

INFORMATION & COMMUNICATION TECHNOLOGY IN EDUCATION

FOR SCHOOLS AND COLLEGES



**EDITED BY
DR. M.A. OMIOLA AND DR. A. SABITU**

Information and Communication Technology in Education
For Schools and Colleges

Edited by

Dr. M. A. OMIOLA
&
Dr. A. SABITU

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Foreword

In our contemporary era, Information and Communication Technology (ICT) has transcended geographical boundaries, morphing the world into a global village. Its profound impact permeates every aspect of society, providing individuals with rapid access to information and facilitating seamless sharing. Embracing ICT is crucial across all sectors, particularly in education, to ensure relevance and efficacy in this digital age. The significance of ICT in education cannot be overstated, especially as the education sector must evolve alongside rapid technological advancements to meet the needs of modern learners. Within this context, the book, 'Information and Communication Technology in Education for School and Colleges,' emerges as a vital resource for both pre-service and in-service teachers within and outside Nigeria's Universities and Colleges of Education.

Crafted with precision and foresight, this textbook equips students with the necessary tools and knowledge for proficiently integrating ICT into teaching and learning practices, both within traditional classrooms and beyond. Through a comprehensive exploration, authors delve into fundamental concepts such as the essence of ICT, distinctions between ICT and IT, roles of digital stakeholders, utilization of ICT equipment and tools, operational intricacies of ICT software, and practical applications of ICT in education. In our current landscape, characterized by a generation of digital natives, educators must be digitally inclined to effectively engage and educate today's learners. This textbook serves as a beacon, illuminating the path towards digital literacy and pedagogical excellence, empowering educators to navigate the complexities of the digital age with confidence and proficiency so that we can embark on a quest to harness the boundless potential of Information and Communication Technology in Education, shaping a future where learning knows no bounds.

SABITU, Abdulmalik (PhD)
Head, Department of Science Education
Faculty of Education,
Federal University Dutsin-Ma,
Katsina State.

Acknowledgment

We wish to express our profound gratitude to Almighty God who has given us the knowledge and wisdom to write this book titled ‘Information and Communication Technology for School and Colleges’. This is because the success of this book is credited to God alone who spared our lives and make provision for its production. We will like to appreciate Prof. A. D., Kankia, Prof. K. J. Olasehinde, Prof. I. Yusuf, Prof. M. A. Fakomogbon, Prof. M. O. Yusuf, Prof. S. A. Onasanya, Prof. C. O. Olumorin, Prof. A. A. Suleiman, Dr. U. Mamman and other senior colleagues in the field who have mentored us in the field of ICT in education. Our wives, children and our colleagues are not left out in this appreciation, may God bless and reward them abundantly for their support.

Dedication

This book is dedicated to Almighty God the giver of life and to our immediate and extended families as well as every stakeholder in education.

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List of Contributors

S/N	NAME	Chapter Contributed	Pages
1.	Dr. Ibrahim, Sukola Tambaya & Dr. Denen, Daniel Ukor Email: sbrahim@fudutsinma.edu.ng, dukor@fudutsinma.edu.ng +234-80655066439,+234-8060899910	Chapter One: Concept of Information and Communication Technology	1-8
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3.	Mrs. Aisha, Usman, & Mr. Gidado, Lawal Email: uaisha@fudutsinma.edu.ng, glawal@fudutsinma.edu.ng +234-8136472305, +234-8067272735	Chapter Three: Operation of Computer, Computer Printer, Photocopier, Computer Scanner and Public Address System for Teaching and Managerial Activities in School	25-34
4.	Isah, Suleiman, Abduljabbar & Ya'u, Nazifi Email: s.isah@fudutsinma.edu.ng, ynazifi@fudutsinma.edu.ng +234-7033096161, +234-7068796832	Chapter Four: Mastering Ms. Word Software for Teaching, Learning and Research Activities	35-48
5.	Umar, Shehu Usman & Gadafi, Abdulhadi Baraya Email: ususman@fudutsinma.edu.ng, gabdulhadi@fudutsinma.edu.ng +234-8063197737, +234-80372876602	Chapter Five: Practical Activities on ICT in Education	49-56
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	+234-8137164354, 9128923090	+234-		
7	Mr. Ahmed, Salihu & Mr. Suwidi, Salisu Email: asalihu@fudutsinma.edu.ng , ssuwidi@fudutsinma.edu.ng +234-8064990160, +234- 803728760		Chapter Seven: Internet, Search Engines and Other Google Applications for Teaching and Learning Activities	70-78
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Chapter One

Concept of Information and Communication Technology (ICT)

By

**Dr. Ibrahim, Sukola Tambaya &
Dr. Denen, Daniel Ukor**

Email: sibrahim@fudutsinma.edu.ng, dukor@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Explain the term ‘Information and Communication Technology’
2. Explain the term ‘Information and Communication Technology in Education’
3. Differentiate between Information Technology and Information and Communication Technology using Web 1.0, Web 2.0 and Web 3.0.
4. List and shed light on stakeholders in education.
5. List and explain at least 5 benefits of using ICT in education.
6. List and explain two ways of using ICT in the education.

Content

- Meaning of Information and Communication Technology
- Meaning of Information and Communication Technology in Education
- Difference between Information Technology and Information and Communication Technology Using Web 1.0, 2.0, 3.0.
- Stakeholders in Education and Types of Digital Stakeholders in Education.
- Benefits of Information and Communication Technology in Education.
- Two ways of Using ICT in Education.

Meaning of Information and Communication Technology

The three key words that can be found in the term ‘Information and Communication Technology’ are: Information, Communication and Technology. Information literal meaning refers to facts provided or learned, news or knowledge received or given, knowledge obtained from investigation, study, or instruction, knowledge communicated or received concerning a particular fact or circumstance, and knowledge gained through study, communication, research, instruction, etc. Communication simply means imparting or exchanging of information by speaking, writing, or using some other medium. It means transferring information from one place, person or group to another. Every communication involves (at least) one sender, a message and a recipient, sending or receiving information and types of communication we use on a daily basis include Verbal, nonverbal, written and visual. Technology refers to methods, systems, and devices which are the result of scientific knowledge being used for practical purposes, tools and machines that may be used to solve real-world problems and the application of scientific knowledge for practical

purposes. Literally from the meaning of the above key words, ICT can be defined as the application of method, system and devices to acquire knowledge or facts and to exchange facts or ideas between one person and group of persons.

Information and Communication Technology (ICT) refers to technologies that provide access to information through telecommunications. It covers any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form (e.g., personal computers, digital television, email, or robots). It means the convergence of audiovisual and telephone networks with computer networks through a single cabling or link system. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliance with them such as video conferencing and distance learning. It is all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions. ICT includes products that store, process, transmit, convert, duplicate, or receive electronic information such as electronic textbooks, instructional software, email, chat, and distance learning programs. It is an extension of Information Technology (IT).

Meaning of Information and Communication Technology in Education

Information and Communication Technology in Education therefore means the application or integration of electronic devices and communication network to store, process, transmit, convert and duplicate information concerning curriculum content and as well as for school management activities. It is handling instructional content delivery and all the information regarding school management using telecommunications, broadcast media and networked –based control and monitoring function. ICT in Education also means application of ICT skills or gadgets in Education or in teaching/processes which help to make the learning more meaningful and interesting.

ICT in education include the use of hardware and software electronics devices in education. Examples of ICT hardware that may be used in education include computer and other accessories, multimedia projector, electronic board, television sets, radio, mobile devices, etc. while software include all the application software which are developed to carry out specific duty or work on the computer. Examples of software are CorelDraw, Photoshop, Dreamweaver, Ms. Word, Ms. PowerPoint, Ms. Excel, Twitter, Facebook, WhatsApp and so on. Teacher needs to show positive attitude and acquire knowledge and competence in the use of these hardware and software to be able to integrate ICT in education effectively. This is necessary because, ICT in Education is an application of ICT knowledge, skills and electronic equipment including telecommunication networked in Education or in teaching/processes which help to make the learning more meaningful and interesting.

Difference between Information Technology and Information and Communication Technology Using Web 1.0, 2.0 and 3.0.

Before discussing the difference between Information Technology and Information and Communication Technology, let us explain the meaning of web 1.0, 2.0 and 3.0 so as to be able get better understanding of the difference between the two terms. Web 1.0 is the first and old web created to help researcher, consumer, or user to have access to variety of information on a particular concept on the web but they are not allowed to create or generate and air their own views on the

web. The content creators were few in Web 1.0 with the vast majority of users simply acting as consumers of content. In web 1.0, only an expert creates content that are found on the web. In short, Web 1.0 is simply an information portal where users passively receive information without being given the opportunity to post reviews, comments, and feedback.

Web 2.0 is an extension of web 1.0 that allow *any* participant to be a content creator and numerous technological aids have been created to maximize the potential for content creation. This is to say that, web 2.0 gives opportunity to the user to create or generate content and share it with other users. In web 2.0, both experts and the users are allowed to create content and share it. Web 2.0 includes social networks such as Facebook, Myspace, WhatApps and so on that allow users to create and share ideas and vital information with the general public. The social Web contains a number of online tools and platforms where people share their perspectives, opinions, thoughts and experiences. Web 2.0 applications tend to interact much more with the end user. As such, the end user is not only a user of the application but also a participant by these tools: Podcasting, Blogging, Tagging, Social bookmarking, Social networking, Social media, Web content voting, etc.

Web 3.0 is an extension of Web 2.0. It is the “executable” phrase of Word Wide Web with dynamic applications, interactive services, and “machine-to-machine” interaction. Web 3.0 is a semantic web which refers to the future. In Web 3.0, computers can interpret information like humans and intelligently generate and distribute useful content tailored to the needs of users. Web 3.0 is a term which is used to describe many evolutions of web usage and interaction among several paths. Its content is accessible by multiple applications, every device is connected to the web, the services can be used everywhere. In Web 3.0, computers can distinguish information like humans in order to provide faster and more relevant results. They become more intelligent to fulfil the requirements of users. One example of Web 3.0 is Tivo, a digital video recorder. Its recording program can search the web and read what it finds to you based on your favorites.

Using the above explanation, Information Technology is the initial use of electronic devices and telecommunication networks to create or generate content and as well make it visible on the World Wide Web or the internet for users to read, copy and save. Information Technology makes use of the web 1.0 technology which only allow experts to create content and share it but does not allow users to create their own.

Information and Communication Technology was born in the era of web 2.0 and extent to 3.0 where both the experts and the end users are given opportunity to create or generate content and as well as share it with other people on the web with the help of social media networks. Information and Communication Technology is an extension of Information Technology and it has many social media software to assist users in generating and communicating content with ease and with many multiple users.

Stakeholders in Education

In education, the term stakeholder typically refers to anyone who is invested in the welfare and success of a school and its students, including administrators, teachers, staff members, students, parents, families, community members, local business leaders, and elected officials such

as school board members. Education is the act or process of imparting or acquiring particular knowledge or skills for self-development and for the development of the society. The stakeholders play an important role in managing schools. They are the partners of the school leaders in making the schools conducive to teaching and learning. They are also responsible for the achievement of the learning outcomes through their active participation in school activities, programs and projects.

A stakeholder in education refers to one who is associated with the welfare and success of a school and its students. It also means a person who has an interest or concern in the organization at hand. So, in terms of education, a stakeholder is someone who has a vested interest in the success and welfare of a school or education system. There are two types of stakeholders which are internal and external. Internal stakeholders are the one within the school which are the teachers, students, parents, support staff, and school assistants. The External stakeholders are groups outside a school which are the one outside the school such as government (Federal and State Ministries of Education), local authority, social workers, neighbours, trainers, suppliers, community, agencies and so on.

School stakeholders are interested in the curriculum and can shape the school curriculum operation which has been designed for the students. The teacher primary role is to write the curriculum and preparing a daily lesson plan, weekly lesson plan, term plan and yearly plans. This is to ensure that the children learn all the information they need to learn to be able to move to the next year and understand the information within the next class and this is done by adapting to meet the needs of the individual within the class. Parents are stakeholders as they pay for their child/children education through their tax's so their voices are heard very loud, Parent is also a stakeholder as the teacher relies on parents to help teach their children by sitting with them to read, practice their writing and helping with homework, etc.

Love for technology: they are comfortable in the digital age because they have cell phones and use email and social media accounts with ease.

Search information on Google: they search information on Google and check their Facebook account every day.

Enthusiastic participants: they use Facebook all day long and have other social media accounts, watching YouTube and movies online as much as possible. This group is easier to reach via social media rather than cell phones. They thrive on instant communication and own a smartphone for constant access to the Web.

Digital Immigrant Stakeholders

Digital immigrant stakeholders are those who are born before 1980s and they are fearful about using technology. Digital immigrants are those who learnt to use computers at some stage during their adult life. *Digital immigrants* process information slowly, working on one thing at a time and do not appreciate less serious approaches to learning. Digital immigrants are the older crew, they weren't raised in a digital environment. The term digital immigrant mostly applies to individuals

who were born before the spread of the digital technology and who were not exposed to it at an early age. Some of the characteristics of digital immigrant stakeholders include:

Avoiders: they prefer a relatively minimal technology, or technology-free lifestyle. They do not have an email account and/or smartphones. Social media is too much for them and they do not see the value in these activities.

Reluctant adopters: they accepted technology but are not trying to engage with it, but feel unintuitive and hard to use it. They have a cell phone but do not use texting, occasionally they use Google but do not have a Facebook account (Prensky, 2001).

Conclusively, Curriculum development requires the input of different stakeholders such as parents, teachers, school heads, administration, and school boards as well as students related government officers and agencies. Therefore, the contemporary teachers must develop digital skills to be able to meet the need of the individual group among the stakeholders in education.

Benefits of Information and Communication Technology in Education

The benefits of information and communication technology are numerous and it is important for every stakeholder to get interested in the application of ICT in education. Benefits of ICT as mentioned by (Semenov, 2005) are:

1. **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 that may be at home or even in hospitals can learn.
2. **ICT brings inclusion:** The benefits of ICT in education is of 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 that 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 providing access to ICT tools and resources for those who are less fortunate.
3. **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 are possible through ICT. 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 estimate the various strategies that they will use.
4. **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. Teachers and students are given the opportunity to have in-depth search for details in any concept in their areas of specialization.
5. **ICT use develops ICT literacy and ICT Capability:** These 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.

6. **ICT use encourages collaboration:** You just have to put a laptop, iPad or computer in the classroom to understand how this works. 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.
7. **ICT use motivates learning:** Society's demands for new technology has not left out children and their needs. Children are fascinated with technology and it encourages and motivates them to learn in the classroom.
8. **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 fun and enjoyable in terms of teaching the same things in different ways. As a consequence of this increased engagement, it is said that they will be able to retain knowledge more effectively and efficiently.
9. **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.
10. **ICT integration is a key part of the national curriculum:** The integration of digital technologies or ICT is a significant part of the Nigeria Curriculum for example, and this is a trend that many global governments are taking up as they begin to see the significance of ICT in education.
11. **We live in a “knowledge economy”:** This is an economy where it is vital to have the ability to produce and use information effectively (Weert, 2005). It is a time when ICT is pervasive and permeates throughout all industries in the economy whether it may be health, education, environment or manufacturing (Moon, 2007).

Two Ways of Using ICT in Education

Teachers in the school can use ICT in the school as:

1. **ICT Assisted/Supported Instruction:** this means using ICT as a tutor or using it to facilitate instruction in the class. ICT prepared lessons can be used as an advanced organizer for students to interact with before coming for the lesson. It can also be used a remediation learning materials after the lesson.
2. **ICT Managed Instruction:** this means using ICT to carryout administrative activities within the school. When using computer to register students, type questions, write memo or letter etc., we call it ICT managed instruction.

Self-Assessment and Reflections

1. Explain the term ‘Information and Communication Technology’.
2. Explain the term ‘Information and Communication Technology in Education’.
3. Differentiate between Information Technology and Information and Communication Technology using Web 1.0, Web 2.0 and Web 3.0.
4. List and shed light on stakeholders in education.
5. List and explain 5 benefits of using ICT in education.

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Chapter Two

Information and Communication Technology Equipment Used for Teaching and Learning

By

Dr. Sabitu, Abdulmalik & Dr. Samuel, Kelvin

Email: asabitu@fudutsinma.edu.ng, kelvisamuel02@gmail.com

Objectives: By the end of this unit, students should be able to:

1. Define ICT equipment or tools.
2. Define computer.
3. List and explain the 4 components of computer.
4. List at least 3 input and output devices.
5. Differentiate between system software and application software with the appropriate examples.
6. List and explain at least 3 ICT equipment or tools used in the school for teaching and learning.

Content

- Definition of ICT Equipment or Tools Used in the School for Teaching and Learning
- Computer and its Components
- Examples of Commonly Used ICT Equipment or Tools in Schools

ICT Equipment or Tools Used in the School for Teaching and Learning

These are ICT devices, hardware, tools and other electronics machines used to create and communicate useful information in the school. Contemporary teachers need to get familiar with them so as to be able to use them to assist and manage instructional activity in the school. The tools include: desktop and laptop computers, multimedia projector, digital still camera, printer, photocopier, tablets, pen drive, public address system, cell phone, digital video camera, scanner, DVD player, LCD television and pointer.

Desktop and Laptop Computers



Computers are electronic devices that accept information and then manipulate it to produce a result. A computer is a device that can be instructed to carry out sequence or logical operations automatically via computer programming. It is an electronic device that can accept data and instructions, store and process it to produce the required result. A computer is a special multi-purpose electronic device (machine) that is capable of receiving instruction (data), storing and processing it and giving a desired result as output accurately at an incredibly high speed. Computers allow us to perform many different tasks from gaming to complicated calculations.

Components of Computer

Any computer system is made up of four parts. These parts are called 'hardware' and 'software', 'firmware' and 'people ware'.

Hardware

This is a generic term for any physical part of the computer system which can be physically touched, picked up or moved. The physical parts of a computer system are often referred to as 'hardware devices'. Hardware works with computer code to carry out jobs such as: Producing an image on a computer screen, producing sound, Moving cursers or pointers around a screen etc. Hardware has internal and external components. Internal components are the components that are found inside the computer. Examples of internal components are: motherboard, RAM, ROM etc. External components are the components that are outside the computer. Examples of external include: speakers, mouse, monitor and printers.

Motherboard



Monitor



Mouse



Scanner



Web Cam



Printer



Speaker



Flash Drive



Microphone Key Board



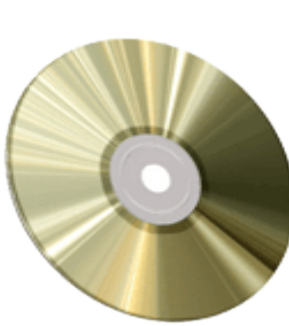
Hard Disk



Camera



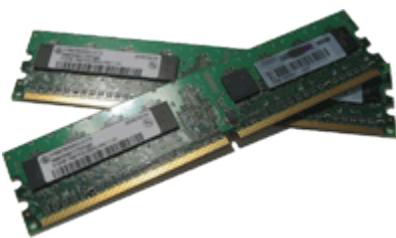
CD-ROM



Processor



RAM



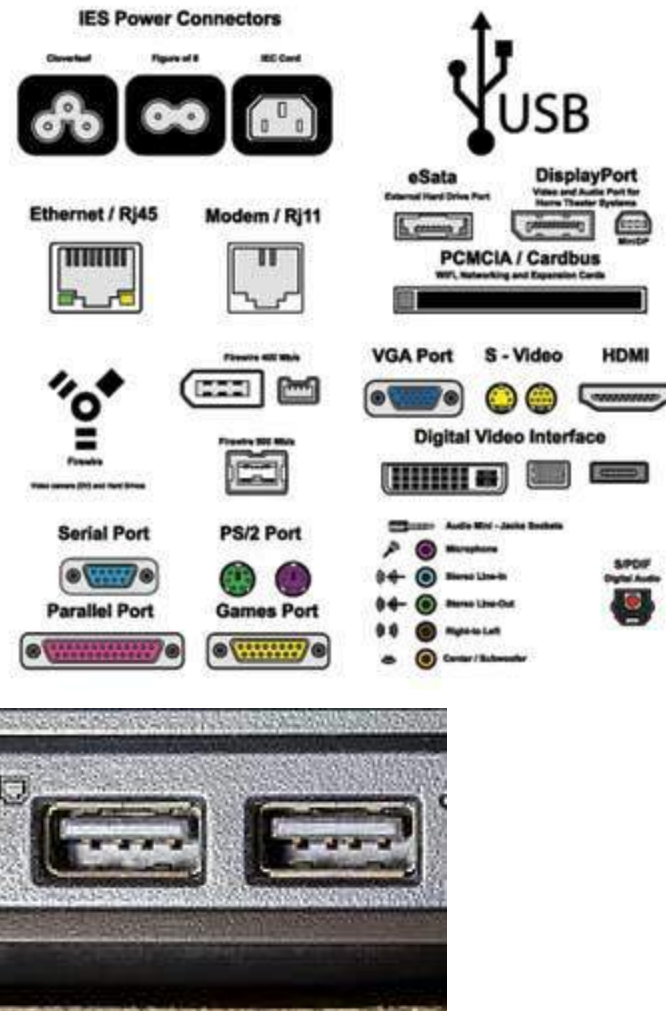
Computer Case



Joystick



Ports



Other examples of hardware include: sound card, graphics card, cooling fan, router, CD/DVD reader, CD/DVD burner and power supply cable.

Assignment

From the pictures of hardware components above, identify and state the functions of the following:

1. Microprocessor
2. Storage devices such as RAM, ROM, disk and flash drive
3. Input devices such as keyboard, mouse, scanner and microphone
4. Output devices such as monitor, projector, printer and speaker
5. Network devices such as modem, USB cable and network card

Software

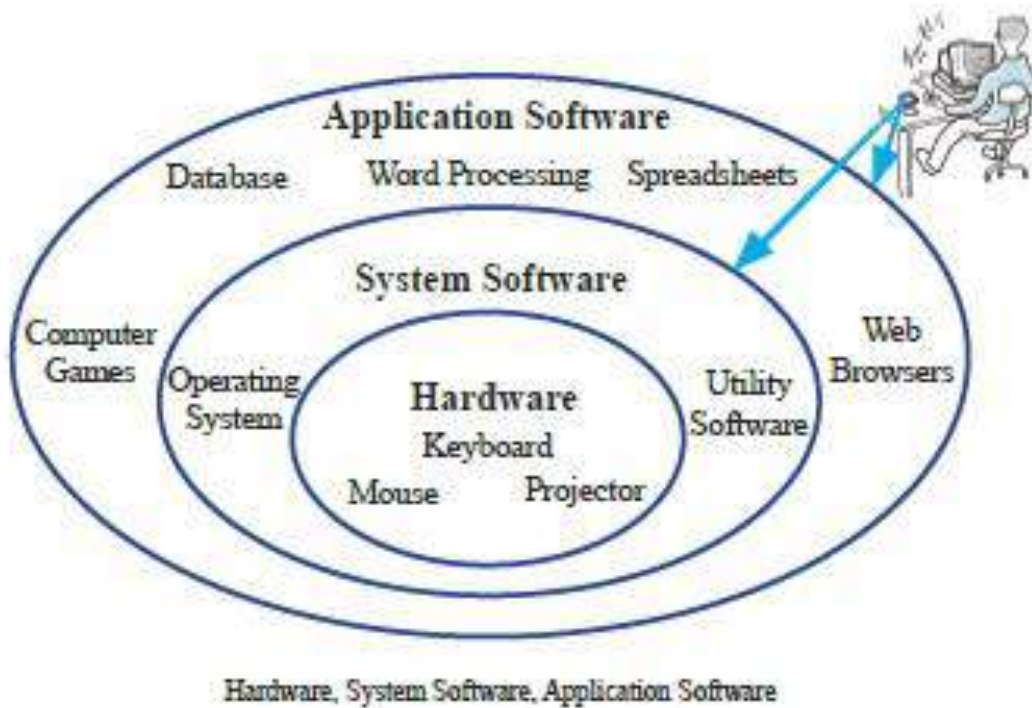
These are the instructions that computers carry out for a specific task. Software applications are the instructions that computers carry out for a specific task. It is a programme or apps that consist of all the instructions that tell the hardware how to perform a task. Software is a set of instructions written in computer code that tell the hardware what to do. There are two types of software. These are: 1. System software and 2. Application software.

