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COURSE GUIDE

SED 314
AFRICAN COSMOLOGY AND INTEGRATED SCIENCE

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MODULE 1 AFRICAN MYTHOLOGY AND SCIENCE

INTRODUCTION

In this module, you will be exposed to the meaning and definitions of mythology and science, African concern for the universe, concepts of reality as well as explanation of some natural phenomena.

The module is divided into five different units as follows:

Unit 1 The meaning and history of African mythology
Unit 2 African concern for the universe
Unit 3 Conceptions of reality
Unit 4 Explanation of some natural phenomena I
Unit 5 Explanation of some basic natural phenomena II

UNIT 1 THE MEANING AND HISTORY OF AFRICAN MYTHOLOGY

CONTENTS

1.0 INTRODUCTION

It is pertinent to understand the meaning of African mythology and briefly trace its history and development. This unit is aimed to achieve this purpose.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- Explain the meaning of African mythology
- Define African mythology
- Discuss how culture influenced African Mythology

3.0 MAIN CONTENT

3.1 Meaning of African Mythology

Africa as a continent is home to many great cultures and to a thousand or more languages. Even though no single set of myths are legends, units, this diverse population, different culture groups and religion share some common elements. These range from the beliefs and values, preserved relics of ancient times, origin of the world and the fate of the individual after death. There appears to be confusion when we attempt to differentiate between myths, tales, folktales and fables. We could have clear view when we pursue stories which might illuminate the nature of the beliefs and customs of the culture of Africa. Greek mythology presents a coherent set of gods and goddesses. African mythology on the other hand did not present a consistent set of characters because of her diversity even though some tribes tell similar stories which crossover into folktales and fables. What exactly is African mythology? African mythology to some is the power of myth. Therefore, folk tales and fables are related to mythology. This infers that African mythology has no water tight definition. However, any definition could be accepted provided certain basic elements are involved.

Some of the generally accepted definitions include:

1. African mythology is a higher form of story. This definition attempts to emphasise the African mythology to be for spiritual instruction.
2. African mythology is equally defined as a way of life. This definition tends to associate mythology with the culture of a people.
3. African mythology is also defined as approach by which knowledge and skills are acquired. This definition assists to put into perspective the relationship between myth, folk tales, legends and fables. Each in its own way is an instrument to help instruct average citizens.

SELF-ASSESSMENT EXERCISE

As a scientists in training, what is your operation definition of African mythology?

African mythology are the supernatural beings who influence human life. Some of these beings are powerful deities. Others are lesser spirits such as the spirits of ancestors. Most African traditional religions have multiple gods, often grouped together in family relations. Nearly

everyone of them recognizes a supreme god, an all-powerful and known creator who is usually associated with the sky.

3.2 History of African Mythology

The history of African mythology is as old as the history of the African continent as well as history of Africans as a people. Myths and legends developed over thousands of years in Africa, South of the Sahara. The developments that took place in the myths and legends then were greatly influenced by the mass migrations that took place from time to time. About 7,000 years ago, the ancestors of the Hottentot and Bushman moved from the Sahara towards Southern Africa (http:www.mythencyclopedia.com/A.Am/African-mythology.html).
Five thousand years later, the people who spoke Bantu languages spread out from Cameroon, on Africa's west coast they eventually inhabited much of sub-Saharan Africa. Such migrations in great measure brought about mixing of myths and legends. For instance, the Bantu groups developed new homelands, they developed legends to explain their ruling families and the structure of their societies.

The ancient people of Africa did not use written language until modern times. The ancient people of Africa possessed rich and complex oral traditions, passing myths, legends, and history from one generation to another generation in spoken form. In some cultures, professional storytellers – called giots – preserved the oral tradition. Written accounts of African mythology began in 1800s, and through the present day scholars' efforts, records of the continent's myths and legends are preserved.

However, since the spread of Islam and Christianity to sub-Saharan Africa, the indigenous religions, myths, and legends are weakened. But traditional beliefs have not disappeared. They have blended with new religions from other cultures in some places.

In most African religions, the supreme god is a far away being that is no longer involved in day-to-day human life. The people rarely call on this deity directly. Instead, they approach this deity through lesser deities, many of whom has specific roles. Examples of such deities are given as follows:

Deity	People and Region	Role
Eshu	Yoruba, Nigeria	Trickster and message god
Katonda	Bungada, East Africa	Creator god, father of the gods, king and judge of the universe
Kibuka	Bungada, East Africa	War god
Leza	Bantu, Central and South Africa	Creator and sky god
Mujaji	Lovedu, South Africa	Rain goddess
Nyame	Ashanti and Akan, Ghana	Creator god associated with sun and moon
Ogun	Yoruba, West Africa	God of war and iron
Olorun	Yoruba, West Africa	Sky god and supreme deity
Ala	Ibo, Nigeria	Mother goddess, ruler of the underworld, goddess of fertility
Amma	Dogon, Mali	Supreme god
Cagn	Bushmen, South Western Africa	Creator god

Source: African Mythology – Myth Encyclopaedia p. 3-4).

The number of gods and goddesses vary from culture to culture. In the Congo River region, the most densely populated wooded part of Africa, the forest itself constitutes a deity – or where other world spirits dwell.

SELF-ASSIGNMENT EXERCISE

1. Trace the history of African mythology and identify some deities and their functions.
2. In your opinion, which of the deities has:
   i. Greatest function, and
   ii. Least function?
   iii. Why?

4.0 CONCLUSION

African mythology which is an embodiment of supernatural beings exerts great influence on human life. Some of these beings are powerful deities which lesser spirits as worshipped today. They influenced the culture of a people and assisted in putting into perspective the relationship between myth, folktales, legends and fables as instruments to instruct average citizens. These were aimed at preserving the rich cultures of Africans.

5.0 SUMMARY

In this unit, you have learnt that African mythology has different definitions depending on who is defining it. Specifically, African mythology means "culture". It implies that its meaning must include a belief system and lifestyle.

African mythology is as old as Africa as a continent. Its early form could be traced to myths and legends developed over thousand years ago in Africa, South of the Sahara. At this time, there were no written documents or accounts of African mythology. And because Africa did not use written language until modern times, they passed their myths, legends, cultures, and history from generation to generation in oral form. Modern African mythology depends heavily on documentaries and other written records.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss how culture influenced African Mythology.

7.0 REFERENCE/FURTHER READING

COMPAS (2006). Series 3. Online.

Myth Encyclopaedia online

UNIT 2 AFRICAN CONCERN FOR THE UNIVERSE

CONTENTS

1.0 INTRODUCTION

Man exists as both spirit and body. African supreme beings are spiritual beings or divinities who are varied as the peoples of sub-Saharan African, the world's second largest continent after Asia. But belief in Supreme Being tends to be universal among most of the sixty peoples of Africa. The diversity of cultural forms and linguistic differences of Africans, not withstanding, they hold a certain uniformity and similarity in the nature, attributes, and powers of the supreme beings and the world around them where they live in.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain creation and existence
- Identify and describe ancient names
- Describe relationship to spiritual and human beings and other cosmic entities.
- Explain attributes expressed by beings.

3.0 MAIN CONTENT

3.1 African Supreme Beings

Africans have rich cultures, values and respect for the universe and its creator. Supreme beings carry a distinct and unique quality in African cosmology as creators with all other supreme attributes in the theocentric universe. Before the coming of Islam and Christianity into Africa and their influences on the African cultures and values, the

nature, characteristics, attributes of the Africans were demonstrated in its supreme being. African ideas about universe where benefits such as air, waters, plants, and fruits, soil, rocks, moon, sun, stars and other creations that are utilized to make life conducive encourage Africans to nurture and preserve environments

SELF-ASSESSMENT EXERCISE

What are the effects of Islam and Christianity on regions tradition?

