Module 4

TECHNOLOGY AND SOCIETY

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Learning Objectives

The students are expected to :

• Understand the definition and difference between Science and Technology

• Know the positive and negative effects of technology.

• Understand the role of technology on socio-economic development

• Explain the impact of technology on culture, politics and religion

• Understand the level of technological advancement in the ancient city of Kano State in the past.

4.1 Introduction

Science, technology, and society (STS) are introduced so that, the students will know how science and technology evolve as human activities and how they relate to the larger civilization. Science and Technology are the backbone for any development. All economic developments that can be seen in the world's super powers were made possible with the help of scientific and engineering researches. These forms of researches are normally conducted in some established settings, particularly in research institutes, research laboratories, development centres and universities.

4.2 Science

The word science comes from the Latin word"scientia", meaning "knowledge" or "to study". Today, science has evolved into philosophy with many branches and countless sub-branches.

Definition :Science is defined as a system of acquiring knowledge based on the established methods. The teaching of science offers students the ability to access knowledge and information which will contribute to an overall understanding of how and why things work. Science also helps to provide visible proof of many facts we read about in books or see on the television. Science lessons are likely to help developing a strong ability to think critically.

Scientific methods are the processes which scientists follow to conduct research. Scientific methods include observations, hypotheses, experimentations and analysis, interpretation, and deductions to describe and explain natural phenomena. The following are some of the fields of Science;

(i) Chemistry, Biochemistry, Analytical Chemistry, Inorganic C hemistry
(ii) Biology, Anatomy, Botany, Microbioloy
(iii) Physics, Acoustic, Astronomy, Biophysics

4.3 Technology

Technology is derived from the Greek words "Techne & Logia", meaning art, skill, or processes used in production of goods and services. Technology is defined as the way things are done or made. Simply, technology is the manipulation and control of the physical world. In general, Technology is meant to create products that solve problems and improve human life.

1.4 HISTORY OF TECHNOLOGY

Human beings have been making and using tools from stones, bones and sticks in an adhoc manner since time immemorial. The tools were simply made for satisfying basic needs in getting shelter, clothing, protection and food. The shapes and sizes of the tools were kept on changing to suit their uses.

4.4.1 Stone Age

Stone age was a prehistoric period or level of development during which stone was widely used to make implements. The history of human technology began with the discovery on how stones could be used as a cutting edge. The type of stone found suitable for this purpose is flint. Ancient people were using round nodules of flint to form sharp edges. The tools made in this way have been found in Africa from about 2.5 million years ago at Gona, in the Awash Valley in Ethiopia. Hundreds of thousands of years later, craftsmen started forming implements of various kinds, producing tools for cutting, scraping, gouging or boring, as well as sharp points for arrow and spear heads.

(i) Paleolithic period (old stone age) is the period when rudimentary chipped stone tools were used. In this period, there was little development, people were few and scattered.

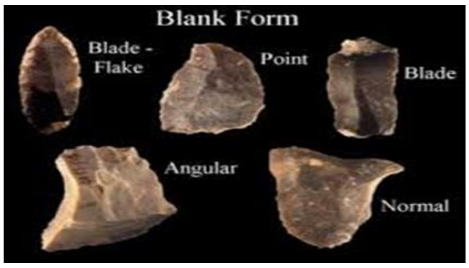
(ii) Mesolithic period is a period of transition between the end of the last Ice age and beginning of the era of human settlement and cultivation.

(iii) Neolithic period is the last phase of stone age when polished stone implements were used in farming. In this period, the basic problem of food was solved and there was rapid growth of population.

4.4.2 Bronze age was a period of time between stone age and iron age. It was the period when bronze was used widely to make tools, weapons and other implements. Bronze is made when copper is heated and mixed with tin.