System software: these are software made by the computer manufacturer and it helps to run the hardware and computer system itself. Examples are operating system and device drivers and these are pre-installed on the computer before the installation of application software.

Application software: these are the software that allow users to accomplish one or more specific task. These include software such as Ms. Offices, CorelDraw, Dreamweaver, Photoshop, web browser such as explorer, Google Chrome and Mozilla Firefox.

Examples of System Software and Application Software





The diagram above can also be used to give a brief explanation on hardware and software components of computer.

Firmware: is just part of hardware that allow it to accomplish some specific task and example include component such as video card and sound card.

People ware: these refer to the computer end users and professional in various areas of ICT such as software engineer, software developer, computer engineer, lawyer, teacher and student.

Examples of Commonly Used ICT Equipment or Tools in Schools

Computers

There are many different types of computers and people often choose which type they use based on what sort of tasks they want the computer to carry out. The types of computer include:

Personal Computer (Desktop)

This is designed to be used by one person at a time. Teachers in the school can use it to type school documents such timetable, examination questions and search information.



Laptop Computer

This is a portable computer and small enough to be put on the lap. It has an in-built battery that can help users to use it for a very long time.



Mainframe Computer

This type of computer is very large and expensive and capable of supporting hundreds, or thousands of users at the time. They are commonly used in large organizations to process huge sums of data and to control massive networks of computers.



Netbook

This is a very small and light version of laptop. It can be used for similar task the laptop is used for.



Personal Digital Assistant (PDAs)

PDAs are handheld computer with facilities including personal organizer, internet browsing, telephone call, multimedia application that allows video and audio.



Palmtop Computer

This is a computer that is very small to PDA's computer but a bit wider and it can be used to make call. It is designed to be placed on the palm of hands when using it.



Multimedia projector

This is one of the output devices used with the computer system. It comes in different shapes and colours based on the choice of the manufacturers. This replaces the use of old projectors like opaque projector, slide projector, overhead projector, etc. Projector receive signals that can be either analogue or digital, although most modern projectors only work with digital input. The signal source is usually for a computer, television or DVD player. The image from the source is magnified and projected onto a large screen.



Projectors

Digital Still Camera

This one of the input devices that can be used on the computer to communicate with the students in the class. Teachers can use it to create visuals to be used to explain some concepts in the school curriculum. Teacher can enlarge the images snapped on the computer to make it visible enough.

Images recorded by the digital still camera can be connected to computer system and can be projected through the multimedia projector for large class. Parts of digital still camera include view finder, lens, shutter, hot shoe, battery, memory card terminal and charging point.



Printer

Printer is also parts of output devices that can be used with the computer system. After typing the document on the system, teachers can print out the document for students to see. Teaching materials are printed by the aid of printer. The printing document can either be in black and white or coloured. Some printer can take A4 paper while some can print document on A3 paper. Teachers need to learn how to use it well so as to ease his/her job.



Photocopier

This is one of the output devices use in duplicating the documents printed out from the system. This machine can be used to increase the number of prints to any number desired or needed for lesson. It can also copy documents on both A4 and A3 papers. Some of the photocopier can produce coloured documents too. Teacher needs to learn how to use it so as to be able to use it when the need arises.



Tablets

This one of the handheld computers that can be used by teachers to search information and as well communication both formal and informal messages.



Pen /Flash Drive

This is a small storage device shaped like a pen with built-in data storage that connects to a computer by a USB port. An example of a pen drive is a pen with a hidden USB port for saving data.



Public Address System

This is a device used in addressing large class or when addressing the students on the assembly ground. The use of this device makes the teachers' voice to be audible enough when disseminating instruction.



Cell phone

This is one the devices used to transmit verbal messages to students and teachers over a long distance. Through this device instruction may be given to the students even when they at home during the holidays.



Digital Video Camera

This device can be used by both teachers and students to capture live presentation of instructional content. Live instructional content can be recorded by the teachers, students and any other professionals invited to talk on a given concepts. The recorded presentation can later be previewed and used for remediation.



Scanner

This device can be used to scan images and any other related documents. The scanned documents can be sent electronically to recipients or manually by printing them out to be used.



DVD Player

This device can be used by teachers to play instructional content or live presentation recorded. This is used to play and replay presentations from teachers or other professionals. This device can be connected to multimedia to project the presentation for large audience.



LCD Television

This device works like multimedia projector. It serves as the output device. Teachers can use it in place of multimedia.



CPJ Computer Pointer

This device is used together with laptop and multimedia projector. The pointer is used to control the information on the multimedia screen.



Web Browser

A **web browser** (commonly referred to as a **browser**) is a software application for accessing information on the World Wide **Web**. When a user requests a **web** page from a particular website, the **web browser** retrieves the necessary content from a **web** server and then displays the page on the user's device. The examples include Mozilla Firefox, Google Chrome, Microsoft Internet Explorer and Opera.



Card Reader

This is another input device used to scan cards. It works like the digitizer.



Card Reader

Light Pen

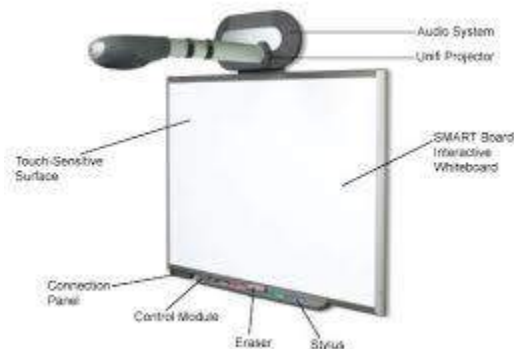
Light pen is a device, which looks like a pen. It is sensitive to light. It is used by pointing the pen at a point on a visual display unit and to draw on the screen by simply touching the light pen on it while moving along.



Smart Board

Interactive whiteboards are large writable display screens (usually in white color) that can be connected to a computer, allowing its screen to be displayed on the board through a projector. They are also sometimes referred to as **electronic interactive whiteboards**. These interactive whiteboards are typically **mounted on a floor** stand or hung on the wall. The main idea of using **interactive boards** is to deliver visual presentations on various subjects by actively engaging a group of people or learners. The advanced technology used in interactive whiteboards offers a better replacement for the existing traditional whiteboards or conventional flip charts. Today, a variety of branded interactive whiteboards are available. Some of the popular brands include SMART Board, ActivBoard, eBeam, Mimio, and Webster. To control the computer while writing on an interactive whiteboard, the board must be first calibrated with a writing device,

usually a stylus. Apart from this key device, there are host of peripherals associated with interactive whiteboard usage.



Self-Assessment and Reflections

1. Define ICT equipment or tools.
2. Define computer.
3. List and explain the 4 components of computer.
4. List at least 3 input and output devices.
5. Differentiate between system software and application software with the appropriate examples.
6. List and explain at least 3 ICT equipment or tools used in the school for teaching and learning.

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Chapter Three

Operation of Computer, Computer Printer, Photocopier, Computer Scanner and Public Address System for Teaching and Managerial Activities in School

By

Mrs. Aisha, Usman, & Mr. Gidado, Lawal

Email: uaisha@fudutsinma.edu.ng, glawal@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Explain how to boot a system, close existing programme on a system and how to shut down a system.
2. Explain how to use a computer printer.
3. Describe how to use photocopier machine.
4. Explain how to use a computer scanner.
5. Describe how to use a public address system.

Content

- Operation of Computer
- Operation of Computer Printer
- Operation of Photocopier Machine
- Operation of Computer Scanner
- Operation of Public Address system

Operation of Computer

Starting your computer

System can be started or booted up in two ways:

1. Booting the computer from hard disk (Drive C)
2. Booting from the floppy diskette (Drive A).

When you re-start or reset a computer without turning it off by pressing a special reset key or series of keys it is termed as **Warm Booting**. It closes the memory and reloads the operating system.

Starting Computer from C Drive

Ensure thorough connection of the main switch and other devices like stabilizer, UPS and so on. Remove any floppy diskette from *drive A* and turn the *Central Processing Unit (CPU)* **ON** first and then the **Monitor** (where power to the Monitor is form the CPU). The system starts booting

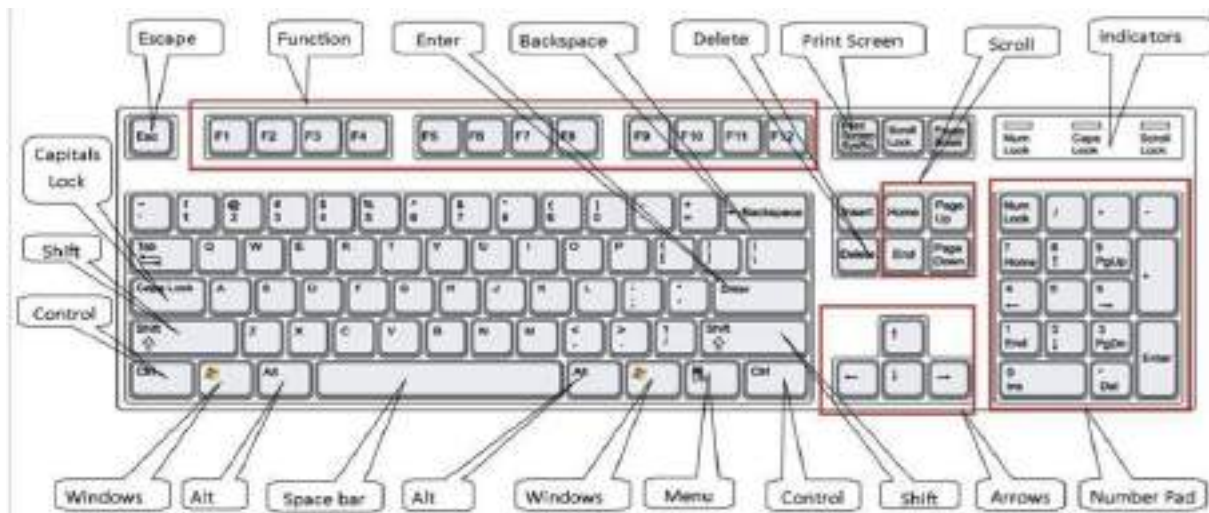
from the hard disk, this runs **BIOS** program – built in self-test which scroll fast information about the system settings, this may prompt for command either from the keyboard or mouse to complete the booting process, thereby displaying either **DOS command prompt** with C drive – **C:/ >** with flashing underscore next to it called **cursor** which indicates where the command you type will appear, or open up **the Window Desktop** depending on the configuration mode (i.e. using Window 95, 98 and NT). However, where the monitor is connected directly to the socket, you should switch on the monitor first to enable you read messages displayed during starting. Other equipment should also be turned on to prevent power surge to the system unit.

The Uses of Computer Keyboard

The Keyboard is one type of input device used to enter information into computer.

The computer keyboard is not so much far away from the typewriter keyboard. It has 101/102 keys divided into five groups – Typing keys, Special keys, Function keys, Dedicated Cursor keys and the Numeric key pad.

When a key is pressed, its corresponding character will be displayed on the screen.



BASIC programming is used for listing of programs. Also in WordPerfect, F2 is used for search while F3 is used to switch to documents.

The shift key:-The shift key which cannot be used alone needs to be used with some other keys to perform certain operations. It can be used to enter both lower and upper case characters. It allows the use of upper special characters and symbols on the number and symbol keys.

The Control key: - It is also used in conjunction with other keys on the keyboard to generate an internal code in the system. For example, CTRL + F8 will select fonts in word perfect. It does not perform any Function when used alone.

The ALT key: - This is the alternate key. It is also used in conjunction with other keys to issue commands. **The Shift + Ctrl and Alt keys cannot lock**, so when using them, you need to simultaneously press the other keys.

The CAPS lock key: - It is a toggle key (i.e. on/off) used to shift from the lower-case letter to the upper case letter and vice versa. When the caps lock indicator light is on, all characters are in upper case, and when the light is off, the characters return to the lower case. *For you to use shift key properly, the cap lock must be off.*

The ENTER key: - The ENTER key, which is similar to the carriage in typewriter, is also called RETURN key or Carriage. When pressed, it tells the computer to execute a command. It can also perform some other functions in word processing program.

The SPACE BAR: -The space bar creates space commencing from the left to the right.

The BACK SPACE key: -The key deletes a character to the left of the cursor, moving, if there is any text to fill up the space created.

The TAB key: - The key is similar to the typewriter tab. It shifts the cursor *eight* spaces to the right of current position.

The ESC key: - **In DOS**, it means the current line will be deleted. When pressed, it can have other meanings in other programs. It may exit the current activity and returns you to the previous one. It also enables you to abandon an error condition and resume the activity prior to it.

The CTRL + TAB: - The pressing of the two keys reverses the movement of the cursor to the left.

The Numeric Key Pad: - This is located at the right-hand side of the keyboard. A close look at it shows that most of the keys on the left side of the keyboard are present there. The default is cursor control. The numeric mode is invoked by pressing the Num lock key which is also a toggle switch.

Delete, Page Up and Page Down, Home and End Keys: -

***Del key:** This key deletes the character under the cursor. If you hold down the delete key, it keeps deleting characters from the right until you release the key.

***Page Up and Page Down keys:** -Page Up keys moves the screen up by one while Page Down moves the screen down by one.

***Home and End keys: -** Home keys move the cursor to the top left position of the screen while the end keys move the cursor to the end of the line.

***The Arrow keys: -** The Arrow keys move the cursor in the direction indicated by the arrows.

***The Insert key:** This key allows you to insert new characters. In the insert mode, anything you type will pushover existing characters on the screen to the right.

The CTRL-NUMLOCK key: - When these keys are used together, information scrolling past on the screen is paused. On some machines, there is a pause key meant for this purpose.

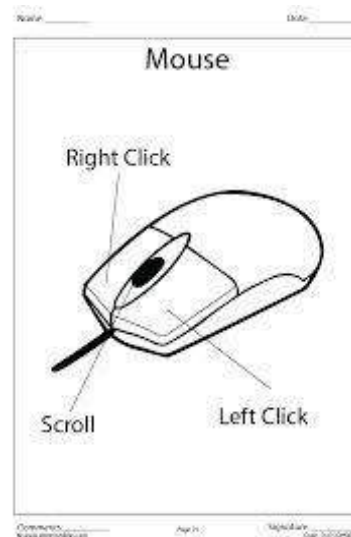
The CTRL+SCROLL LOCK key: - When these keys are used together, it causes an executing program to stop.

Command	What it Does
Programs	Displays a list of programs you can start
Documents	Displays a list of documents that you have opened previously
Settings	Displays a secondary menu including control panel, printer folders, taskbar commands, folder option, active desktop and windows update
Find	Enables you to find a folder, file, shared computer, or mail message
Help	Starts Help. You can then use Help Contents, Index, or other tabs to find out how to do a task in Windows
Run	Starts a program or opens a folder when you type an MS-DOS command
Shut Down	Shuts down or restarts your computer or logs you off

Depending on your computer and the options you have chosen, you may see additional items on your menu.

Using the Mouse

The mouse makes most of the actions you perform with a keyboard easier. It is a pointing device that shows like a pointer on the screen of your computer. When you slide over a flat surface such as a Mouse Pad in the direction you want, it can choose whatever you want to select on the screen. At times you may not have enough space to slide your mouse, all you need to do is lift it up and relocate it comfortably on the pad. The mouse performs the following six basic actions.



S/N	Action	What you Need to Do
1.	Point to an item	Move the mouse to select the item i.e. the pointer rests on the item.
2.	Click an item	When you point to one item on the screen, quickly press and release the left mouse Button
3.	Right Click an item	Select the item with the pointer and then quickly press and release the right mouse

		button. This will display a shortcut Menu. You can then choose from a list of commands as appropriate to the item.
4.	Double-Click on item	Place the pointer on the item and then quickly press and release the left mouse button twice.
5.	Drag an item	Point to the item, hold down the left mouse button then move the pointer. The item moves.
6.	Drag and drop an item	Point to the item and hold down the left mouse button as you move the pointer. When you reach where you want to drop the item, release the mouse Button.



How to Shut Down the Computer System

After finishing using the system. The user should close the programmes running on the system by clicking X at the upper right-hand side of the computer. Thereafter go to start menu at the left side bottom the computer. Then, click the power button. The 3 options will be displayed on the screen. Choose shutdown if you intend to close the system. Select restart if you intend to restart

the system and choose sleep or hibernate if you intend to keep system running internally without shutting down the system.

Operation of Computer Printer



1. Plug in the **printer's** power cable and make sure it's turned on.
2. Connect the included cable (usually a **USB** cable) from the **printer** to the **computer**.
3. On your **computer**, locate the **Printer settings**. ...
4. Look for the option to add a **printer**, then follow the instructions that appear.
5. Now it's time to try **printing** something.

Setting up your Printer on your Android device

1. To begin, go to **SETTINGS**, and look for **the SEARCH** icon.
2. Enter **PRINTING** in the search field and press **the ENTER** key.
3. Tap on **the PRINTING** option.
4. You will then be given the opportunity to turn toggle on “Default **Print Services**”.

Note:

Most **Android** phones have **printing** capabilities built in, but if your device isn't giving you an option to **connect**, you'll have to download the Google Cloud **Print** app. **Windows**

1. First, open Cortana and type in **Printer**. ...
2. Select **Add a Printer** or Scanner. ...
3. Now you should be able to **print** with ease.

How to Use a Photocopier Machine?

How to Use a Photocopier?



1. Turn on the Photocopier. The first step you will take in using the photocopier is making sure it is powered on a plugged up.
2. Put Your Document on the Copier. The next step is placing your document on the copier.
3. Select the Number of Copies.
4. Select the Color Preference.
5. Select Paper Size.
6. Press the Copy Button.

Networking your Photocopier

1. Turn the photocopier off.
2. Connect the Ethernet cable to the LAN port on the connection panel of the photocopier.
3. Connect the other side of the cable into one of the open ports on your network switch.
4. Turn on the photocopier.
5. Turn on your computer and connect to your network.

How to Scan a Document?

A scanner is a device usually connected to a computer. Its main function is to scan or take a picture of the document, digitize the information and present it on the computer screen. The instructions for this scanner are specific to a brand and may vary for other brands and products. Scanning a document or photo can be as simple as pressing the button to start the scan and saving it onto your computer.



How to Use a Scanner

1. Switch on the Scanner by pressing the power button on your scanner to turn on your scanner.

2. Place the Document on the Paper Feeder

3. Take the document or picture you want to scan and place it on the paper feeder.

Note: There are some scanners that have a glass bed. Lift up the top cover and place the document on the glass bed. Then, close the top cover.

4. Remember to place the paper that has the information or the picture you want to scan, facing down, i.e., the blank side of the paper should be facing up.

5. Once you place the document on the paper feeder, you will notice a message on the display screen on the scanner that says Document Loaded

6. Scan the Document

7. Look for the “Scan” or “Start Scan” button on the scanner. Then, press that button to start scanning your document.

8. You will notice a message on the display screen on the scanner that says Waiting for pc.

9. Start the Scanning Program

10. Once the scanning is complete, a dialog box opens up asking if you would like to scan another page. If you want to continue scanning another document, then click Yes. Repeat the scanning steps.

Note: For Windows* 7 users, click Import. You will notice the scanned image is automatically saved in your system’s default picture library with the current date as folder name. If you do not wish to scan any more documents, click No.

11. Save Your Scanned Document as a File. After you scan your document, a Save dialog box opens up.

Note: For Windows* 7 users, the scanned image is automatically saved in your system’s default picture library with the current date as folder name.

12. Select a location in your computer where you want to save the scanned document. Type an appropriate file name for the scanned document.

13. Select an appropriate file type from the given list.

Note: The *.jpg file type is most commonly selected.

14. Click Save.

Public address system

A public address (PA) system is for amplifying the human voice. In its simplest form, it has a microphone, mixer, and loudspeakers. It all starts with the microphone (mic), which converts sound pressure to voltage. That means when you speak or sing into the mic, its magnetic force outputs a small amount of voltage.



1. Explain how to boot a system, close existing programme on a system and how to shut down a system.
2. Explain how to use a computer printer.
3. Describe how to use photocopier machine.
4. State the procedures to use a scanner.
5. Itemize the steps to be followed in using public address system to aid your lesson.

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Chapter Four

Mastering Ms. Word Software for Teaching, Learning and Research Activities

By

Isah, Suleiman, Abdul-Jabbar & Ya'u, Nazifi

Email: s.isah@fudutsinma.edu.ng, ynazifi@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Explain how to operate Ms. Word software.
2. Identify at least 2 menus available in Ms. Word.
3. Type and edit using Ms. Word interface
4. Print Ms. Word document typed

Content

- Operation of Ms. Word Software.
- Identification of Ms. Menu
- Type and Edit Ms. World Document Typed
- Print Ms. Word Document

Microsoft Word Processing Package 2007

Word Processing is the ability to manipulate alphabets and numbers to form words, sentences and documents using computer as a device. It is very important that every teacher should learn how to use one of the Word Processing software to be able to write letters, memos, reports and other documents in and outside the school.

Opening Microsoft Word

Before you get started with Microsoft Word (commonly referred to as MS Word), you will need to locate and open it on the computer. It may be on your desktop.

From the computer desktop:

1. Double-click on the MS Word icon →



Go to the Start Menu if the MS Word icon is not on the desktop:

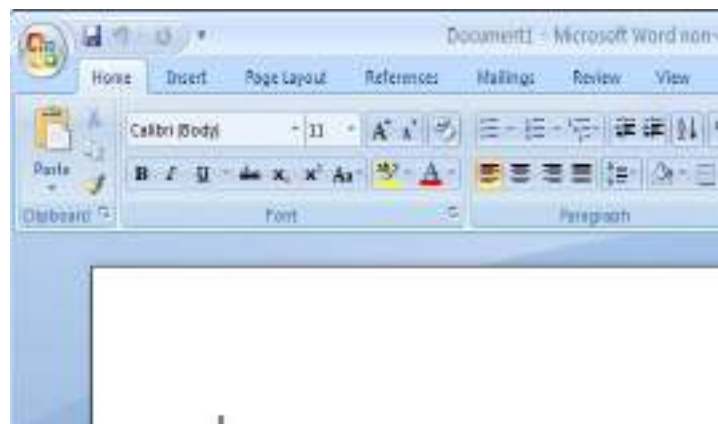
1. Click —**Start** —**Programs** —**Microsoft Word***

* Occasionally, Microsoft Word will be in a folder called "Microsoft Office" or something similar – this will make one more step between "Programs" and "Microsoft Word" in the diagram above.

MS Word will open a blank page called "Document 1."

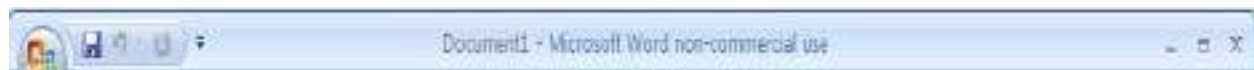
This is an image of the upper-left corner of MS Word.

This box features two important bits of information: which file you are currently working on (in this case, "Document 1" since we have not yet renamed it) and which program you are using (in this case, "Microsoft Word.")



This box shows a blinking cursor, ready for your commands.

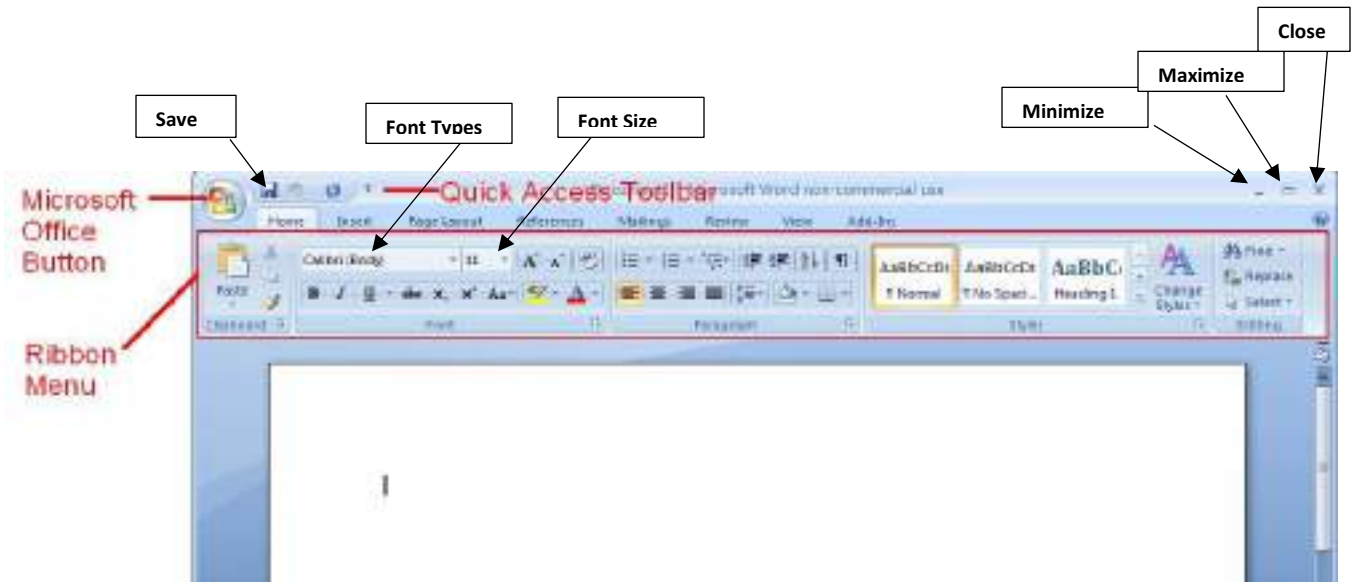
The Title Bar



This is a close-up view of the Title Bar, where file information is located. Notice the three buttons on the right side, controlling program features.

