REPUBLIC OF KENYA
MINISTRY OF EDUCATION

DIPLOMA IN EDUCATION LEADERSHIP AND MANAGEMENT
MODULE 5: LEADERSHIP AND MANAGEMENT OF ICT INTEGRATION IN EDUCATION

KENYA EDUCATION MANAGEMENT INSTITUTE

INTRODUCTION TO INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION

UNIT 1



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- Information and Communication Technology (ICT) continues to play a central role in different spheres of lives. In education, ICT is viewed as a transformative tool that has the potential to promote the acquisition of 21st Century skills and raising the quality of education.
- They can also promote the shift to learner centered environment. In this unit, we will learn about the concept of ICT integration in education.
- We will also examine the importance of ICT integration in education.
- To enhance your skills in ICT integration, we shall seek to learn more about computer basics. In addition, we shall look at ICT tools for learning and special mention will be made of assistive devices for learners with special needs.

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Learning Outcomes

a) Demonstrate understanding of the concept of ICT integration in education.
b) Explain the importance of ICT in education
c) Use computing devices to perform various functions in an institution of learning.
d) Create awareness of assistive devices and technologies for learners with special needs.
e) Appreciate the need to effectively use ICT tools in teaching and learning.

Definition of ICT Terminologies

- **ICT:** This is a tool in form of hardware such as computers, digital cameras; or software such as Excel, discussion forums, or both. In the educational context, ICT mainly refers to various resources and tools (software) presented on the computer.
- **ICT integration:** The use of technology in a seamless manner to support and extend curriculum objectives and to engage learners in meaningful learning.
- **Computer:** is a electronic device that stores retrieve, and processes data.

- **Computer Hardware:** This refers to all the physical components of a computer. It includes all input devices, processing devices, storage devices, and output devices. The keyboard, mouse, motherboard, monitor, hard disk, cables, and printer are all examples of hardware.
- **Computer Software:** these refer to the programs which process instructions given through the hardware and then enable the hardware to give the output. The most important software on the computer is the ***operating system***, which controls and manages the hardware connected to your computer.

- **Computer Programs:** is a collection of instructions that performs a specific task when executed by a computer. Most of computing devices require a program to function properly. Computer programs may be categorized along functional lines, such as application software and system software. Some programs allow you to perform tasks such as writing letters, doing calculations, or sending e-mail messages. Example of program include; operating system and Microsoft® Office Word 2010.
- **Computer applications:** program designed to provide the skills needed in the use of application software on a computer. These programs process data that you provide as an input to your computer. This data can be in the form of text, graphics, audio, or video depending on the type of program. Applications include office productivity software, desktop publishing, the Internet, mobile apps, Email etc.

- **Networks:** You can connect your computer to other computers to share information and hardware components. A group of computers and associated devices that are linked together to facilitate sharing of information is called a network. Networks can also be used to share data and devices such as printers.
- **Internet:** The Internet is a worldwide collection of public networks that are linked to each other for information exchange. The Internet offers a range of services to its users, such as file transfers between Internet users and electronic mail for sending messages. Today, the Internet connects many commercial, government, and educational networks, as well as individual computers, which share data.

- **Internet Service Provider** (**ISP):** This is a company that provides Internet connectivity to individuals, businesses, and organizations
- **User interface:** This is the Visual part of a computer application or operating system through which a user interacts with a computer or software.

We hope that you are now beginning to acclimatize to various terms used in the field of ICT. We will be using many of these terms as we move along the units. In the next section, we will look at the concept of ICT integration.

Concept of ICT integration in Education

- The potential of ICTs to promote the acquisition of 21st Century skills is linked to its use as a transformation tool for raising the quality of education. It also enables the shift towards a learner–centered environment.
- According to the Basic Education Act 2013, ICT Integration in Education is defined as the seamless incorporation of information and communication technologies to support and enhance the attainment of curriculum objectives.
- It is also defined as the use of ICTs during the learning process to enhance the attainment of learning outcomes and appropriate competencies, namely, knowledge, skills, attitudes and values. (KICD, 2019)

- Technology is best integrated when it is used in a seamless manner to support and extend curriculum objectives, and also engage students in meaningful learning.
- It is not something one does separately; it is part of the daily activities taking place in the classroom.