4.4.3 Iron age is the period when human beings started making implements and weapons made of iron.

Pre-Technological Inventions



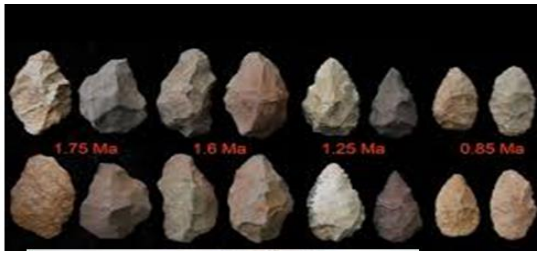


Figure 1: Earlier stones

Figure 2; Polished stones

Figure 3 : Pre-technological tools

Figures 1and 2 show rudimentary chipped and polished stones while figure 3 shows the tools produced in pre-technological period

After simple tools were produced from rudimentary materials, the next major technological invention is that of a wheel. The ancient wheels were made from wooden planks and used for caravan and other forms of transportation mechanisms to move people or luggage behind animals. Today wheels are found in virtually all mechanical devices such as bicycles, motor cars and aeroplanes. Figure 4 shows two different wheels produced from wooden planks.

Figure 4 : Wheels made from wooden planks

4.4.4 Middle Ages

Middle Age is the period between the Roman Empire and Renaissance. That is the period after the fall of the great Roman Empire and before the Rebirth of culture. Arabs and Persians produced devices that were impressive and ingenious in agriculture, roads, defence and textiles

in different parts of the world. Islamic civilization also brought a lot of scientific and technological innovations in agriculture, construction, military and textile equipments.

1.4.5 Renaissance is the period between 14th and extended to the 17th century. This is the time when art, literature and learning in Europe started surviving and it is also regarded as the cultural bridge between the Middle Ages and Modern history. This is the period when there was a total change from imitation to creation.

Early Technological Inventions

Figure 5: Wind mill

Figure 6: Locomotive train

Figure 5 shows a windmill which was used to drive water pumps from natural winds. Figure 6 shows a locomotive train that was used as a means of transportation.

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Advanced Technological Inventions

Fiure 7: Rockets Figure 8: Combined harvester Figure 9: fabrics

Figure 7 shows rockets that were produced from defence industry. Combined harvester shown in figure 8 is used for processing agricultural produce. The fabrics shown in figure 9 were produced from textile industry.

4.4.6 Information Age which is also known as the Computer Age, Digital Age or New Media Age. It is the period in human history characterized by the shift from traditional industry to economic based on information technology. Information revolution leads to the proliferation of the availability of information and the accompanying changes in its storage and dissemination owing to the use of computers, internet and other digital electronic devices.

4.5 Technology is everywhere

Generally, technology is everywhere be it agriculture, buildings, transportation, textiles, printing, politics where government extremely uses technology in education and health or works in order to provide essential services to the people. Technological products are used in enhancing religious activities. Examples: Printing machines are used for printing religious books, aeroplanes for transporting pilgrims to the holy land, loud speakers for calling worshippers to prayers etc. Without technology we would be living in caves, no papers or pencil to write, no cloth to wear, no vehicles to travel, no books to read, no electricity etc. Therefore, life would be unbearable without technology.

4.6 Is Technology Good or Bad ?

There are a lot of benefits from technology but there are also negative effects on social, mental, physical and environmental health as a result of usage.

Computer technology is eliminating jobs as more work is being done automatically by computers and robots. New industrial processes now require less manpower because of automation. The Internet has bred many unethical practices like hacking, spamming and phishing. The Internet being an open platform, lacks regulation and therefore, causes an increase in crime. There is also no regulation on the content displayed on websites. Children are spending all their time playing online and less or almost no time to play on the ground. Online messengers, emails, phones and cellular technology have deprived mankind from personal contact. Emails have also replaced handwritten letters which makes communication so easily accessible.

Technology has changed the relationships of families. Families are now distracted by laptops, televisions(TV), smartphones, and video games. Families lack friendly attitude towards each other as they used to in the past. Families used to sit around the table and play together before the creation of these devices. Today, instead of watching TV together or eating together around a table, everyone is in a different room, playing video games, watching TV, texting or listening to music. Television and mobile phones provide little opportunity for meaningful interaction and therefore contributes to the downfall of social values in a family.