The Ribbon Menu System

The **tabbed Ribbon menu system** is how you navigate through Word and access the various Word commands. If you have used previous versions of Word, the Ribbon system replaces the traditional menus. Above the Ribbon in the upper-left corner is the **Microsoft Office Button**. From here, you can access important options such as New, Save, Save As, and Print. By default the **Quick Access Toolbar** is pinned next to the Microsoft Office Button, and includes commands such as Undo and Redo.



The Microsoft Office Button

The **Microsoft Office Button** appears at the top of the Word window. When you click the button, a menu appears. From this menu you can create a **new** document, **open** existing files, **save** files in a variety of ways, and **print**. You can also add security features, send, publish, and close files.

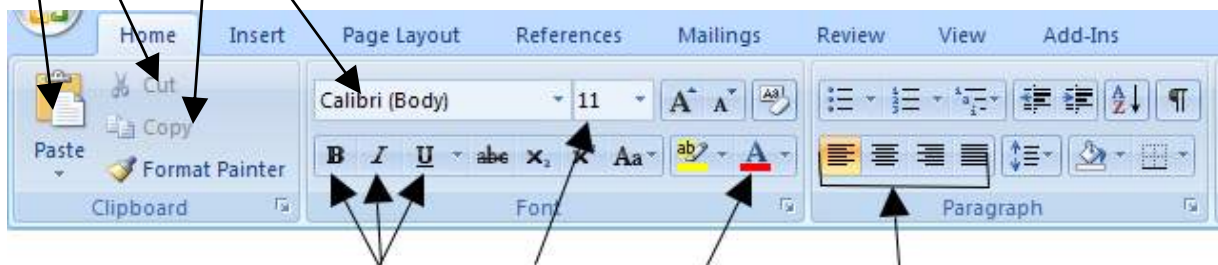


Home Tab Toolbar

Toolbars provide "shortcuts" to commands also found in the Menu Bar. Toolbars are usually located just below the Menu Bar and exist to offer another way to perform the same task.

The most commonly used commands in MS Word are also the most accessible. Some of these commands are:

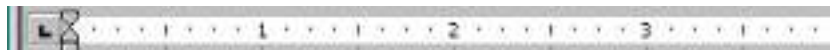
Paste | Cut | Copy | Font



Font Style | Font Size | Font Colour | Text Alignment

The Home Tab Toolbar offers options that can change the font, size, color, alignment, organization and style of the text in the document. For example, (starting from the left side of the Toolbar) the "Calibri" indicates the FONT of your text, the "11" indicates the SIZE of your text; and so on.

The Ruler



The ruler is found below the Ribbon. The ruler tells you where you are on the page, along with the dimensions of the overall document. Just like a real-world piece of paper, the default setting is 8.5 x 11 inches, and margins have been incorporated for you. Similar to most options in MS Word, this is entirely customizable and the user can create document of any dimension.

The Keyboard



In order to use MS Word effectively, you must input commands using both the mouse and the keyboard. The above image of a keyboard may closely resemble (if it is not identical to) the keyboard in front of you; learning just a few certain keys will help to improve your efficiency in typing as well as present you with more options within the program. The following is a list of commonly used keys that have special functions in MS Word (key functions can change depending on which program you are using):

1. **Backspace:** This key deletes backwards as you type.
2. **Delete:** This key deletes forwards as you type.
3. **Shift:** This key, when pressed **WITH** another key, will perform a secondary function.
4. **Spacebar:** This key enters a space between words as you type.
5. **Tab:** This key will force the cursor to indent, or jump forward 10 spaces.
6. **Caps Lock:** This key will present the capitalized version of each letter key.
7. **Control (Ctrl):** This key, when pressed **WITH** another key, performs as shortcut.
8. **Enter:** This key executes a command (pressed in MS Word, it begins a new line).
9. **Number keypad:** This is a redundant keypad existing only for user preference.
10. **Arrow keys:** Like the mouse, these keys are used to navigate through the document.

Simple Tasks in Microsoft Word

Typing Text

To enter text, type just as you would if you were using a typewriter.

To capitalize a letter, hold down the **SHIFT** key while typing the letter. Or, press the **CAPS LOCK** key on the left-hand side of your keyboard. You will have to press the **CAPS LOCK** key again—once you are done capitalizing—to remove the lock.

You do not need to press **ENTER** to start a new line—Microsoft Word will automatically wrap your sentence at the end of the line.

To move the cursor from its position at the end of the your sentence to anywhere else on the page, use the mouse or the arrow keys to move the cursor where you want the letters or spaces to be (left-click the mouse to place the cursor) and then type what you want to add—the text will adjust to include it.

Press **ENTER** to start a new paragraph (this is sometimes called a “carriage return”).

PRACTICE - Type the following text in your document:

Dear Diary,

Today was a good day. I got a promotion at work. My boss says it is because I'm a SUPER salesperson! The whole office went out to lunch to celebrate.

Deleting Text

While typing a document, sometimes you will make a mistake. Unlike a typewriter, MS Word can delete text on the screen and leave no trace—it is as if you never typed on the page in the first place.

There are two different buttons on the keyboard that will allow you to erase text. They are the “Delete” key and the “Backspace” key (#s 1 and 2 on the keyboard map on page 7). The “Backspace” key deletes words to the LEFT of the cursor, and the “Delete” key deletes words to the RIGHT of the cursor.

This is my crea | tive sentence.

BACKSPACE □DELETE

Let's assume that the vertical line dissecting the word “creative” in the example above is our cursor. Pressing the “Backspace” key will erase “a,” “e,” “r,” “c,” and so on, moving LEFT. The “Delete” key will erase “t,” “i,” “v,” “e,” and so on, moving RIGHT.

To delete a whole chunk of text at once, left-click with your mouse and drag to highlight a section of text. Then simply press “Backspace” or “Delete” and all of the highlighted text will disappear!

PRACTICE

Delete the following sentence from the text you typed earlier: My boss says it's because I'm a SUPER salesperson!

Undoing and Redoing

The **UNDO** and **REDO** features of Microsoft Windows applications are great tools to rely on (especially in MS Word). The program will keep a list of the last 25 commands that you have performed, and it allows for taking "one step" backwards in order to erase what you have just done.



Click on the **UNDO** button in the Quick Access Toolbar to go back one step (up to 25).



Click on the **REDO** button in the Quick Access Toolbar to go forward one step (up to 25).

PRACTICE

Undo your previous deletion so that your sentence reappears in the paragraph.

Formatting Text

Changing the look of what you've written is called "formatting." This can include changing the text style, size, color, and more.

This is **a** sentence that features many different fonts.

This is a sentence that features many different sizes.

From the Home Tab, **the "B" will make your text BOLD**, *the "I" will put it in italics*, and the "U" will add an underline to your text. These features do not have to be used independently of each other either—in other words, you can bold, underline, and italicize a *single piece of text*.

The alignment of the text can be altered using the buttons with the horizontal lines on them. You can align text

To the LEFT, To the CENTER, and to the RIGHT.

In order to apply certain stylistic or other changes to text, you must first **Highlight** the text. This is a common procedure in Microsoft Windows applications, and, because it is so useful, it is a skill worth practicing.

You can also change the font color by clicking on the appropriate buttons in the Formatting Toolbar. Experiment and remember—you can always start over with a fresh, new document, so don't worry about making mistakes! If you do, however, there is always the incredible "UNDO" tool.

Practice

Use the alignment button to center the line with 'Dear Diary,' on it. Change the font color to your favourite colour. Highlight the rest of the sentences to select them. Now change the font to Times New Roman, font size to 14 and italicize it. Your document should now look similar to below:

Dear Diary,

Today was a good day. I got a promotion at work. My boss says it's because I'm a SUPER salesperson! The whole office went out to lunch to celebrate.

Spelling and Grammar Check

One benefit of using a computerized word processor is its ability to recognize, change and give advice about your writing. MS Word has utilities that can check your spelling and grammar against a master database, and can offer advice on a variety of different grammatical styles.

MS Word automatically underlines any words that it does not recognize in red, assuming that they are not spelled right, and green if it does not recognize the grammar, assuming that the sentence does not make logical sense. For example:

The quickly brown fox jumps over the lazi dog.

In this case, "quickly brown fox" should read "quick brown fox" and "lazi" should be "lazy." If you right-click on the word, a menu will pop up with options, including "Ignore" if you do not want help on this specific phrase.

You can also choose to add words to the MS Word database, if you are going to be typing them consistently and do not want to flag each one – this is especially useful for names of people as MS Word will interpret these as misspellings.



The spelling and grammar tools can be found out the **Review Tab**.

Copying, Cutting, and Pasting Text

In MS Word, you can **Cut** or **Copy** text from one area of the document and save that text to be **Pasted** elsewhere (these commands are found on the **Home Tab**).

When you **CUT** text, you actually delete it from where you took it, as opposed to **Copying** it, which makes a copy of your selection.

When you **Cut** or **Copy** text, it is stored on the **Clipboard**. The Clipboard is a tool in MS Word that stores cuts and copies of your work, to be pasted in other places in the document. Once your selection is on the **Clipboard**, you can **Paste** it as many times as you want!

Cutting a selection will also make a copy of it, just in case you want to **Paste** it elsewhere.

To **Cut** a selection, first highlight it. Then, click on the **Cut** icon from the Home Tab.

The highlighted text will disappear, as you have just cut it out, but a copy is now on your clipboard, and MS Word is waiting for you to paste it somewhere else.



To **Paste** this cut selection, place your cursor where you want the selection to go. Click on the **Paste** icon from the Home Tab toolbar, and it will pop the text into place, right where you have your cursor.



To **Copy**, simply follow those same steps, replacing the **Cut** command with **Copy**.

The **Copy** command will not alter your original selection at all, as it simply makes a copy of the selection without changing or deleting it in any way.

Practice

Highlight the first sentence of your paragraph “Today was a good day.” Select COPY. Move the cursor to the end of your paragraph and press enter a couple of times to move the cursor further down the page. Now press PASTE. Your document should now look similar to below:

Dear Diary,

Today was a good day. I got a promotion at work. My Boss says it’s because I’m a SUPER salesperson! The whole office went out to lunch to celebrate.

Today was a good day.

Inserting Clip Art Images:

Clip Art is a collection of cartoon and computer-generated images that cover a broad array of commonly needed icons and pictures. These include business, holiday, nature, entertainment, academic and other themes, along with standard bullets and symbols.

To insert a clip art picture into a Microsoft Word document, you will first need to place your Cursor (left-click) where you wish to insert you picture in your document.

Then, from the Insert tab on the Ribbon, click on “Clip Art.”

An **Insert Clip Art** Window will appear. You can search for a word related to the type of picture you are looking for.



Navigate the window and make a selection. It will appear in your document where the cursor is. To resize, grab one of the corners of the image by left-clicking and holding – drag it to size and fine tune the placement.

You can move the image to another place in the document by left-clicking and holding on the center of it; drag it to its desired location. More options, such as aligning the image with text (or special effects like wrapping text around or through an image) can be found by right-clicking the center, and choosing the Format Picture option from the menu.

Occasionally, images are not as they seem. In other words, it may look one way in the preview, but come out far different in the document.

To resize your image, grab one of the corners of the image by left-clicking and holding—drag it to your desired size and fine-tune the placement.

The cursor will change from a typing icon to a double-arrow when it can be used to resize the image. Drag the corner toward the upper-left corner of the screen, and the image will grow. Drag toward the bottom-right, and it will shrink.



You can move the image to another place in the document by left-clicking and holding on the center of it; drag it to its desired location. More options, such as aligning the image with text (or special effects like, wrapping text around or through an image) can be found by clicking on the picture, and then choosing the Picture Tools tab.

You can also insert a photograph or other multimedia from your files using this same process.

On the **Insert Tab**, click on **Picture** and locate the files that you want to include.

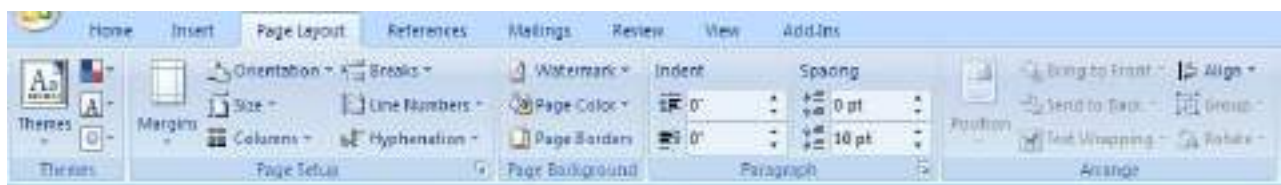
Practice

Place your cursor under the sentence “Today was a good day” and navigate to the Insert Clip Art window. Search for ‘computer’. Pick an image you like and click it to insert it into your document. Take a minute or two to resize the image to a size you like

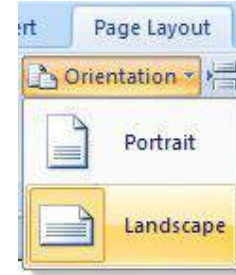
Changing Views and Overall Look:

There will be times in which you create documents that don't fit on a standard piece of paper in its normal dimensions (8.5" by 11").

Click on the **Page Layout Tab**.



From this menu, you can alter the margins, the width, height, orientation (portrait = 11" long; landscape = 11" wide), as well as choose from a variety of templates different types of paper and document styles that come with the program.



To change the orientation of your page, click on the **Orientation** button. Click on Landscape from the drop-down box that appears. Your document should now be in a landscape position. If you wish to return to a portrait orientation, go through the same steps, clicking on the **Landscape** option instead of **Portrait**.

Your document should now be in a landscape position. If you wish to place it back in a portrait position, go through the same steps but instead of clicking on the **Landscape** option, click on the **Portrait** option.

Anything you change from the View Tab **will not** change the way your document prints out. So if you want your text to be bigger when you print out, make sure to change the size of the font instead of the zoom.

Practice

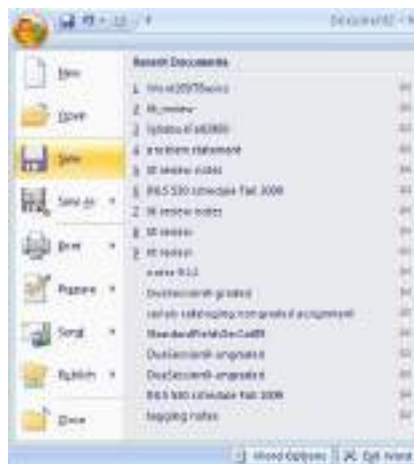
Change the orientation of your document to Landscape.

Close Microsoft Word

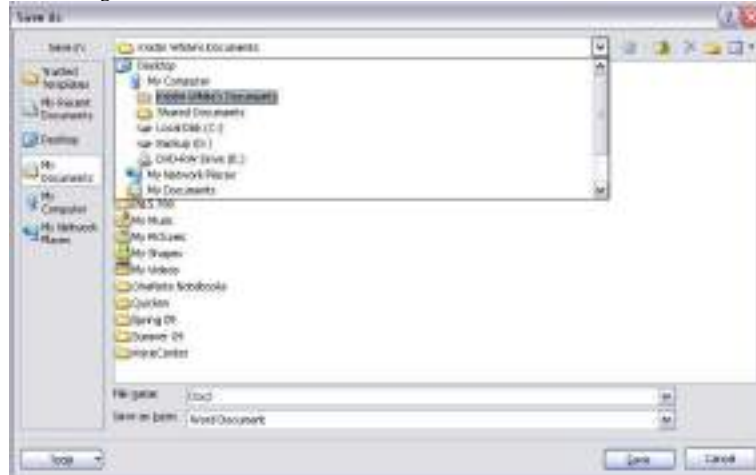
Saving Documents:

When you finish typing and want to leave the computer, it is important to save your work, even if you are printing a hard copy. To save your work in MS Word, it is essential to know **WHAT** you are trying to save and **WHERE** you are trying to save it.

Click on the **Microsoft Office Button** —then click **Save** to get started.



You can change the file name that Word has automatically chosen just by typing a new one in the “File name” box at the bottom of the window that appears.



MS Word will automatically save your document with the suffix (“extension”) “.docx”—this simply lets your computer know that the file needs to be opened in Word 2007. You do not have to type this extension name—just highlight the words (the default is “Document1”) and write a new file name.

As evidenced in the picture above, there are many places where you can save a file, some of which are portable and some of which are immobile.

The My Documents folder on your computer’s hard drive is a good place to store your documents. A blank CD (compact disc) is a great portable storage device and can contain a LOT of data. Another good option is a USB key/thumb drive/flash drive.

Due to differences between older versions of Word and the new 2010 version, older versions of Word cannot open documents saved in Word 2010 with the suffix “.docx”. If you think you might want to share your document with someone who has an older version of Word on their computer, you can save your document in a format that is compatible with older version, like “.doc”.

To do this, click on the Microsoft Office button, click Save As, then choose Word 97-2003 Document.

Follow the normal steps above to name your document.

It is important to note that every following command of SAVE will overwrite your original file, creating the most up-to-date version. To save multiple versions of your document, you will need to save copies with slightly different names.

If you want to save the changed document without destroying the original one:

If you want to save the changed document without destroying the original one:



Click on the Microsoft Office Button and then click “Save As,” giving your document a new file name, different from the original.

If you want to open up a saved document in Word: Click on the Microsoft Office Button, then click Open.

Locate where the file is located on your computer and double-click on the file name of the document you want to open.

Printing Documents:

To print your Ms. Word Document:

Click on the Microsoft Office Button, then click Print; a print preview and print options will appear.

Click OK for your document to start printing.

As with all commands in MS Word, you can make changes along the way. From the Print menu, you can alter how many copies will be made, in what order the pages will be printed, etc.

As with all commands in MS Word, you can make changes along the way. From the Print menu, you can alter how many copies will be made, in what order the pages will be and much more.

Finding More Help:

You can get help with MS Word by clicking the **Question Mark Button** located in the top right corner of the window.

Tutorials are also available on the Internet. Some of them come straight from Microsoft! You can also always come and ask quick questions at the library.

Closing the Program:

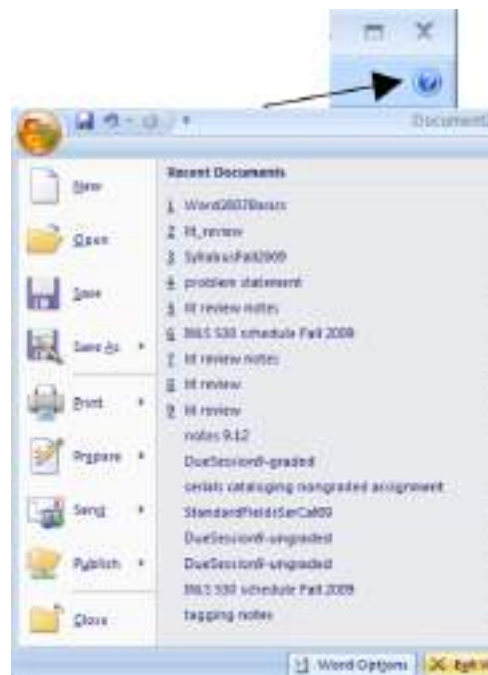
Congratulations! You have completed this course in Microsoft Word Basics. As you become more and more comfortable with the program, it is always helpful to continue to experiment with options that you come across—sometimes, you can uncover a tool that would have stayed hidden—and you can improve proficiency by learning the fine details of the program. When you are finished,

Click on the **Microsoft Office button** —then click **Exit Word**.

OR

Click on the **X** in the top right corner of the computer screen.

It's that easy! If you don't save before attempting to close the program, Word will prompt you to save the file. Make sure you save if you don't want to lose any changes!!



Self-Assessment and Reflections

1. Explain how to operate Ms. Word software.
2. Identify at least 2 menus available in Ms. Word.
3. Type and edit 100 words per minute using Ms. Word interface
4. Explain how to print Ms. Word document typed

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Chapter Five

Practical Activities on ICT in Education

By

Umar, Sheu Usman & Gadafi, Abdulhadi Baraya

Email: ususman@fudutsinma.edu.ng, gabdulhadi@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Explain how to registering email.
2. Describe how access email.
3. Explain how to send email messages.
4. Describe how to create instructional content to be used on Facebook and WhatsApp Social Media Platform.
5. Explain how to write a script for the development of ICT instructional materials.

Content

- How to Register Email.
- How to Access Email.
- How to Send Email Messages.
- Creation of Content to be used on the Facebook and WhatsApp Social Media Platform.
- How to Write ICT Instructional Materials Script.

How to Register Electronic mail (Email)

This is the application that allows exchange of messages between two or more computers by telecommunication. It was one of the first services that were used for communicating over the internet. Several websites on the internet provide free Email services example like Yahoo mail, Take mail, Hotmail, Google mail etc. Before any user can access it, he/she must register at the site and an Email account is created for the user.

How to Register to an Email Account

Anybody willing to register should follow the below steps:

- ❖ Double click on the windows explorer on the taskbar or double click on any available browser icon on your desktop,

- ❖ When it opens up, type the web address of the Email you want to register to, for example (www.gmail.com),
- ❖ When it opens up, click on “sign up” button,
- ❖ A web page will open with some items of personal information the user is required to fill,
- ❖ After filling all the appropriate information, then click on sign up or create button,
- ❖ Then an Email account will be assign to you.

How to Send a Message using your Email Account

Users should follow the below steps:

- ❖ After you access or open your Email account,
- ❖ Click on the “compose” button,
- ❖ A menu or web page will open or appear with various spaces, first space is where you will type the receiver’s Email address, for example (tayoprecious@gmail.com),
- ❖ Then the second space is where you will type the subject of your message, example (Date of Submission of Assignment),
- ❖ Then the third space is the word pad, where you will type your message,
- ❖ If you want to attach a file to the message,
- ❖ Then click on attachment or a button with a sign of an office pins,
- ❖ A menu will pop up, then select the file you are going to attach,
- ❖ Then click on the “send” button.

How to Access an Existing Email Account

Users should follow the below steps:

- ❖ Lunch your browser,
- ❖ Type the web address of the Email providers in the space provided, for example (tayoprecious@gmail.com),
- ❖ When it opens up, you will see the space that you will be required to type your Email address, for example (tayoprecious@gmail.com) and then type the password in the space provided,
- ❖ Then click on sign in button or alternatively press the “enter” key on your keyboard,

- ❖ Then you will have access to your Email account.

Creating ICT Instructional Content to be used on Facebook and WhatsApp Social Media Platform

Creating Electronic ICT Instructional Content

To be able to create instructional content to be used on the Facebook and WhatsApp social platform, the below steps should be followed:

1. Check the curriculum and be sure that the concept to be developed in is the curriculum. Check the scheme of work to be sure of the term and class of students the concept is meant for. Check the register to know the exact number of students you producing ICT materials for.
2. Formulate behavioural objectives and outline the contents for the topic to be discussed.
3. Write a script or draw a storyboard for the development of ICT content. This is necessary to be able to ensure quality of the ICT materials and to avoid so many mistakes.
4. Carry out script vetting. This enables the developers to minimize so many grammatical errors. This is important because, once the developers broadcast the ICT materials, it may be difficulty to retrieve the mistakes noticed on the platform.
5. Lunch the social media software either Facebook or WhatsApp on your laptop or mobile devices. Then, start writing on the interface open to you following step by step procedures as you have it on the script.
6. Vet again the ICT materials before broadcasting the ICT materials using social media platform you are using. Check spelling mistakes, and ensure proper alignment of the words typed.
7. Create a group forum on the social media platform you are using. Add the students' WhatsApp number to the group created. This will help to ensure good interaction between the teachers and students and it will also allow easy broadcast. Once you send to one, you have sent to all.
8. Broadcast or post the ICT assisted/supported content created. This will make it visible to all students using the number added to the group.
9. Send information to the students and remind them to freely ask questions on whatever area they have issue by interacting with you through the group forum.
10. Give the students' information about further reading on the concept by given them the references to be contacted.