Importance of ICT in education

- Improving the quality of education and training is a critical issue, particularly at a time of educational expansion.
- ICT tends to expand access to education. Through ICT, learning can occur anytime and anywhere.
- ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, facilitating the acquisition of basic skills, and enhancing teacher training.
- ICTs are also transformational tools which when used appropriately, can promote the shift to a learner-centred environment.
- ICTs such as videos, television and multimedia computer software that combine text, sound, and colourful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process

- Online learning resources are always available and through the application of teleconferencing classrooms, both learner and teacher interact simultaneously with ease and convenience.
- Based on ICT, learning and teaching no longer depend exclusively on printed materials.
- Multiple resources are abundant on the Internet, and knowledge can be acquired through video clips, audio sounds, visual presentation and so on.
- The ICTs have the potential not only in ensuring effectiveness and efficiency in teaching and learning; but also in supporting administrative duties.
- Below are the benefits of ICT integration in teaching and learning:

- **E-learning or Online Learning:** The presence of ICT in education allows for new ways of learning for students and teachers. E-learning or online learning is becoming increasingly popular and with various unprecedented events taking place in our lives, this does not only open opportunities for schools to ensure that students have access to curriculum materials whilst in the classroom but also allows them to ensure students outside the classroom such as at home or even in hospitals can learn.
- **ICT brings inclusion:** The benefits of ICT in education are such that students in the classroom can all learn from the curriculum material. Students with special needs are no longer at a disadvantage as they have access to essential material and special ICT tools can be used by students to make use of ICT for their own educational needs. Despite this, it opens up new issues related to the 'digital divide' and provides access to ICT tools and resources for those who are less fortunate.

- **ICT promotes higher-order thinking skills**: One of the key skills for the 21st century which includes evaluating, planning, monitoring, and reflecting to name a few. The effective use of ICT in education demands skills such as explaining and justifying the use of ICT in producing solutions to problems. Students need to discuss, test, and conjecture the various strategies that they will use.
- **ICT enhances subject learning**: It is well known these days that the use of ICT in education adds a lot of value to key learning areas like literacy and numeracy.
- **ICT use develops ICT literacy and ICT Capability:** Both are 21st-century skills that are best developed whilst ICT remains transparent in the background of subject learning. The best way to develop ICT capability is to provide them with meaningful activities, embedded in purposeful subject-related contexts.

- **ICT use encourages collaboration:** ICT naturally brings children together where they can talk and discuss what they are doing for their work and this, in turn, opens up avenues for communication thus leading to language development.
- **ICT use motivates learning**: Society's demands for new technology have not left out children and their needs. Children are fascinated with technology and it encourages and motivates them to learn in the classroom.
- **ICT in education improves engagement and knowledge retention:** When ICT is integrated into lessons, students become more engaged in their work. This is because technology provides different opportunities to make it more enjoyable in terms of teaching the same things in different ways. This results in the retention of knowledge more effectively and efficiently.

- **ICT use allows for effective Differentiation Instruction with technology**: We all learn differently at different rates and styles and technology provide opportunities for this to occur.
- **ICT integration is a key part of the national curriculum**: The integration of digital technologies or ICT is a significant part of the curriculum.
- **We live in a "knowledge economy"**: This is an economy where it is vital to have the ability to produce and use information effectively. ICT has permeated all sectors of our economy including but not limited to; health, education, environment and manufacturing.

Activity

Research results indicate that a respectable number of educators hold a negative attitude towards ICT integration, exhibiting negative reactions to computers ranging from —mild discomfort to extreme avoidance (Todman, 2000, p. 27).

- **Discuss** the possible reasons for this phenomenon and how it can be resolved.

Computer Basics

- ICT integration entails use of computing devices such as computers, laptops, smart phones among other ICT tools.
- Effective integration of ICT requires you to have some basic knowledge and skills on how computers work.
- In this section, we will learn some computer basics to allow you start using computers in the teaching and learning process.

Types of computers

- **General-purpose computer :** A computer capable of performing many different tasks. It can be used to read this web page, browse the Internet, play a game in a word processor, and do other tasks.
- **Special-purpose computer:** Computers embedded in almost all electronic devices This computer is designed for a specific task and is found in ATMs, cars, microwaves, TVs, and other home electronics.





- **Specialized computer:** A computer designed only to perform one or a few different tasks. Good examples of specialized computers are today's gaming consoles (play stations). Other examples of devices that are using specialized computers; are smart TVs, Set-top boxes.



- **Desktop Computer:** Desktop computers are made up of individual components, such as a monitor, a keyboard, a system unit, and a printer. Desktop computers are not portable and are generally placed on the surface of a desk or a table.



- **Laptop Computer:** Laptop computers are lightweight personal computers. Laptop computers are smaller in size as compared to a desktop computer and are designed for travel. Laptop computers are also called *notebook* computers.



- **Handheld Computers:** Handheld computers are devices used for specific everyday tasks, such as managing personal data. These are smaller than laptops and provide fewer features compared to desktop computers or laptops. These can also perform basic word-processing activities and help you access the Internet. Several handheld computer models can also work as cellular phones or digital cameras**.**



- **Tablet Computers:** Tablet computers are fully functional computers that allow you to write directly on the screen by using a tablet pen. You can also use the tablet pen to perform mouse functions. Tablet computers, therefore, do not need a keyboard and a mouse.

