1.62 - Traffic Lights Control System

Example 3 - Parking identification placard

This is an entrance pass which is stuck on the windshield of a vehicle. When the vehicle comes close to the gate of the parking space, the sensors read the placard and only open the gates if the vehicle is already pre-registered. This system also helps to avoid building up of traffic at the gates due to its quick processing ability.
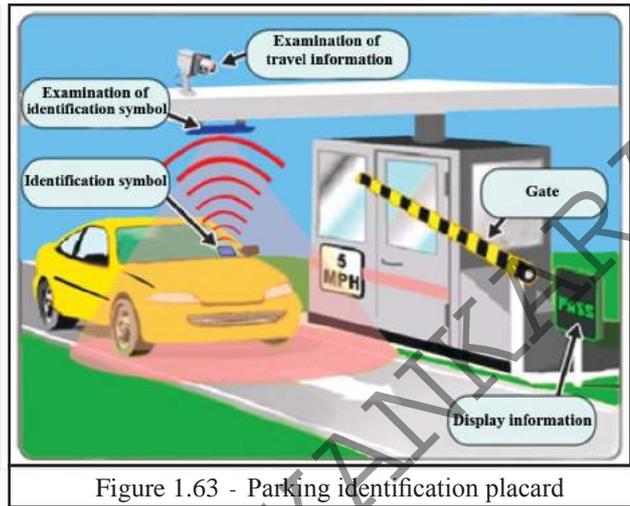

Figure 1.63 - Parking identification placard

Activity

Observe other instances where ICT is used in business and manufacturing and compile a list.

1.4.9 ICT in Entertainment

Various devices and equipment have been invented to provide some peace of mind to human beings who are spending a busy life today. These devices enable us to:

★ listen to music to overcome a monotonous life,

★ watch missed TV programmes or movies of our choise,

★ exchange information between friends and relatives who live abroad or whom we have lost touch through social media,

★ watch high definition video using technology,

★ surf the internet. This helps children to do learning activities and play games during the free time,

★   read e-books on internet,

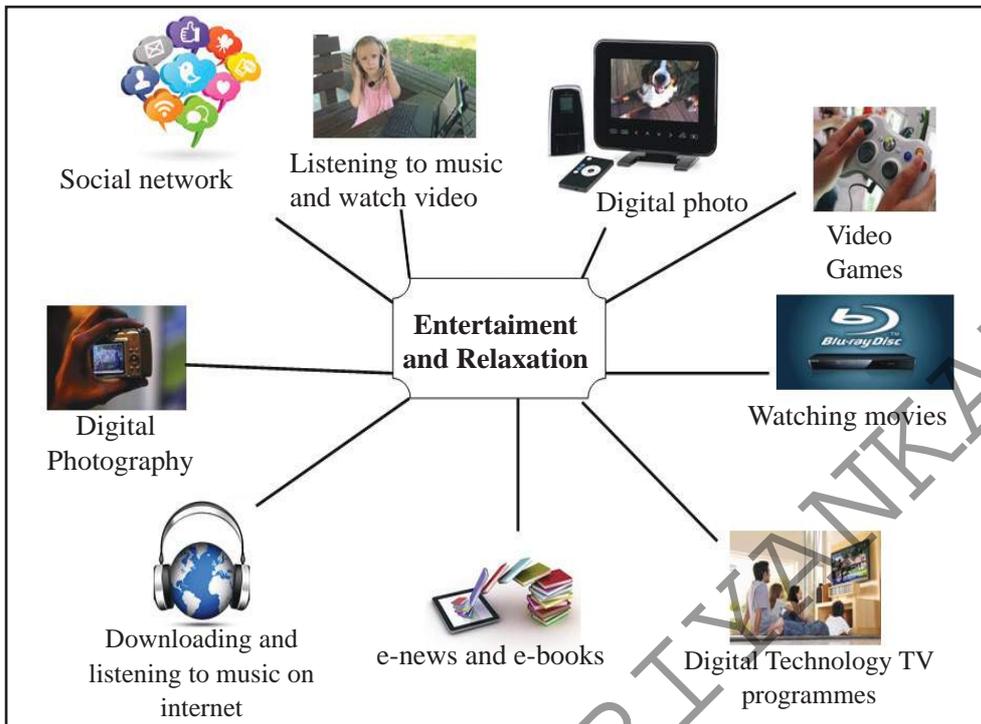★ take photographs of favourite places and store them in the computer.

Figure 1.64 - ICT in Entertainment

1.5   Demerits of ICT

Not only does ICT help us as enabler to perform our day today activities, it has become a close companion also. However, if you use this companion in an undue manner it may bring forth undesirable effects to you as well to the whole world.

⮝ Addiction – A student or any other person who immerses himself/herself in the use of computer or who plays games on internet without limit, may lose track of education and/or end up with ailments such as sore eyes, back pain, head ache etc.

⮝ Building unsuitable friendships through social media.

⮝ The computers could become infected by virus due to improper use of internet.

