FORM 4 COMPUTING & ICT 2022

STRAND 1: COMPUTER SYSTEMS

Learning Outcome: Students should be able to relate to early computer inventions, understand major components and functions of a computer system, and how to manage and operate a PC with required and online resources.

SUB-STRAND 1: EARLY COMPUTERS

Learning Outcome: Students should be able to find and present the contributions of early computer inventors and their impact on the development of computers.

Notes: Some of the famous names in computing and their contributions.

INVENTOR	CONTRIBUTION	YEAR
Charles Babbage- United Kingdom (*26 Dec 1791-18 Oct 1871)*	Built the difference Engine- first mechanical computer and automatic computing several sets of numbers.	1822
	Design the Analytical Engine- the first programmable mechanical which was then built by his son to perform basic calculation in 1910.	1837
Alan Turing- United Kingdom (*23 June 1912- 7 June 1954)*	Invented the Turing machine also known as the Bombe- The first electromechanical device that helped break security codes during World War II.	1939
Thomas Harold Flowers- United Kingdom (*22 Dec 1905- 28 Oct 1998)*	Developed the world's first electronic computer known as the Colossus- the first programmable and digital computer that helped break German's code during World War II.	1943
Konrad Zuse- Germany (*22 June 1910- 18 Dec 1995*	Developed the first real functional modern computer known as ZI- an electro-mechanical binary programmable computer.	1938
	Built the first commercial computer known as Z4 which was sold to a Mathematician of the Swiss Federal Institute of Technology Zurich on July 12, 1950.	1942
John Vincent Atanasoff – USA (*4 Oct 1903- 15 June 1995)*	Designed and developed the Atanasoff-Berry Computer (ABC) - the first electronic digital computer using vacuum tubes and not a central processing unit (CPU). The machine was capable of digital computation with binary math and Boolean logic.	1937
Engineering Research Associates(ERA) & The Remington Rand Corporation- USA	They designed the first electronic computer that was capable of storing and running a program from memory. The computer was known as the UNIVAC 1101 or ERA 1101.	1950
Henry Edward "Ed" Roberts – USA (*13 Sept 1941- 1 April 2010)*	This time marks the beginning of personal computing. Ed was known as the father or personal computing with his Altair 8800 PC.	1974
International Business Machines corporation(IBM)- USA	IBM built the first portable computer- The IBM 5100. This computer weighed 55 pounds and had a 5-inch CRT display, tape drive, 1.9MHz PALM processor, and only 64KB of RAM.	1975
Steve Jobs- USA (*24 Feb 1955- 5 Oct 2011)*	Jobs and Steve Wozniak designed and built the first PC with a window interface. This involved using a Graphical User Interface (GUI) and a mouse rather than a command line interface.	1983
Bill Gates- USA *(28 Oct 1955)*	Bill Gates was the owner of Microsoft, responsible for the most popular and successful windows operating system and the Microsoft Office Applications (Microsoft Word, Excel, PowerPoint, etc.).	1981

Activity 0.1

1. Study the above table carefully and answer the following questions.

a. Who was Charles Babbage and what was his main contribution to computing?

b. Why was John Vincent Atanasoff's invention so important to the world?

c. What was Steve Job's major invention and what made him so popular today?

d. What do you know about Microsoft and its origin (how the company started)?

e. What was the main purpose of the very first electronic computer?

SUB-STRAND 2: COMPUTER SYSTEM

Learning Outcome: Students should be able to describe the functions of the major components of a computer system (user, application software, Operating System and Hardware) and the Interactions between them.

What is a Computer?

A computer is an electronic device that manipulates information, or data. It has the ability to store, retrieve, and process that data.

You can use a computer to type a documents, send email, play games, and browse the Web. It can also used to edit or create spreadsheets, presentations, and even videos.

What is a Computer System?

A computer system consists of two Major elements: **Hardware** and **Software.** A computer system takes a set of Inputs, Processes them and creates a set of Outputs. Some of the Processed Data can be stored for later use.

This is done through the interactions between the users, software (computer applications and operating systems) and hardware.

The computer system has one or more **inputs**(this is data mostly provided from the users). This data is then **processed** in some way. The outcome of the processing is the **output.** Data used in the computer system can be stored for later use.

The processing can only happen by using sets of instructions explaining what needs to be done. This set of instructions is called a **Program.**

There are 4 major components of a computer system.

- User
- Programs
- Operating System
- Hardware

Functions of a Computer System

1. **User**

This is often referred to as the computer user or end user. A user is a person who uses a computer or network service. A user often has a user account and is identified by a username or login name.

Users generally use a computer or hand held device without the technical knowledge of the processes working in the background of the system. On the other hand, Power Users use advanced features of programs or applications therefore need the technical knowledge to do so.

2. **Programs or Applications**

A computer program or Applications is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are sometimes called Desktop Applications, and those for mobile devices are called Mobile Apps. When you open an application, it runs inside the operating system until you close it. Usually you would have more than one application opened or running at the same time; this is a process known as Multitasking.

There are many desktop applications available, and each one is grouped into many different categories. Some are more full-featured (like Microsoft Word), while others may only do one or two things.

Here are just a few categories of applications you might be familiar with:

Word Processors- A word processor allows you to write a letter, design a flyer, and create many other types of documents. The most well-known word processor is Microsoft Word.

Web Browsers- This is the program you use to access the internet. Most computers come with a web browser pre-installed, but you can also download a different one if you prefer. Examples of browsers include Internet Explorer, Firefox, Google Chrome, and Safari.

Media Players- Allows users to listen to music or watch a movies or videos. An example would be Windows Media Player.