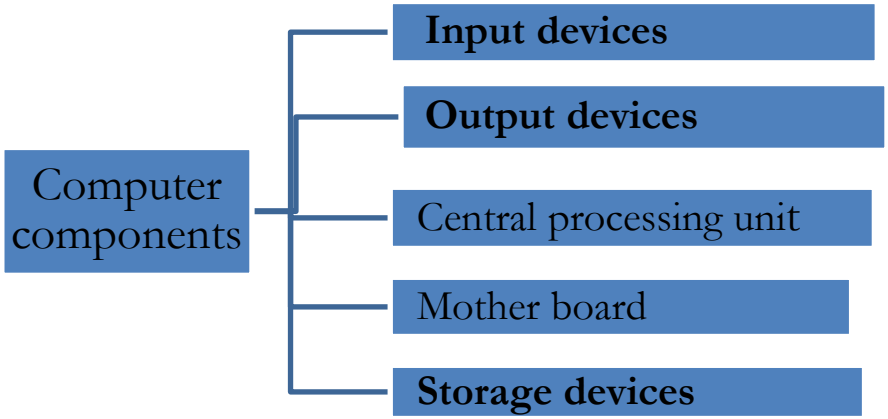


- **Smartphone:** A mobile phone that performs many of the functions of a personal computer.



Components of a computer

- The parts of a computer can be classified into: input devices, output devices, central processing unit and storage devices as illustrated on the diagram below:



- It's important to note that each of the component performs a specific function as we will see in the descriptions below:
- **Input devices**: we use input devices to provide information to a computer such as when typing a letter or giving instructions to a computer to perform a task. Below are examples of input devices:
  - **Mouse:** A device that you use to interact with items displayed on the computer screen



- **Keyboard:** A set of keys that resembles a typewriter keyboard. You use the keyboard to type text, such as letters or numbers into the computer.



- **Microphone:** A device that you can use to talk to people in different parts of the world.



- **Scanner:** A device that is similar to a photocopy machine. You can use this device to transfer an exact copy of a photograph or document onto a computer.



- **Webcam:** A device that is similar to a video camera. It allows you to capture and send live pictures to the other user.



- **Output devices:** We use output devices to get feedback from a computer after it performs a task and examples of such devices are given below:
  - **Monitor:** A device that is similar to a television. It is used to display information, such as text and graphics, on the computer.
  - **Printer:** A device that you use to transfer text and images from a computer to paper or another medium, such as a transparency film. These days we have Multifunction printers (MFPs) which perform the function of scanning, photocopying and faxing among their many features
  - **Speaker/headphone:** Devices that allow you to hear sounds. Speakers may either be external or built into the computer.







Central processing unit:

- The central processing unit (CPU) is a device that interprets and runs the commands that you give to the computer. It is the control unit of a computer. The CPU is also referred to as the processor.
- CPU contains system memory which is the place where the computer holds current programs and data that are in use. There are various levels of computer memory including; Random Access Memory (RAM) and Read-Only Memory (ROM).



Random Access Memory (RAM):

- It is the main memory and allows you to temporarily store commands and data. RAM, or Random Access Memory, is "volatile." This means that it only holds data while power is present.
- More specifically, RAM is the feature of a computer that allows programs to run. The more RAM that a computer has, the faster programs will run. Having more RAM also allows the user to run more programs concurrently.



Read-Only Memory (ROM):

- It is the memory that retains its contents even after the computer is turned off. ROM is nonvolatile or permanent. ROM is always found on motherboards but is increasingly found on graphics cards and some other expansion cards and peripherals.

Motherboard:

- A motherboard is sometimes known as the mainboard, system board, planar board or logic board.
- The motherboard is the main circuit board inside the computer. It has tiny electronic circuits and other components on it. A motherboard connects input, output, and processing devices together and tells the CPU how to run.



Storage Devices:

- We use storage devices to store computer information. Storage devices can be divided into two types, internal storage devices and external storage devices. The following are types of storage devices:
  - **Hard Disk:** A magnetic disk is an internal device that is usually the main storage device on most computers



- **CD-ROM:** A portable storage medium that allows you to store 400 times more data than on a floppy disk. It is less prone to damage than a floppy disk.



- **DVD-ROM:** A portable storage medium that is similar to a CD-ROM; however, it can store larger amounts of data than a floppy disk or a CD-ROM. A DVD-ROM is commonly used to store movies and videos.



- **External hard disks:** An external drive is just a hard drive (HDD) connected to a computer on the outside rather than on the inside. They are portable, easy to use, and can provide a large amount of storage whenever you need it. Since you can move them from computer to computer, they can be used for sharing large files.
- **USB Flash drive:** A USB flash drive is a data storage device that includes flash memory with an integrated USB interface. Most USB flash drives are removable and rewritable.
- **Memory cards:** A memory card is a type of storage device that is used for storing media and data files. It provides a permanent and non-volatile medium to store data and files from the attached device. Memory cards are commonly used in small, portable devices, such as cameras and phones.







