INTRODUCTION TO A-LEVEL

INFORMATION COMMUNICATION TECHNOLOGY

Information and communication technology (ICT)

- ICT refers to the variety of technologies used to create, process, transmit, store and retrieve information.
- These technologies include: radio, television, cellular phones, computers and networks, software, satellite systems, as well as the a combination of audio-visual technologies like videoconferencing etc.

Earlier ICT technologies

- Drums & smoke
- Messengers
- Horns
- Paper Print
- Photographs
- Audio Recordings
- Film stripes
- Radio
- Televisions
- Landline telephones

Morse cord
Telegraph
type writers

Disadvantages of earlier ICT

- They were slow in processing or transmission of data.
- They had low storage capacity of data.
- They were not reliable in data. transmission to high level of inefficiency.
- They had relatively small area coverage.
- There was a limited variety of technologies which limited access to information.
- Messages could be misinterpreted.

Modern ICT technologies

- Satellites
- Cellular phones/mobile technologies
- Fax machines
- Compact disk/DVDs/Blu rays
- Computers, smartphones, IPad, tablets
- E-mail
- SMS and MMS
- Internet
- Data warehouses or data bases
- Video conferencing
- Computer and communication networks

- Virtual reality
- E-commerce
- Video
- Global positioning systems
- Cloud computing
- Social media
- Etc.

Virtual Reality (VR) parachute trainer

The quadrupedal military robot Cheetah

Advantages/Positive effects of modern ICT

- improved corporate image of institutions using computers because they are perceived to be well organized and efficient.
- Highly skilled jobs are being created like programming, systems analysis. Software engineering, etc.
- increased access to information using the available computer resources such as the Internet and CDs

- More employment opportunities are created in different fields e.g. computer technical work and selling computers.
- Faster and cheaper communication among people e.g. through the use of e-mail, chat rooms, social networks, internet telephone, etc.
- There is better entertainment and leisure through computer games, downloads, making and playback of music and videos. etc.

- improved science research by use of computers to record and analyse data.
- Higher creativity by users because computer applications offer very many professional ways of doing a given task.
- Increased Efficiency and productivity of workers due to use of computers because they process large amount of data accurately in a short time.

- Easy and relatively cheap storage of huge amounts of data for future use because Modern computers have very large storage capacity.
- There is improvement in technologies applied in different fields by combining existing technologies with ICT. e.g. using embedded computers.
- Increased investment opportunities in providing communication and Internet services, e.g. telephone networks.

- Reduced costs of production through less demanding ICTs.
- Improved and sustained quality goods and services.
- Businesses provide better services to their clients.

Disadvantages of ICT

- Many ICT related crimes such as forgeries and illegal fund transfers.
- Moral degeneration through access to pornographic materials from the Internet.
- Loss of employment because computer use replaces human labour

- Computer Virus threats which makes data stored on computers very insecure because of possible data loss.
- Loss of man-hours as some workers go for unproductive computer based leisure at the expense of their work.
- Addiction to computer games, surfing and social networks such as Facebook.

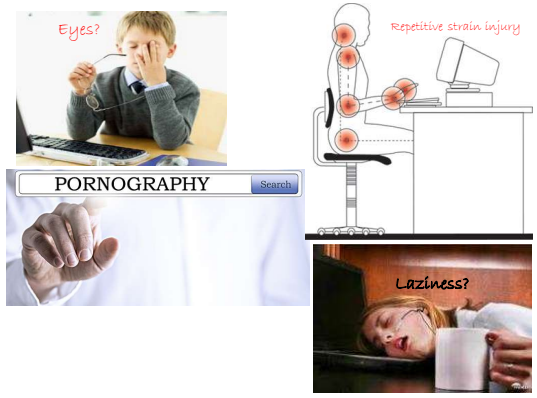
- Digital divide; a development gap between people with effective access to digital information technology and those without which results in a development gap.
- The public is Bombarded with too much information- good and bad. Causing information overload ("infoxication or infobesity") which is confusing and delays decision making.

- Environmental pollution due to e-waste of the discarded computer parts that contain contaminants such as lead, cadmium, and beryllium.
- Erosion of individual privacy as more data about people is stored on databases and can be accessed any time.

What is the effect of this to the environment?

- **Unemployment as less skilled people get retrenched and their roles taken over by more effective ITs.**
- **Initial, maintenance and on-line IT costs are highly segregative.**
- **Data misuse**

- **Over use of computers lead to health problems like eye strain and text neck etc.**



The Health risks associated with continued computer usage

- **Repetitive strain injury. (RSI). These cause muscle pains in the upper body parts such as the neck, shoulder, wrists and fingers.**
- **RSI is usually due to;**
  1. **using computers without regular breaks,**
  2. **using poorly designed tools,**
  3. **poor seating posture,**
  4. **holding the same posture for a long time.**

Other health issues include:

- **Techno-stress due to continuous noise made by computer system and funs, etc.**
- **Contracting Germs from dirty keyboards and mouse.**
- **Eye strain due to staring at the computer for too long especially in a poorly lit environment**

- **Back pain and neck pain due to poor sitting posture**
- **Headaches**
- **Ear problems due to over use of headsets**

How to prevent or minimise ICT related health risks

- **Work at intervals to avoid prolonged usage of computers.**
- **Use appropriate furniture that allows the user to sit upright and eyes level with the monitor and keyboard level with the elbow.**
- **Use ergonomic devices that conform to international safety standards.**
- **Regulate the light of the monitor.**

- **Work from a well-lit room.**
- **Regularly clean the keyboard and mouse with a damp cloth with a detergent.**

ICT(computer/digital) literacy

- This is the ability of an individual to use ICT technologies to create, access, manage, integrate, evaluate information.