Creating ICT Audio Instructional Content

To be able to create ICT audio instructional content to be used on the Facebook and WhatsApp social platform, the below steps should be followed:

1. Check the curriculum and be sure that the concept to be developed in is the curriculum. Check the scheme of work to be sure of the term and class of students the concept is meant for. Check the register to know the exact number of students you producing ICT materials for.
2. Formulate behavioural objectives and outline the contents for the topic to be discussed.

3. Write audio script or draw a storyboard for the development of ICT content. This is necessary to be able to ensure quality of the ICT materials and to avoid so many mistakes.
4. Carry out script vetting. This enables the developers to minimize so many grammatical errors. This is important because, once the developers broadcast the ICT materials, it may be difficult to retrieve the mistakes noticed on the platform.
5. Do script reading. This is the time to practice how to read the script written fluently to avoid skipping during actual production. Read several times to be sure you have mastered the script.
6. Launch the social media software either Facebook or WhatsApp on your laptop or mobile devices. Then, start recording by pressing the microphone on the WhatsApp interface open to you following step by step procedures as you have it on the script. Alternatively, launch the sound recorder on your social media software and start recording following the written script. Do this where there will be no interference.
7. Vet again the ICT materials before broadcasting the ICT audio materials using social media platform you are using. Check spelling mistakes, and ensure proper pronouncement of the words read.
8. Create a group forum on the social media platform you are using. Add the students' WhatsApp number to the group created. This will help to ensure good interaction between the teachers and students and it will also allow easy broadcast. Once you send to one, you have sent to all.
9. Broadcast or post the ICT assisted/supported content created. This will make it visible to all students using the number added to the group.
10. Send information to the students and remind them to freely ask questions on whatever area they have issue by interacting with you through the group forum.
11. Give the students' information about further reading on the concept by given them the references to be contacted.

Creating ICT Audio-Visual Instructional Content

To be able to create ICT audio-visual instructional content to be used on the Facebook and WhatsApp social platform, the below steps should be followed:

1. Check the curriculum and be sure that the concept to be developed in is the curriculum. Check the scheme of work to be sure of the term and class of students the concept is meant for. Check the register to know the exact number of students you producing ICT materials for.
2. Formulate behavioural objectives and outline the contents for the topic to be discussed.
3. Write audio-visual script or draw a storyboard for the development of ICT content. This is necessary to be able to ensure quality of the ICT materials and to avoid so many mistakes.
4. Carry out audio-visual script vetting. This enables the developers to minimize so many grammatical errors. This is important because, once the developers broadcast the ICT materials, it may be difficult to retrieve the mistakes noticed on the platform.
5. Do audio-visual script reading. This is the time to practice how to reading the script written fluently to avoid skipping during actual production. Read several times to be sure you have mastered the script.

6. Prepare the appropriate visual to accompany the audio narration. This can be done by using digital camera on your mobile devices. After snapping, you can then save them to be used later.
7. Launch the social media software either Facebook or WhatsApp on your laptop or mobile devices. Then, start recording by pressing the microphone and import the necessary visuals synchronize with your narration on the WhatsApp interface open to you following step by step procedures as you have it on the script. Make sure you do this where there will be no interference.
8. Vet again the ICT materials before broadcasting the ICT audio-visual materials using social media platform you are using. Check spelling mistakes, and ensure proper pronouncement of the words read and as well as the appropriate alignment of the visuals used.
9. Create a group forum on the social media platform you are using. Add the students' WhatsApp number to the group created. This will help to ensure good interaction between the teachers and students and it will also allow easy broadcast. Once you send to one, you have sent to all.
10. Broadcast or post the ICT assisted/supported audio-visual content created. This will make it visible to all students using the number added to the group.
11. Send information to the students and remind them to freely ask questions on whatever area they have issue by interacting with you through the group forum.
12. Give the students' information about further reading on the concept by given them the references to be contacted.

A Guide to ICT Instructional Material Production Scripts

Production script is written to guide the production or development of media while lesson plan is meant to guide teaching of concept in the class and the lesson note is only prepare to give detail notes on the concept discussed in the class. The production script is necessary for majorly the production of media from audio, audio-visual, multimedia and hypermedia respectively. The script can be written by the developer or producer and strictly supervised by the subject matter experts and educational technology experts or it can be contracted and be given to the subject matter experts and strictly supervised by educational technology experts to ensure quality. Production script needs to follow standard format or procedures to be followed when teaching and these pattern include:

- **Preparatory Activity:** This is done by the writer to call the attention of the learners or students to the main discussion of the concept in the presentation. For instance, producer can say, hello students, you are welcome to this audio tutorial presentation on concept. The audio tutorial will be presented by Dr. Tajudeen, please, pay attention as the presentation proceeds. This is just an example, the producer can vary it. If it is audio-visual or multimedia, it will be, you are welcome to audio-visual or multimedia presentation on concept, etc. if it is hypermedia, the producer will say, you are welcome to hypermedia instructional content presentation on Concept, etc.

- Behavioural Objectives:** This part is used by the writer to remind learners or students on what the presenter is expecting from them to master at the end of the presentation. Language used varies depending on types of media to be developed. If it is audio, the writer will say, at the end of this audio media or audio tutorial or podcast on concept, learners or students should be able to: 1..... Alternatively, the writer can say, after listening to this audio media or audio tutorial or podcast on concept, learners or students should be able to: 1.....

If it is audio-visual or multimedia, the writer will say, at the end of this audio-visual media or multimedia presentation of instructional content on concept, learners or students should be able to: 1..... Alternatively, the writer can say, after listening and watching this audio-visual media or multimedia presentation of instructional content on concept, learners or students should be able to: 1.....

If it is hypermedia or other electronics materials, the writer will say, at the end of interacting with this hypermedia presentation of instructional content on concept or after reading through this electronics learning materials, learners or students should be able to: 1..... Alternatively, the writer can say, after interacting with this hypermedia presentation of instructional content on concept, learners or students should be able to: 1.....
- Content:** This is where the writer outlines the contents for the presentation following the behavioural objectives stated for the lesson. For instance, if the objectives are stated like this: after listening to this audio media presentation on Importance of Education, learners should be able to: 1. Explain the meaning of education 2. List and explain at least 4 importance of education. To form the contents for this presentation, it will be: To be able to achieve the objectives stated for the lesson above, the following contents will be discussed: 1. Meaning of Education 2. Importance of Education. Content will be formulated based on the objectives of the lesson.
- Terms:** This part is used to clarify some technical words the learners may come across while listening to the presentation. The language to be used is: while listening or going through this presentation, you may come across these words: 1. Education: it means 2. Importance: it means, etc.
- Presentation of Content:** This part of the script will be inside the table. See below example.

Narration	Visuals	Comments
Meaning of Education will be discussed here	Relevant visuals that will accompany this narration will be inserted or drawn here	Comments from experts (Language experts, subject matter experts, educational technologist, etc).
Importance of Education will be discussed here	Relevant visuals that will accompany this narration will be inserted or drawn here	Comments from experts (Language experts, subject matter experts, educational, technologist, etc).

Note here that, if it is audio media, column will only be two which are Narration part and experts' comment's part but if it is audio-visual, multimedia, and hypermedia, the three columns will be used.

- **Summary:** This is done to emphasis the main points in the presentation. The language to be used may include: we have successfully discussed the meaning of education and effectively listed the importance of education and explained them. Therefore, is there any question before we proceed? If there is any question, contact the presenter through this GSM number: 08160686593 or email the presenter using this mail address: tayoprecious@gmail.com
- **Evaluation:** This part of the script will used to assess learners achievement and the language to be used may be: having successfully discussed the concept on and there is no further questions, let us practice the following questions: 1. What is education? 2. List and explain 3importance of education. It is important to note that, the questions that will be asked must be in line with the behavioural objectives stated for the lesson.
- **References:** This part is used by the writer to list the textbooks and other materials used in preparing the lesson. The writer may say it like this: For further reading on the concept presented, the following references may be contacted: Omiola, M.A (2019). Introduction to media production and implementation. Katsina: FUDMA Press Ltd.etc.
- **Closure:** This is used to round up the whole presentation and to bring the presentation to a close. This language may be used: We have come to the end of this audio media presentation for this week or period, meet me same time, same period and same station next week. I remain your regular presenter Tayo Abiodun. Bye for now.

Assignment: Use this format to develop one audio media production script, one audio-visual media production script, one multimedia production script and one hypermedia production script using one concept from the curriculum based on your area of specialization.

Self-Assessment and Reflections

1. Explain how to registering email.
2. Describe how to access email.
3. Explain how to send email messages.
4. Describe how create instructional content to be used on Facebook and WhatsApp Social Media Platform.
5. Explain how to write either electronics learning materials script or audio materials script for the development of ICT instructional content on a topic in your area of specialization.

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Chapter Six

Mastering Ms. Excel and Ms. PowerPoint Software for Teaching and Managerial Activities

By

Mr. Ibrahim, Tukur & Mr. Aminu, Ango

Email: tbrahim@fudutsinma.edu.ng, aango@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

5. Explain how to operate Ms. Excel software.
6. Identify some formulars and functions available in Ms. Excel
7. Describe how to use presentation software for teaching and learning tasks

Content

- Operation of Ms. Excel software.
- Formular and Functions in Excel.
- Operation of PowerPoint Software

Microsoft Excel

Electronic spreadsheet is a software application that enables a user to save, sort and manage data in an arranged form of rows and columns. A spreadsheet stores data in a tabular format as an electronic document.

Starting Microsoft Excel

When windows is fully loaded, click excel icon  or click start menu, click programs and select Microsoft Excel. Wait for the program to load.



The Excel Screen

When Excel is loaded 'Blank' spreadsheet screen displays with a similar Title bar, Menu bar, Toolbar and Formatting to those of Word. Obviously there are some differences, but that is to be expected as the two programs serve different purposes.

Edit Line

Contains the selection indicator (cell co-ordinates), and the name box that identifies the selected cell, chart item, or drawing object. The edit line box can display a number, a label, or the formula behind a result.

Cell Pointer

Marks the current cell.

Column Letter

This is the Letter that identifies each column.

Row Number

The number that identifies each row.

Tab Scrolling

Clicking on these buttons, scroll sheet tabs right or left, when there are more tabs that can be displayed at once.

Current Sheet

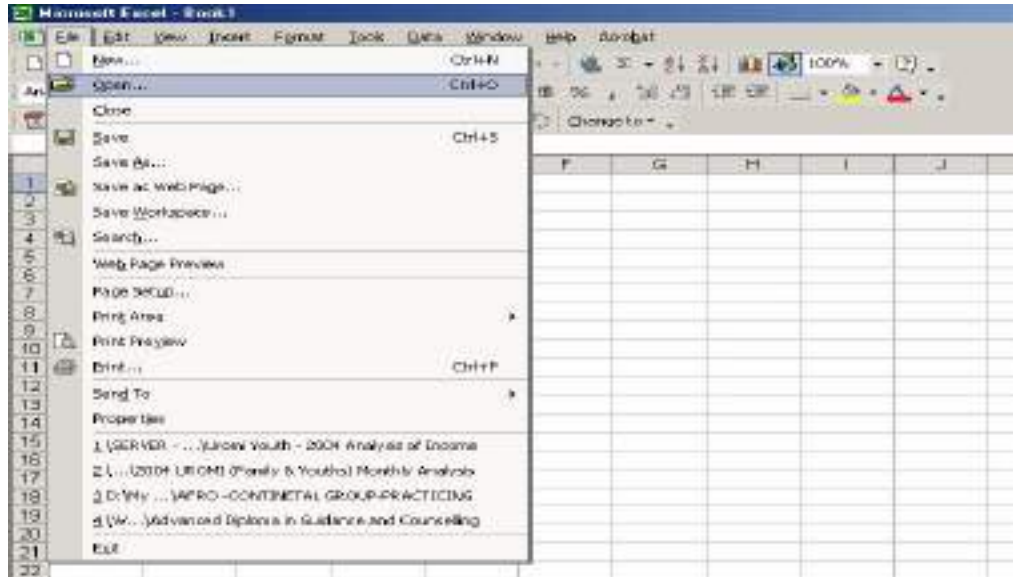
Shows the current sheet amongst a number of sheets in a file. These are named Sheet 1, Sheet 2, Sheet 3, and so on, and so on. Clicking on a sheet tab, moves you to that sheet.

Tab Split

The split box, which you drag, left to see more of the scroll bar, or right to see more tabs.

How to Open a File

1. Click **File** from the main menu.
2. From the drop down menu, click **Open** to open an existing file or **New** to open a new file. You may also click **Open** button on the Standard toolbar. If you are working from any external memories or hardisks, click to open the device before you select the file name.
3. A blank workbook comprising of rows and columns is opened.

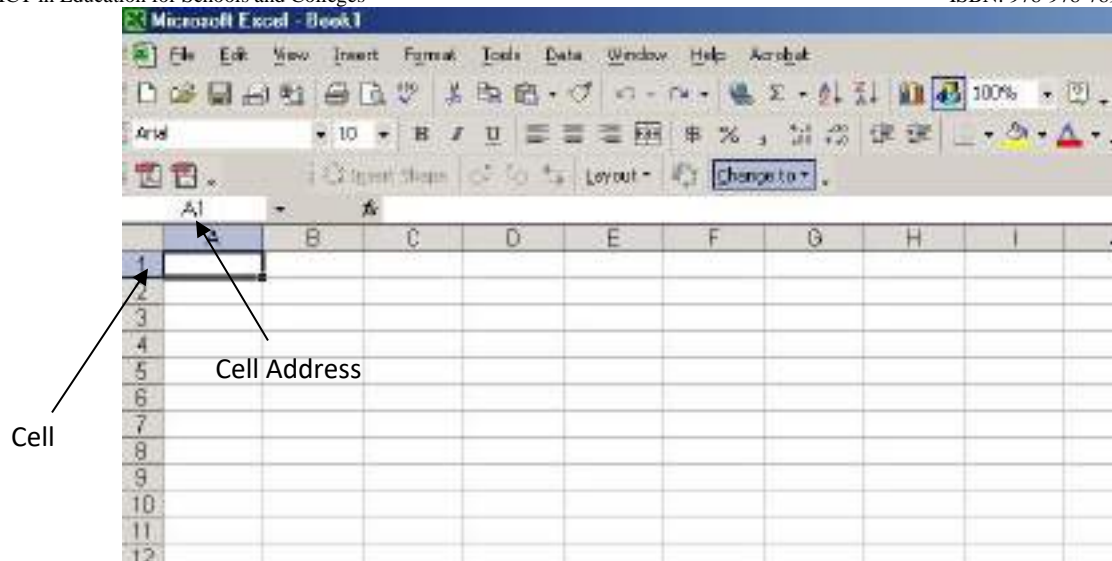


Closing and Exiting

Use close to exit the current document. Use Exit to exit any open documents and then exit Excel. Excel prompts you to save any changes you have made to a document before you close or exit it.

Cell Address

A cell is addressed by the column letter and row number e.g. cell **A1** refers to column **A** row **1**.



Workbook Navigation

When you first enter Excel, the program sets up a series of huge electronic pages, or worksheets, in your computer's memory, many times larger than the small part shown on the screen. Individual cells are identified by column and row location (in that order) with present size extending to 256 columns and 65,536 rows. The columns labelled from A to Z followed by AA to BZ, and so on, IV, while the rows are numbered from 1 to 65,536.

Navigation around the worksheet is achieved by using one of the following keys or key combinations:

- Pressing one of the four arrow keys (↑↓←→) moves the active cell one position right, down, left or up.
- Pressing the Page Down or Page Up keys moves the active cell down or up one visible page
- Pressing the Ctrl + End or Ctrl + Home key combinations moves the active cell to the extreme right of the worksheet (column IV) or extreme bottom of the worksheet (row 65,536).
- Pressing the <Home> key moves the active cell to the beginning of a row.
- Pressing the <Control Home> key combination moves the active cell to the lower right corner of the worksheet's currently used area.
- Pressing the F5 function key will display Go To dialogue box. In the Reference box you type the cell reference or named range you want to move to.

To move the active cell with a mouse, do the following:

- Point to the cell you want to move and click the left mouse button. If the cell is not visible, move the window by clicking on the scroll bar arrowhead that point to the direction you want to move.

Moving Between Sheets

You can make a sheet current by clicking its tab. With the keyboard, you can scroll one sheet at a time, and make it active at the same time, by using the <Ctrl Page Down> key combination. Using <Ctrl Page Up> scrolls in the reverse direction.

Inserting and Deleting Worksheets

You easily add or remove some worksheets from a workbook.

Steps:

To insert a worksheet

- On the insert menu, click worksheet.

To delete a worksheet

- Make it current and click Delete Sheet on the Edit menu.

Selecting a Range of Cells

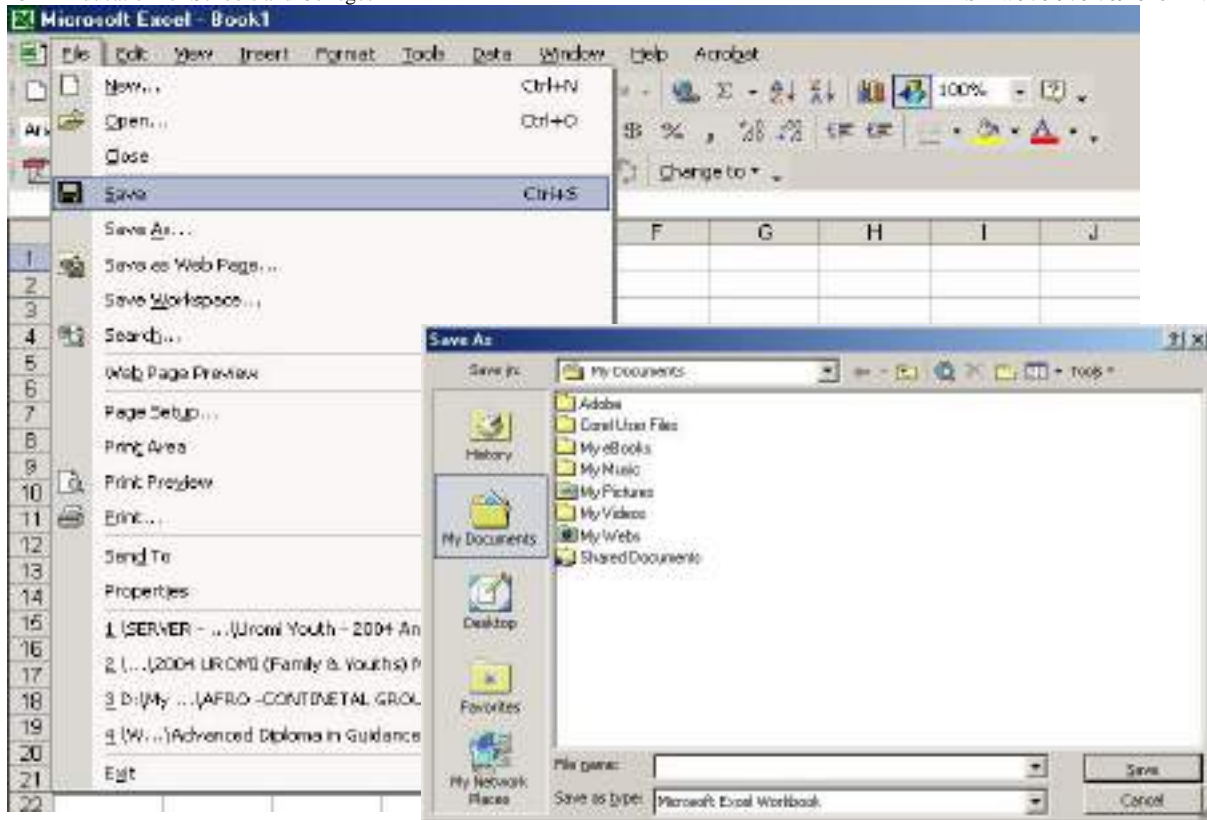
You can select a range of cells, say, A3, C3, point to A3, then press the left mouse button, and while holding it pressed, drag the mouse to the right.

With the keyboard, hold down the <Shift> key and use the right arrow to highlight the required range.

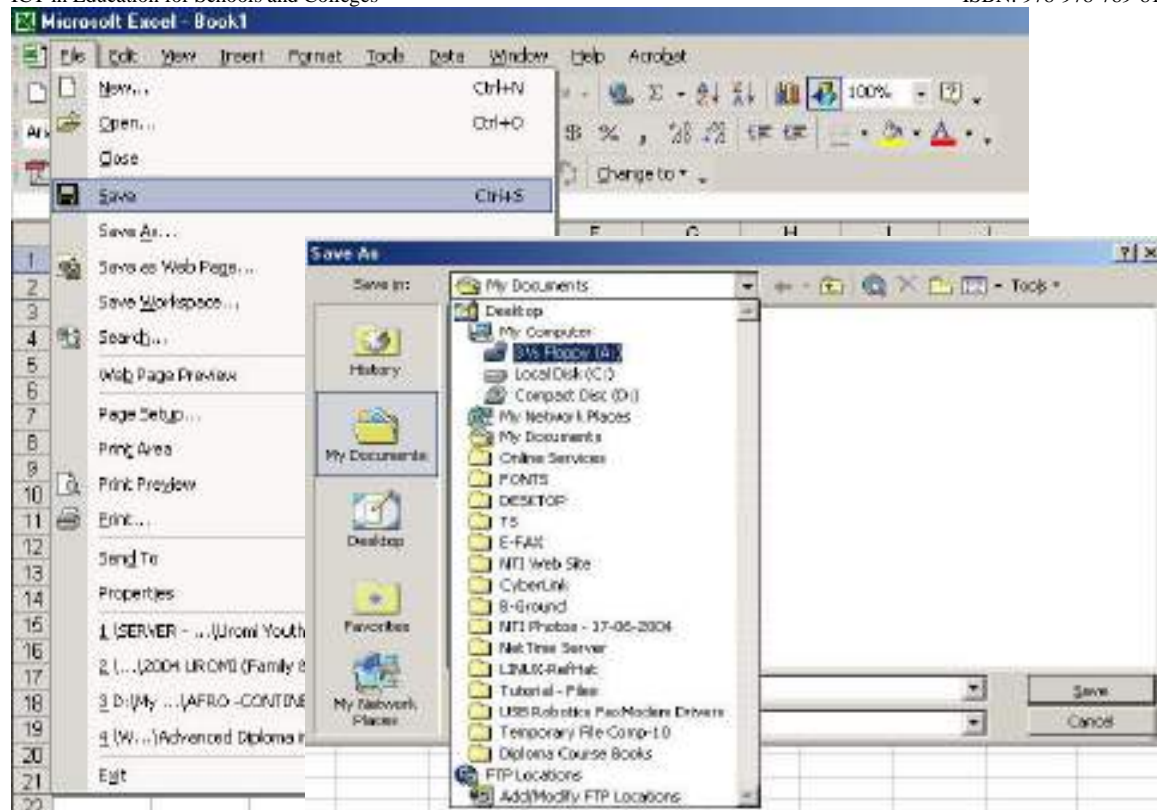
Saving Documents

You can save the active document you reworking on, whether it is new or existed previously. You can save all open documents at the same time. And you can save a copy of the active document with a different name or in a different location.

1. Click **File**
2. Click **Save**
3. Supply the **filename** at the appropriate place
4. Click **Save** or **Cancel** if you do not want to save the document



How to Save in an External Hardisk or Other Secondary Storage Media



1. Click **File**
2. Click **Save As**
3. In the Save in box (where you have My Document) click and select the **drive** e.g. External drive which can be flash drive, external harddisk or memory cards
4. Click **Save**

How to Enter Data into a Cell

1. **Move** cursor to the **cell** and **click** the **left button** of the mouse. A rectangular box will be visible indicating that the cell is now active. Alternatively, you can use the arrow keys to move to the appropriate cell.
2. **Type** in your data.
3. As you type, the data appears on the formula bar at the top of the screen.
4. Press **ENTER** to accept what you have typed.