⮝ Negative effects on psychology of a person by visiting improper websites.

⮝ Publishing of edited photographs and videos of individuals affecting their personal lives.

There is an opinion that ICT has negative impacts on human society due to issues such as the above. But we have understood that the systems made by ICT make most of man's routine work effortless. Therefore, it is our responsibility to use ICT in a responsible manner.

1.6 Evolution of the Computer

By now you would have understood that computers assist us in converting data into information. Even though at present, there are automated computer systems, the computer too has undergone a similar evolution process as human beings and has reached the advanced stage today.

The computer was born with the attempt to make an adding machine. In order to perform addition of numbers, a device called Abacus was invented around 5000 ago.

In due course many new inventions were made. The followings are few of them:

- In 1642, Blaise Pascal invented a machine called the Adding Machine. This was the world's first ever mathematical machine.

- In 1674, Gottfried Wilhelm Von Leibnitz improved the machine invented by Pascal. With these improvements the machine was able to perform multiplication and division too.

Figure 1.65 **-** The Abacus

- A French Scientist named Joseph Jacquard invented a mechanical loom using Punch Card System.

- Charles Babbage started to make his Analytical Engine using the Punch Card System concept. This machine was based on the concepts input, process, output and store since this concept helped in the development of the computer, Charles Babbage is called the father of computing.

- Madam Ada Augusta Lovelace is considered as the first programmer since she tried to write programmes for the Analytical Engine.

- In the year 1944, a man named Howard Aiken invented the machine called Automatic Sequence Control Calculator at the Harvard University with the assistance of his companions and IBM Company. This was named MARK 1.
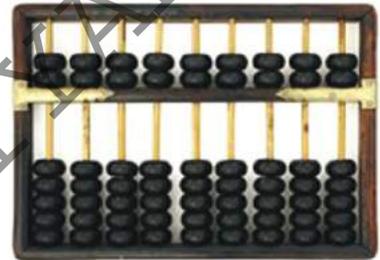
All the versions of early computers were mechanical in nature. From the time when the computers became automated they were categorized into various 'Generations' as below:

Generations	Major Hardware Technology	Software Used	Characteristics	Systems invented
First Generation Computers 1940-1956	• Vacuum Tubes • Punch Cards are used for input, process, output and storge of data	• Machine language • Assembly language • Stored Program Concept	• High Heat Generation • Slow in processing • Large in size • Not Portable • Consumes a lot of electricity • Expensive	ENIAC EDVAC EDSAC UNIVAC IBM 701
Second Generation Computers 1956-1963	• Transistors • Tape • Floppy Disk, Tape for Secondary Storage	• High-level Programming language • Use of Assembly Language	• Smaller in size. • Less heat Generation • Low power consumption • Faster processing • Expensive	• Honey well 400 • IBM 7030 • CDC 1604 • UNIVAC LARC

Generations	Major Hardware Technology	Software Used	Charateristics	Systems invented
Third Generation Computers (1964-1975)	• Integrated Circuits (IC) • High capacity disks for secondary storage • Keyboard and mouse for data input	• birth of Operating Systems (OS) • Well developed Programming languages • high level computer languages for coding	• Smaller in size • Less heat Generation • Faster processing • Expensive • Low power consumption	• IBM-360/370 • PDP-8 • PDP-11 • CDC 6600
Fourth Generation Computers (1975-1989)	•LSIC (Large Scale Integrated Circuits) and VLSIC (Very Large Scale Integrated Circuits •Microprocessor •Palm Tops •High Capacity hard disks •Floppy disk •Optical disk •Personal computers (PC) •Faster computer networks	•OS with GUI (Graphical User Interface) • UNIX OS	• Very small in size • Portable • Upgradable	• IBM PC • Apple II

Generation	Major Hardware Technology	Software Used	Charateristics	Systems invented
Fifth Generation Computers (1989 to present)	• ULSI (Ultra Large Scale Integration) • Very High Capacity Hard disks and optical disks • Internet	• Operating Systems with GUI (Graphycal user Interface) • Internet and multi-media applications • Voice recognition based on AI (Artificial Intelligence) • Character recognition • Hand-writing recognition systems	• Portable • Less Expensive • Smaller in size • Easy operation • High reliability • High efficiency	• IBM notebooks • Pentium PCs • SUN workstations

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Summary

- Images, words, numbers or symbols which do not convey a meaning when standing alone are called data.

- Information is obtained by processing data. Information is used to make decisions.

- Computer is a system.

- Computers and computer based systems are used to process data.

- Providing data is called 'input' while extracting information is called 'output'

- Quality of information is important, (relavancy, compeness, accuracy, timeliness, low cost)

- Data input, processing and data output are components of a system.

- Technology is used to exchange the processed data.

- Applications of ICT have made man's life easy. There are many applications such as e-Government, education, health, agriculture, business, entertainment etc.

- The advent of computing dates back to 5000 years. Computing is categorized into many generations from the period of automation.