

Unit 2 Application Areas of ICT

Introduction and Application areas of information and communication technology

Computers are used in several areas and industries. Many manual jobs have been replaced by computers. This has led to processes being faster and efficient.

Application areas of information and communication technology

Information and Communication Technology (ICT) has impacted on various fields as shown in the table below.

Financial systems

Area	Uses
Payroll Systems	• Human Resource Management. • Salary processing.
Accounting Systems	• Customer orders entry. • Billing. • Inventory management.
ICT in Banks and Insurance companies	• Automated Teller Machines (ATMs). • Cheques Processing. • Electronic Funds Transfer. • Internet banking and Mobile banking. • Asset finance management such as loan processing systems.

Retail systems

Area	Uses
ICT in supermarkets	• Stock control. • Electronic Point of Sale (EPOS) - barcode reader, Electronic Funds Transfer, acknowledging and appending transactions. • Security such as CCTV cameras and sensors item tags. • Advertisements and promotions.

Reservation systems

Area	Uses
Reservation Systems	• Hotel booking. • Airline booking.

Education

Area	Uses
Education	• Computer Aided Learning (CAL). • Computer Aided Teaching (CAT). • E-learning. • Computer Based Simulation. • Virtual Learning. • Record Management. • Exams preparation and processing.

Industrial systems

Area	Uses
Industrial systems	• Computer Aided Design (CAD). • Computer Aided Manufacture (CAM). • Simulation such as flight simulators. • Process control using robots. • Management control such as to keep track of orders, bills and transactions. • Competitive tools such as designing new products and services.

Scientific and research systems

Area	Uses
Scientific and research systems	• Hospitals-Control lifesaving machines, diagnosis, intensive care units, health expert systems among others. • Weather forecasting-Analyse climatic patterns and trends. • Military-Weapons testing, radar systems, launching and guiding missiles, surveillance and tracking target enemies among others. • Space exploration-Launch space automobiles and monitor flights. • Nuclear science-Design and testing of nuclear weapons.

Transportation systems

Area	Uses
Transportation systems	• Automobile traffic control systems. • Railway corporations to coordinate the movement of their goods and wagons. • Shipping control for communication and management of fleets efficiently. • Airline industry to control the movement of aircrafts, take off and landing through the use of radar equipment.

Entertainment systems

Area	Uses
Entertainment systems	• Business presentations for advertisement purposes. • Internet, radio and television. • Music related equipment such as synthesisers. • Production of movies and computer games.

Virtual reality

Area	Uses
Virtual Reality	• Entertainment. • Training military personnel. • Education. • Flight simulation. Components of Virtual Reality: • Gloves. • Sensors. • Body suit. • Head mounted display headgear. • Virtual reality software.

Library systems

Area	Uses
Library systems	• Cataloguing system-Locate books and other resources in an easier way. • Inventory control system- Determine what books need to be ordered or which ones have been lost. • Borrowing and lending system- For easier borrowing and returning of library materials. • E-Libraries- Virtual library on the internet that offers electronic books and other learning materials online. • Research-Using research sites such as google. • Security -To control theft of books and other library properties.

Domestic systems

Area	Uses
Domestic systems	• Watching movies, playing music and computer games. • Storing personal information. • Calculating and storing home budgets. • Shopping purposes. They provide people with lists of shopping items as well as their prices. They also provide electronic money transfer facilities. • Internet, radio, televisions, music, games. • Production of movies and computer games.

Health expert systems

Area	Uses
Health expert systems	• It allows experts with no experience of computers to build and evaluate complex disease models. • Used to disseminate key findings on research on medical treatment outcomes.

Office expert systems

Area	Uses
Office expert systems	• Assist in decision making process. • Support planning and scheduling of activities in offices. • Solve complex problems by reasoning through bodies of knowledge.