3.2 Creation and Existence

Different groups of Africa have developed varying myths around their supreme beings' transcendence and immense. Despite the Africans' diverse perceptions towards supreme beings, they express relatively common patterns that run through African social organisation and hierarchical structures, including relationships between elders and youths and humans' interconnections with natural phenomena. The sky, the earth, and the underworld (beneath the earth) are believed to be peopled by different categories of spiritual and physical beings, and all are connected in certain relational ways to the Supreme Being.

African peoples hold the supreme being responsible for the creation of their universe, including the earth and sky, human beings, and spiritual beings. Also, the African peoples affirm that the supreme being delegated to lesser spiritual beings the responsibilities of creating the local universes of Africa; creation and allocation of what each community considers to be essence of human beings (including destiny and pre-destination). Therefore, the entire universe is dependent upon the power and authority of the supreme being.

Different African language groups have different names of African supreme beings. The names used by different African language groups for supreme beings can be broadly classified into to:

i. The ancient or primary local names; and
ii. The descriptive or secondary names.

Ancient or primary names are those that are mostly used by older and elderly members of the communities. The ancient names express the inexplicable nature, character, essence, and attributes of a being as an almighty, ever-present creator, and who is supreme in all senses of supremacy, among others. Descriptive names have etymologies that express the perceived knowledge and living experiences of people in their mundane situation.

SELF-ASSESSMENT EXERCISE

Identify some ancient or primary names and descriptive or secondary names of supreme beings in Nigeria and Africa as peoples and their meanings.

3.3 Attributes: Being and Expression

African conceptions of supreme beings are closely related to those of most Western and Eastern religions with respect to Godly characteristics, which include Omnipotence, Omniscience, Omnipresence, transcendence, immanence, benevolence, to mention a few. These attributes express a complex relationship between the supreme being and other entities, human and non human, animate and inanimate, visible and invisible, material, and spiritual. Some supreme beings exhibit negative behaviours. Such supreme beings are those that serve as intermediaries of supreme beings. These attributes are manifested in such as natural occurrences as thunder, storm, wind, whirlwind, thick cloud, running streams, flood, beaming oceans, among others.

The moral aspect of the relationship of the supreme being to the African universe reveals the polarity of the being who is essential good. The polarity is demonstrated in the supreme being giving man and other organisms of choice of what to do and what not to do. Thus, the concept of free will and determinism, by which the supreme being operates in the theocentric universe. This idea is expressly explained in African mythologies that the supreme being creates certain spiritual beings and deities and details to whom he delegates responsibility for creating other universal entities, including human beings.

SELF-ASSESSMENT EXERCISE

Identify and discuss universally accepted attributes of supreme beings.

4.0 CONCLUSION

This unit discussed African concern for universe and it relates to supreme beings. Creation, existence and universal names of supreme beings were equally discussed in this unit. The issues of universal attributes and expression for supreme beings were highlighted in the unit.

5.0 SUMMARY

In this unit, we have learnt about African concern for the universe. We saw that the universe is created/formed by the supreme being. African

peoples as they differ in languages so also they differ in the names ascribed to supreme beings. Basically, supreme beings' name are grouped into two:

i. Ancient or primary names
ii. Descriptive or secondary names

The moral aspect of the relationship of the supreme being to the African universe include in the concept of will and determinism.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss what you understand by supreme beings and African universe.

7.0 REFERENCES/FURTHER READING

Wikipedia, the Free Encyclopaedia (2012). African Mythology. Retrieved 16th January 2015. http://en.wikipedia.org/wiki/african-mythology.

UNIT 3 CONCEPTIONS OF REALITY

CONTENTS

1.0 INTRODUCTION

Africans as a people live in environments. They are influenced by their environments and they in turn influence their environment through their activities to suit their needs. The processes bring about adoption or/and adaptation. Therefore, this unit introduces you to conceptions of reality and science.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of reality.
- Distinguish between reality and science

3.0 MAIN CONTENT

3.1 Meaning of Reality

Every race, generation as a people lives within cultural context. Africans as a people share a single continent. They are culturally diverse, but bound together by under-development, poverty, unemployment, the factors making some general observations about the African view of reality or possibility (Prah, 1980). The interpretation of reality by any group of people involves tough processes. For instance, in farming, success cannot be recorded without some rational knowledge of the soil, seeds and climate. Similarly, a fisherman is likely to fail if he lacks the rational knowledge of the weather, wind systems and tidal phenomena. A herbalist cannot cure without a relational knowledge of the signs and symptoms of diseases (Atadoga & Onaolapo, 2008). Therefore, for any race to survive at all, there must be an exhibition of rational thinking – whether white or black. The question is: What exactly is reality? Reality

some say is what people think. This simply means reality has more than one definition since difference people think differently. However, any definition could be accepted provided certain basic elements are involved. Some of the generally accepted definitions include:

- Reality is thought process: This means reality is human enterprise.
- Reality is rational thought: This means reality is systematic and void of biases.
- Aimed at overall development of any society. This definition tends to associate reality to culture of a people.

SELF-ASSESSMENT EXERCISE

As a science educator in training, what is your definition of reality?

Traditional African have its belief system based on causality but the extent to which a group of people explore causal relations may depend on the setting but the tendency is there in all human beings. However, causality is closely linked with rationality; rational thought processes which are important in the interpretation of reality form a meaningful basis for the study of science in Africa.

3.2 Science and Reality

One of the definitions of science is a way of knowing the world we live in, in rational terms (Dienye & Gbamanja, 1990). But any way of knowing that is not based on scientific criteria may not be acceptable to science.

SELF-ASSESSMENT EXERCISE

List some of the scientific ways of knowing.

There are many ways of scientific approach in knowing. Some of the scientific ways of knowing if they are not part of your list depend on conceptual observation, experimentation, explanation and predicting of events and phenomena in the world. There exist close relationship between what is known and the ways of knowing in science. Methods employed in knowing determines to a large extent in quality of what is known.

The product of interplay between what man perceives or senses and his capacity to organise such inputs into explainable sensations is reality (Anderson, 1976). Reality is constructional, irrespective of the seemingly concrete or abstract object, event or phenomenon may be. To ascertain what reality is, scientist will have to interact with the nature he

observes and his observations may be limited in that he is capable of seeing or perceiving. What he is able to perceive may generally be limited by some lack of special techniques or innovations and also the available worldview. Therefore, a scientific explanation becomes tentative and could be revised or discarded for one that is more useful in making predictions that are verifiable. Also, the one that is more generalised than its predecessor like the shift from geocentric to heliocentric universe in which the latter has proved more useful in verifying predictions. Therefore, membership in a different community could drastically alter the nature of the perceptual plane data, and the nature of circuit of its verification.

4.0 CONCLUSION

Reality consists of an endless flow of perceptual interpretations which we, the individuals who share a specific membership have learned to make in common. Scientists in the context of this unit work within a given paradigm.

5.0 SUMMARY

In this unit, you have learnt about reality and science. Causality is linked with rationality, rational though processes which are important in interpretation of reality form a meaningful basis for the study of science in Africa.

6.0 TUTOR-MARKED ASSIGNMENT

i. Discuss the difference between reality and science.
ii. How real is science?

7.0 REFERENCES/FURTHER READINGS

Anderson, O.R. (1976). The Experience of Science, New York Teachers. Columbia's University Press.