Games- There are many different games you can play on your computer. They range from card board games such as Solitaire to action games like the Halo series. Many action games require a lot of computing power, so they may not work unless you have a newer or a faster working computer.

3. **Operating System (OS)**

An operating system is the most important software that runs on a computer. This system allows computer applications to be operated by users. The operating system manages the following key activities and components:

- Computer Memory and storages
- Computer Processes
- Computer Applications
- Computer Hardware

Most of the time, there are many different computer programs running at the same time, and they all need to access your computer's central

processing unit (CPU), memory, and storage. The operating system coordinates all of this to make sure each program gets what it needs. **Note:** Without an operating system, a computer is useless.

The 3 most common operating systems for Personal Computers (PC) are:

- Microsoft Windows
- Apple Mac OS X
- Linux

The above operating systems all use a **Graphical User Interface,** or GUI. A GUI lets you use your mouse to click icons, buttons and menus, and everything else that is clearly displayed on the screen. This is possible using a combination of graphics and text.

Mobile Phones use more advanced operating systems such as Windows Mobile, OS 9.0 iPhone on the Apple iPhone, Linux on the Blackberry and Google Android. All of these have their own unique features.

4. Hardware

Computer Hardware is simply the tangible parts of the computer system. Computer Hardware refers to the various electronic components that are required for you to use, along with the hardware components inside the computer case. A computer hardware has the following common components:

- The main computer box
- A monitor or screen
- A keyboard
- A mouse
- Speakers
- An optional printer

The computer box is the main component of the computer. It has computer hardware parts inside that perform the following functions:

- Temporary storage of data- this function is done by memory

- Permanent storage of data- this function is done by a hard disk, floppy disk, or CD ROM.

- Manipulation or processing of data- used to determine where data is stored and perform calculations that support operations that the user is doing.

-Interfacing to the outside components or to the outside world- this supports the ability for the user to communicate with the computer and know how the computer is responding to commands which are done primarily through the monitor, keyboard, and mouse along with their interface components in the main computer box.

- A power supply to provide the electrical power to the components in the computer box.

Some hardware components are easy to recognize, such as the computer case, keyboard, and monitor. However, there are many other different types of hardware components not easy to recognize.

Activity 0.2

1. Complete the table by:
   a. Describing the main functions of the different layers of a computer system
   b. Providing some examples of each layer.

Computer System Layer	Functions	Examples
User		
Application		
Operating System		
Hardware		

2. A computer system follows a set of instructions. Complete the table with the correct computer operation that corresponds to the following real life processes. The first one is done for you as an example.

Process	Input	Software	Hardware	Output
Washing clothes in a washing machine				
Playing a guitar				
Making a cup of coffee				
Cooking fish				
Riding a bus to school				

3. Use this story below to answer the questions that follows.

"Sione opens a computer program and start typing a report using the keyboard and a mouse. After typing, Sione starts formatting and editing his report with different styles and fonts. Then he prints out a hardcopy of his report. He also saves a copy for later use."

a. Who is the user?

b. Which sentence explains the input of data?

c. Which sentence explains the processing of data?

d. Which sentence explains the output of data?

e. Which sentence explains the storage of data?

SUB-STRAND 3: TYPES OF COMPUTERS

Learning Outcome: Students should be able to explain the main uses of the different types of computers.

Computer Systems can be categorized according to their size, processing speed, power and price.

There are 4 main categories:

1. Microcomputer or Personal Computers
2. Minicomputer or mid-range server
3. Mainframe
4. Super Computer

Main uses of the different types of computers

Type of Computer	Description	Main Uses
Microcomputer	Personal computers (PC), desktops, laptops, hand-held or tablet devices. These computers are built to perform specific user tasks that do not require much processing power.	This type of computer is designed mainly for public use. Can be used at home, school or in the office for simple and user related tasks.
Minicomputer	More powerful and larger than a workstation (personal) computer. Users can access a mid-range server through a personal computer or a terminal (a device with only a monitor and a keyboard with network connections).	This type of computers can give parallel access of up to 100 users. They are mainly used in banks or business organizations for maintaining financial information and activities.
Mainframe	A large, expensive, very powerful computer that can handle hundreds or thousands of connected users at the same time.	Mainly used by larger organizations like meteorological surveys, statistical institutes, Universities for performing huge mathematical

		computations and specific research projects. They are used in managing the desktop functions of over hundreds of users at the same time.
Super Computer	The fastest, most powerful, and most expensive type of computer. Super computers are accommodated in large air-conditions rooms; some can fit an entire building.	With very high speed processing ability they are used for huge animation graphics projects, weather forecasting, nuclear research work, launching space shuttles, huge research works and any specific tasks that require far more powerful processing ability.

Note: There are different types of microcomputers available now.

Notebook computer- These can be as small as a physical notebook, hence their name. They can be great for travelers as they are still powerful but very easy to carry about in your bag.

Laptop- Bigger than a notebook and heavier but still portable. As their name suggests, they were built to fit on someone's lap to enable the user to type and use anywhere simply by placing it on their lap.

Desktop Computer- These, are the name suggests, are designed to fit on a desk or flat surface such as a table. They are heavier and bigger than a laptop but are often designed to complete more complex operations as well as having each component such as the mouse, keyboard and screen separate from the main unit and simply attached by wires.

Mini Tower- this is a version of the desktop computer but as suggested by the name, it has a smaller main unit or tower. This not only means it takes up less space on a surface or desk but is designed to stand upright on any surface, whereas a desktop computer tower is designed to lay flat with the screen often on top.

Full Tower- These are very similar to the mini tower with the main difference being than the tower is slightly higher and wider than the mini. Other than this, the differences are very small.

Note: Today, majority of the computer hardware manufactured and software used are either IBM compatible PC or Apple Macintosh Compatible.