How to Edit the Content of a Cell

1. **Move** to the **cell** using your mouse and **click** it
2. The content of the cell will appear on the formula bar.
3. **Move** your mouse to the formula bar and **click**.

4. You can then perform your **editing**.
5. Press **ENTER** to accept the change when done.

Formatting and Filling a Worksheet

As an example, we are going to use the information below:

Changing Text Alignment

One way of improving the look of your worksheet is to justify the text. For example, you can center the text.

Steps:

1. Move the active cell to the beginning of the text and select the range by dragging the mouse.
2. Click the Center button on the Formatting toolbar.

Changing Fonts, Font Size and Style

You can further improve the looks of your worksheet by choosing a different font for your text.

Steps:

1. Select cell as appropriate
2. Click font size button on the formatting toolbar, choose a point size, and then click in succession the Bold and Italic buttons. To change the colour, click the Font colour and select a colour.

Currency Styles

The numbers within the cell block of a selected range can be formatted by using the currency style command.

Steps:

1. Select the range.
2. Click the currency style button on the formatting toolbar.

Adding Lines

Lines can be entered by using the border's command.

Entering Text, Numbers and Formulae

When a text, a number, a formula, or an Excel function is entered into a cell, or reference is made to the contents of a cell by the address, then the content of the status bar changes from Ready to Enter. This status can be changed back to Ready by either completing an entry and by pressing <enter> or one of the arrow keys.

Using Functions

Steps:

1. Activate cell E4 and click Paste Function button on the Standard toolbar.
2. If the functions you require appear on the displayed dialogue box under function Name, choose it, otherwise select the appropriate class from the list under Function category. Choosing the SUM function, inserts the entry SUM (A1:D1) in the Edit line.
3. Click Ok.

Using the Auto Sum Button

With addition, there is a better and quicker way of letting Excel work out the desired result.

Steps:

1. Select the range of cells, which contains the figures you would like to add up.
2. Click the Auto Sum button on the Standard toolbar.

Filling a Range by Example

You can easily copy a formula from one cell to a range of cells.

Steps:

1. Select the cell, then point at the **right corner** of the cell.
2. When the mouse pointer changes to a **small cross**, drag the mouse in the required direction.

Auto Formatting Worksheet

You can easily select a pre-defined style to display your work on both the screen and on paper.

Steps:

1. Place the active cell within the table you want to format.
2. On the format menu, click AutoFormat
3. Select a table format that suits your needs.
4. Click Ok.

Headers and Footers

With the help of header and footer command, you can position text or automatically insert information at the top or bottom of a report printout.

Steps:

1. On the file menu, click page setup.
2. Click first the header/footer tab, then the custom header button.
3. Type your information in the left section or centre of the header box. You can repeat for footer.

Cutting, Copying and Pasting

Use cut with paste to move selected text or numbers, or use Copy with Paste to copy selected text or numbers. Once you have copied information, you can paste it anywhere in the current document, in another document, or in another application, until you exit Windows.

Steps:

Cut or Copy Information

1. Select the text or numbers you want to cut or copy
2. Click the cut or copy button on the standard toolbar, or on the Edit menu, click either Cut or Copy.

Paste Information

1. Position the insertion point where you want to insert the information.
2. Click Paste button on the Standard toolbar, or on the Edit menu, click Paste. If you want it to have a link with the original, Click Paste Special on the Edit menu, then Paste Link.

Relative and Absolute Cell Addresses

Entering a mathematical expression into Excel, such as the formula = B14 + C13 into cell C14 causes Excel to interpret it as “*add the contents of cell, one column to the left of the current position to the contents of cell, one row above the current position*”. In this way, when the formula was later copied into cell address D14, the content of the cell relative to the position of D14 (i.e.C14) and the contents of the cell one row above it were used, instead of the original cell addresses entered in C14. This is **relative addressing**.

To see the effect of Relative versus absolute addressing, copy the formula in cell C14 into C17. Note that in cell C14 the formula was = B14 + C13. However, when copied into C17, the formula appears as = B17 + C16 because it has been interpreted as relative addressing. In this case, no value appears in cell C17 because we are attempting to add two **blank cells**.

Now change the formula in C14 by editing it to =\$B\$14+\$C\$13 which is interpreted as absolute addressing. Copying this formula into cell C17 calculates the correct result. This \$ sign must prefix both the column reference and the row reference in absolute addressing.

Freezing Panes on Screen

Sometimes there might be too much information on screen and attempting to see a certain part of a sheet might cause the labels associated with information to scroll off the screen.

Steps:

1. Move the cell pointer to the right (or below) the column (or row) which you want to freeze.
2. On the window menu, click freeze panes.

Inserting Columns

1. To insert a single column, click a cell in the column **immediately to the right** of where you want to insert the new column. For example, to insert a new column to the left of Column B, click a cell in Column B.
2. On the Insert menu, click Columns

Inserting Rows

1. To insert a single row, click a cell in the row immediately below where you want the new row. For example, to insert a new row above Row 5, click cell in Row 5.
2. On the Insert menu, click Rows.

Keys/Key Combinations for Moving Around the Worksheet

To move around the cells within a selection press ENTER to move through a range from Top to Bottom.

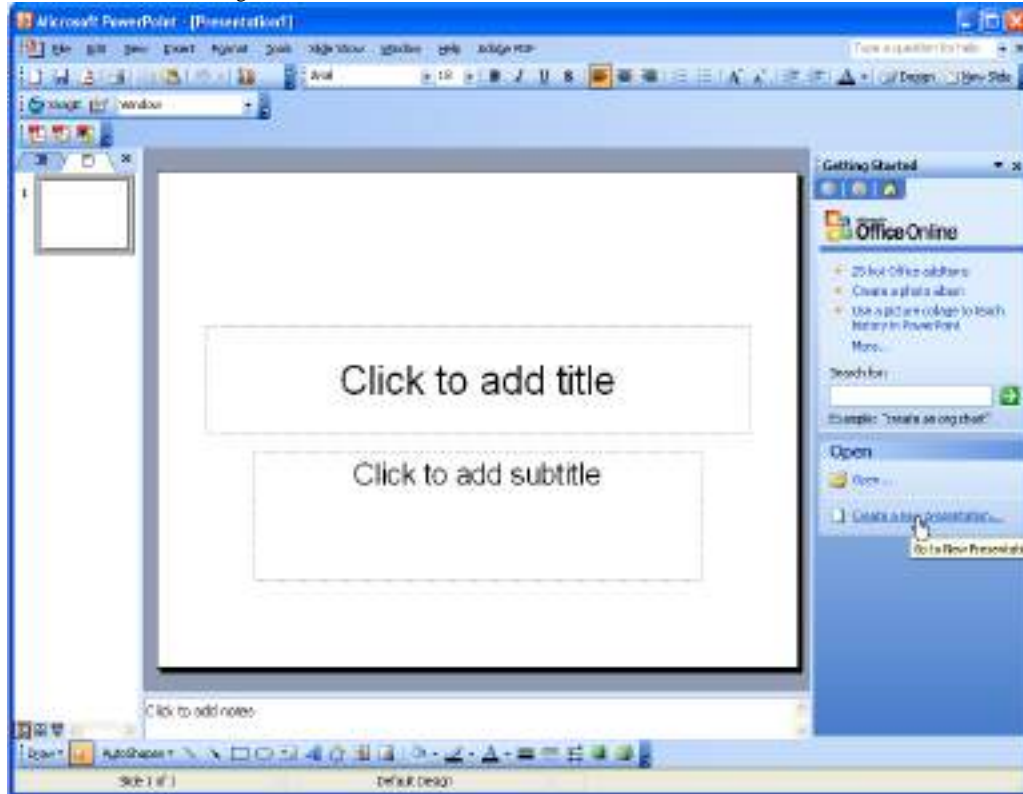
Formula and Functions Available in M.S-Excel

S/N	KEYS	FUNCTION
1	Shift + Enter	Moves from bottom to top within the selection
2	TAB	Moves from left to right within the selection
3	SHIFT +TAB	Moves from right to left within the selection
4	CTRL + PERIOD	Moves clockwise to the next corner of the selection
5	F2	Activates the cell and formula bar
6	ENTER	Carries out an action
7	ESC	Cancels an action
8	F4	Repeats the last action
9	CTRL + Z	Undo the last action
10	CTRL + SHIFT + PLUS SIGN	Insert blank cells
11	CTRL + MINUS SIGN	Deletes the selection
12	DEL	Clears the selection of formula or data
13	CTRL + X	Cuts the selection
14	CTRL + C	Copies the selection
15	CTRL + V	Pastes the selection
16	BACKSPACE	Activates and clears the formula bar when a cell is selected or deletes the preceding character in the cell or formula bar.
17	SHIFT + F2	Edits a cell note

S/N	KEYS	FUNCTION
18	F3	Pastes a name into a formula
19	SHIFT + F3	Displays the function wizard
20	CTRL + SHIFT	After typing a valid function name in a formula, inserts the argument names and parentheses for the function
21	CTRL + A	After typing a valid function name in a formula, displays step 2 of the function wizard
22	CTRL + F3	Defines a name
23	CTRL + =	Calculates all sheets in all open workbooks

Microsoft PowerPoint Software

Microsoft PowerPoint is a presentation program, created by Robert Gaskins and Dennis Austin at a software company named Forethought, Inc. It is one of many programs run by the Microsoft company and can be identified by its trademark orange, and P initial on the logo. It offers users many ways to display information from simple presentations to complex multimedia presentations. Microsoft PowerPoint makes it easy for you to outline your thought and to organize your presentation clearly and quickly. See the interface of Ms. PowerPoint below:





Creation of a Simple Slide

- (1) At Desktop, click PowerPoint
- (2) Click Blank Presentation
- (3) Click Title slide
- (4) Click OK
- (5) Click to add title
- (6) Click to add sub-title
- (7) Click slide show
- (8) Click set-up show
- (9) Choose and click Presented by a speaker
- (10) Choose and click loop continuously until Esc.
- (11) Click OK.



Demonstration of the Use of Slide to Present Lectures

- At Desktop, click PowerPoint 
- Click AutoContent wizard, then next
- Select the type of Presentation e.g. lecture
- Click Next
- Click Presentations, Informal meeting handouts, then click next.
- Enter information for title slide, then click next
- Click Finish
- Then Insert your topics
- At Menu bar, click slide show (or the symbol  at the status bar).
- Click View show
- Press spacebar once at a time until the end of the show.

Self-Assessment and Reflections

5. Explain how to operate Ms. Excel software.
6. Describe how to operate presentation software

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Chapter Seven

Internet, Search Engines and Other Google Applications for Teaching and Learning Activities

By

Mr. Ahmed, Salihu & Mr. Suwidi, Salisu

Email: asalihu@fudutsinma.edu.ng, ssuwidi@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Define internet
2. List at least 4 search engines.
3. Write short notes on: Google, Google Advance Search, Google Book, Google Scholar, Google Map and Web Browser.

Content

1. Definition of Internet
2. Internet Search Engines.
3. Google, Google Advance Search, Google Book, Google Scholar, Google Map and Web Browser.

1. Internet

Internet stands for international network. Internet is a global system of interconnected computer networks that use the standard internet protocol suite (TCP/IP) to link several billion devices worldwide. It enables users to obtain information about any subject or topic by connecting to the internet. The internet carries an extensive range of information resources and services such as the inter-linked hypertext documents and applications of the World Wide Web (www). The World Wide Web (www) also called web is a sub set of internets, it is a series of interconnected servers that support specially formatted documents.

2. Internet Search Engines

A search engine is an information retrieval software program that discovers, crawls, transforms and stores information for retrieval and presentation in response to user queries. A search engine is a web-based tool that enable user to locate information on www. A web search engine or Internet search engine is a software system that is designed to carry out web search (Internet search), which means to search the World Wide Web in a systematic way for particular information specified in a textual web search query. The search results are generally presented in a line of results, often referred to as search engine results pages. Examples of internet search engines are:

Bing

Bing was launched in 2009 and it is the default search engine in Microsoft's web browser.

**Yahoo**

Yahoo is another example of internet search engine that learners can be used to search for relevant information on a particular topic and it is also known to be a leader of free email provider.

**Baidu**

Baidu is the most used search engine in China and was founded in Jan, 2000 by Chinese Entrepreneur, Eric Xu. This web search is made to deliver results for website, audio files and images. It provides some other services including maps, news, cloud storage and so on.

**Aol**

Aol.com is also among the top search engines. AOL is a global mass media company which is based in New York. The company also provides advertising services as AOL Advertising, AOL mail and AOL Platform.



Ask.com

Founded in 1995, Ask.com, previously known as Ask Jeeves. Their key concept was to have search results based on a simple question + answer web format. It is a question & answer community where you can get the answers for your question and it integrates a large amount of archive data to answer your question.

**Excite**

Excite is an online service portal that provides internet services like email, search engine, news, instant messaging and weather updates. This also provides us with the latest trends, topics and search for phrases.

**DuckDuckGo**

DuckDuckGo is a popular search engine known for protecting the privacy of the users. They are used to generate search results and was founded back in 2008 by Gabriel Weinberg in California.

**Wolfram Alpha**

Wolfram Alpha is a computational knowledge search engine which does not give list of documents or web pages as search results. Results are based on facts & data about that query. Their mission statement is to make all systematic knowledge computable and broadly accessible and it was launched in 2009.



Yandex

Yandex is most used search engine in Russia and it was launched in 1997. It provides services like Yandex Maps, Yandex Music, online translator, Yandex Money and many other services.



Lycos

Lycos has a good reputation in search engine industry. Its key areas served are email, web hosting, social networking, and entertainment websites.



Chacha.com

Chacha.com is a human-guided search engine and was founded in 2006. One can ask anything in its search box and answered will be relayed in real-time.



Google Search Engine

Google Search Engine is the best search engine in the world and it is also one of most popular products from Google. Almost 70 percent of the Search Engine market has been acquired by Google. To search information with ease, one needs to make use of Google search operator.



3. Google Search Operators

Google is the most used search engine in the world because it is the most powerful. Despite the fact of its usefulness, many students are unable to use the full potential of this wonderful tool that has become the gateway to the Internet. Google search operator is the syntax used to search the internet to reduce stress and make room for the quality search. Let us try to see some tips to increase your chances of finding the information you were looking for among several web pages.

General Principles

You can use symbols or words as operators in your search to make your results more precise.

- Google Search usually ignores punctuation that isn't part of a search operator.
- Don't put spaces between the symbol or word and your search term.

As an example, when you want to limit your search to a specific website:

A search for site: ifrc.org will work, but site: ifrc.org won't.

Common Operators

Search for an exact match: Put a word or phrase inside quotes.

For example, "recent droughts"

Exclude words from your search: Put -in front of a word you want to leave out.

For example, Red Cross -ICRC

Combine searches: Put "OR" between each search query.

For example, refugees OR migrants

Search social media: Put @ in front of a word to search social media.
For example: @twitter.

Search hashtags: Put # in front of a word.
For example: #throwbackthursday

Search for wildcards or unknown words: Put a *in your word or phrase where you want to leave a placeholder.
For example, “largest * in the world”

Search within a range of numbers: Put .. between two numbers.
For example, displacement 100..1000

Search for a specific site: Put “site:” in front of a site or domain.
For example, site: nytimes.com or site:.gov

Search for related sites: Put “related:” in front of a web address you already know. For example, related: i-frc.org

Get details about a site: Put “info:” in front of the site address.
Example: info: www.ifrc.org

See Google’s cached version of a site: Put “cache:” in front of the site address.
Example: cache: www.ifrc.org

Search for a file format: Put “file:” in front of the query.
For example, file:pdf world disasters report 2018

Other Google Useful Products

Google Advance Search

Google search operators that consist of special characters and commands – also known as “advanced operators” – that goes beyond a normal Google search. The search operators can be used to identify and locate information **more precisely and much quicker**, whether you’re looking for data on websites or images. This function can be incredibly useful for content research. Google Advanced Search uses advanced search operators – or special commands and parameters – that **modify Google searches to narrow down searches** into more detailed and specific results. To clear things up, Google Advanced Search has a completely separate search window than the regular Google search bar that you know all too well. The search operators that are used in a regular Google search can also be used in Google Advanced Search, with a few additional functionalities. See the page below.

Advanced Search

Find pages with...

all these words: To do this in the search box: Type the important words: "education" and "curriculum"

the exact word or phrase: Parenthesize it better: "year" "revision"

any of these words: Type (a) between all the words you want: education OR curriculum

none of these words: Place (a) on either side of the words you don't want: education -curriculum

numbers ranging from: to Put (a) periods between the numbers and add a unit if relevant: 2011-2012 Jan., 2008., 2010., 2013.

Then narrow your results by...

language: Find pages in the language you want.

region: Find pages published in a particular region.

last update: Find pages updated within the time you specify.

site or domain: Search one site (edu. gov) or find a site you like (edu.gov) or limit your results to a domain (edu. edu. gov) or (edu. gov).

terms appearing: Search for terms in the whole page, page title, or web address, or title in the page where looking for.

SafeSearch: Tell SafeSearch whether to filter security-related content.

file type: Find pages in the format you prefer.

usage rights: Find copies you can use to your personal.

Advanced Search

Google Book Search

Google Book Search (<http://books.google.com>) indexes the full text of books and allow you to either see small portions of the text (for copyrighted works) or to view or download the full text (for public-domain works). If a book is submitted by a book publisher, the publisher determines which portions are included (table of contents, index, sample chapters), as well as how much of the other material may be viewable. If included from a library scanning project, only snippets immediately surrounding the searched keywords are available. For some views, you will need to complete a free registration. The content focus is Book, although other materials are increasingly being added such as dissertations, documents and reports. Recently some journals and magazines have been included, though they may appear in full yearly volumes and are not easily separated. This is Not a Journal Archive.

Google Scholar

Google Scholar (<http://scholar.google.com>) searches materials with a very broad definition of scholarly content. This includes books, journal articles, pre-prints, theses and dissertations, as well as syllabi, resumes, and other material indexed on the web. It also includes information from book and article citations in other scholarly works whether or not the full text is web-accessible. In Google Scholar the content focus is Scholarly Journal Articles, although, in addition to Google Books, other materials are increasingly being searched and included in the search results, e.g. dissertations, documents and reports.

Google Map

Google Maps is a web mapping service developed by Google. It offers satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets, real-time traffic conditions, and route planning for traveling by foot, car, bicycle and air, or public transportation.



Google Maps provides a [route planner](#), allowing users to find available directions through driving, public transportation, walking, or biking. The app can indicate users' transit route.

Web Browser

A *browser* is a [software application](#) used to locate, retrieve and display content on the [World Wide Web](#), including [webpages](#), images, video and other files. It is a software application for accessing information on the World Wide Web. When a user requests a web page from a particular website, the web browser retrieves the necessary content from a web server and then displays the page on the user's device. A web browser takes you anywhere on the internet, letting you see text, images and video from anywhere in the world. A web browser takes you anywhere on the internet. It retrieves information from other parts of the web and displays it on your desktop or mobile device. The information is transferred using the Hypertext Transfer Protocol, which defines how text, images and video are transmitted on the web. Examples of web browsers include: Mozilla Firefox, Google Chrome, Microsoft Edge and Apple Safari. Etc.



Self-Assessment and Reflections

1. Define internet
2. List at least 4 search engines.
3. List and explain any 3 Google search operators.
4. Write short notes on: Google, Google Advance Search, Google Book, Google Scholar, Google Map and Web Browser

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Chapter Eight

Protection when Integrating ICT in Education and Transfer of Soft Educational Files

By

Mr. Alabi, Albert & Dr. Omiola, Matthew Adetayo

Email: aalbert@fudutsinma.edu.ng, aomiola@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

7. Define information security
8. Explain how to secure computer data from theft.
9. Mention and explain at least 4 malicious programs that can damage computer Operating System (OS).
10. Define and explain functions of antivirus.
11. Identify features of an effective antivirus.
12. Explain the meaning of soft educational files
13. List at least 3 methods of transferring educational document from computer to external drive.
14. Explain at least 3 methods of transferring educational document from computer to external drive.

Content

- Information Security
- Securing Computer Data
- Malicious Programs
- Functioning of antivirus software
- Features of an Effective Antivirus
- Meaning of soft educational files
- Transfer of educational document from android phone to PC
- Transfer with an external hard drive
- Transfer using data transfer cable
- Transfer locally over Wi-Fi or LAN
- Transfer via cloud storage

Definition of Information Security

Information security refers to the practice of protecting information from unauthorized access, disclosure, alteration, and destruction. It involves implementing measures to ensure the confidentiality, integrity, and availability of information. Information security is crucial in the digital age, where vast amounts of data are stored, processed, and transmitted through various technologies.

- **Confidentiality:** Ensuring that information is accessible only to those who have the authorized permission to access it. This involves preventing unauthorized individuals or systems from accessing sensitive data such as examination question paper, staff detail etc.
- **Integrity:** Maintaining the accuracy and trustworthiness of information. Measures are put in place to prevent unauthorized or unintentional alterations to data, ensuring that information remains reliable.
- **Availability:** Ensuring that authorized users have timely and reliable access to information and resources. This involves protecting against disruptions, downtime, or denial-of-service attacks that could impact the availability of systems and data.
- **Authentication:** Verifying the identity of users, systems, or devices attempting to access information or resources. This can involve the use of passwords, biometrics, smart cards, or other authentication methods.

Securing Computer Data

Any data can be lost; therefore, it is necessary to have it stored in several places. The term backup signifies the process of making a copy of the original data (files, programs). This helps protect data in the event of damage to the original data source or its loss. Electronic data can be stored on another server, magnetic tape, hard disk, DVD or CD, etc.

To protect data from unauthorized access and theft, we use a username and password to confirm our identity, and prevent unauthorized data access. Similarly, in case we need to briefly step away from a computer, it is necessary to lock it. Computers can be locked by opening the Start menu, clicking the arrow next to the Shut Down button and selecting the Lock command. The following methods can be utilized

Method A: Using Keyboard Shortcuts

1. **Press the Windows key + L:**
 - Simply press the "Windows" key on your keyboard along with the "L" key at the same time.
2. **Alternatively, press Ctrl + Alt + Del:**
 - Press the "Ctrl," "Alt," and "Delete" keys simultaneously.
 - Click on "Lock."

Method B: Using the Start Menu

1. **Click on the Windows icon:**
 - Click on the "Start" button located at the bottom-left corner of your screen.
2. **Click on your account name:**
 - Click on your account name in the Start Menu.
3. **Select "Lock:"**
 - Choose the "Lock" option from the dropdown menu.

Method C: Using Command Prompt

1. **Open Command Prompt:**
 - Press `Windows key + X` to open the Power User menu.
 - Select "Command Prompt."
2. **Type the command:**
 - In the Command Prompt window, type the following command and press Enter:
 - `rundll32.exe user32.dll,LockWorkStation`

How to set a password for Windows computer:

1. **Open Settings:**
 - Click on the "Start" button (Windows icon) in the bottom-left corner of your screen.
 - Click on the gear-shaped icon to open "Settings."
2. **Go to Accounts:**
 - In the Settings window, select "Accounts."
3. **Select Sign-in options:**
 - On the left sidebar, choose "Sign-in options."
4. **Set a Password:**
 - Under the "Password" section, click on "Add" or "Change" (depending on your current setup).
5. **Enter your Current Password (if applicable):**
 - If you already have a password, you may need to enter it to proceed.
6. **Create a New Password:**
 - Enter the new password you want to set. Make sure it is a strong password with a mix of letters, numbers, and special characters for better security.
7. **Confirm the New Password:**
 - Re-enter the password to confirm it.
8. **Add Password Hint (optional):**
 - You can add a hint to help you remember your password, but make sure it's not too obvious or easily guessable.
9. **Click "Next" or "Finish":**
 - Complete the process by clicking the appropriate button. Windows will now prompt you to enter this password whenever you log in or wake up your computer from sleep.