Atadoga, M.M. & Onaolapo, (2008). A Handbook on Science Teaching Method (vol. One). Zaria: Shola Press.

Dienye, N.E. & Gbamaya, S.P.T. (1990). Science Education Theory and Practice. Abuja: Totan Plusher Ltd.

Prah, V. (1980). The Philosophy of the Social Sciences. London: Methuem.

Wiredu, K. (1980). Philosophy and an African Culture. Camridge: Cambridge University Press.

UNIT 4 EXPLANATION OF SOME NATURAL PHENOMENA I

CONTENTS

1.0 INTRODUCTION

This unit introduces you to cosmic serpent, significance of cosmic serpent and origins of rainbows.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain cosmic serpent.
- Discuss significance of cosmic serpent
- Explain the origins of rainbow.

3.0 MAIN CONTENT

3.1 Cosmic Serpent

Our environments are made up of living and non living organisms, plants and animals, some of these living organisms inhabit land, seas and rivers (waters). Serpents are part of the living organisms that we find in the world around us. The serpents are of different colours, sizes and names. One of the important questions that come to mind is: How do the Africans regard/treat them? Some of the serpents that some Africans hold on high esteem are pre-determined by their cultural beliefs. However, reptilian serpent has been an archetype for many tribes, societies and civilisations. In most African traditions, the serpent is a symbol for immense and powerful cosmic movements. This is the form of cosmic serpents. The cosmic serpent is a trans-cultural icon. It is a global symbol that highlighted the interconnected nature of

fundamental concepts in earth, space, life and environmental sciences. The cosmic serpent is identified as a reptile, an earthly serpent, a flying dragon, a water serpent, with many supernatural characteristics. These symbolic characteristics are based on biological observation. Sometimes the cosmic serpent is viewed as a representative of negative energy. Sometimes as positive and sometime as providing balance and/or ambivalence. For instance, the story of Adam and Eve in the garden of Eden portrays serpent as deceitful being.

SELF-ASSESSMENT EXERCISE

Explain what you understand by cosmic serpent.

3.2 Significance of Cosmic Serpent

Cosmic serpent is symbolic and unique as unifying bridge between the African science and western science worldviews. Museum practitioners patronise cosmic serpent. The cosmic serpent has introduced many people to the knowledge of the serpent through multiple academic disciplines. Globally, cosmic serpent helps to convey the message that all culture are interconnected by virtue of their humanity. In many cultures, serpents are linked to protection and guardianship and so considered as friends, and should not be hurt or killed.

SELF-ASSESSMENT EXERICISE

Identify and discuss significance of cosmic to both African and western sciences.

3.3 Origins of Rainbow

All natural phenomena around us can be traced to source(s). The origin of rainbow is traced to serpent. According to a British anthropologist named Alfred Radcliff-Brown in his stories in 1926, certain serpent was said to be closely associated with the rainbow, rain, rivers and deep waterholes. The serpent was given different names by different tribes across Australia. Radcliffe-Brown was the one who gave the name Rainbow Serpent that is called till today – worldwide to represent the Pan-Australian myth and as a symbol of Aboriginal mythology in general.

The Rainbow Serpent is generally recognised by those who tell the Rainbow Serpent myths, as snake of some enormous size often living within the deepest waterholes of Australia's waterways; it is known both as a benevolent protector of its people and as malevolent punisher of law breakers. The rainbow serpent's mythology is closely linked to land,

water, life, social relationships and fertility. It reveals itself to people in this world as rainbow as it moves through water and the rain, shaping landscapes naming and singing of places, dreaming them into being. According to biblical injunction, rainbow is a symbol of seal of covenant between God and man; that He (God) will not destroy the world with water again after the generation of Noah.

4.0 CONCLUSION

This unit treated you to cosmic serpent, significance of cosmic serpent. Also treated in the unit is the origins of Rainbow Serpent and rainbow as A "baby" of Rainbow Serpent.

5.0 SUMMARY

In this unit, we learnt that cosmic serpent is a trans-cultural icon. And that it is a symbol that highlights the interconnected nature of fundamental concepts in earth, space, life and environmental sciences. In the unit, we also learnt that formation of rainbow can be traced to the serpent named the "Rainbow Serpent". Biblically, rainbow was identified as sign of covenant between God and man in the generation of Noah when the world was destroyed by flood because of sin.

6.0 TUTOR-MARKED ASSIGNMENT

Give a brief account of the origin of rainbow.

7.0 REFERENCES/FURTHER READING

Maugh, T.H. (2009). Los Angeles Times: The New Mexican. 2009.

Narby, J. (2009). The Cosmic Serpent on Line.

The Holy Bible

UNIT 5 EXPLANATION OF SOME BASIC NATURAL PHENOMENA II

CONTENTS

1.0 INTRODUCTION

In all environments there exist uncountable natural phenomena that man has to contend with. The natural phenomena in all communities influence the cultures of the people. The people within their knowledge, cultural beliefs and environments try to give explanations to natural phenomena. This unit focuses on:

i. Lightning and Thunder
ii. Echo and Mirage

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of twin myths.
- Discuss relationship between lightning and thunder.
- Explain how mirage and echo occur and their link with gods.

3.0 MAIN CONTENT

3.1 Twin

The history of twin mythology exact date is not know till date. Twin is one of the natural phenomena in the African culture. Twin myths is based on concept of good and evil and how twins are formed.

SELF-ASSESSMENT EXERCISE

Explain how you think twins are followed.

Greek mythology believed that wins were produced after a mother copulated with a god like; such as Heracles and his twin brother Iphicles and Romulus and Remus – half god, half human. In several native American cultures, they believed that if women ate twin like fruits, such as double almond or apples, it would increase the chances of having twins. While in other cultures, twins were attributed to the virility of the father.

One of the most common dichotomies is the belief that there is a "good" and "bad" twin. Mothers of twins usually reported that each twins have had the good and bad moments. Expression about the opposition of twins given by Greeks was based on Apollo and Artemis. Apollo became the sun god and Artemis became moon goddess. In Brazil, the Xingu mythology has Kuat as the sun and Lae as the moon who were twin brothers. Egypt has their own twin mythology about Geb who became the earth god and Nut who became the sky goddess.

Some cultures have even given twins special powers. An aboriginal tale explains that twin lizards created the planets, animals and saved women from evil spirits. Also, in West Africa, the Dogon of Mali believes that twins represent completeness and perfection. This is symbolically depicted by the divine Nummo – a fraternal twin, male and female. The divinity required humans to sacrifice being male and female and pick one gender to live as.

SELF-ASSESSMENT EXERCISE

Explain why Africans as a people have different views about twin myths.

3.2 Lightning and Thunder

Rivers in some tribes are seen to represent the body of the Wagyle which meandered over the land creating the curves and contours of the hills and gullies. As the Wagyle slithered over the land, his tracks shaped the sand dunes: His body scored out the course of the rivers, where occasionally stopped for a rest. He created bays and lakes. As he moved, his scales scraped off and become forests and woodlands of the region. The story of Wagyle was strengthened by a British anthropologist named Alfred Radcliffe-Brown who gave the name rainbow snake. The serpent was believed to be closely associated with the rainbow, rain, rivers and deep waterholes. The Rainbow Serpent has

different names among different tribes across Australia, but essentially the same tale.

The Rainbow Serpent is accorded great powers in Australia. These powers include: a personification of fertility, richness in propagation of plants and animals and rain, creator of human beings, having life – giving powers that send conception spirit to all the waterholes. Two types of Rainbow Serpents constantly turn up the culture of Aboriginal Australians; female Rainbow Serpent, is the mother, the original creator being; and the male Rainbow Serpent, is the transformer of the land. In the physical world, the Rainbow Serpent represents the element of water and may appear as a rainbow, lightning or thunder. As a lightning is sending of warning to people that do evil; and also a thunder to punish the people who do not heed to warning but continue in sins/evil ways.