Computer Operating System (OS)

- Every computing device must have an operating system.
- An operating system controls how programs work with each other and how they interact with the computer hardware.
- It also creates a file system that determines how your data is stored within a storage device. Examples of operating systems are Windows, Linux, Mac, Android (for mobile phones).



Functions of the computer operating system

The operating system is the most important program on the computer. It performs four primary functions:-

- It manages and controls the hardware connected to a computer.
- It helps other programs running on a computer to use the hardware.
- It helps you organize and manage files and folders on the computer.
- It provides a user interface that allows you to interact with the hardware, the operating system itself, and other programs.

The operating system performs the following basic tasks:

1. **Recognizing input from the keyboard or mouse; sending output to the display screen or monitor.**



2. **Keeping track of files and directories on the disk**



3. **Controlling peripheral devices such as printers.**



Computer Networks

- For computers to be able to share data, they must be connected through a network.
- Computer networks are groups of interconnected computers.
- They may be near each other, as in an office, or distributed geographically like the Internet.
- They are used for communication such as file transfer or email and also for sharing resources such as hard disks or printers.
- The major types of networks include:

Local Area Networks (LANs):

- These are designed to operate in areas such as offices, homes or a group of buildings such as a school.
- They allow the computers attached to the network to share devices such as printers, store or recall data from central hard disks, and access programs that can be used by many people at the same time such as databases.
- In a school setting, LANS can be used in connecting administration and departmental offices for easy access of necessary files

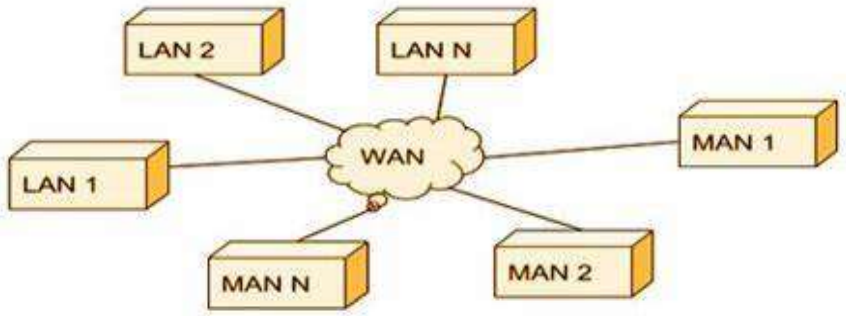
Wireless Local Area Networks (WLAN).

- It is a wireless connection that connects two or more devices in LAN. WLAN uses access points and routers to make a connection between devices.
- Wi-Fi is an example of WLAN where devices are connected wirelessly within a limited range. WLAN is made within home, office building, computer lab oratory and school building.



Wide Area Networks (WANs)

- A WAN is a network that spans relatively large geographical areas. They typically consist of two or more LANs connected via a telecommunication system.
- These systems could include the telephone network, satellites or leased lines.
- WANs facilitate communication and sharing of information among institutions such as banks that are located in different geographical location.
- They provide access to central resources such as databases.



Using a Computer

- We have learnt some basics about a computer and we will now learn how to use it.
- You need to note that using a computer is not such a daunting task, especially when you are more familiar with some of its basic operations.
- This section will help you move smoothly through some basic operations of a computer.

Starting a computer

a) The very first step is to turn on the computer. This is what is called cold booting. i.e. the process of starting up a computer that is switched off. To do this, locate and press the power button. It's in a different place on every computer, but it will have the universal power button symbol.



Warm booting is the process of restarting a computer. It can be initialized using the operating system. In Windows, the user can perform warm booting by selecting the restart option from the start menu.

b) When you turn on the computer, the lights on the keyboard may blink briefly and you may also hear a beep. This is an indication that the Power-on Self-Test (POST) has started. The computer performs a sequence of quick tests to check whether the motherboard, memory, hard drive, and other components are working. If you hear a series of beeps, the monitor may display a message indicating that a component is not functioning.



c) After Power-on Self-Test (POST), the computer starts the operating system and then displays the login screen. You now log on to the computer. This means identifying yourself by typing your user name or selecting your profile, then typing your password.



d) To securely turn off your computer, you must shut down Windows. To shut down Windows, click the Start button, then select Shut down from the menu (in some versions, this may say Turn Off Computer or look like the power symbol).



Using the keyboard

Whenever you use a computer, you'll probably use a keyboard. The most common kind is referred to as a "QWERTY" keyboard after the keys on the top row of letters.

