Topic: Emerging Technologies II

Focus: Robotics, Virtual Reality (VR), and Augmented Reality (AR)

LESSON INFORMATION

Subject: Digital Technologies
Class Level: Senior Secondary School (SS1)
Duration: 40Minutes
Topic: Emerging Technologies II
Sub-topics:

- Robotics
- Virtual Reality (VR)
- Augmented Reality (AR)

LEARNING OBJECTIVES

At the end of the lesson, students should be able to:

1. Define Robotics, Virtual Reality, and Augmented Reality.
2. Explain the components and uses of Robotics.
3. Differentiate between Virtual Reality and Augmented Reality.
4. Identify real-life applications of VR and AR.
5. State the advantages and disadvantages of these technologies.
6. Mention careers related to emerging technologies.

INTRODUCTION

Emerging technologies are new and developing technologies that are changing the way people live, learn, communicate, and work. These technologies improve efficiency and solve modern problems in different sectors such as healthcare, education, agriculture, entertainment, security, and manufacturing.

Examples of emerging technologies include:

- Artificial Intelligence (AI)
- Robotics
- Virtual Reality (VR)
- Augmented Reality (AR)
- Internet of Things (IoT)
- Blockchain Technology

This lesson focuses on Robotics, Virtual Reality, and Augmented Reality.

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1. ROBOTICS

Meaning of Robotics

Robotics is the branch of technology that deals with the design, construction, programming, and operation of robots.

A robot is a programmable machine that can perform tasks automatically or semi-automatically.

Components of a Robot

A robot consists of the following parts:

1. Sensors: These help robots detect changes in their environment such as light, heat, sound, movement, or touch.

2. Controller: The controller acts as the brain of the robot. It processes information and controls the robot's actions.

3. Actuators/Motors: These help robots move parts of their body such as arms, wheels, or legs.

4. Power Supply: Provides electrical energy for the robot to function.

5. Software/Programming: Instructions written by programmers that tell the robot what to do.

Types of Robots

1. Industrial Robots

2. Medical Robots
3. Military Robots
4. Service Robots
5. Educational Robots
6. Humanoid Robots

Uses of Robotics

In Manufacturing: Robots assemble products in factories.

In Medicine: Robots assist doctors during surgery.

In Agriculture: Robots help in planting and harvesting crops.

In Security: Robots are used for bomb detection and surveillance.

In Education: Educational robots assist students in learning coding and engineering.

Advantages of Robotics

- Increases productivity
- Performs dangerous tasks safely
- Reduces human error
- Works continuously without fatigue
- Improves precision and accuracy

Disadvantages of Robotics

- Expensive to develop and maintain
- Can lead to unemployment
- Requires technical expertise
- May malfunction

2. VIRTUAL REALITY (VR)

Meaning of Virtual Reality

Virtual Reality (VR) is a computer-generated environment that allows users to experience and interact with a simulated world as if it were real.

Users usually wear special devices called VR headsets.

Features of Virtual Reality

- Creates immersive experiences
- Uses 3D graphics and sound
- Allows interaction with virtual objects
- Simulates real-life environments

Devices Used in VR

1. VR Headsets
2. Motion Sensors
3. VR Gloves
4. Controllers
5. Special Computers or Consoles

Applications of Virtual Reality

Education: Students can visit virtual laboratories and museums.

Gaming: Provides realistic gaming experiences.

Medicine: Doctors practice surgeries using simulations.

Military Training: Soldiers train in virtual combat environments.

Architecture: Architects create virtual building designs.

Advantages of VR

- Enhances learning experiences
- Improves training and simulations
- Encourages creativity
- Provides entertainment

Disadvantages of VR

- Very expensive
- Can cause eye strain or dizziness
- Requires powerful devices
- May reduce social interaction

3. AUGMENTED REALITY (AR)

Meaning of Augmented Reality

Augmented Reality (AR) is a technology that adds digital information such as images, sounds, or animations to the real-world environment.

Unlike VR, AR does not completely replace the real world.

Features of AR

- Combines digital objects with real environments
- Works in real time
- Uses smartphones, tablets, or AR glasses
- Interactive and engaging

Applications of AR

Education: AR books display animated diagrams.

Navigation: Maps show directions on real streets.

Shopping: Customers can preview furniture in their homes.

Medicine: Doctors view digital body information during operations.

Entertainment and Social Media: Filters on social media apps use AR technology.

Advantages of AR

- Improves learning and understanding
- Interactive and engaging
- Easy access through smartphones
- Enhances user experience

Disadvantages of AR

- Privacy concerns
- Expensive advanced devices
- Technical limitations
- May distract users

DIFFERENCE BETWEEN VR AND AR

Virtual Reality (VR)	**Augmented Reality (AR)**
Creates a completely virtual environment	Adds digital elements to the real world
Requires VR headsets	Can work on smartphones and tablets
Replaces the real environment	Enhances the real environment

Virtual Reality (VR)	Augmented Reality (AR)
Fully immersive	Partially immersive

CAREER OPPORTUNITIES

1. Robotics Engineer
2. VR Developer
3. AR Designer
4. Software Engineer
5. AI Specialist
6. Game Developer
7. Computer Programmer

CLASS ACTIVITY

Activity 1

Ask students to identify devices that use AR or VR.

Activity 2

Students should discuss areas where robots are used in Nigeria.

Activity 3

Show pictures/videos of robots, VR headsets, and AR applications.

EVALUATION QUESTIONS

1. Define Robotics.
2. Mention four components of a robot.
3. What is Virtual Reality?
4. State three uses of VR.

5. Define Augmented Reality.
6. Mention three applications of AR.
7. State two differences between VR and AR.
8. Mention two advantages of Robotics.

ASSIGNMENT

1. Explain five applications of Robotics in modern society.
2. Differentiate between Virtual Reality and Augmented Reality with examples.
3. List five careers related to emerging technologies.

TEACHING AIDS

- Computer system
- Projector
- Pictures/videos of robots
- VR headset images
- Smartphones/tablets showing AR applications
- Whiteboard and marker

SUMMARY

Robotics, Virtual Reality, and Augmented Reality are important emerging technologies shaping the future. Robotics involves intelligent machines performing tasks automatically, while VR creates virtual environments and AR enhances the real world with digital information. These technologies are widely used in education, healthcare, entertainment, manufacturing, and security.