Limitations to ICT literacy

- High level of illiteracy; not being able to read and write
- High cost of ICT facilities
- High cost of using ICT devices, such as servicing and airtime.
- High level of conservatism
- technology phobia
- Poverty among many.

Possible measures to increase ICT literacy

- introduce ICT training in schools.
- Establish ICT training institutions.
- Reduce cost of acquiring ICT equipment.
- Provide cheaper Internet access.
- Provide training for trainers in using ICT.
- Sensitising the public on the available ICTs and their benefits.

Characteristics of Modern computers

- They have High processing speed.
- They are Accurate in processing once given right instructions and data input.
- Ability to store huge volume of data.
- Versatility- performing many tasks in different fields.
- Diligence and consistence- they can perform the same tasks over and over again without complaining.
- They are highly automated because they work with minimal or no human aid.

- They have Artificial intelligence. They can be programmed to assume capabilities such as learning, reasoning, adaptation, and self-correction.

Common computer terminologies and concepts include

- Computer literacy: knowing about and understanding computers and their uses and the ability to use them to do tasks.
- Personal computers (PC): PCs are Computers designed to be used by a single user at a time usually for general purposes. For example desktop PC, a laptop, a netbook, tablet PC , and smartphones
- computer network: more than one computer connected together for purposes of sharing information and communication

- Internet: international connection of computer networks for purposes of sharing information.
- Social networks: a dedicated website or other application that enables users to communicate with each other by posting information, comments, messages, images, etc.
- Computer hardware: the physical components of a computer

- Computer software: the computer programs defined as the step by step instructions a computer must follow to do a task.
- Input devices: computer components used to enter data into the computer for processing
- Output devices: computer parts used to present information to the computer user after processing.

- **Netiquette. (abbreviation of Internet etiquette and network etiquette). These are guidelines for courteous communication while using the internet and other media.**
- **E.g. avoid flaming**
- **Avoid shouting**

Introduction to computer systems

A computer is an electronic device that processes data into information using a set of instructions stored in its own memory.

The computer has four basic functions:

- **Accepts data input**
- **Processes data**
- **Produces output**
- **Stores data and information**

How computers work

- Computers are machines, therefore they do not think.
- They process information based on the data input and the instructions given. If incorrect data is fed into the computer, it gives undesirable or misleading information (Garbage in Garbage out (GIGO).

- It is electronic in nature because it consists of a number of electronic circuits through which electrons flow.

- Computer circuits use binary codes (they use only two digits; 1 for On and 0 for Off(a circuit switched on represents 1 and one switch off represents 0).
- The computer stores data in memory.
- Each memory location is called a BIT (BIT for Binary Digit).

- Data appears as a chain of 0 and 1 in the computer system electric circuitry.
- Each character stored in memory occupies 8 BITs.

- 8 bits make up one byte
- About 1024 bytes make up 1 Kilobyte (1 KB)
- 1024 KBs make up 1 megabyte (I MB)
- 1024 Megabytes make up 1 Gigabyte (1 GB)
- 1024 GBs make up 1 Terabyte (1 TB)
- 1024 TB make up 1 Petabyte (1PB)

- Generally, files, storage devices, and storage capacity are measure in bytes, while file transfer rates are measured in bits e.g. A memory card may have a storage capacity of of 250 Giga bytes while a download may transfer at rate of 10 Mbps.
- Bits are also used to describe a processor architecture such as a 32-bit or 64 bit processor.

Example 1

How many bytes are contained in 88 bits?

Answer

- There are 8 bits in 1 byte. Thus 88 bits will contain 88/8 = 11 bytes.

- How many KBs are in 1,240,056 bytes

Solution

- Each KB occupies about 1024 bytes
- Therefore there are 1,240,056/1024 KBs
- = 1210.99219 KBs

- How many MBs does a file of 114,698 KBs occupy?

Solution

- Each MB occupies about 1024 KBs
- Therefore the file occupies 114,698/1000 MBs
- = 114.698 MBs

- How many MBs are in 149200 bytes?

Answer

- There are 1024×1024 bytes (1048576) in 1 MB
- Therefore, 149200 bytes is made of 149200÷1048576 = 0.142288 MB

- Given that a certain song stored as a music file occupies 4.3 MB, how many music files of such size can fit onto 4 GB?

Answer

- 1 GB = 1024 MB. Thus 4 GB is equal to 4×1024 = 4096 MB.
- The given music files requires 4.3 MB. Thus 4096 MB can store 4096/4.3 = 952 music files