Step 1: Have a good look at your keyboard. The most important keys are labelled on the diagram below:



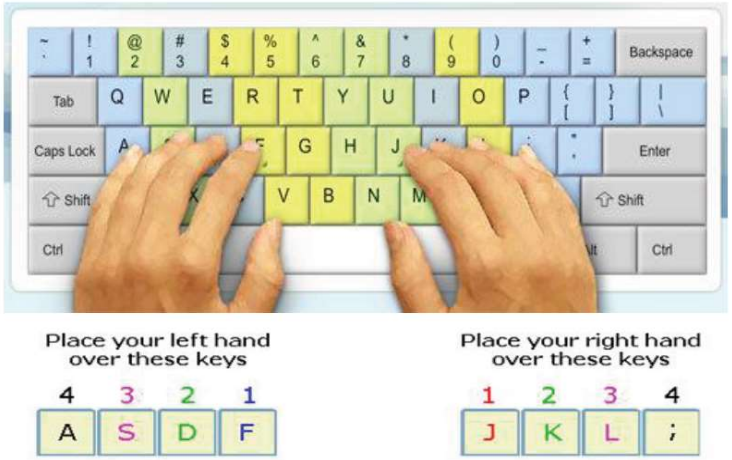
Some keyboards, especially those on laptops, will have a slightly different layout. For example, yours might not have a number pad or the delete key may be in a different place. But virtually all keyboards will have these important keys somewhere. The function of the major keys is as follows:-

- **ENTER** or **RETURN Key:** The label on this key can be either ENTER or RETURN. You use the ENTER or the RETURN key to move the insertion point to the beginning of a new line. In some programs, it is used to send commands and to confirm a task on a computer.
- **Navigation Keys:** Keys such as the arrow keys, HOME, END, PAGE UP, and PAGE DOWN, are navigation keys. You use the arrow keys to move the insertion point up, down, right and left. The HOME key is used to move the cursor to the left end of a line of text or the top of a document. The END key, in contrast, moves the cursor to the end of a line or a file, depending on the program. The PAGE UP key is used to move one page up and the PAGE DOWN key is used to move one page down while viewing a document.
- **Function Keys:** Keys labeled from F1 to F12 are function keys. You use them to perform specific functions. Their functions differ from program to program. The function of the F1 key in most programs is to access the help file associated with a program.

- **Numeric Keypad:** Not all keyboards have a numeric keyboard. If available, this is a separate set of keys with numbers from 0 to 9, the decimal point, special characters, and navigation symbols. The NUM LOCK key on this keypad allows you to switch between the numeric and the navigation keys.
- **Windows Key:** The key between the CTRL key and the ALT key is the Windows key. It has the Microsoft Logo or the Windows flag. This key is used to open the Start menu, or is used in combination with a second key to perform common Windows tasks. The exact use of the Windows key may vary from program to program.

Windows Key: The key between the CTRL key and the ALT key is the Windows key.

- It has the Microsoft Logo or the Windows flag. This key is used to open the Start menu, or is used in combination with a second key to perform common Windows tasks.
- The exact use of the Windows key may vary from program to program.
- If you are inexperienced in typing then you are most probably likely to type using only two fingers and always having to keep your eyes on the keyboard to get the right keys. Learn to place the correct fingers on the keyboard. If you take a closer look at your keyboard, you'll notice raised bumps on each of the F key and J key.
- This is to help you find the correct finger placement without having to look at the keyboard. Ideally, your index fingers should rest on the F and J keys and the other fingers will fall into place naturally (see diagram below).



Learn to type without having to look at the keyboard. In fact, for seasoned typists, looking at the keyboard slows them down.

- Getting there takes practice, and we‘re not talking about hours here.
- It could be weeks before you condition your fingers to take control of the keys -they’ are responsible for.
- Even if it slows vou down. do not revert to how vou used to type.



Place your left hand over these keys

4 3 2 1

A S D F

Place your right hand over these keys

1 2 3 4

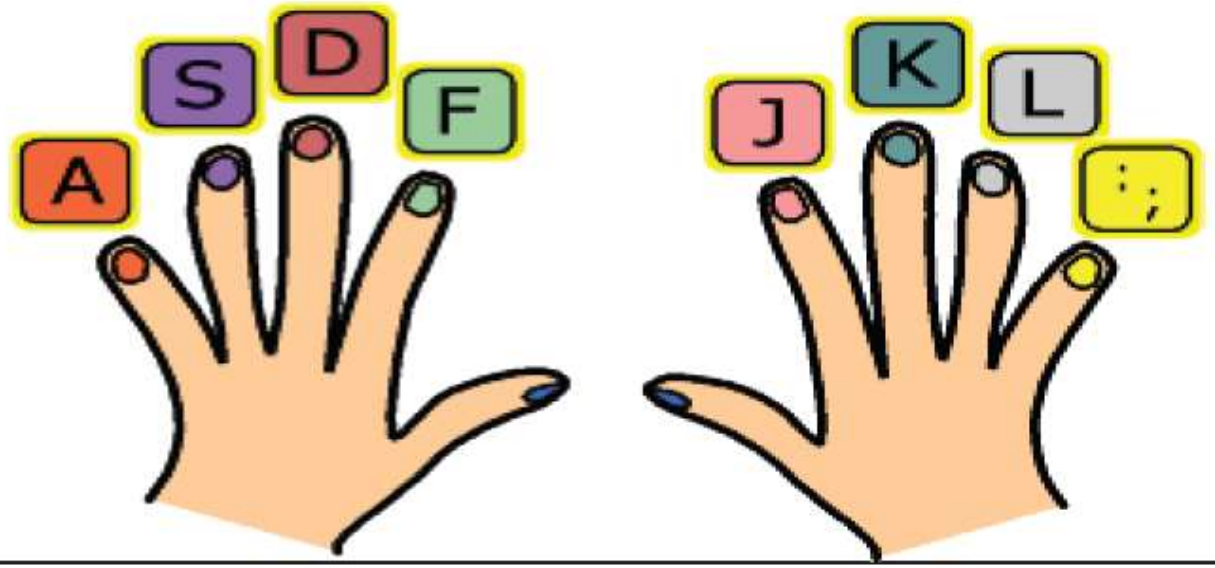
J K L ;