3.3 Echo and Mirage

In Greek mythology, echo which means sound or reflection of sound was an Oread who resided on mount Kithaiwn. Zeus loved consorting with beautiful nymphs and visited them on Earth often. Eventually, Zeus wife Hera became suspicious and came from mount Olympus in an attempt to catch Zeus with Nymphs.

Zeus the king of the Olympians, was known for his many love affairs. Sometimes, the young and beautiful nymph echo would distinct and amuse his wife, Hera with long and entertaining stories while Zeus took advantage of the moment to vanish to the other mountain nymphs. When Hera discovered the trickery, she punished the talkative echo by taking away her voice except in foolish repetition of another shouted words. Thus, all echo would do was repeat the voice of another.

Mirage is associated with the Rainbow Serpent. The rainbow Serpent has control of waters, seas, trees, plants, animals and planets, though it (mirage) is a result of total internal reflection of light on a sunny day. As ray of light passes from dense medium (i.e. the sky) to a less dense medium (i.e. the surface of the earth) it suffers total internal reflection and an observer sees the shadow of the sky as pool of water known as mirage. But by the Rainbow Serpent myth, it represents one of the elements of the rainbow serpent. It is called devil “sea”.

4.0 CONCLUSION

This unit examined the various explanations given twin, lightning and thunder, echo and mirage. There exist divergent views and explanations to their meanings.

5.0 SUMMARY

In this unit, you have learnt that:

- Different natural phenomena are explained based on cultural beliefs and region.
- The Rainbow Serpent controls both the physical and spiritual worlds.
- The Rainbow Serpent has power to create.

6.0 TUTOR-MARKED ASSIGNMENTS

Narrate all you know about the followings:

i. Twin
ii. Lightning and thunder
iii. Echo and mirage

7.0 REFERENCES/FURTHER READING

Ndupu, B.L.N & Okeke, P.N. (2000). *Round-up Physics*. Lagos: Longman.

Wikipedia, the Free Encyclopedia (2012). Rainbow Serpent. Retrieved 16th January 2015 http://en.wikipedia.org/wiki/RainbowSerpent.

MODULE 2 AFRICAN TRADITION

INTRODUCTION

This module deals with the use of numbers in African tradition, ways of knowing in African belief system and ways of knowing in science. We will also look at in the unit, comparing African belief system compared to science and possible ways of curbing superstitious belief through integrated science.

The module is divided into five different units as follows:

Unit 1 The use of numbers in African tradition
Unit 2 Ways of knowing in African belief system
Unit 3 African ways of knowing
Unit 4 Comparing African belief system to science
Unit 5 Possible ways of curbing superstitious belief through integrated science

UNIT 1 THE USE OF NUMBERS IN AFRICAN TRADITION

CONTENTS

1.0 INTRODUCTION

This unit will expose you to African tradition meaning and history of number. You will learn the uses of numbers in African tradition.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of number in African tradition.
- Define number
- Narrate the uses of number in African tradition.

3.0 MAIN CONTENT

3.1 Meaning of number in African Tradition.

All our symbols and objects of various kinds are used to pass information across to people. In cases of business goods change hands. Some are exchanged for services rendered and other items among traditional Africans. In whatever form the goods are, their equivalent in terms of quantity and quality. In African tradition, number means many things to many people. For any definition of African tradition number to be acceptable, certain basic elements must be present.

Some of the elements that are looked for, for acceptable definition of African tradition number include:

- Quantity
- Symbol
- Arithmetical value
- Property
- Counting
- Calculation

From the listed elements, number in African tradition could be seen as quantity involving zero and units.

SELF-ASSESSMENT EXERCISE

As a young scientist in training, what is your definition of number in African tradition?

3.2 History of Number

There was a complex trade system that developed in the context of trans-Saharan trade and trade with Asia in terms of commodities such as gold and gold dust, kola nuts, leather items such as bags and various types of textile. The extensive trade that developed Great Zimbabwe and the Swahili city-states necessitated systematic calculation and systems of measurement which involves numbering. Similarly, in Muslim regions, the calculation of inheritance and the distribution of Zakat demanded numbering and mathematical accuracy. Some indigenous systems of calculation had 10 as a base whilst others were vegisimal (have the base 20) such as the Yoruba system. Distinctions were made between prime numbers and multiple. Various symbols were evolved to represent various quantities. African systems of logic were represented in games and activities such as mancala and ayo as well as games of alignment and puzzles.

SELF-ASSESSMENT EXERCISE

Trace the history of number in Africa.

3.3 Uses of Numbers in African Tradition

Numbers have religious meaning in many traditional cosmovisions. As documented by Mbiti (1969) counting people and livestock is forbidden in many African societies, partly for fear that misfortune could befall those who are numbered. Another reason is that people are not individuals but corporate members of a society that cannot be defined numerically.

All numbers are significant in African tradition. They have spiritual meanings attached to them. One, primarily deals with strong will, positively, pure energy. It reflects new beginnings and purity.

Two: Two is kindness, balance, tact, equation and duality. It reflects a quiet power of judgement, and the need for planning. Three: Three deals with magic, intuition, fecundity and advantage. It invokes expression, versatility and pure joy of creativity. Number four represents stability and, invokes the grounded nature of all things. Number five deals with travel, adventure and motion. Five also carry instability and unpredictability and radical changes. The spiritual meaning of five draws our attention to the wonder of life, and beckons us to appreciate the perception of chaos all around us. Six is legend. Six represents harmony, balance, sincerity, love and truth. Six naturally reveals solutions for us in a calm, unfolding manner. The number “six” is sacred to the Shona and Jie, who sacrifice six animals. The Akamba and Vugusu have taboos attached to number “seven”. Seven like threes, deal with magic forces, activation of imagination and manifesting results in our lives through the use of conscious thought and awareness. Eight deals largely with business, success and wealth. Also, matters of business and wealth largely depend on cycles to fulfil their manifestation. The spiritual meaning of nine brings us to the height of vibrational frequencies in this number sequence. Also, nine represent attainment, satisfaction, accomplishment. The number “nine” is sacred for the Baganda and all their gifts, sacrifices and sacred vessels must number nine or its multiples.

4.0 CONCLUSION

The use of numbers in African tradition are in the areas of trade, business. Most numbers in African tradition are sacred, and they are treated with “honour” and “respect”.

5.0 SUMMARY

In this unit, you have learnt what numbers are in African tradition. The business use of numbers in the African tradition started on wider scope at the beginning of trans-Saharan trade, and in Islam religion, the calculation of inheritance and the distribution of Zakat. All numbers in African tradition have spiritual meanings attached to them.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss the uses of number in African tradition

7.0 REFERENCES/FURTHER READING

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UNIT 2 WAYS OF KNOWING IN AFRICAN BELIEF SYSTEM

CONTENTS

1.0 INTRODUCTION

This unit introduces you to African belief system; its meaning and African traditional ways of knowing.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of African belief system.
- Define African belief system.
- State and discuss African belief system

3.0 MAIN CONTENT

3.1 Meaning of African Belief System

Based on the diverse socio-cultural and economic background of the continent, traditional African ways of thinking and reasoning differ significantly in many respects from the dominant international approach. Despite the independence from the colonisation, the decisions about agriculture, health and nature management are still heavily based on the concepts of African traditions. In the community we live in this day displaces uncountable products of African belief systems. These include tribal marks, shrines, prayer houses, symbols, naming of beings, artistic expressions, traditional leadership and title. Other products of African belief systems include reasoning and thinking. Therefore, any definition of African belief could be accepted provided some basic concepts are involved.