Malicious Programs

Malware (malicious software) is a software, which infiltrates an operating system in a seamless manner, whether by human mistake or due to shortcomings of the operating system and software support, with malicious intentions. Malicious software includes:

- **Virus** is a malicious program with the possibility of self-replication. In a computer it seeks other files, trying to infect them and the ultimate goal is to spread to other computers. Depending on what malicious code it contains, it may cause more or less damage to your computer.
- **Worms** like viruses, they possess the ability of self-replication, and however they cannot infect other programs. Their usual intent is to take control of your computer and allow remote control by opening, the so-called, 'backdoor'.
- **Trojan horses** can be presented in the form of games or files in e-mail attachments, with different purposes, such as: to allow remote control to your computer, delete data, allow spreading of viruses, send spam from the infected computer, etc. Unlike viruses and worms, it does not replicate and it needs to be executed, that is, it is not autonomous.
- **Spyware** is a program that secretly collects data about computer users (passwords, credit card numbers, etc.), therefore it spies on users. The most common spyware infections usually occur while visiting suspicious sites with illegal or pornographic content.
- **Adware** is a program that uses collected data about a user in order to display advertisements in a way regarded as intrusive. It usually manifests itself in the form of many pop-up windows that display ads.
- **Hoax** is a false message being spread by e-mail in order to deceive users. Their goal is to obtain data of, for instance, a bank account, or persuade users to pay some fees in order to win the lottery (which they never applied for), or pay costs of money transfers from an exotic prince to help him withdraw money from a country that is falling apart and, in return, will receive an impressive award, etc.

Antivirus

Antivirus software is a class of program designed to prevent, detect and remove malware infections on individual computing devices, networks and IT systems. Antivirus software, originally designed to detect and remove viruses from computers, can also protect against a wide variety of

threats, including other types of malicious software, such as key loggers, browser hijackers, Trojan, horses, worms, rootkits, spyware, adware, botnets and ransomware.

Functioning of antivirus software

Antivirus software typically runs as a background process, scanning computers, servers or mobile devices to detect and restrict the spread of malware. Many antivirus software programs include real-time threat detection and protection to guard against potential vulnerabilities as they happen, as well as system scans that monitor device and system files looking for possible risks.

Antivirus software usually performs these basic functions:

1. Scanning directories or specific files for known malicious patterns indicating the presence of malicious software;
2. Allowing users to schedule scans so they run automatically;
3. Allowing users to initiate new scans at any time; and
4. Removing any malicious software it detects. Some antivirus software programs do this automatically in the background, while others notify users of infections and ask them if they want to clean the files.

In order to scan systems comprehensively, antivirus software must generally be given privileged access to the entire system. This makes antivirus software itself a common target for attackers, and researchers have discovered remote code execution and other serious vulnerabilities in antivirus software products in recent years.

Features of an Effective Antivirus

The following features of any antivirus are to be looked for when you decide on installing one Proactive scanning for malwares, and deleting once detected Default-Deny Protection – Default-Deny protection that is implemented to prevent the entry of suspicious files by default.

Auto Sandbox Technology – A virtual environment where suspicious and unknown files are secluded and run to check for any malicious activity without interfering with the normal operations.

Containment Technology – Validates and authorizes the programs that are executable and ensures that the processes are run without effecting the regular operations of the system.

Host Intrusion Protection System (HIPS) – This feature works on a protocol-based intrusion prevention system that oversees all the application and program activities that are processed in the system. The HIPS terminates any malicious activities once found. This prevents the malware from infecting the operating system, registry keys or personal data or system memory.

Transfer of Soft Educational files

Transfer of soft file simply refer to the process of moving files or data from one location to another. This transfer can occur within the same device, between devices, or across a network. File transfer is a fundamental aspect of ICT, and various methods and protocols are used to facilitate the efficient and secure exchange of data

Transfer of educational document from android phone to PC

1. Unlock your device.
2. With a USB and OTG cable, connect your device to your computer.
3. On your device, tap the "Charging this device via USB" notification.
4. Under "Use USB for," select **File Transfer**.
5. A file transfer window will open on your computer. Use it to drag files.
6. When you're done, eject your device from Windows.
7. Unplug the USB cable.

Transfer with an external hard drive

An external hard drive is a physical storage device that can help you transfer a few files or most of the contents of your PC, depending on the drive's capacity.

The following process helps to transfer files with an external hard drive:

- Connect your device to one PC
- Find the device in your file explorer, then drag the files you want to transfer onto the folder in the hard drive
- Safely eject the hard drive, then connect it to the new PC
- Find the device in your file explorer again, then drag the files from the hard drive folder to wherever you want to store this data on your new computer

External hard drives are ideal for transferring files when you don't have an internet connection. Similarly, you may not have the time to download and install transfer software. In this case, an external hard drive will offer you the kind of quick and direct transfer you need.

Many external hard drives are relatively small and lightweight. However, because they're physical devices, external hard drives can be easily lost or damaged. This is especially true of smaller flash storage methods like USB sticks and memory cards.

Transfer using data transfer cable

Transfer cables are tried-and-tested method for transferring files between two PCs that are relatively close together (for example, on the same desk).

All you have to do is connect your cable to both PCs via the appropriate ports (usually USB), then use the cable's built-in software to transfer your files. This removes the hassle of inserting then ejecting a device like an external hard drive.

To transfer data via a cable, your PCs need to be near to each other and switched on at the same time. This means that your new PC would need to be already set up and ready to go before receiving the file transfers.



Plug the USB cables into both computers. Once both computers recognize the cable, they will automatically install the driver.

After installing the drivers for the USB cable, then download and install the data transfer software for both computers. Finally, launch the transfer application on both computers and start transferring files.

Transfer locally over Wi-Fi or LAN

Wi-Fi and local area networks (LAN) are two mediums you can use for transferring files and folders between PCs that are close to each other.

- Through a LAN, you can work on one PC while searching through another PC's internal hard drives to select the files you want to transfer. As long as your PCs are on the same router or network, the LAN will mean these devices recognize each other every time you need to make a file transfer.
- File transfer through Wi-Fi differs across operating systems. For Windows 10 and 11 PCs you can use Nearby Sharing. Your PCs need to be connected to the same Wi-Fi network and have the same permissions (such as which devices you can share or receive files from).

Transfer via cloud storage

Cloud storage makes accessing and sharing files much easier. This is one of the most convenient options for storing and transferring files—no external storage devices or cables needed!

Any file transferred through cloud storage is secured through data encryption. The main thing needed for this method is an account with a cloud storage provider like Dropbox. Once you have an account, the transfer process is simple:

1. Download and install the Dropbox desktop app on both PCs
2. Sign in to your Dropbox account on both PCs
3. Open the Dropbox desktop app on the computer containing the data you are going to transfer
4. Locate and select the files and folders you want to move.
5. Drag and drop these selected items to your Dropbox folder to upload them to your account

Your files and folders will then be visible in a Dropbox folder on both PCs. You can either leave them where they are or move them to a different location on your new PC.

Always remember to sign out of your Dropbox account and uninstall the app on your old PC before wiping your hard drive or deleting any files. While both PCs are signed in, any files you upload to Dropbox will be synced to your account—so if you remove a file from one PC, it will be removed from the other.

Transfer via Email

Email services allow users to attach and send files as attachments. However, there are often limitations on file size, and certain types of files may be restricted due to security concerns.

Bluetooth File Transfer: For short-range wireless communication, Bluetooth can be used to transfer files between devices, such as smartphones, tablets, and laptops.

Self-Assessment and Reflections

1. Define information security
2. Explain how to secure computer data from theft.
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Chapter Nine

Operation of Electronics Smart Board and Multimedia Projector for Teaching and Managerial Tasks in School

By

Dr. Omiola, Matthew Adetayo, & Mrs. Areo, Janet

Email: aomiola@fudutsinma.edu.ng, areojanet@gmail.com

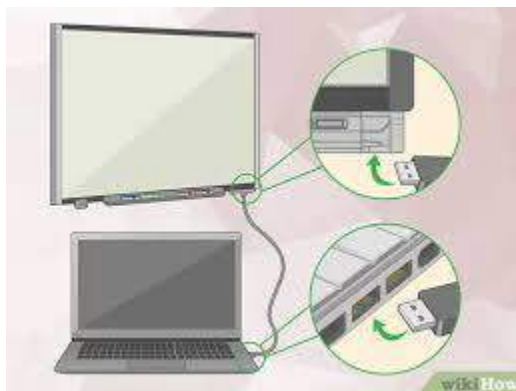
Objectives: By the end of this unit, students should be able to:

1. Demonstrate the use of electronics smart board
2. Describe on how to operate a multimedia projector.
3. Explain how to connect a computer to LCD television

Content

- Operation of Electronic Smart Board
- Operation of Multimedia Projector
- How to Connect a Computer to LCD Television

Operation of Electronic Smart Board



SMART Board is used to create interactive presentations during meetings to add notes or make changes to your document. To use the SMART Board data projector and white board functionality,

connect your laptop to the video and USB cables. The Smart Board will automatically power on when your laptop is turned on. To operate the smart board, follow the below steps:

- **Connect your Smartboard to a computer.** You'll need to have the Smartboard software installed and connected to your computer before getting started. Most schools and businesses will install it for you, but you can also install it yourself. Follow the setup wizard instructions to install the software and connect the Smartboard to your computer.
- **Open Smartboard Notebook on your computer.** This is the program that operates your Smartboard from your computer. You can plan lessons, write notes, and save files with it. Open it by clicking the Notebook icon or file on your computer.
- **Connect your Smartboard to an LCD projector.** This will let you use the Smartboard as a projector so everyone can see it. The setup wizard for the Smartboard will have specific instructions, but for most projectors, you'll have to connect it to your computer first before linking it to your Smartboard. To link it to your Smartboard, open Notebook, then select the Projector option from the drop-down box.
- **Turn on your Smartboard and log in.** Press the "on" button on your Smartboard. You log on via the software program on your computer, so open the program and follow the login instructions. Your login will be determined by your organization, so ask your office administrator if you aren't sure what yours is.
- **Calibrate your Smartboard.** You'll need to calibrate your Smartboard before using it to be sure it's aligned properly. To calibrate your Smartboard, press the keyboard and right mouse buttons at the bottom of the board at the same time. Then, pick up one of the Smartboard pens and tap it against the target that appears onscreen. You may be given several targets to tap!
- **Download additional programs if applicable.** Your Smartboard may offer optional programs that provide extra features like personalized handwriting display or multicolor writing options. If you have any of these programs, download them to your computer and open them with the Smartboard program.
- **Control the board by touch.** You can use your fingertips just like you would with a standard mouse. Tapping your fingertip on the board once will activate the cursor, and from there you can try other functions. To select an icon or open a file, tap your finger on the icon twice in quick succession. If you want to right click something, hold your finger down in one spot. For dragging and dropping files or icons, hold your finger down on it, then drag it to where you want to drop it.
- **Use the formatting toolbar to access specialty tools.** The formatting toolbar is visible at the top of your Smartboard and also within Smartboard Notebook on your computer. Each button controls a different function. All you have to do is tap the button on the board with your finger to activate them. There are dozens of possible buttons depending on your software, but some are more common than others. Save, Pen, Erase, and Undo/Redo are some of the most popular. Tap each icon to perform the command. Many of these buttons are common functions in other programs. If you aren't sure how to use them, talk to your office administrator or consult your Smartboard user guide.
- **Use the Smartboard pens to write.** The Smartboard pens are stored in a pen tray below the board, just like on a regular whiteboard. Pick one up and hold it up to the board. When a box appears on the screen that means you're ready to write. You can write and draw just like you would

with an ordinary pen. To change colors, put the pen back in the tray and pick up a different color. You can't scroll when you're in writing mode, so be sure the screen is where you want it to be before you pick up the pen. To exit writing mode, put the pen back in the tray. You can also activate the pen function by tapping the pen button on the toolbar. This will also bring up specialized pen functions, like Draw Shape or Handwriting to Text.

- **Use the eraser to erase any mistakes.** The pen tray will also have an eraser. You'll use this just like a regular eraser—simply press it against the writing you want to erase and rub it back and forth until it disappears. You can also use the eraser to trace a big circle around everything you want to erase. Just tap the middle of the circle with the eraser and watch it disappear!
- **Use Notebook to open the Internet, PowerPoint, or videos on the Smartboard.** Go to the Smartboard Notebook on your computer. You'll be able to access browsers and other programs via the drop-down box in the upper left corner. If you want to display a saved file, click Open in the drop-down box, then choose your file. Smartboards are becoming more popular in schools as they make learning interactive and can help teachers tailor the curriculum to students of all different learning styles. For instance, tactile learners can touch and write on the board, while visual learners can observe the projections and other visual elements. Additionally, Smartboards make presentations more engaging. Rather than clicking through pre-set slides, presenters can touch and manipulate the information on the board, bringing it to life for the viewers.
- **Save your work.** Tapping the screen once with your finger and selecting Save Ink or pressing the file icon in the toolbar will bring up the Save menu on your computer. Simply select Save File on your computer to save your Smart board notes. If you want to save a screenshot of the entire Smartboard, tap the camera icon on your toolbar. It will automatically save the file in your Notebook on the computer.
- **Share your work with others, if desired.** After saving a file in Notebook, you can save it to a thumb drive or send it as an attachment to anyone. Just drag the file into your drive, email, or messaging program.

Multimedia Projector

This is one of the output devices or equipment that can be used by teachers for instructional content delivery. A multimedia projector processes a specific video signal and projects a corresponding image on a large screen using a lens system. Multimedia projector helps to arrange highly organized notes for taking in a class. Teachers can prepare multimedia PowerPoint presentations and visualize it by using projectors. This equipment can be used before a discussion to give students an anchor, and can be used to share a discussion to reinforce ideas and concepts discussed.

How to Connect Multimedia Projector to a Laptop or Desktop



The below steps should be followed when connecting a multimedia projector to a laptop:

1. Setup the projector facing the screen, and plug in the power cord. Set your laptop next to the projector.
2. Plug one end of VGA cable (shown above) into the **COMPUTER 1 IN** port on the projector.
3. Plug the other end of the VGA cable into your laptop's monitor port. If you have a display [adapter](#) for your laptop, connect that to the VGA cable before connecting it to your laptop.
4. Turn on your laptop first. Then turn on the projector by first turning power button on and then push the top power button. The lamp will take a minute to warm up and display. If there is a display problem, continue to step 5.



5. Switch your monitor (click on your laptop type below for details):

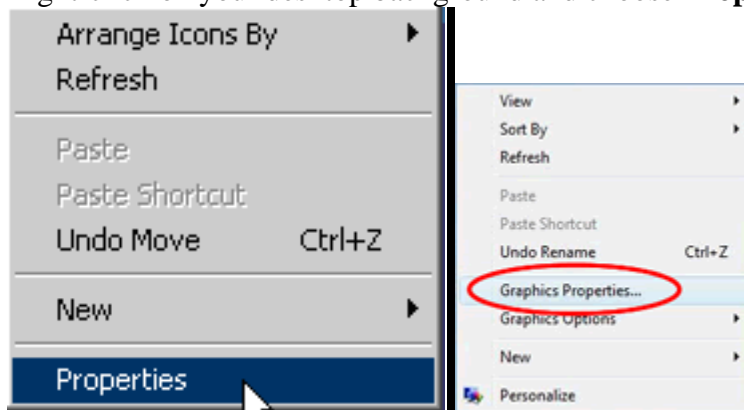
If your system is using Windows then follow the below instructions:



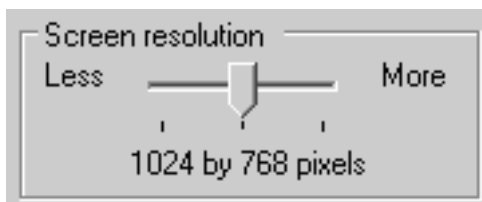
- On your laptop, hold down the **Fn** key and press the **F** display key (the F key with the monitor icon) to change your display.
- You may be presented with the option to choose what you want to do:



- After you have set the display mode, you may need to adjust your laptop's resolution to 1024x768.
- Right-click on your desktop background and choose **Properties** or **Graphic Properties**



Click on the **Settings** tab or General Settings and make sure the screen resolution is set to 1024x768.



- Click on **Apply** and then **OK**.

If you are using **Macintosh**, then, follow the below instructions

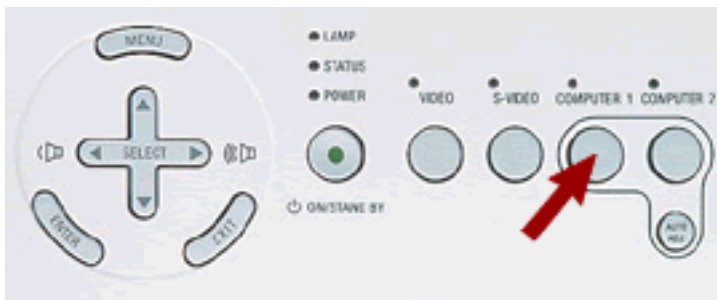
- Go to Apple menu>System preferences.
- Select Displays preference, then go to Arrangement tab.



- Click on **Detect Displays** button.
- Check the **Mirror Displays** checkbox if you want the same display to appear on the projector.
- Check **Show displays in menu bar**, then select 1024x768 under **LCD Projector** on the menu bar pulldown:



- If 1024x768 is not an option, you will need to choose **Display Preferences...** There will be a pane on your MacBook and a pane on the Projector. Pick the projector pane and set to 1024x768 using the lowest frequency.
- If you still do not see a display after following these instructions, check the source on the projector. Below are two different projector button arrangements:



Select **COMPUTER 1** input button or



- Select **SOURCE** button, use the arrow keys to select **COMPUTER 1**, then push the **ENTER** button.
- **After you are finished with the projector, please push the top power button twice to allow the fan to turn on and cool down before unplugging the power cord.**

Troubleshooting

If the projector is still not projecting your laptop after following the instructions above, check to be sure all connections are plugged in all the way, and then try switching the display once again. If you are still unable to connect, please call the technical staff for assistance.

Summary of Operation of Multimedia Projector for Former Presentation

Steps for Connecting a Laptop to a Projector

4. Make sure your computer and laptop are both turned off.
5. Connect the video cable (usually VGA) from your laptop's external video port to the projector. ...
6. Plug your projector into an electrical outlet and press the "power" button to turn it ON.
7. Turn on your laptop.

Laptop and Projector Setup (Wired)

If the laptop will be wired to the projector with audio/video cables, this is how you need to set it up:

1. Make sure the laptop and projector are both turned off before making any connections. You can turn off a laptop by hitting the [power button](#) or using the shutdown function in the operating system. To shut down a projector, press its power button, usually on the top or front of the device; if you can't find it, just unplug it from the wall.
2. Connect one end of the video cable to the laptop's [monitor](#) port and the other end to the projector's "in" port.

Note: The ends of the cable are the same, so it doesn't matter which one goes into which device.

3. Take a minute to ensure that both ends are securely connected, and tighten if necessary. A loose connection at either end will prevent the presentation from displaying or might shut the video off randomly. Use a screwdriver or small pliers to tighten the connectors, if necessary, but just pushing both ends as far as possible into each port should be enough.

Tip: [HDMI](#) cables can't be screwed in like some [VGA](#) and [DVI](#) cables can, so pushing until you reach the end of the port is the best you can do.

DVI

HDMI Cable

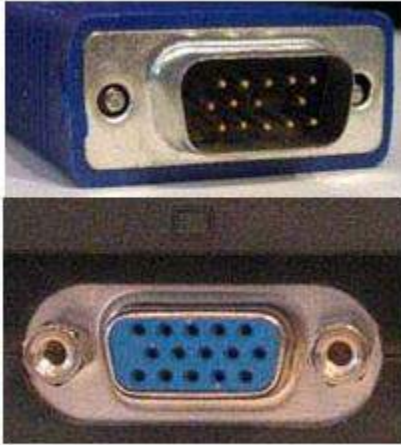


ComputerHope.com



ComputerHope.com

VGA Connector and Port



ComputerHope.com



ComputerHope.com

4. If your projector has a [mouse](#) for remote control, connect the cable to the laptop's mouse port and then connect the other end to the Projector Mouse/Com port. If the projector uses an infrared remote, make sure the [USB](#) adapter is in place and that the devices are lined up correctly for the signal to be sent and received.
5. Connect the audio cable included with the projector to the audio "out" port on the laptop and the audio "in" port on the projector. Make sure these connections are tight.

Note: Your projector/laptop setup doesn't need an audio cable if you're using an HDMI cable because HDMI carries both video and audio.

6. Turn on both the laptop and the projector, and then double-check that the connections have been properly secured.

Laptop and Projector Setup (Wireless)

Some laptops connect to projectors wirelessly, in which case the setup directions are different:

Important: Wired projector/laptop setups are much more straightforward than wireless setups because they are multiple. It is important you follow manufacturer-specific methods. The general

steps below will have to be adapted to apply to your situation, so it's important to read the manual that comes with the projector for specific directions.

1. Turn off both the wireless projector and the laptop.
2. Connect the wireless transmitter device to the laptop and/or projector as described in the projector's manual. This is the device that allows communication between the laptop and the projector.

Note: You can skip this step if your projector and laptop come with the ability to connect to each other out of the box. You'll know this by reading the documentation that came with the projector.

1. Turn on the laptop and wait for it to fully boot up.
2. Install on the laptop any software that was provided with the projector. It's possible that the projector works out of the box with basic drivers provided by your operating system, but if not, install and run any projector related programs.
3. Turn on the projector.

Note: The computer *should* automatically recognize the projector so long as the correct hardware is plugged into both and any relevant software installed on the computer. If the laptop doesn't recognize the projector, close down and reopen the software that you installed, reboot the computer, or consult the projector's documentation. The projected programme will be relayed on the projector's screen or wall as an alternative after setting up a projector (<https://www.lifewire.com/how-to-set-up-a-projector-and-laptop-for-presentations-2378137>).

How to Connect a Computer to LCD Television



All modern [televisions](#) and [projectors](#) have one or more ports that allow them to receive and display an image generated by a computer. Both [desktop](#) and [laptop](#) computers are capable of connecting to a TV or projector, provided that they have the appropriate cables.

Identifying Available Connections

The first step in connecting your computer to TV or projector is finding an identical port on both machines. Once the matching port is identified (one that is the same on both your input device and output device), you need the appropriate cable to connect them. You can check Epson projector and its available connection ports in the above picture.

HDMI

The HDMI connection is currently the most common connection. Nearly all modern televisions and projectors feature HDMI ports. Most laptop computers support HDMI, and it is becoming more prevalent on desktop computers as well, even those without a high-end video card. HDMI has become the standard for all electronic equipment for its high-quality signal and ability to carry both audio and video signals. The image is an example of an HDMI cable.

VGA

The VGA connection used to be the most common on both desktop and laptop computers; it's also found on many projectors. The VGA cable has a 15-pin connector on each end that plugs into a VGA port on each device. Because most televisions do not support VGA, we recommend using HDMI for their wider range of compatibility.

Note: VGA cabling is universal for devices that support it. For example, if your desktop monitor uses a removable VGA cable, that same cable can be used by a laptop to projector. Also, if you are using Apple desktop or laptop computer, you need a VGA adaptor to connect a VGA cable to the computer.

DVI

The DVI connection is newer than VGA, and it offers a sharper image. Although the DVI port is not shown in our Epson projector example, it may be used with a projector but is not used on TVs. It's only found on desktop computers for use with monitors. Consequently, projectors with DVI

inputs may only utilize a desktop computer. As such, we recommend using HDMI cables if they are available.

Tip: there are special cable that convert from DVI to VGA, or DVI to HDMI, and vice versa.

How to Convert DVI to VGA or VGA to DVI and How to Convert DVI to HDMI or HDMI to DVI

Composite Video and S-Video

The composite video and S-Video connections used to be quite common on TVs and projectors. However, it is nearly non-existent on modern electronics. This composite connection is the yellow female cable on what is usually a three-cable bundle consisting of red, white, and yellow cables. The only time this is seen in setup is on desktop computer video cards.

USB

Although all computers have USB, it's not used to connect to a projector or TV unless it's a USB-C. This technology is very new and is not likely to be found on projectors or TVs. You're much better off using one of the connections above.

Display on a Desktop Computer

For a desktop, plug the cable into the computer and output device. If you don't see an image, you may need to change the display using the following steps.

1. Press the Windows Key.
2. Type **Adjust screen resolution** and press **Enter**.
3. Find **Display** and click the down arrow on the right side of the box.
4. Select the appropriate output device.