- Learn to use basic keyboard shortcuts. Since both your hands are already on the keyboard, you can save time by using common shortcuts instead of using the mouse to navigate.
- The following are some common keyboard shortcuts:

Description	Windows
Edit menu	Alt + E
File menu	Alt + F
View menu	Alt + V
Select all text	Ctrl + A
Copy text	Ctrl + C
Find text	Ctrl + F
Find and replace text	Ctrl + H
New Document	Ctrl + N
Open a file	Ctrl + O
Print options	Ctrl + P
Save file	Ctrl + S
Paste text	Ctrl + V
Cut text	Ctrl + X
Redo text	Ctrl + Y
Undo text	Ctrl + Z

Activity

Practice typing by visiting www.powertyping.com



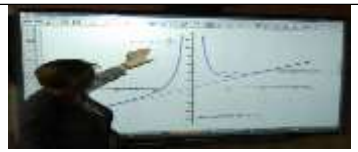
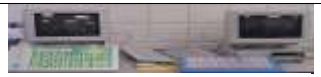
ICT Tools for Learning

- With the rapid developments in technology, there are myriad of ICT tools that teachers can choose to enhance teaching and learning..
- In our classrooms we get **information created, stored, processed, transmitted, displayed and shared is in digital form and through electronic media.**
- The technologies used in these processes are referred to as **ICT tools**.
- It includes not only traditional technologies like radio and television, but also modern ones like cellular phones, computer and network, hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and search engines.
- There is a variety of ICT tools that teachers can use in the process of teaching and learning. These are in form of hardware and software.

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Types of ICT tools

Digital Camera and Camcorders	 	**Interactive Smart board**	
Open Book and PEARL portable scanner		**Mobile Smart Phones**	
Monitor		**Printer**	
Projector		**Chording keyboards**	
Expanded keyboards		Compact/Miniature Keyboards	

- **Factors to consider while selecting ICT tools**
- We have seen that there are very ICT tools that a teacher can use in the learning process. It's important to note that there is no one ICT tool that will be appropriate for every learning situation.
- There are various factors to consider while selecting ICT tool to use for a lesson.
- Below are the considerations to be made while selecting ICT tools for learning:

1. The ICT tool should be educational: ICT tools used by learners should be educational in nature, and should be:
   - Be related to learning outcomes
   - Suitable for the content and leaning activities
2. Availability of the tool: Cost and ease of reach
3. Multisensory: Allow learners to learn through all senses
4. Attractiveness: Be able to attract attention of the learner
5. Cost: Be affordable to all learners
6. Should encourage collaboration:I n learning, we know that activities that provide contexts for collaboration are especially important. Working alone as well as in collaboration and in a range of other ways in interacting with technology is important too. However, *'joint attention'* and *'learners learning to share'* and/or *'engaged jointly'* provides a better cognitive challenge for learners

7. The ICT tool should support integration: ICT applications should be integrated as far as possible with other established education practices (e.g. play, project work) which make the curriculum relevant to the learners.
8. Provide motivation to discover more: ICTs should provide a means by which learners may engage and interact with a much wider range of 'virtual' artifacts and environments.
9. The ICT tool should leave the learner in control: ICT tools should be controlled by the learner; they should not control the learner's interaction through programmed learning.
10. The ICT tool should be transparent and intuitive: As far as possible, we should choose only such applications, which are 'transparent' – their functions should be clearly defined and intuitive. i.e the tool should complete each clearly defined task in a single operation.

Activity

i. Identify a sub-strand/topic from one of your teaching areas/subjects

ii. Identify ICT tool that you can use to enhance learning of the sub-strand/topic

Assistive and Adaptive Technologies

- The term adaptive technology is often used as the synonym for assistive technology; however, they are different terms.
- Assistive technology refers to “any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities”, while adaptive technology covers items that are specifically designed for persons with disabilities and would seldom be used by non-disabled persons.
- Assistive technology refers to any service or tool that helps the elderly or a person with a disability do the activities they have always done but must now do differently.