Some of the generally accepted definitions include:

i. African belief system is a process by which knowledge is acquired. Thus, it involves "doing things".
ii. African belief system is a way of life. This definition presents African belief system as part of the culture of the people.

SELF-ASSESSMENT EXERCISE

As a science educator in training, what is your working definition of African Belief System (ABS)?

3.2 African Worldviews and Belief System

In the world we live in today, thinking among Africans ranges from traditional to modern, but in most cases both systems of thinking can be observed parallel to each other. Traditional worldviews and traditional institutions play an important role. The African worldviews belief system are influenced by the various religious practices he is involved in. Mbiti (1969) identified five categories that the various African religious practices brought to his belief system. These are:

a. God as the ultimate explanation of the genesis and sustenance of man and all beings.
b. Spirits, made up of superhuman beings and spirits of ancestors.
c. Man, including human beings alive and those not yet born.
d. Animals and plants or the remainders of biological life.
e. Phenomena and objects without biological life.

Religious and philosophical concepts have roles within the African ways of knowing and belief systems. Very often, a hierarch between divine beings, spiritual beings, especially the ancestors, men and women, and natural forces, such as climate, disease, flood, soil, vegetation, animals, is indicated. This is known as Cosmovision. These cosmovisions mentioned give rise to several rituals in which the elders, the priests, soothsayers and spiritual leaders play a significant role. Cosmovision are consulted to know which of the way land, water, plants and animals are to be used; how decision are taken; problems are solved and experimentation takes place and how rural people organise themselves (Haverkort & Hiemstra, 1999). Millah (1999) presents the cosmovision of the people of Northern Ghana in Figure 1.

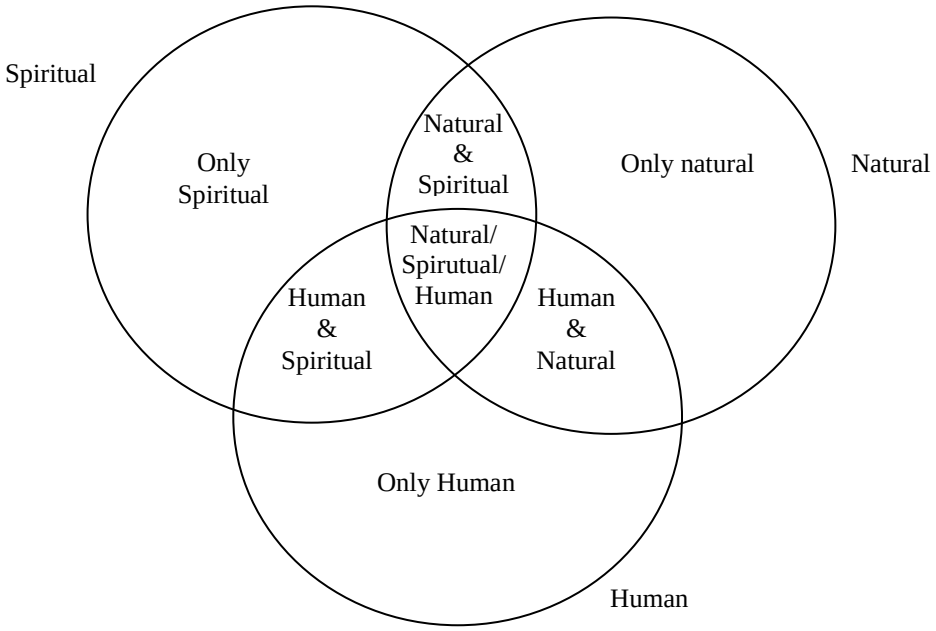

Figure 1: Constellations of Cosmovision Related to Knowledge
Source: COMPAS (2006) Series 3:21

From the figure 1, it can be deduced that the interaction of the human, natural and spiritual worlds will generate the following possible constellations of knowledges:

i. Knowledge resulting from social interactions only.
ii. Combination of knowledge of the social and natural worlds.
iii. Combination of knowledge between the social and spiritual worlds.
iv. Knowledge resulting from natural interactions only.
v. Combination of knowledge of the natural and spiritual worlds.
vi. Knowledge resulting from spiritual only.
vii. Combination of social, spiritual and natural.

The natural world provides habitat for the spirits and sends message from the spiritual world to the human world. The spiritual world provides guidance, punishment and blessing to the human world. Therefore, people have to relate to both the natural and spiritual worlds. Rain is regarded by African people as one of the greatest blessings of God, who is often referred to as the rain-giver. Many of them make sacrifices, offerings and prayers to God in connection to rain. Rainmakers are reported in all parts of the continent. Their duties are to solicit God's help in providing rain or in halting it if too much falls.

African worldviews and belief system hold beyond a production factor with economic significance, land, water, animals and plants. They have their place within the sanctity of nature. In some countries within the

continent, certain places have a special spiritual significance and are used as locations for rituals and sacrifices ‘shrines, mountains and rivers. Fig trees and baobabs are treated as sacred trees. The sun, moon and stars feature in myths and beliefs of many people. Certain beings such as animal species have a spiritual significance too. Cattle, sheep, goats, chicken, pigeon are often used for sacrifices and other religious purposes. Snakes, lizards, chameleons and certain birds like owls are considered messengers of the spiritual world.

African ways of thinking and reasoning are mystical, illogical and incapable of scientific pursuit (Biakolo, 1998). This is linked up with the state of technology in Africa. Also, Africa is seen to depend heavily on oral, magical, prelogical past for his thinking and reasoning.

African ways of knowing and belief system are demonstratedin artistic expressions. Proverbs as African ways of knowing and belief system represent values related to religions, immorality, survival, goodwill; communal and individual values, morality, responsibility, marriage and family life, work ethic, chieftaincy, aesthetic values, knowledge and wisdom, human rights and ancestors.

African art and artefacts such as masks, clothes, body painting, architecture and sculptures, like African music, have been emerged in the function of religion, rites and rituals, and are undoubtedly expressions of African emotions and identity. Internationally reputed artists like Picasso, Moore and Giacometti have found great inspiration in African sculptures and paintings. Music such as jazz, blues and reggae have equally found their roots in Africa.

In most cases, traditional communities have a variety of traditional leaders, specialists and spiritual mediums, who play an important role in village life. The specialists include medicine man/woman – healers (or sometimes called witch doctors, rainmakers. Others are kings, queens, and rulers, priests, soothsayers and religious founders. They all have their specified roles to play with the community.

4.0 CONCLUSION

Ways of knowing in African belief system are rooted principally on combinations of social, spiritual and natural worlds.

5.0 SUMMARY

In this unit you learnt that:

- African worldviews and belief system are based on combination of social, spiritual and natural worlds.
- The interaction of the human, natural and spiritual worlds will give rise to the following possible constellations of knowledges.
  - Knowledge resulting from social interaction only.
  - Combination of knowledge of the social and natural worlds.
  - Combination of the knowledge between social and spiritual worlds.
  - Knowledge resulting from natural interactions only.
  - Combination of knowledge of the natural and the spiritual worlds.
  - Knowledge resulting from the spiritual only.
  - Combination of social, spiritual and natural.

6.0 TUTOR-MARKED ASSIGNMENT

Identify and discuss various ways of knowing in African belief systems.