Marketing

Area	Uses
Marketing	• Electronic commerce or E-business-Transactions are carried out electronically without physical interaction between the seller & the buyer. This saves on travel costs, time and other resources. • Electronic presentation- Computers are used to create exciting presentations concerning the products of a business and present them to the audience using presentation software.
Advertising	• Computers are used to design catchy presentations using animation softwares that can be broadcasted, placed on billboards or on the internet. Note: The employee in charge of this work in an organisation is called a webmaster.

Security

Area	Uses
Law enforcement agencies	• Biometrics such as fingerprints, iris, facials, DNA and general database of outlaws. • Lie detectors in criminology. • Forensic analysis. • To speed-up investigations.

Sample KCSE Questions

1. Write the following acronym in full as used in computing POS (1 mark) **KCSE 2013 Paper 1**

2. Explain three ways in which computers have impacted on education. (3 marks)

KCSE 2005 Paper 1

3. State two advantages of using robots in manufacturing of goods. (2 marks)

KCSE 2008 Paper 1

4. State three ways in which ICT can be used in shipping control. (3 marks) **KCSE 2010 Paper 1**

5. State four benefits of using a computer in a school library. (2 marks) **KCSE 2007 Paper 1**

6. An employee in a business company is charged with the responsibility of putting the company advertisements on the internet. **KCSE 2006 Paper 1**

i) State the professional title of the employee. (1 mark)

ii) Give an example of software used by this employee to carry out the above task. (1 mark)

7. Explain two benefits that the employer will get by allowing a worker to do the office work through telecommuting. (4 marks) **KCSE 2013 Paper 1**

8. List three ways in which computer technology can be used in law enforcement. (3 marks)

KCSE 2008 Paper 1

9. Simulation is one of the application areas of computers. **KCSE 2005 Paper 1**

i) What is meant by the term simulation? (1 mark)

ii) Name two application areas of simulation. (2 marks)

iii) State three advantages of computer based simulation. (3 marks)

Unit 3 Impact of ICT on Society

Impact of ICT on Society and the areas affected by use of ICT

Introduction

Information and Communication Technology (ICT) continues to influence our lifestyle both negatively and positively.

Areas affected by use of ICT

The use of ICT offers a different set of opportunities and challenges in our society. Some of the areas affected by the use of ICT are:

1. Employment.
2. Automated production.
3. Workers' health.
4. Culture.
5. Breakthroughs in ICT.

Effects on employment

ICT has affected employment in three ways:

- a) **Job creation** - More technical jobs have been created to be done by ICT experts, such as programming and networking.
- b) **Job replacement** - Some workers doing clerical and manual jobs have lost their jobs and have been replaced by ICT systems which are faster and more accurate.
- c) **Job displacement** - Some workers have been moved away from office jobs that require computer skills and have been taken to do manual jobs.

Benefits and Effects of automating production

- a) Standardised output.
- b) High levels of accuracy.
- c) Faster production.
- d) Voluminous output per given time.
- e) Better customer satisfaction.
- f) Optimisation of organisational resources.
- g) Cuts down on production cost.

Effects on automated production

Automation; Refers to the process of digitising processes in an organisation leading to little human intervention. ICT has revolutionised the production processes in factories, industries and companies by automating and speeding up processes that take place hence improving the quality of products and services.

Disadvantages of automating production

- a) Electronic layoffs – leads to job loss.
- b) Installation costs are high.
- c) Operational overheads may go up such as maintenance cost.
- d) Low level of decision making hence difficulty in dealing with unforeseen situations.
- e) Restricted only to the instructions given.

Health issues

- a) Improved screening and diagnosis of patients.
- b) Eye defects including eye strains, double visions and blurred vision.
- c) Repetitive Strain Injuries (RSI).
- d) Electromagnetic radiations related problems such as causing skin cancer, birth defects among others.
- e) Headaches.
- f) Back and neck strains.

Cultural effects

ICT has changed the way of life of people in various ways such as;

- a) Internet addiction.
- b) Entertainment like 3D online movies and games.
- c) Social networking.
- d) Illicit content access like pornography.
- e) New crop of crimes (Computer crimes) through the internet.
- f) Online betting and gambling.