- In other words, “assistive technology is any object or system that increases or maintains the capabilities of people with disabilities,” while adaptive technology is “any object or system that is specifically designed for the purpose of increasing or maintaining the capabilities of persons with disabilities.”
- Consequently, adaptive technology is a subset of assistive technology.
- Adaptive technology often refers specifically to electronic and information technology access.

Assistive Technology tools

- Assistive technology in education can be referred to any hardware, software or system of technical components and processes that enhance the capacity for all learners to engage more effectively with the curriculum and their learning environment.
- They can support teachers to provide teaching and learning that is accessible to all learners.
- Assistive technology supports learners with diverse learning needs within an inclusive learning environment by:

i. Delivering information to learners in a way that is more appropriate to their needs

ii. Changing the way a learner can interact with the curriculum and their environment

iii. Providing a more appropriate and accessible way for learners to demonstrate their knowledge and understanding of the curriculum.

- Today, assistive technology can help learners with certain disabilities learn more effectively.
- They range from “low” technologies such as a graphic organizer worksheet to “high” technologies including cutting-edge software and smartphone apps.
- Below are examples of assistive technology tools that schools can use in order to meet the needs of individual learners:

i. **Screen readers**: Software used by blind or visually impaired people to read the content of the computer screen. Examples include JAWS for Windows, NVDA, or Voiceover for Mac.

ii. **Screen magnification software:** Allow users to control the size of text and or graphics on the screen. Unlike using a zoom feature, these applications allow the user to have the ability to see the enlarged text in relation to the rest of the screen. This is done by emulating a handheld magnifier over the screen.

iii. **Text readers:** Software used by people with various forms of learning disabilities that affect their ability to read text. This software will read text with a synthesized voice and may have a highlighter to emphasize the word being spoken. These applications do not read things such as menus or types of elements - they only read the text.

iv. **Speech input software:** Provides people with difficulty in typing an alternate way to type text and also control the computer. Users can give the system some limited commands to perform mouse actions. Users can tell the system to click a link or a button or use a menu item. Examples would be Dragon Naturally Speaking for Windows or Mac. Please note both Windows and Mac have some speech recognition utilities, but they cannot be used to browse the web

- **Alternative input devices:** Some users may not be able to use a mouse or keyboard to work on a computer. These people can use various forms of devices, such as:
  - **Head pointers:** A stick or object mounted directly on the user's head that can be used to push keys on the keyboard. This device is used by individuals who have no use of their hands.
  - **Motion tracking or eye tracking:** This can include devices that watch a target or even the eyes of the user to interpret where the user wants to place the mouse pointer and moves it for the user.
  - **Single switch entry devices:** These kinds of devices can be used with other alternative input devices or by themselves. These are typically used with on-screen keyboards. The on-screen keyboard has a cursor move across the keys, and when the key the user wants is in focus, the user will click the switch. This can also work on a webpage: the cursor can move through the webpage, and if the user wants a to click on a link or button when that link or button is in focus, the user can activate the switch.

- **Braille and Braille Embossers**: Braille is a system of raised dots formed into units called braille cells. A full braille cell is made up of six dots, with two parallel rows of three dots, but other combinations and quantities of dots represent other letters, numbers, punctuation marks, or words. People can then use their fingers to read the code of raised dots. A braille embosser is, simply put, a printer for braille. Instead of a standard printer adding ink onto a page, the braille embosser imprints the raised dots of braille onto a page. Some braille embossers combine both braille and ink so the documents can be read with either sight or touch.
- **Large-print and tactile keyboards:** A large-print keyboard has large letters printed on the keys. On the keyboard shown, the round buttons at the top control software which can magnify the screen (zoom in), change the background color of the screen, or make the mouse cursor on the screen larger. The "bump dots" on the keys, installed in this case by the organization using the keyboards, help the user find the right keys in a tactile way.

- **Amplified telephone equipment:** This type of assistive technology allows users to amplify the volume and clarity of their phone calls so that they can easily partake in this medium of communication. There are also options to adjust the frequency and tone of a call to suit their individual hearing needs. Additionally, there is a wide variety of amplified telephones to choose from, with different degrees of amplification. For example, a phone with 26 to 40 decibel is generally sufficient for mild hearing loss, while a phone with 71 to 90 decibel is better for more severe hearing loss.
- **Alternative mouse** for learners who have difficulty using a regular mouse (for example trackball, joystick, smaller mouse).
- **Alternative and augmentative communication (AAC)** systems for learners with complex communication needs (for example speech-generating device, a communication app for tablet devices).
- **Literacy support software** for learners where written information is a barrier to their learning and engagement (for example text to speech, speech to text, word prediction).
- **Visual supports** to assist learners to understand concepts and organise ideas, as alternative ways to deliver information to learners with low vision (for example software that magnifies text, graphic organiser, visual timetable).