7.0 REFERENCES/FURTHER READING

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UNIT 3 AFRICAN WAYS OF KNOWING

CONTENTS

1.0 INTRODUCTION

This unit introduces you to African ways of knowing, African past and present, and technical knowledges and practices.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain African ways of knowing science
- Enumerate African ways of knowing science.
- Discuss African past and present ways of knowing
- Explain African technical knowledges and practices.

3.0 MAIN CONTENT

3.1 African ways of knowing sciences

Knowledge is given different expressions by different people from different cultural background. Hence, we talk about African sciences. However, there are many common elements in African ways of knowing; the worldviews, ecological spirituality and the existing cultural/religious practices do have similarities. In the real traditional African context, there is no clear cut between "arts" and "science". In the African culture, what the younger generations know are not knowledge generated by their explorations of the environments but they were told or handed over to them by their ancestors.

SELF-ASSESSMENT EXERCISE

List African ways of knowing.

African culture does not assume that reality can be perceived through reason alone. Other modes of knowing by the African include:

i. Imagination
ii. Intuition
iii. Personal feelings
iv. Inspiration

For this reason, the deepest expression of the African cultural reality has been through art, myths and music. The ways are mechanical and not through logical analysis as the case with the western mode. The traditional African view about nature is that matter and spirits are inseparable. The African hardly proffers definitions of the life forces but often demonstrates understanding and offers descriptions of the forces in terms of their functions and operations (Miller & Haverkort, 2006).

Emegiawali (2003) opined that the African way of knowing seems to be relatively less transferable than conventional science, considering its holistic socio-cultural and spiritual dimensions. The African way of knowing appears to be largely communication in terms of discovery and experimentation which is collective rather than individualistic. The community is a source of strength for the African way of knowing in terms of the discovery process and knowledge production. Goduka (2000) characterised African knowledge as spiritually-centred wisdoms. In traditional African view, the universe is a spiritual and a material whole in which all beings are organically interrelated and interdependent.

3.2 Africa's Past and Present

Sub-Sahara Africa is made up of diverse cultures. Some of the factors that brought about a diversity of lifestyles, professional practices, values, regions and knowledge systems include historic developments, demographic and ecological differences, as well as economic opportunities, colonial impact and religious missionary activities. Nomadic people often compete for land and water resources – with sedentary people. Traditional religions have common elements, but there is also a great variation in rituals, traditional institutions and leadership structures. The population of Africa has rural background, and agriculture remains the main occupation. Due to degraded African soils, combined with a harsh climate, African agriculture becomes complex,

diverse, and risk prone. Africa has bad roads and poor communication system.

The first African people hunted a wide range of animals, and learnt to use fire to control vegetation. During the last glacial period, Africa was not covered with ice, but, as much of the earth's water resources reserve was frozen, endured drought. Millar and Haverkort (2006) observed that about 9000 years ago, sorghum, millet, rice, yam, oil palm, as well as cattle were domesticated, while barley was introduced from Western Asia.

The introduction of iron tools made way for the development of sophisticated settlements in Africa and the construction of monumental centres and phenomenal civilisations such as Great Zimbabwe. From the 8th century onwards, Arab trading penetrated sub-Sahara Africa, bring oil, lamps, pottery and cowry shells in exchange for ivory, ebony, gold, as well as slaves. As a result of trades, several kingdoms emerged. The Portuguese were the first Europeans who got involved in slave trade, bringing Christianity with it. In the 19th century, the Portuguese lost their monopoly and the British, French, Belgians and Germans colonised and Christianised the continent, except Ethiopia. These colonies lasted until around the second part of the 20th century, when the independent nation states were formed. The colonial past had a great impact on the indigenous cultures and peoples. It aimed to replace traditional knowledge and beliefs with western knowledge and by that, it has limited the African capacity to solve their own problems and to develop technologies and skills to build their own ways of knowing. However, this aspect of colonisation did not record full success. The continent has a low level of literacy and few people are educated in the western sense. The good news is that the traditional education is still widely practiced and, co-exists with western knowledge system. The systems of governance of most of the present nation states, established less than 50 years ago, often reflect more aspects of the colonial system than indigenous systems. The same situation holds for both the legal and educational systems. The way of farming and social organisation are greatly influenced by the ancestral knowledge. In rural Africa today, most medical practices are based on traditional healers and knowledge, using herbs and rituals. Even among the educated Africans, both traditional health services and western health care are widely used. Africa is changing fast. Some aspects of indigenous knowledge are expressed openly, whilst other aspects are secretive and hidden from outsiders.

SELF-ASSESSMENT EXERCISE

Discuss Africa past and present as it relates to her culture.

3.3 African Technical Knowledges and Practices

Africa as a people is blessed with a lot of natural resources which when tapped will provide sources of income for the continent.

SELF-ASSESSMENT EXERCISE

List some of the African practices

Based on Africans' knowledge of knowing, they are involved in a number of practices. Compare your list with the following African practices:

1. Soil and water management
2. Crops and trees, and animal production
3. Medicine
4. Mathematics
5. Food production
6. Metallurgy system
7. Building system.

One of the common characteristics of the African cultures is the perception that the earth is associated with the concept of the mother, or womb. It is often considered a deity, the property of gods, and the founders of a clan or tribe who were the first settlers in the area. The traditional functionaries, such as the earth priest, exercise spiritual control over the land. Based on the technical knowledges African's soil and water practices involved use of water pockets in plant holes, soil conservation, traditional erosion control, water harvesting and irrigation.

African traditional farmers know the qualities of trees, what they can be used for, and the possibilities and limitations of combining trees with crops. Some tree species have a spiritual significance, which is reflected in taboos and rituals associated with them. Most African houses deal with fowls. They combine species including guinea fowls, ducks, turkeys and pigeons.

African Traditional Medicine (ATM) are hydrotherapy, heat therapy, spinal manipulation, quarantine, bone-setting and surgery. Incantations, and other devices of psychotherapeutic are often applied. Treatment from cancer, obesity, drug addiction, diabetes and other ailments have benefited directly and indirectly from traditional African pharmacologists through plants such as the African willow (South Africa), the ibodia (Namibia), iboga (Gabon and Cameroon) and other botanicals (Emeagwali, 2003).

A complex system of trade developed in the context of the trans-Saharan trade and also trade with Asia in terms of commodities such as gold and gold dust, kola nuts, leather items such as bags and various types of textile. The extensive trade that developed between Great Zimbabwe and Swahili city sates necessitated systematic calculation and systems of measurement (Eglash, 1999). Some indigenous systems of calculation had 10 as a base whilst others were vegesimal (have the base of 20) such as the Yoruba system. African systems of logic have also been manifested in games and activities of strategy such as mancala and ayo as well as games of alignment and puzzles.

Indigenous fermented foods in Africa have derived, usually, from cassava tubers, cereal, legumes, oil seeds, palm tree sap, milk and various old other local products. Products such as sorghum, maize or other cereal fermented and made into alcoholic beverages.

In the North/East Ethiopia and Nubia were the major suppliers of gold, with Egypt being a major importer. In Southern Africa, the kingdom of Monomatapa reign supreme as a major gold producer. The various metal products were used for a wide range of purposes including armour as in the case of some Northern Nigeria city states, silver, iron, copper and brass jewellery, currency including circular and non-circular coin; pots and cooking utensils; cloth dyeing, sculpture and agricultural implements.

Builders integrated the concept of the arch, the dome, and the use of columns and aisles in their construction. The underground vaults and passages and rock-hewn churches of Ancient Ethiopia are matched in Nubia and Egypt with pyramids of various dimensions. Mats were utilised as part of the decor and also to be saturated repeatedly, to cool the room.