Generally, technology is neither good nor bad but it depends on the individuals or the society to either use it in a beneficial way or in a harmful way. Therefore, it is neutral.

4.7 Impacts of Technology

4.7.1 Agricultural technology

Modern agricultural implement gives high yield of food in a short period of time with less input and also allows a small number of people to grow vast quantities of food. Technology is presently used in manufacturing of genetically modified crops that are resistant to many pests and diseases. Also farmers use artificial fertilizers in their farms which add value to the soil and boost the growth of the crops.

4.7.2 Transportation technology

Human beings have been using bicycle for many decades all over the world. It has contributed in transportation industry and in the development of production technology. Bicycle is the predominant means of transportation of populace and light goods from one place to another. It is one of the earliest technology that has had a great impact on society. Human life was highly

restricted due to the unavailability of technological applications when there were no modern means of transport. Modern Transportation uses vehicles, trains, airplanes, roads etc. which provide mobility for people and goods. Transportation Technology is used to manufacture automobiles, buses and trucks which improve the way people move and transport their goods. Technology has helped in advancing road transport, air transport, water transportation and space transportation.

4.7.3 Communication technology

Radios, television, internet, social medias have improved the way ideas are exchanged. Emails have also replaced handwritten letters which makes communication easily accessible. Businesses are also using internet and mobile communication technology to grow and improve their customer services. Cellular technology has made it possible for us to communicate over wireless media.

4.7.4 Technology and education

Knowledge was only available in the minds of Scholars before the advent of paper technology. Paper technology has brought a cultural revolution because books are produced in large scale. With the advent of printing technology, printed materials became a medium of exchange of knowledge and other forms of communication. Presently, many schools have started integrating new methods of teaching and learning with the aim of improving the way students learn. Whiteboards, computers, projectors and internet are presently being used in classrooms. Also long distance learning has been opened to many scholars around the world.

4.8 Technology and Economy

Investments in technology are vital to economic growth and wealth creation for people and businesses throughout the world. Federal, States and Local Governments and communities are faced with several challenges when planning and implementing strategies for economic growth. Therefore, they must be able to adapt programs and initiatives that will address the economic disruption caused by technology. Some ways that technology affects economy:

1.8.1 Contribution to GDP growth

ICT contributes immensely to the GDP growth. Findings from many countries have shown that there have been positive effects of ICT on GDP growth. Most of the effects are driven by people advertising and selling goods online.

4.8.2 New services and industries

The transition to cloud computing is one of the key trends for modernization. Numerous public services have become available online and through mobile phones.

4.8.3 Workforce transformation

Microwork platforms developed by companies allow entrepreneurs to reduce costs and get access to qualified workers. ICT has also contributed to the rise of entrepreneurship, making it much easier for self-starters to access legal and regulatory information, marketing and investment resources.

4.8.4 Business innovation

Social media has established itself as a powerful marketing tool over the past few years. People have been using Internet as new ways of reaching out to customers and competing for market share. Companies are using ICT tools to streamline business processes and improve efficiency.

4.9 Technology and Development

Technology has simplified many tools that people need in education, medicine, communication, transportation, etc Rapid advancement in modern technology all over the world has changed society in different ways. Computer technology has had a great impact on society and has modified the behavior of the people towards technological advancements. The increasing gap in living standards between developed and developing countries are as a result of the increasing gap in technology.

4.10 The Industrial Revolution

This is the period which started from 18^{th} to 19^{th} centuries. In this period, there was a change from an agrarian and handcraft economy to industries and machine manufacturing in Britain then spread to other parts of the world. In general, it was a period in which fundamental changes in agriculture, textile and metal manufacturing started in Europe The development and subsequent application of steam power (James Watt) was undoubtedly the greatest technical achievement of the Industrial Revolution. Figures 10 and 11 show an industrial area and a train that were used during the industrial revolution.