Environmental effects and Breakthroughs in ICT

- a) Noise pollution.
- b) Electromagnetic radiations.
- c) Improper electronic waste (e-waste) management.
- d) Paperless or electronic offices have reduced deforestation.

Breakthroughs in ICT

ICT has managed key milestones in various areas which include;

- a) Medical field** – Expert systems for disease diagnosis and treatment, 3D patients body imaging using Computer Tomography scanners, life support automated machines among others.
- b) Finance** – Mobile banking, Internet banking, Decision support Systems among others.
- c) Communication** – Video conferencing, telecommuting, social media among others.
- d) Entertainment** – Animations, call back tunes and online gaming.
- e) Industries** – Computer Aided Manufacture and Computer Aided Design systems, Computer based industrial simulations, process control systems, robots among others.
- f) Education** – Computer Aided Learning and Teaching, electronic learning, computer based simulation among others.
- g) Transport** – Navigation control using Geographical Positioning systems, reservation systems for electronic ticketing and traffic control systems.

Evolution of computer systems

ICT is dynamic and improving in the following areas:

1. Hardware and software

Computer hardware has become:

- a) Smaller in size.
- b) More powerful.
- c) Faster.
- d) Higher storage capacity.
- e) Universal connection for peripheral devices
- f) Technological convergence.
- g) Cheaper prices.

Computer software is:

- a) More user-friendly.
- b) Sophisticated.
- c) More secure.
- d) Gaining more control over hardware.
- e) Simpler to develop.

2. Artificial intelligence

Artificial intelligence is a field of computer science that develops machines that mimic human intelligence such as; reasoning, language processing, tasting, hearing, learning, seeing and smelling.

There are four main areas of artificial intelligence namely:

- a) Expert systems.
- b) Natural language processing.
- c) Artificial neural networks.
- d) Robotics and perception systems.

a) Expert systems

- It is a computer system that simulates the work of human experts in a certain domain of knowledge in the society such as doctors, engineers, financial analysts among others.
- The main components of an expert system are knowledge base, inference engine and user interface.

b) Natural language processing

It is a computer system that is able to listen, recognise and interpret natural human languages.

c) Artificial neural networks

They are a combination of both electronic devices and software that depict the cognitive learning process of human brain.

d) Robotics and perception systems

It is a computer-controlled device used to do repetitive tasks that are cumbersome or too dangerous for human beings to perform. Robots can be fitted with sensory ability to touch, see, hear, smell or even taste. A robot consists of an arm, sensors and pivots.

These systems are faster, more accurate, more reliable than human beings and do not get tired.

Expanded internet

The internet has become an information superhighway because of highly increased speed and bandwidth. There has been integration of computers and communication systems for the purpose of exchanging large volumes of multimedia data or content. Use of fiber optic cables and satellite systems has enormously transformed internet.

Sample KCSE Questions

- 1.Distinguish between "Job replacement" and "Job displacement" in reference to computerisation. (2 marks) **KCSE 2001 Paper 1**
- 2.The 21st Century has had many forms of ICT technologies improving the various means of communication. However, these changes have brought many challenges. State three negative social impacts of these technologies. (3 marks) **KCSE 2003 Paper 1**
- 3.Explain the impact of information technology on organisations in each of the following areas: **KCSE 2001 Paper 1**
 - a) Competition (2 marks)
 - b) Pace of growth (2 marks)
4. State three ways in which computer technology may affect employment patterns in organisations. (3 marks) **KCSE 2001 Paper 1**
 - i) State and explain three reasons why the employment patterns are affected. (6 marks)
- 5.Define the term artificial intelligence. (2 marks) **KCSE 2005 Paper 1**
- 6.List three application areas of artificial intelligence. (3 marks) **KCSE 2004 Paper 1**
- 7.a) What is an expert system? (1 mark) **KCSE 2003 Paper 1**
 - b) State any two components of an expert system. (2 marks)