4.0 CONCLUSION

African knowledges and sciences are related to the perceptions of the people of the continent. The way they know and organise themselves are determined by their religious and socio-cultural background. African technical knowledges and practices have grown beyond the colonial era. African technical knowledges and practices can be seen in the fields of soil and water management, crops and trees, and animal production, medicine, mathematics, food production, metallurgy system and building system.

5.0 SUMMARY

In this unit, you have learnt African modes of knowing which include:

- Imagination
- Intuition
- Personal feelings
- Inspiration

Also learnt in the unit are the African past and present in the areas of:

- Soil and water management
- Crops and trees, and animal production
- Medicine
- Mathematics
- Food production
- Metallurgy system
- Building system

6.0 TUTOR-MARKED ASSIGNMENT

i. Discuss African ways of knowing
ii. Narrate and discuss African technical knowledges and practices.

7.0 REFERENCES/FURTHER READING

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UNIT 4 COMPARING AFRICAN BELIEF SYSTEM TO SCIENCE

CONTENTS

1.0 INTRODUCTION

This unit focus on the meanings of African belief system and science. Also, the unit compares African belief system to science with emphasis on African and science reality.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of African belief system and science.
- Define African belief system and science.
- Identify and discuss similarities and differences between African belief system and science.

3.0 MAIN CONTENT

3.1 Meaning of African belief system

A number of Africans and African writers made their observations on African belief system. Africans themselves have perceptions about themselves. Africans have their ways of life. African belief system originate from indigenous environment. Characterised African knowledge is mostly rooted in spiritual-centred wisdom as it is the view of some people. African peoples live in diverse culture with different cultural beliefs and practices. Therefore, African belief systems mean many things to many people.

African belief system involves ways of reasoning and thinking. Any acceptable definition of African belief system must contain some basic elements that are generally considered appropriate.

Some of the generally accepted definitions of African belief system include:

1. African belief system is a way of life. This definition associates African belief with the culture of a people.
2. African belief system is a way knowledge is generated. Therefore, this definition sees it as a way of doing things.
3. African belief system is orderly body knowledge. This definition focuses on how knowledge is acquired.

SELF-ASSESSMENT EXERCISE

As a scientist in training, what is your working definition of African belief system?

Science means many things to many people. Therefore, science has more than one definition. Definition of science is as many as the number of scientists. To some, science is what scientists do. However, acceptable definition of science must contain some required basic elements.

Some of the generally accepted definitions include:

1. Science is a way of knowing the world in rational terms. This implies that the product of science and its knowledge depends on how the knowledge is required.
2. Science is also defined as a process by which knowledge is required. By this definition, science is about doing things.
3. Science to some is a way of life. This definition links science with the culture of the people.

SELF-ASSESSMENT EXERCISE

As a will-be scientist, what is your definition of science?

Both African belief view and science practitioners observe their environments. They ask questions such as “How?”, “What?” and “Why?”. They attempt to find answers to their questions.

3.2 African and Science Reality

Science is as old as man because since man came on scene he has been searching for explanations for the "world" and the "happenings" around him. Man (African people as a part) believe that apart from him, there must be other beings and powers that make things to happen. African belief system holds that hidden beings and forces reside in different locations like in animals, trees, seas, mountains, valleys, winds, rivers which can be channelled to and for man's purpose. This statement gives the impression that science is often developed from magic (Ronan, 1982). This view has led many people to most ideas from African traditional belief system such as the stated one round primitive and unreasonable but magical postulations have led into great scientific findings. African belief system through the eyes of rain maker for example, sees the relationship between rain, growth of crops and the very survival of man as been determined by certain "powers" that must be appeased with invocation, incantations, prepared portions and sacrifices for cooperation. But science has been provoked to find explanations, which has resulted in topics like water cycle, nutrition, ecology, agriculture, among others (Dienye & Gbamanja, 1990).

Every culture works hard to interpret reality in its own setting because how reality is perceived might count towards the overall development of any society. Africa as a continent is made up of many peoples with diverse culture. Reality is a product of interplay between what man perceives or senses and his ability to organise such inputs into explainable sensations. Therefore, reality is liable to change should man discovers another basis for interpreting his observation. To ascertain what reality is, a scientist will have to interact with the nature he observes and his observations may be limited in that he is capable of seeing or perceiving in the absence of using special techniques. An African belief views hold that a herbalist cannot cure without a rational knowledge of the signs and symptoms of the diseases. Scientifically, treatment cannot start without running tests in addition to knowledge of signs and symptoms of the diseases. Therefore, both African belief system and science admit rational thinking.

African belief system hold the view that unseen forces could be seen in action by everyone, like in thunder and lightning, earthquake or flood, disease and pestilence, which were accepted as evidence of acts by evil spirits. Natural phenomena in African belief system are correlated with those of the evil world (Atadoga & Onaolapo, 2008). The subtle insight of the African belief system into the general relationships of nature and African manipulative acts led to certain empirical knowledge of various substances. African belief system is based on causality as it is linked with rationality. Rational thought processes which are important in

interpretation of reality form a meaningful basis for the study of science in Africa. Scientists work within a given paradigm and members in a different community could drastically after the nature of the perceptual plane data, and the nature of circuit of its verification.

4.0 CONCLUSION

African belief system and science work within the frame of the "world" (environments) they live in. The choice of certain ingredients for portions of African belief system, for example, might have been done based on magical association. But as successes or failure became registered in their uses, formulae of those efficacious ingredients slowly became collected and systemised and used. This registered the first in the line of experimental results and the remote ancestor of the modern science.

5.0 SUMMARY

In this unit, you have learnt about African belief system and science. African belief system and science ask common questions such as "How?", "What?", "Why?". African belief system and science attempt to give explanations and find solutions to natural phenomena and to problems in the "world" (environments) people live in. Basically, their approaches are based on observation, rational thinking and approach.

6.0 TUTOR-MARKED ASSIGNMENT

List and discuss similarities and differences between African belief system and science.

7.0 REFERENCES/FURTHER READING

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UNIT 5 POSSIBLE WAYS OF CURBING SUPERSTITIOUS BELIEF THROUGH INTEGRATED SCIENCE

CONTENTS

1.0 INTRODUCTION

People around the globe hold on to certain ideas and beliefs. Ideas and beliefs people stick to have their basis. For a people to discard their original ideas and beliefs, there should be a new one they rationally discover superior to theirs. The unit exposes you to possible ways of curbing superstitious belief through Integrated Science.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of superstitious belief.
- Define superstitious belief.
- Identify and discuss possible ways of curbing superstitious belief through Integrated Science.

3.0 MAIN CONTENT

3.1 Meaning of Superstitious Belief

Man's belief to a large extent is a product of his interaction with his environment and its component. Superstitious belief connotes many things to many people. Therefore, there is no one generally accepted meaning. To some, superstitious belief has to do with believing in magic. To others beliefs that lack empirical proves. Also, believing in living and non-living beings.

Generally, accepted definitions of superstitious belief contains some of the following elements:

1. Superstitious belief is believing in magic.
2. An irrational abject attitude of mind towards nature or supernatural.
3. Belief based on fear of the unknown.
4. A belief and practice based on ignorance.

Basically, superstitious belief is based on lack of knowledge, inadequate information about something and ignorance.

SELF ASSESSMENT EXERCISE

What is your working definition of superstitious belief?