Multimedia Applications

- Multimedia application is interactive software that combines several types of media at once to convey information to an audience. Different types of media that can be used include:
  - Text
  - Images (photographs, illustrations)
  - Audio (music, sounds)
  - Video
  - Animation
- Multimedia applications have brought about changes to the way people learn, work and play. They are now common in:
- E-learning both in education and the workplace entertainment
- Modelling and simulation (for example, in virtual reality)
- Conveying public information and promotional/advertising messages

- The use of different media components working together creates a more engaging and stimulating product, communicating more effectively to the end user.
- The process of combining many different types of media (including video, text and audio) with interactivity to create an application and convey information to an audience is referred as multimedia authoring.
- Multimedia applications can be delivered using a variety of mediums, e.g. through web pages, DVDs or mobile apps.

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Common elements of multimedia authoring

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Feature	Description
Video	Video footage is often used in multimedia products to explain complex topics or to demonstrate a concept or idea.
Animation	Animation will be used to show successive drawings or images. This will allow the authors to demonstrate a concept. Animation should be used sparingly in multimedia design. Animation should only add value rather than distract the user
Sound	Sound files can be used as background to help develop an immersive experience or they can provide voiceover explanations or musical accompaniment. The user should be given the option of controlling sound, (Volume and On/Off). Sound is often used in multimedia authoring to help visually impaired users.
Scripting	A scripting language can be used in multimedia authoring to create customised features. Multimedia authors write scripts that execute one command at a time to provide interactivity manipulate data and enhance the functionality of the package.
Hypertext	Hypertext is text displayed on the computer display with references (hyperlinks) to other text which the reader can immediately access.

- When creating multimedia solutions, optimizing your media files for the web allows you to achieve a balance between quality and load times.
- Fast site speed leads to a positive user experience and is often used by search engines as part of their ranking algorithms.
- Media resources that have not been optimized will increase load times and reduce site speed.
- This leads to increased rates of abandonment. This is extremely important for ecommerce websites, as slow load times will cause users to abandon the checkout process and not purchase a product or service.
- Web users expect a site to load in two seconds or less, and they tend to abandon a site that has not loaded within three seconds.

Developing multi-media application

- There are programs used for developing multimedia resources and they include:
- **Authoring tools** usually enable you to create a final application merely by linking together objects, such as a paragraph of text, an illustration, or a song.
- **Text Editor:** is a type of program used for editing plain text files. Common features include: cut, copy and paste
- **Text formatting:** A graphics program that provides a variety of special features for editing bitmap images. Common features include; Selection, Layers, Image size alteration, Crop, Undo and redo, Data transformation

- **Image Editor:** A graphics program that provides a variety of special features for editing bitmap images. Common features include; selection, layers, image size alteration, crop
- **Drawing program:** Drawing program is a computer program that allows users to compose and edit vector graphics images interactively on the computer screen.
- **Computer animation:** can be created with an animation software. Some impressive animation can be achieved even with basic programs;

- **Wave Editing Program:** Waveform programs is a computer application for audio editing, i.e. manipulating digital audio. They allow the user to do the following:
  - Record audio and store as digital audio
  - Mix multiple sound sources/tracks
  - Apply simple or advanced effects or filters
  - Conversion between different audio file formats, or between different sound quality levels
- **Video editing programs:** Video editing program is application software which handles the editing of video sequences on a computer. Common features include; splitting, add background sound, transition, crop, add title, add special effect

Benefits of using multi-media applications

Using multimedia applications affords you the following advantages:-

i. **Creativity:** It brings more life to discussions.
ii. **Evaluation**: It offers ideal learning assessment tools which are also entertaining for the students.
iii. **User-friendly interface**: they make the user's interaction with them as intuitive as possible.
iv. **Meaningful and ease of use:** They are easier to use. Users can learn, discover content and do more with it.

v. **Interactivity**: allows the user to control, combine, and manipulate a variety of media types, such as text, computer graphics, audio and video materials, as well as animation

vi. **Self-paced interaction:** Cultivates interaction between the learner and the learning content and the content with the learner.

vii. **Cost-effectiveness with greater efficiency:** Multimedia mostly requires only a one-time purchase of devices and software, which can be used unlimited times thereafter.

We need to note that there multimedia applications have some disadvantage which may include:

- **Accessibility:** Multimedia requires electricity to be operated, which may not be accessible in some areas.
- **Distracting:** It takes away the focus from the lesson due to its attention-grabbing formats.
- **Costly:** The production of multimedia is more costly than others because it is made up of more than one medium.
- **Time Consuming:** Creating multimedia requires time**.**
- **Limited Support/Compatibility:** There is a wide variety of gadget models which arouses incompatibilities of media formats.



- In this unit, we have looked at the concept of ICT integration in education.
- We have learnt that there are various ICT tools that teachers can use to enhance teaching and learning.
- We have said that for you to use the tools effective you need to learn and practice some computer basics.
- Let us continue learning how to use computers and other tools in order to gain from the wide range of benefits which accrue from use of ICTs in teaching and learning.