5. Click **Apply**, then click **OK**.

How to Connect an External Display to My Laptop

I don't see an image on my TV screen. Finally, if you're connecting a computer to a TV, make sure the TV is switched to the correct input channel. For example, if you connected an HDMI cable to your computer and the "HDMI 2" TV port, switch to the "HDMI 2" input channel on the TV. This action can usually be accomplished by pressing the **input** button on your TV remote until the correct input channel is displayed (<https://www.computerhope.com/issues/ch001370.htm>).

Self-Assessment and Reflections

6. Describe how to use electronic smart board for your lesson presentation.
7. Describe on how to operate a multimedia projector.
8. Explain how to a computer to LCD television

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Chapter Ten

Basic ICT Skills Required for Lecturers and Students and Concept of Virtual Learning in Education

By

Abdulhafiz, Ahmed & Sagir, Lawan Bashir

Email: sagirlawanbashir@gmail.com, abdulhafizahmed058@gmail.com

Objectives: By the end of this unit, students should be able to:

1. List at least 3 ICT skills that will be needed by lecturers and students at this contemporary time
2. Explain how to demonstrate at least 2 ICT skills listed in one
3. Define what is virtual learning
4. State at least 2 benefits of virtual learning in education
5. Identify at least 2 forms of virtual learning in education

Content

- Computer Appreciation Skill
- Word Processing Skill
- Internet Usage Skill
- Data Processing Skills
- ICT Content Development Skill
- ICT Hardware and Software Operation Skill
- Concept of Virtual Learning
- Benefits of Virtual Learning
- Forms of Virtual Learning

Skill is an ability to translate knowledge into action that results in the desired performance and for a skill to be acquired, the learner should be exposed to the relevant activities embodying the skill and be offered opportunity for participation and practice of such skill under the real-life condition.

ICT skills involve having the basic understanding of what computer is and how it can be used as

a resource material. Students and teachers should be sensitized enough to be able to use these innovations.

The ICT skills as reported by Ibelegbu (2013) are grouped into four which include:

1. **Computer Appreciation:** computer appreciation skill can be regarded as the potentials one acquires that makes learners capable of operating and using the computer efficiently. Performing basic operations like starting a computer, using the mouse, managing various windows, etc. Skills such as turning computer on and off, copying, deleting and renaming files are required in performing basic operations. The author further stressed that a computer literate teacher must be familiar with computer terms; know how computers work; be able to enter and retrieve data; know the uses of computers; able to programme a computer; know the future general direction of computers; artificial intelligence, and robotics and understand the abuse and misuse of the computer so that students will realize that such problems exist.
2. **Word processing:** Word processing is the application of computer for manipulating text-based documents; the electronic equivalent of paper, pen, typewriter, eraser, and most likely, dictionary and glossary. Word processing is the application of computer technology to the input, editing, merging, sorting, formatting and printing of text. The word processor is a special-purpose computer expressly designed for and solely devoted to the preparation, storage and printing of documents. The system includes a display unit, keyboard, floppy disk drives and a letter-quality print head. Word processing has been developed from typewriting, using computer technology to automate many of the 24 procedures in the production of documents. The computer can be used to perform multiple word processing activities such as editing text, inserting new text, deleting text, and performing search and replace functions

within the text. Other area where the computer is most useful in daily activities in offices is in the use of the internet and data processing.

3. **Internet usage:** The internet is a computer-based global information system (Comer, 2008). It is composed of many interconnected computer networks. Each network may link tens, hundreds, or even thousands of computers, enabling them to share information and processing power. The Internet has made it possible for people all over the world to communicate with one another effectively, inexpensively and to have free access to useful data for further processing. The internet is one of the computer and multi-media skills that have brought revolution to entire educational system in recent times. It is another important skill area that is required by students and teachers. Internet is the abbreviated form of international communication (computer) network. It means a network of computers linked to big central processing unit in the same way telephone lines in homes are linked to one central communication equipment in NITEL. This enables the user to interact with another via the computer if he or she is connected. The internet is a global collection of many different types of computers, computer operators and computer networks that are linked together through telephone lines, satellites, microphones, and all other possible devices.
4. **Data processing:** data processing deals with the analysis and organization of data by the repeated use of one or more computer programmes. Data processing is used extensively in business, engineering, science and to an increasing extent in nearly all areas in which computers are used such as education, to process data educationally by the students and other stakeholders in education. The importance attached to the acquisition of ICT skills make it necessary for the students to possess the required skills in these areas. This will make them to be able to compete with their counterparts anywhere in the world. In this information age,

data is the building block on which every organization is built to operate. Wu (2005) defined data as raw facts or observations typically about physical phenomena or business transactions that are processed into finished information products. Data processing is a process where raw data is subjected to a value- added process where its form is aggregated and organized; its content is analyzed and evaluated; and it is placed in a proper context for a human user.

In this contemporary time, Omiola (2020) opined that ICT skills need to be expanded to include:

1. **ICT content development skill:** many African countries including Nigeria are still depending on foreign ICT content in the school which by now supposed to be reduced. ICT skill content development involves the ability to be able to create software to be used on the hardware. Creation of educational resources for the school curriculum development and in other sector to ensure meaningful development in the society. Students need skills to create content to be used on educational sites, Facebook, WhatsApp, and other social media platforms.
2. **ICT hardware and software operation skill:** this involves the acquisition of skills to help in the effective operation of hardware and software to be self-reliance. This skill includes skill needed in the effective operation of multimedia projector, smartboard, Zoom platform, video conferencing equipment, audio conferencing equipment, and other forms of utility or application software.

Concept of Virtual Learning in Education

Virtual learning is a learning facilitated online through network technologies involving the utilization of virtual technologies in the practice of teaching, learning, and assessment. Virtual learning means the abilities of people to use information technology and the Internet to learn, improve their learning skills and strengthen their capabilities in the information society. It is a new electronic way of guided or unguided learning through new systems for communicating (instant

messaging), sharing (blogs), exchanging (peer-to-peer technology), creating (Flash), collecting (downloads), coordinating (wikis), evaluating (reputation systems), researching (microfiches), socializing (chat rooms), reporting (camera phones), searching (Google), and on-line learning (web surfing). This type of learning can be called different names based on the perspective of the researcher and some other names include: e-learning, blended learning, hybrid models, Internet learning, networked learning, tele learning, virtual learning, computer-assisted learning, web-based learning and on-line learning.

The Benefits of Virtual Learning in Education

The benefits of virtual learning cannot be underestimated as perceived by the writers and these include:

1. Its availability and usage have strong effect on students' motivation, attitudes and achievements in the courses they study.
2. It helps learners to become motivated, eager to learn and creative
3. It helps learners to create a situation or atmosphere, in which curiosity is aroused, imaginations stimulated, interests generated, viewpoints enlarged and attitudes changed thereby attaining the basis for education.
4. It assists learners to study at a time and location that suits them and can quickly locate misplaced notes
5. There is instantaneous feedback incorporated into the design of online materials so that students can reflect on their mistakes as when they happen.
6. The utilization of online learning technologies provides an infrastructure for delivering education and training to less well-developed regions of Africa.
7. The growth of virtual technologies has resulted in the development of online social network and the ability to communicate with others on a regular basis.
8. Students are able to overcome feelings of isolation and disengagement with the learning experience as they create their own communities both within the confines of the learning materials and beyond.

9. It promotes interest and vocabulary development in students and also “provides experiences not easily obtained through other learning strategies and contributes to the efficiency, depth and variety of learning.

Forms of Virtual Learning in Education

There are many forms of virtual learning. These include e-Learning, Virtual teaching, Virtual beams, Authoring Packages, Web-delivery, Peer-to-Peer Computing, and Virtual library as reported by Association of African Universities (AAU, 2005).

e-Learning

e-Learning involves the use of World Wide Web, e-mails, and search engines for teaching and learning. e-Learning could be used for distance or face-to-face learning. Most e-learning materials come in a module-based design, allowing the learner to go through smaller chunks of training that can be used and absorbed for a while before moving on. In e-learning, students are exposed to the use of internet as a tool to explore, investigate and learn many concepts in their courses. Internet could be used to do a number of things for e-learning and teaching purposes. Through the Internet, e-learning can be a useful tool that can enhance interactivity in classes.

Virtual teaching

Through virtual-teaching, students are exposed to the knowledge of on-line teaching. In virtual-teaching, interactive video conferencing or online teleconferencing is used to facilitate face-to-face teaching and learning. Virtual-teaching could be used to assist learning through simulations, virtual field trips, games, database search/inquiry methods and programmed instruction. Virtual-teaching is a direct two-way communication between an individual student and programmed instructional material stored in a computer. An example of virtual-teaching in Nigeria is the Nigerian Open University (NOUN).

Virtual Team

A virtual team is a collection of a small number of interdependent, geographically dispersed, individuals that have a common goal and depend on electronic linking in order to collaborate and achieve learning. A virtual team is a group of people who work interdependently with a shared

purpose across space, time and organization boundaries using technology. Virtual team is used to describe teams of students that are dispersed, do some collaborative work but may also cooperate and coordinate their assigned tasks. They may communicate to a limited extent using other media but use computer-mediated communication to a large extent. They are largely self-managed, but the team is required to work together on a clearly defined task set by an outside authority, that is, the lecturer.

Authoring Packages

There are quite a number of authoring packages, which learners can exploit to improve learning. An authoring software provides “a set of comments which allows a tutor to set up the structure of tutorial lesson, enter the content or the subject matter he wants to present to the learners, add the necessary prompt, the acceptable answers and feedback.” An authoring package presents a stimulus to be checked against a range of alternative answers. Authoring packages are also interactive, which is a major difference between programming language and an authoring package. An authoring package shields the user from the complexities of the logic of programming, and offers a simple framework into which the tutorial material can be slotted. There are different types of authoring packages and some of these can be downloaded from the Internet.

Web-delivery

Another virtual-learning technique is web-delivery. Web delivery is also the delivery of courses online via the Internet. This has been possible by the use of programming tools such as the Internet-Oriented Hypertext Mark-up language (html). A teacher can also visit several web sites to learn more on innovative techniques and principles of instruction. Lotus Notes, the software that packaged e-mail with data repositories and basic collaborative tools, was the first catalyst for web-delivery.

Portals

Portals started as a way to organize a variety of web-based information sources on one desktop interface: a search tool, news feeds, links to favourite web sites, content organized by topics, and so forth. Corporate portals such as university portals do the same thing, allowing users to customize their desktops to show information from a variety of sources within the organization.

Peer-to-Peer Computing

Peer-to-peer (P2P) computing implies a communication network in which different users connect their computers and exchange files directly without going through a server. In this regard, “Peers” are computers that are connected and share resources in a network. However, the term is continuously evolving to an expanded usage depicting not just computers connected in a network but human beings or users of computers in a network. It therefore means that, P2P computing is a type of virtual learning in which students engage in anonymous peer interactions on-line. These students could ask one another questions, evaluate one another’s written works, or share learning content.

Virtual library

A “virtual” or “digital” library is an extension of traditional library. It may also sometimes replace the traditional library. It is an online facility provided by a conventional library to read books and access other facilities or it may mean a website which offers links to various sites with a large store of information in a catalogued or archived form. It is a a collective manner to the entire number of online books and other literary materials related to any subject available on the Internet. It can be viewed as a network which presents linkages to libraries. It can be called an organized set of links to items (documents, software, images, databases etc) on a network. It is an access point for an electronic collection of services and information objects, that is organized in such a

way that the electronic organization and presentation of those objects support the needs of the users. The major purpose of a virtual library is to enable users of a site to find information that exists elsewhere on a network.

Self-Assessment and Reflections

1. List at least 3 ICT skills that will be useful for the contemporary students
2. Describe how to demonstrate each of this skill in the school for the teaching and learning activities
3. Define virtual learning
4. List at least 2 benefits of virtual learning in education
5. State at least 2 forms of virtual learning in education

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Chapter Eleven

Harnessing the Power of Artificial Intelligence in Education

By

Dr. Sabitu, Abdulmalik & Miss. Abdulrahman Safiyya Rafindadi

Email: asabitu@fudutsinma.edu.ng, sabdulrahman@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Gain an understanding of the fundamental concepts of Artificial Intelligence (AI) and its various subfields
2. Explore the diverse applications of AI in educational settings
3. Examine the impact of AI-powered learning tools and platforms on teaching and learning practices.
4. Understand the implications of AI on teaching and learning processes
5. Identify ethical considerations in the implementation of AI in education
6. Analyze practical examples and case studies of successful AI implementations in education
7. Discuss future directions and challenges in the integration of AI in education

Content

- Understanding Artificial Intelligence (AI)
- Applications of AI in Educational Settings
- AI-Powered Learning Tools and Platforms
- Impacts of AI on Teaching and Learning
- Ethical Considerations in AI Implementation in Education

Introduction to Artificial Intelligence in Education

Artificial Intelligence (AI) has emerged as a groundbreaking force in education, harnessing advanced technologies to revolutionize teaching and learning processes (Baker et al., 2010). Defined as the development of computer systems capable of performing tasks typically requiring human intelligence, AI holds immense potential to reshape education and enhance student outcomes (Blikstein, 2013). Its significance in education lies in its ability to personalize learning

experiences, automate administrative tasks, and foster innovation in educational practices (Holstein & McLaren, 2016).

Originating from various technologies and methodologies aimed at stimulating human intelligence in machines, AI encompasses subfields such as machine learning, natural language processing, and computer vision (Russell & Norvig, 2016). These advancements enable AI systems to analyze data, comprehend human language, and interpret visual information, leading to breakthroughs in speech recognition, image classification, and decision-making (Goodfellow et al., 2016; LeCun et al., 2015).

In educational settings, AI offers a diverse range of applications, including personalized tutoring systems, educational games, and intelligent data analytics (Lane et al., 2014). Intelligent tutoring systems utilize AI algorithms to deliver customized instruction and feedback tailored to individual student needs and preferences (VanLehn et al., 2007). Similarly, AI-powered educational games and simulations engage students in immersive learning experiences, fostering problem-solving skills and critical thinking (Johnson et al., 2016). Additionally, AI-driven analytics tools empower educators to analyze student performance data, identify learning trends, and make informed instructional decisions (Siemens & Long, 2011).

AI-Powered Learning Tools and Platforms

AI-powered learning tools and platforms are transforming the landscape of education by offering innovative solutions to enhance teaching and learning experiences. These tools leverage artificial intelligence algorithms to personalize learning pathways, provide instant support, and empower educators to create customized instructional resources. These include; Adaptive learning systems, Virtual Tutors and Chatbots and AI-driven Content Creation Tools. Detail explanation of each tools is as follows:

Adaptive Learning Systems

Adaptive learning systems represent a subset of educational technology that harnesses artificial intelligence (AI) algorithms to customize learning experiences according to each student's unique needs and preferences. These systems continuously analyze student performance data, such as assessment results and interaction patterns, to dynamically adjust various aspects of content

delivery, including pacing, difficulty levels, and instructional resources (Baker & Inventado, 2014).

An illustrative example of adaptive learning systems is the use of personalized learning pathways in mathematics education. In a traditional classroom setting, students often follow a uniform curriculum pace, regardless of their individual mastery levels. However, with adaptive learning systems, students can progress through mathematical concepts at their own pace, with the system adapting the difficulty of problems and providing targeted feedback based on their performance. For instance, a student who quickly grasps basic arithmetic operations may advance to more complex topics, such as algebra, while another student who struggles with multiplication tables may receive additional practice and reinforcement until mastery is achieved.

The impact of adaptive learning systems on teaching and learning is profound. By tailoring learning experiences to individual students, these systems foster greater engagement and motivation, as students receive personalized support and challenges aligned with their abilities and interests. Educators also benefit from adaptive learning systems by gaining insights into each student's learning progress and areas of difficulty, allowing for more targeted instruction and intervention strategies. Moreover, adaptive learning systems can promote a more inclusive learning environment by accommodating diverse learning styles and preferences. Despite their potential benefits, adaptive learning systems also present certain challenges. One challenge is the need for robust data collection and analysis mechanisms to ensure accurate and reliable adaptation to student needs. Additionally, the effectiveness of adaptive learning systems may be influenced by factors such as the quality of content and the extent of alignment with curriculum standards. Furthermore, issues related to student privacy and data security must be carefully addressed to maintain trust and compliance with regulations (Baker & Inventado, 2014).

Virtual Tutors and Chatbots

Virtual tutors and chatbots represent AI-driven innovations in education aimed at providing immediate assistance and support to students. These tools leverage artificial intelligence algorithms to simulate human interactions and offer real-time guidance on various academic topics. For example, a virtual tutor could assist a student with math homework by explaining complex concepts or solving practice problems step-by-step. Similarly, a chatbot could engage

with students in a natural language conversation, addressing their queries and clarifying doubts instantly (Veletsianos & Miller, 2008).

The impact of virtual tutors and chatbots on teaching and learning is profound. By offering personalized guidance and feedback, these AI-powered tools enhance student engagement and comprehension. Students can receive assistance tailored to their individual learning needs and preferences, allowing them to navigate learning materials more effectively and achieve better academic outcomes. Furthermore, virtual tutors and chatbots promote self-directed learning by empowering students to seek help independently and engage in autonomous learning activities (Veletsianos & Miller, 2008).

Despite their potential benefits, virtual tutors and chatbots also present several challenges. One major challenge is ensuring the accuracy and reliability of the information provided by these AI-powered tools. Since virtual tutors and chatbots rely on algorithms to generate responses, there is a risk of inaccuracies or misunderstandings, especially when dealing with complex or nuanced topics. Additionally, maintaining the engagement and motivation of students when interacting with virtual tutors and chatbots can be challenging, as some students may prefer human interaction or face difficulties in communicating effectively with AI-powered tools (Veletsianos & Miller, 2008).

Thus, virtual tutors and chatbots offer valuable support and assistance to students in their learning journey. These AI-powered tools enhance student engagement, comprehension, and autonomy by providing personalized guidance and feedback. However, challenges such as ensuring accuracy and maintaining student motivation need to be addressed to fully leverage the potential of virtual tutors and chatbots in education. Continued research and development in AI-driven education technologies are essential to overcome these challenges and maximize the benefits of virtual tutors and chatbots in teaching and learning contexts.

AI-driven Content Creation Tools

AI-driven content creation tools represent a significant advancement in educational technology, leveraging artificial intelligence algorithms to streamline the development of personalized learning materials and assessments. These tools employ AI to analyze educational content, identifying key learning objectives and generating resources tailored to the individual needs of students. For instance, platforms like Quillionz use natural language processing algorithms to automatically

generate quiz questions and study materials from text-based content, such as lecture notes or textbook chapters. By automating the content creation process, educators can save time and effort while ensuring that instructional materials align closely with curriculum standards and student learning objectives.

The impact of AI-driven content creation tools on teaching and learning is profound. By providing educators with the ability to rapidly generate personalized resources, these tools enhance the relevance and effectiveness of instructional materials. Educators can use AI-generated content to address diverse learning styles and preferences, catering to the individual needs of each student. Furthermore, AI-driven tools enable educators to focus more on teaching and student engagement, rather than spending excessive time on manual content creation tasks. This shift allows educators to allocate their time and energy more efficiently, ultimately improving the quality of instruction and student learning outcomes.

However, the adoption of AI-driven content creation tools in education also presents challenges and considerations. One potential challenge is the need for educators to develop a deep understanding of how AI algorithms analyze and generate content. Without adequate training and support, educators may struggle to effectively integrate AI-driven tools into their instructional practices. Additionally, concerns related to data privacy and security may arise, particularly regarding the collection and use of student data by AI systems. Educators and educational institutions must implement robust data protection measures to safeguard sensitive student information and ensure compliance with relevant privacy regulations. Therefore, AI-driven content creation tools offer significant potential to enhance teaching and learning experiences by automating the development of personalized instructional materials. While these tools can improve the efficiency and effectiveness of educational content creation, educators must be mindful of potential challenges related to algorithmic complexity and data privacy. With proper training and support, educators can leverage AI-driven tools to create engaging and relevant learning experiences that meet the diverse needs of students.

In summary, AI-powered learning tools and platforms offer personalized learning experiences, instant support, and efficient content creation capabilities, revolutionizing the way education is delivered and accessed. These tools enhance student engagement, optimize learning outcomes, and empower educators to create more effective instructional resources.

Impacts of AI on Teaching and Learning

The integration of AI into education has transformative effects on teaching and learning practices. Adaptive learning systems, for instance, revolutionize the traditional classroom dynamic by tailoring instruction to individual student needs and preferences. Through sophisticated algorithms, these systems analyze students' learning patterns and adjust content delivery accordingly. This personalization enhances student engagement and comprehension, leading to more effective learning outcomes (Baker & Inventado, 2014).

Virtual tutors and chatbots represent another facet of AI integration, offering immediate support and guidance to students. By providing instant responses to queries and explanations of complex concepts, these AI-driven tools empower learners to progress at their own pace. This personalized assistance not only enhances student autonomy but also fosters a supportive learning environment. With virtual tutors and chatbots handling routine inquiries, educators can dedicate more time to meaningful interactions with students, such as mentorship and collaborative learning experiences (Veletsianos & Miller, 2008).

Furthermore, AI-driven content creation tools streamline the development of instructional materials, allowing educators to focus on pedagogical innovation. By automating tasks such as resource generation and assessment creation, these tools enable educators to devote more attention to experimenting with new teaching strategies and technologies. This promotes a culture of continuous improvement and innovation in education, as educators are empowered to explore diverse instructional models and adapt to the evolving needs of learners. Through AI-driven content creation, educators can create dynamic and engaging learning experiences that cater to the individual preferences and learning styles of students (Koedinger et al., 2012).

Therefore, the integration of AI into education has profound implications for teaching and learning practices. AI enables educators to adopt learner-centered approaches that prioritize individual student needs and preferences (Graesser et al., 2014). By automating routine tasks and administrative duties, AI frees up educators' time to focus on more meaningful interactions with students, such as mentoring, coaching, and facilitating collaborative learning experiences (Blikstein & Wilensky, 2015). Moreover, AI fosters a culture of continuous improvement and

innovation in education, empowering educators to experiment with new teaching strategies, technologies, and instructional models to better meet the diverse needs of learners (Koedinger & Corbett, 2006).

Ethical Considerations in AI Implementation in Education

As Artificial Intelligence (AI) technologies become increasingly integrated into educational settings, ethical considerations must be carefully addressed, encompassing a range of complex issues including data privacy, equity, bias, transparency, and plagiarism. Ethics in education refers to the moral principles and standards guiding the use of technology and data in educational contexts. Key ethical considerations include data privacy, equity, bias, transparency, and the prevention of plagiarism (Holstein & McLaren, 2018).

Data privacy and security concerns arise from the collection, storage, and use of sensitive student data by AI systems. This raises questions about consent, confidentiality, and data ownership, highlighting the importance of implementing robust data protection measures (Floridi et al., 2018). For instance, educators must obtain informed consent from students and parents before collecting and using their data, and ensure that data storage and transmission methods comply with relevant privacy regulations.

Equity issues may arise if AI algorithms perpetuate biases or inequalities in educational opportunities and outcomes. For example, biased algorithms may result in unequal access to learning resources or opportunities for certain student groups, exacerbating existing disparities in education (Dillenbourg et al., 2016). To mitigate bias, educators and developers must critically evaluate AI systems for fairness and inclusivity, and implement measures to address any identified biases through algorithmic adjustments or data diversification strategies.

Ensuring the accountability and transparency of AI systems is crucial for maintaining trust and confidence in their use in education. Educators and stakeholders should be transparent about how AI technologies are used in educational settings, including their purpose, functionality, and potential impacts on students and learning outcomes (Lan et al., 2020). Additionally, mechanisms for accountability, such as clear policies, procedures, and oversight mechanisms, should be established to hold individuals and organizations accountable for the ethical use of AI in education.

Furthermore, the use of AI in education raises concerns about plagiarism, as AI-powered tools can facilitate the generation of content that may not be original. Educators must emphasize the importance of academic integrity and provide guidance on how to appropriately use AI tools to support learning without resorting to plagiarism. Additionally, educational institutions should implement plagiarism detection systems and strategies to identify and address instances of plagiarism effectively.

In summary, addressing ethical considerations in the use of AI in education is essential for promoting responsible and equitable implementation. By prioritizing data privacy, equity, bias mitigation, accountability, transparency, and the prevention of plagiarism, educators can harness the potential of AI technologies to enhance teaching and learning experiences while minimizing ethical risks and promoting ethical conduct in educational settings.