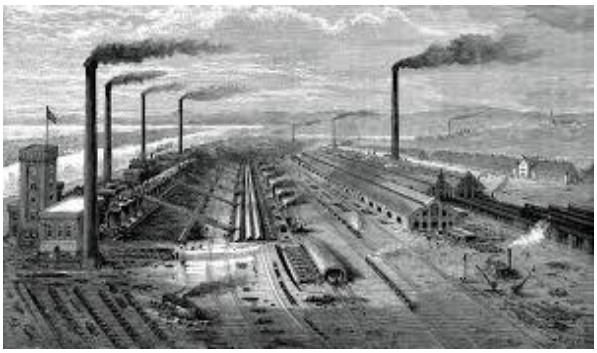

Figure 10: Industrial area

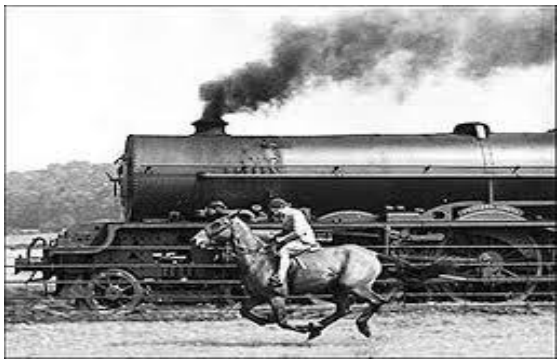

Figure 11: A train

4.11 The Information Revolution

The term information revolution describes current economic, social and technological trends beyond the Industrial Revolution. This leads to the proliferation of the availability of information and the accompanying changes in its storage and dissemination owing to the use of Computers, Internet and other Digital Electronic Devices. This revolution is making the entire world into a global village. Figure 12 shows a global networking system of digital electronic devices.

Figure 12: Digital electronic devices

4.12 TECHNOLOGY IN ANCIENT AND MODERN KANO

4.12.1 Ancient Kano city walls

The ancient Kano city walls were built inorder to provide security and protection to the inhabitants of the ancient city of Kano. The city wall is 14km radious and the foundation for the construction of the waii was laid by saikin Gijimasu from 105-1134 and was completed in the middle of 14th centuary during the reign of Zamnagawa. The wall was further extended to their present position in the 16th centuary. The gates were used to control movement of people and they are as old as the walls. The figures 13 and 14 show the ancient and modern style of buildings in Kano State.

Figure 13: An ancient style of buildings

Figure 14: Modern style of buildings

4.12.2 Ancient Kano Dye Pits

The Kofar Mata Dye Pits were established in 1498 and situated in the city centre as way back as 500yrs. It is an indigenous technology and also played a significant role in the economy of the inhabitants of the ancient people of Kano city Kano. History shows that, the Kofar Mata dye pits is one of the earliest business set by the ancient people of Kano when even the western world was yet to be industrialized. Presently researchers across the world and students use the place as tourists' attraction site.

The figures above show Kano indigo-vegetable dyeing pits, process of dyeing and the various designs produced locally by the ancient people of Kano at Kofar mata dyeing pits. The fabric is often beaten to achieve the shiny and decent appearance.

4.12.3 Ancient Kano Tannery

(a) (b)

A tannery is a place where skins and hides from animals especially cows are processed into leather. Figure (a) shows how the ancient people of Kano city produce leather locally. Figure (b) shows person holding a fished leather produce from the hides of a crocodile.

4.13 The importance of technology

Technology improves the standard of living, it has boosted industries, businesses have grown and more employment opportunities have been created. Advancements in technology have led to the evolution of newer and faster modes of transport and communication. The computer and Internet technologies have changed every sector; be it business, medicine, tourism, education, entertainment or any other. Lastly, technology has touched every aspect of life, making it easier, better and different.

4.14 Conclusion:

World has entirely depended on science and technology. Specifically, life will be totally unbearable without technology. The dependence on technology shows that, it is either a master or a slave. If it is a master, it means the entire lives of human beings are controlled by technology but if it is a slave, it means human beings develop technology and decide how best to use it.

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