Practical Examples and Case Studies

Practical examples and case studies offer valuable insights into the successful integration of Artificial Intelligence (AI) in education, demonstrating its tangible impact on teaching and learning processes. Real-world applications showcase how AI-powered tools and platforms are enhancing educational experiences, improving student outcomes, and addressing challenges in education (Beck et al., 2014). These examples illustrate the transformative potential of AI in education and highlight its role in creating more engaging and effective learning environments.

For instance, intelligent tutoring systems represent one practical application of AI in education. These systems utilize AI algorithms to deliver personalized instruction and feedback to students, adapting to their individual learning needs and preferences. Case studies have shown that intelligent tutoring systems can significantly improve student performance and engagement in subjects such as mathematics and language learning (VanLehn et al., 2007). By providing tailored support and guidance, these AI-powered systems help students master complex concepts and achieve better learning outcomes.

In addition to intelligent tutoring systems, AI-driven content creation tools have also been implemented in educational settings. These tools use AI algorithms to analyze educational content, identify learning objectives, and generate personalized resources for students. Practical examples have demonstrated how AI-driven content creation tools enable educators to develop customized

learning materials and assessments, enhancing the relevance and effectiveness of instructional resources (Koedinger et al., 2012). By automating the content creation process, these tools free up educators' time to focus on teaching and student interaction, ultimately improving the overall learning experience.

Overall, practical examples and case studies provide compelling evidence of the positive impact of AI in education. By leveraging AI-powered tools and platforms, educators can create more engaging and personalized learning experiences, leading to improved student outcomes and greater educational equity. These examples underscore the importance of continued innovation and integration of AI technologies in education to meet the evolving needs of learners in the digital age.

Future Directions and Challenges

As the integration of Artificial Intelligence (AI) in education continues to evolve, several future directions and challenges emerge, shaping the trajectory of AI's impact on teaching and learning. One promising direction is the further development of AI-powered adaptive learning systems. These systems have the potential to revolutionize education by providing highly personalized learning experiences tailored to individual student needs and preferences (Kumar & Dawson, 2019). By leveraging advanced AI algorithms, adaptive learning systems can dynamically adjust content delivery, pacing, and difficulty levels in real-time, optimizing learning outcomes for each student. Furthermore, advancements in natural language processing and affective computing could enable these systems to better understand and respond to students' emotions and learning styles, further enhancing their effectiveness (Baker, 2019).

However, the widespread adoption of AI in education also presents significant challenges that must be addressed. One key challenge is the ethical use of AI algorithms and data in educational settings. Issues such as data privacy, bias, and transparency raise concerns about the potential impact of AI on student privacy and equity (Dede, 2019). Without adequate safeguards and regulations in place, there is a risk that AI systems could perpetuate existing inequalities and reinforce biases in educational outcomes. Moreover, ensuring the responsible and ethical deployment of AI technologies requires collaboration and dialogue among educators, policymakers, and technology

developers to establish guidelines and best practices for AI implementation in education (Rienties et al., 2020).

Another challenge is the digital divide and unequal access to AI-powered educational resources. While AI has the potential to democratize access to quality education, disparities in technology infrastructure and internet connectivity could widen existing educational inequalities (Hao, 2020). Without equitable access to AI tools and platforms, marginalized communities and underserved populations may be left behind, exacerbating educational disparities. Addressing these challenges requires concerted efforts to bridge the digital divide and ensure that all students have access to the benefits of AI-enabled learning environments (Hu, 2020). By addressing these challenges and embracing the opportunities presented by AI in education, stakeholders can work towards creating more inclusive, equitable, and effective learning experiences for all students.

Conclusion

In conclusion, Artificial Intelligence has the potential to revolutionize education by providing personalized, adaptive learning experiences for students. By understanding AI's fundamental concepts, exploring its applications in education, and addressing ethical considerations, educators can harness the power of AI to create more inclusive, equitable, and transformative educational environments.

Self-assessment

These self-assessment questions can help individuals gauge their understanding of key concepts, applications, and ethical considerations related to the integration of Artificial Intelligence in education.

1. Explain the fundamental concepts of Artificial Intelligence and its significance in education?
2. Describe the subfields of AI, including machine learning, natural language processing, and computer vision, and their applications in educational settings.
3. Provide examples of AI applications in education, such as intelligent tutoring systems, educational games, and AI-driven analytics tools.
4. How do these AI applications enhance teaching and learning experiences in educational settings?

5. Describe adaptive learning systems and their role in personalizing learning pathways for students.
6. How do virtual tutors and chatbots support student learning and engagement in educational settings?
7. Explain how AI-driven content creation tools can enhance the development of customized learning materials for students.
8. Discuss the implications of AI on teaching and learning practices, including its role in promoting learner-centered approaches and automating routine tasks.
9. How does AI foster innovation in educational practices and support educators in meeting the diverse needs of learners?
10. Identify ethical considerations related to the implementation of AI in education, such as data privacy, equity, bias, and transparency.
11. How can educators and policymakers address these ethical considerations to ensure responsible AI implementation in education?
12. Analyze practical examples and case studies of successful AI implementations in education.
13. What lessons can be learned from these examples, and how can they inform future AI implementation efforts in educational settings?
14. Discuss potential future developments and challenges in the integration of AI in education.
15. What recommendations would you propose for addressing these challenges and maximizing the benefits of AI in education?

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Chapter Twelve

Emerging Technologies in Education

By

Dr. Sabitu, Abdulmalik & Mr. Umar Shehu Usman

Email: asabitu@fudutsinma.edu.ng, ususman@fudutsinma.edu.ng

Objectives: By the end of this unit, students should be able to:

1. Identify and explain emerging technologies with potential impacts on education.
2. Illustrate how virtual reality, augmented reality, gamification, and robotics enhance teaching and learning, supported by specific examples.
3. Explore the use of big data analytics in education for informed decision-making and personalized learning, with real-world examples.
4. Discuss the benefits of integrating blockchain technology into educational systems for secure transactions and credential verification.
5. Emphasize the importance of accessibility and inclusivity in educational technology, proposing strategies for equitable access for all students, including those with disabilities.

Content

- Emerging Technologies in Education
- Virtual and Augmented Reality in the Classroom
- Gamification and Adaptive Learning Systems
- Robotics and Automation in Education
- Internet of Things (IoT) in Educational Environments
- Accessibility and Inclusivity in ICT for Education
- Integrating Blockchain Technology for Secure Educational Transactions

Introduction

The concept of emerging technologies (EM) refers to innovations and advancements in various fields that have the potential to significantly impact society, economy, and daily life. These technologies are characterized by their novelty, rapid development, and disruptive nature, often reshaping traditional practices and paradigms. Emerging technologies are revolutionizing the field of education, offering innovative solutions to enhance teaching and learning experiences. From

artificial intelligence to virtual reality, these technologies are transforming traditional educational paradigms, expanding access to education, and fostering personalized learning environments. Emerging technologies encompass a wide range of disciplines, including science, engineering, information technology, healthcare, and education, among others. At the forefront of contemporary progress lie emerging technologies, characterized by their innovative prowess, disruptive potential, and interdisciplinary nature. These technologies, born from scientific inquiry and technological breakthroughs, transcend conventional boundaries to introduce novel solutions and redefine established paradigms. With their rapid development and profound impact on society, economy, and the environment, emerging technologies herald a new era of transformation and possibility

Key Aspects of Emerging Technologies

In the realm of emerging technologies, several key aspects delineate their significance and transformative potential. These include; Innovation, Disruption, Rapid Development, Interdisciplinary Nature and Impact.

Emerging technologies can be operationally defined as innovative advancements in various fields that are characterized by their novelty, rapid development, and disruptive nature (Rogers, 2003). Additionally, emerging technologies encompass a broad spectrum of innovations that represent the cutting edge of progress and development across diverse fields (Gupta, 2019). These technologies are typically at the forefront of scientific research and technological innovation, introducing new concepts, ideas, and solutions that have the potential to significantly impact society, economy, and daily life (Diamandis & Kotler, 2012). Moreover, EM embody the spirit of innovation and exploration, pushing the boundaries of what is currently possible and opening new avenues for scientific discovery, technological advancement, and societal change (West, 2019) Therefore, emerging technologies often focus on specific examples such as artificial intelligence, virtual reality, blockchain, and others, highlighting their key features, applications, and potential implications (Schwab, 2016). Additionally, emerging technologies emphasize their transformative potential, disruptive capabilities, and interdisciplinary nature, highlighting their role in shaping the future of various industries, domains, and human endeavors (Dertouzos, 2001).

Examples of Emerging Technologies in Education

Emerging technologies have been increasingly integrated into education, offering innovative solutions to enhance teaching and learning experiences. Some examples of emerging technologies in education include: Artificial Intelligence (AI), Virtual Reality (VR) and Augmented Reality (AR), Gamification, Robotics technologies, Big data analytics tools, Internet of Things (IoT), and Integrating Blockchain Technology for Secure Educational Transactions. These examples demonstrate the diverse range of emerging technologies that are transforming education and shaping the future of teaching and learning. Let us briefly explain each of these technologies and their role in teaching and learning.

Artificial Intelligence (AI)

"Artificial intelligence" (AI) refers to the development of systems or machines that mimic human intelligence, enabling them to perform tasks that typically require human cognition. These systems, created by humans, analyze data, recognize patterns, and make decisions or predictions based on their findings. AI encompasses various subfields such as machine learning and natural language processing, each focusing on different aspects of intelligence emulation. While significant progress has been made in AI, achieving true human-like intelligence remains a long-term goal. AI technologies, such as intelligent tutoring systems and personalized learning platforms, have been shown to improve student engagement and learning outcomes (VanLehn et al., 2007). These systems use algorithms to analyze student performance data and provide tailored feedback and recommendations, adapting the learning experience to individual student needs.

Virtual Reality (VR) and Augmented Reality (AR)

Virtual Reality (VR) and Augmented Reality (AR) are groundbreaking technologies that redefine human interaction with digital content. VR creates immersive, computer-generated environments that simulate real-world experiences, transporting users to artificial realms where they can explore, interact, and engage with virtual elements. In contrast, AR enhances real-world experiences by overlaying digital content onto the physical environment (Chen et al., 2018), seamlessly integrating virtual objects, images, or information into the user's view. While VR immerses users

in entirely digital environments, AR integrates virtual elements into the user's surroundings, blending the digital and physical realms to augment real-world experiences (Milgram & Kishino, 1994). Both technologies offer unique opportunities for interactive entertainment, education, healthcare, and industry, driven by their literal meanings and underlying principles of creating virtual and augmented realities that enhance human experiences.

VR and AR technologies offer immersive learning experiences that enable students to explore virtual environments and interact with digital content in three-dimensional space (Dalgarno & Lee, 2010). Research suggests that VR and AR can enhance student motivation, engagement, and knowledge retention across various subjects (Akçayır & Akçayır, 2017).

Gamification

Gamification is a pedagogical approach gaining traction in educational contexts, entails the strategic incorporation of game elements, including rewards, challenges, and competitive structures, within instructional frameworks to cultivate student engagement and motivation (Deterding et al., 2011). By harnessing the inherent appeal of game mechanics, educators seek to enhance the learning experience and foster active participation among students. Extending beyond traditional didactic methods, gamification leverages elements such as points, badges, leaderboards, and narratives to create immersive and interactive learning environments that captivate learners' attention and stimulate their intrinsic motivation to achieve educational objectives.

Scholarly research underscores the efficacy of gamification in enhancing various facets of the educational process. Educational games and gamified learning platforms have demonstrated considerable potential in improving student motivation, collaboration, and learning outcomes across diverse educational contexts (Papastergiou, 2009). Through carefully designed game mechanics and engaging narratives, gamification imbues learning activities with elements of enjoyment and challenge, thereby heightening students' sense of agency and investment in their academic pursuits. Moreover, gamified approaches offer opportunities for personalized learning experiences tailored to individual student needs and preferences, promoting active engagement and knowledge retention.

Furthermore, the integration of gamification principles into educational practices aligns with contemporary pedagogical paradigms emphasizing student-centered, experiential learning

methodologies. By fostering a sense of autonomy, competence, and relatedness, gamified learning environments empower students to take ownership of their learning journey and cultivate essential skills such as problem-solving, critical thinking, and collaboration (Deci & Ryan, 1985). As educators continue to explore innovative approaches to pedagogy and instructional design, gamification emerges as a promising strategy for reimagining education in the digital age, facilitating meaningful learning experiences that inspire and empower students to thrive academically and beyond.

Robotics

Robotics technologies, encompassing programmable robots and robotic kits, present educational prospects that emphasize hands-on learning experiences conducive to fostering problem-solving abilities, creative thinking, and computational skills (Bers, 2008). The integration of robotics into educational curricula holds promise for stimulating student engagement and interest in STEM disciplines, as evidenced by research findings highlighting its potential to invigorate learning environments and promote interdisciplinary exploration (Bers et al., 2014). By offering tangible platforms for experimentation and exploration, robotics technologies serve as catalysts for cultivating critical competencies essential for navigating the complexities of the modern world.

Moreover, the incorporation of robotics technologies into educational settings aligns with pedagogical paradigms emphasizing experiential and constructivist learning approaches. By actively engaging with programmable robots and robotic kits, students are afforded opportunities to apply theoretical concepts in practical contexts, fostering deeper conceptual understanding and knowledge retention (Hmelo-Silver et al., 2007). Such immersive learning experiences not only empower students to develop technical proficiencies but also cultivate essential soft skills, such as collaboration, communication, and adaptability, crucial for success in today's dynamic workforce (Bers et al., 2014).

Furthermore, the pedagogical implications of robotics technologies extend beyond the acquisition of domain-specific knowledge, offering pathways for promoting lifelong learning and nurturing a culture of innovation. Through iterative design processes and iterative problem-solving activities inherent in robotics projects, students are encouraged to embrace a growth mindset, persisting through challenges and iteratively refining their solutions (Papert, 1980). By fostering an ethos of

experimentation, creativity, and resilience, robotics technologies serve as vehicles for instilling in students the dispositions and competencies necessary for navigating an increasingly complex and interconnected world.

Big Data Analytics

Big data analytics tools have emerged as pivotal instruments in the educational landscape, facilitating the collection, analysis, and interpretation of extensive datasets to extract meaningful insights into student learning behaviors and performance patterns (Siemens & Long, 2011). Leveraging advanced computational techniques, these tools enable educators to sift through vast volumes of data generated within educational settings, encompassing student assessments, learning activities, and engagement metrics. This analytical process furnishes educators with comprehensive perspectives on student progress and engagement, transcending traditional assessment methods and offering nuanced understandings of individual learning trajectories.

Central to the efficacy of big data analytics in education is its capacity to personalize learning experiences and optimize instructional strategies based on empirical evidence (Romero & Ventura, 2010). By harnessing data-driven insights, educators can tailor learning pathways to meet the diverse needs and preferences of students, fostering individualized approaches that cater to varying learning styles and abilities. Moreover, big data analytics empower educators to identify at-risk students who may require additional support or interventions, enabling timely interventions to mitigate academic challenges and enhance student success rates. Through this iterative process of analysis and intervention, educators can optimize instructional decision-making and refine educational practices to better align with student needs and aspirations.

Furthermore, the integration of big data analytics in education holds promise for enhancing institutional effectiveness and fostering continuous improvement initiatives (Siemens & Long, 2011). By synthesizing disparate datasets from various educational sources, institutions can gain holistic insights into organizational processes, resource allocations, and student outcomes. This holistic perspective enables stakeholders to identify systemic challenges, allocate resources strategically, and implement evidence-based interventions to enhance overall educational quality and student success rates. Thus, big data analytics not only enhance pedagogical practices but also

serve as catalysts for systemic transformation and institutional enhancement within the educational landscape.

The Internet of Things (IoT)

The Internet of Things (IoT) represents a paradigm shift in technological connectivity, embodying a network of interconnected physical devices capable of collecting, exchanging, and processing data autonomously. This transformative concept has garnered significant attention across diverse sectors, including education, owing to its potential to revolutionize traditional learning environments. Within educational settings, IoT technologies offer educators the opportunity to create dynamic and interconnected ecosystems that facilitate data-driven decision-making, personalized learning experiences, and enhanced pedagogical outcomes.

In the realm of education, the integration of IoT devices and sensors holds promise for fostering a more intelligent and connected learning environment. By harnessing the power of IoT, educators can augment traditional teaching methods with real-time data collection, analysis, and automation, thereby enriching the learning experiences of students. Through the deployment of IoT-enabled devices such as smartboards, wearable technology, and environmental sensors, educational institutions can capture valuable insights into student engagement, behavior patterns, and learning preferences, facilitating the implementation of tailored instructional strategies and interventions.

Furthermore, the utilization of IoT technologies in education transcends the confines of the traditional classroom, extending learning opportunities beyond physical boundaries. Remote learning environments, online platforms, and virtual classrooms can leverage IoT-enabled devices to promote collaborative learning, facilitate remote monitoring and assessment, and foster seamless communication among students and educators. As educational institutions continue to embrace the potential of IoT, the landscape of teaching and learning is poised to undergo profound transformations, ushering in an era of enhanced connectivity, innovation, and inclusivity in education.

Block Chain Technology

Block chain technology has emerged as a disruptive force across various sectors, offering a decentralized and transparent system for recording transactions and managing digital assets. In the

context of education, block chain technology holds promise for ensuring the security and integrity of educational transactions. By providing a tamper-resistant and immutable ledger of academic credentials, certifications, and achievements, block chain technology mitigates the risks associated with fraud, credential misrepresentation, and unauthorized alterations (Nakamoto, 2008). The decentralized nature of block chain systems enhances trust and reliability by removing the need for intermediaries and central authorities, thereby streamlining administrative processes and reducing administrative burdens in educational institutions (Swan, 2015).

Moreover, block chain technology facilitates the verification and authentication of academic credentials in a secure and efficient manner. With block chain-based credentialing systems, individuals can securely store their educational records and share them with employers, institutions, or other relevant parties as needed, without relying on centralized databases or third-party verification services (Tapscott & Tapscott, 2016). This not only enhances the portability and accessibility of educational credentials but also reduces the administrative overhead and costs associated with credential verification, benefiting both learners and educational institutions (Swan, 2015).

Likewise, block chain technology has the potential to revolutionize the management of intellectual property rights and digital content in education. By leveraging smart contracts and decentralized storage solutions, educators and content creators can securely distribute and monetize educational materials while ensuring fair compensation and copyright protection (Tapscott & Tapscott, 2016). Additionally, block chain-based platforms enable the creation of decentralized learning environments and educational marketplaces, where learners can access a wide range of educational resources and services, collaborate with peers, and engage in peer-to-peer learning experiences (Swan, 2015). Overall, block chain technology offers innovative solutions for addressing the security, authenticity, and accessibility of educational transactions, paving the way for a more transparent, efficient, and inclusive educational ecosystem.

Promoting Accessibility and Inclusivity in Education using Emerging Technologies (ET)

Inclusive educational technology (IET) refers to the integration of emerging technologies (ET) into educational environments in a manner that ensures equal access and participation for all students, including those with disabilities. It encompasses the design and implementation of digital

tools, platforms, and resources that accommodate diverse learning needs and preferences, fostering an inclusive learning environment where every student can thrive. IET aims to remove barriers to learning and promote equitable access to educational opportunities, regardless of students' backgrounds, abilities, or circumstances.

Emerging technologies offer powerful tools and resources for promoting inclusive educational technology by addressing diverse learning needs and preferences. For example, artificial intelligence (AI) and machine learning algorithms can personalize learning experiences by analyzing students' learning styles, preferences, and performance data, and adapting instructional content and delivery methods accordingly (Blikstein, 2019). Virtual reality (VR) and augmented reality (AR) technologies can provide immersive and interactive learning experiences that cater to different sensory modalities and preferences, accommodating diverse learning styles and abilities (Akçayır & Akçayır, 2017). Additionally, assistive technologies such as screen readers, speech recognition software, and alternative input devices can empower students with disabilities to access digital content and participate in educational activities on equal footing with their peers (Edyburn, 2010).

Furthermore, emerging technologies can facilitate collaboration, communication, and engagement among students, fostering a sense of belonging and community in inclusive educational environments. Online collaborative platforms, social media tools, and virtual learning communities enable students to connect with peers, share ideas, and collaborate on projects regardless of geographical location or physical limitations (Yang & Gu, 2015). Additionally, gamification and game-based learning approaches can motivate and engage students by incorporating elements of competition, challenge, and rewards into educational activities, making learning more enjoyable and accessible to diverse learners (Deterding et al., 2011). Overall, the strategic integration of emerging technologies in promoting inclusive educational technology holds tremendous potential for creating more accessible, engaging, and effective learning experiences for all students, regardless of their abilities or backgrounds.

Benefits and Challenges of Emerging Technologies in Education

As education evolves in response to advancements in technology, the integration of emerging technologies holds great promise for transforming teaching and learning experiences. However,

along with the benefits they bring, these technologies also present unique challenges that educators, policymakers, and stakeholders must navigate. Below, we explore ten benefits and challenges associated with the integration of emerging technologies in education.

Benefits

1. **Enhanced Engagement:** Emerging technologies such as virtual reality (VR) and gamification increase student engagement by providing interactive and immersive learning experiences.
2. **Personalized Learning:** Adaptive learning systems powered by artificial intelligence (AI) tailor educational content and pacing to individual student needs, promoting personalized learning experiences.
3. **Accessibility:** Emerging technologies improve accessibility for students with disabilities through features like text-to-speech, screen readers, and alternative input methods.
4. **Global Connectivity:** Online learning platforms and virtual classrooms enable students to access educational resources and collaborate with peers from around the world, fostering global connectivity.
5. **Cost-effectiveness:** Digital textbooks, open educational resources (OER), and online courses reduce the costs associated with traditional educational materials and facilities, making education more affordable and accessible.
6. **Real-world Application:** Virtual simulations and augmented reality (AR) applications provide opportunities for hands-on learning and practical skill development in a safe and controlled environment.
7. **Data-driven Decision-making:** Big data analytics enable educators to gather and analyze student performance data, informing instructional strategies, curriculum design, and intervention efforts.
8. **Lifelong Learning:** Emerging technologies support lifelong learning by providing flexible and accessible learning opportunities for individuals of all ages and backgrounds.

9. **Collaboration and Communication:** Online collaboration tools, social media platforms, and virtual learning communities facilitate communication and collaboration among students, educators, and experts across geographic boundaries.

10. **Innovation and Creativity:** Emerging technologies encourage innovation and creativity in education by enabling students to explore new ideas, experiment with different approaches, and develop 21st-century skills.

Challenges

1. **Access Disparities:** Socioeconomic disparities in access to technology and internet connectivity create inequalities in educational opportunities and outcomes.

2. **Digital Divide:** The digital divide between urban and rural areas, as well as between developed and developing regions, exacerbates disparities in access to educational resources and technologies.

3. **Technological Barriers:** Technical issues such as software glitches, hardware malfunctions, and compatibility issues can disrupt learning experiences and hinder the effective integration of emerging technologies in education.

4. **Privacy and Security Concerns:** Data privacy and security risks associated with the collection, storage, and use of student data raise concerns about confidentiality, consent, and data protection.

5. **Training and Professional Development:** Educators require ongoing training and professional development to effectively integrate emerging technologies into their teaching practices and curriculum design.

6. **Pedagogical Integration:** The effective integration of emerging technologies into educational contexts requires careful consideration of pedagogical principles, learning objectives, and instructional strategies.

7. **Digital Literacy Skills:** Students and educators need digital literacy skills to navigate and critically evaluate digital information, media, and technologies, but many lack the necessary competencies.

8. **Overreliance on Technology:** Overreliance on technology can lead to passive learning experiences, reduced social interaction, and diminished critical thinking skills.

9. **Equity and Inclusion:** Emerging technologies may inadvertently perpetuate existing inequities and biases if not designed and implemented with equity and inclusion in mind.

10. **Ethical Dilemmas:** Ethical dilemmas related to the use of emerging technologies in education, such as data privacy, algorithmic bias, and intellectual property rights, pose complex challenges that require careful consideration and ethical reflection.

Self-Assessment

1. List and describe at least three emerging technologies that are expected to impact the future of education
2. Explain with relevant examples how big data analytics can be utilized in education to inform decision-making processes
3. Give an account on the significance of accessibility and inclusivity in ICT for education
4. What are the possible future trends in ICT for education and give an analysis of their potential implications for educational institutions

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