3.2 Why we Teaching Integrated Science

Integrated science as an interdisciplinary curriculum deals with all approaches to the teaching and learning of science. Integrated Science is the science subject that is taught to the students at middle basic (formerly known as Junior Secondary (JS). It is aimed at introducing African child like any other child in the globe right from the beginning to start to develop basic scientific skills, abilities and attitudes such as curiosity, manipulative ability, spontaneous flexibility, experimentation, initiative, industry, manual dexterity, mechanical comprehension and the coordination of hand and eye; in passing, how he/she wishes he/she could do this in his/her own mother tongue (Fafunwa, 1971; Atadoga, & Onaolapo, 2008).

Integrated Science teaching is aimed also at developing in students all round abilities that foster better citizenries who are potential leaders of tomorrow. It also affords the students the opportunity to contribute positively and intelligently in the technical, and agricultural and other science related sectors of their nation.

SELF-ASSESSMENT EXERCISE

Narrate some other reasons why integrated science is taught in schools.

3.3 Curbing Superstitious Belief Through Integrated Science

Psychologically, children at JS (middle basic) level learn more by observing, touching, and interacting with environment and its contents. The integrated approach tends to afford the learners at all levels of education more consistent way of looking at the world round them thereby curbing superstitious belief.

According to Ogunniyi (1986), teaching strategies and methods for integrated science should contain the following:

i. Using of discovery teaching strategies. This means introducing students to concepts by broad definition and then encourage them to arrive at scientific knowledge and scientific understanding as a result of their own observation. In this context, the teacher's role is that of a facilitator, guide or motivator.
ii. The inclusion of problem solving activities: This may be problem(s) identified by students through observations or interaction with materials or environment; or given by the teacher or found in the material (e.g. texts, online).
iii. The involvement of students in open ended field of laboratory exercises or activities. This may be to verify, prove or confirm certain scientific laws and theories.

These three approaches are some of the major approaches in the teaching-learning process of integrated science. Therefore, by these approaches which are emphasised and adopted in integrated science, assist the subject in curbing superstitious belief.

Bruner's learning theories emphasise discovery and problem solving approaches. And that transfer of concepts, principles and strategies from one learning situation to another should be done in mass, or unit. Therefore, integrated approach via integrated science would enhance transfer of learning that could give the students ability to use concepts and principles learned in one discipline in another related discipline. By this approach therefore, integrated science can be effectively used to curb superstitious belief.

4.0 CONCLUSION

Superstitious belief is born out from fear and ignorance. Integrated Science as an interdisciplinary subject with all approaches to teaching-learning process of science can be used to curb superstitious belief. This can be done through integrated approach strategies that are emphasised in the teaching-learning approach of integrated science.

5.0 SUMMARY

This unit has exposed you to explanation of superstitious belief, why integrated science is taught. Also treated in the unit are ways integrated science could be used to curb superstitious belief. Some of the ways Integrated Science could be used to curb superstitious belief include among others; using discovery teaching strategies, inclusion of problem solving activities and the involvement of students in open ended field of laboratory exercises in teaching-learning approaches of the subject.

6.0 TUTOR-MARKED ASSIGNMENT

Identify and discuss possible ways of curbing superstitious belief through Integrated Science.

7.0 REFERENCES/FURTHER READING

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MODULE 3 CONCEPT OF AFRICAN SCIENCE

INTRODUCTION

In this module, you will be exposed to meaning and history of African science, meaning and resources for teaching integrated science and concept of African science as different from integrated science. Also discussed in this module are identification of elements of integration in African traditional science and African contribution to science, technology and development.

The module is divided into five different units as follows:

Unit 1 Meaning and history of African sciences
Unit 2 The meaning and reasonings for teaching integrated science
Unit 3 Concept of African sciences as different from integrated science
Unit 4 Identification of elements of integration in African traditional science
Unit 5 African contributions to science, technology and development

UNIT 1 MEANING AND HISTORY OF AFRICAN SCIENCE

CONTENTS

1.0 INTRODUCTION

You cannot integrate what you don't know. Therefore, before we discuss about elements of integration in African traditional science, we need to have some basic understanding of what is African science. This unit sets out to achieve this purpose.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of African science.
- Define African science
- Identify and explain the processes of African science

3.0 MAIN CONTENT

3.1 Meaning of African Science

We live in the world that is enveloped with natural phenomena right from the foundation of the earth that determines understanding and explanation before we can appreciate our environment. As far back as in the time of first generation on earth, we heard about sicknesses and diseases, death, flood, fire accidents, wars, evil spirits to mention a few. In the present day we can see all around us attempts made by African scientists (herbalists) to improve health. We can equally find lists of their "scientific advances' in volume of books. Others of their products include principles, laws, attitudes, formulae. The fundamental question is: What is African Science? Some view African science as what African scientists do. Therefore, there are many definitions of African science as there are many African scientists. Basically, any definition could be accepted provided certain fundamental elements are involve.

Some of the generally accepted definitions include:

1. Systematised and processed body of knowledge. This emphasised how knowledge and products of African science are obtained. The process involves doing. Therefore, African science is human enterprise.
2. African science is also defined as a way of life. Therefore, African science is associated with the cultures of Africans – the culture of African as a people.

SELF-ASSESSMENT EXERCISE

Give your operational definition of African science.

There is a science in Africa; activities and nature which demand for understanding and explanation. Just as in other parts of the world, we equally have many traditional great thinkers in Africa who also through their experiences, years of training attempt to unfold the truth in nature.

3.2 History of African Science

African science is as old as man because since man came on scene, he has been searching for explanations for the "world" and the "happening" around him. Africans believed that apart from them, there must be other beings and powers that make things to happen. Africans believed these hidden beings and forces resided in different locations like in animals, trees, seas, mountains, valleys, wind, rivers. Similarly, Africans believed that these forces, spirits can be channelled to and for man's purpose, hence is often considered to have developed from magic (Ronan, 1982).

Magic also believed that these unseen forces/spirits could be seen in action by someone. For instance, thunder and lightning, earthquake or flood, diseases and pestilence which were accepted as evidence for acts of evil spirits (Atadoga and Onaolapo, 2008). A rain maker sees the relationship between rain, growth of groups and the survival of man as being terminated by certain "powers" that must be appeased with invocation, incantations, prepared sacrifice for cooperation. Natural phenomena of the physical world were correlated with those of spirit world. The choice of certain ingredients for magical portions might be done through magical associations. As successes and failures were registered in their uses, formulae of those efficacious ingredients slowly became collected and systematised and used (Ronan, 1982). This became the first in the line of experimental results and the remote ancestor of the modern sciences.

As the society developed, particularly in the Middle East, Africans became more interested in details of natural phenomena and that gave rise to a more systematised form of knowledge. Gradually, magic in itself as a way of explaining the natural world started to fall into disrepute. As a break from the magical and animistic view of the world, every object and phenomenon started to be viewed mechanically in the absence of laboratories. This view started to become visible the late Babylonian times that resulted in the establishment of the attitude of mind which was central to scientific culture as emphasised by Greek philosophers. African societies are very creative as shown in their arts and crafts.

SELF-ASSESSMENT EXERCISE

Trace the history of African science.

4.0 CONCLUSION

Every culture has its own science which constitutes its total symbolic expression. It is inseparable from its architecture, art, sculpture, and even religion. African science depends greatly on personality. Parents are expected to pass on their knowledge of traditional herbs to some carefully selected children in their family. African science has been so exclusive that it makes nonsense of any notion about the freedom to information.

5.0 SUMMARY

This unit explained the meaning of African science. African science accounts for nature and its works. An African scientist considers the whole of a problem and does not believe its possible to isolate and control variables in all situations. There is no watertight definition of African science. The history of African science is as old as history of man. Generally, African environments are rich in arts and crafts which are translated in the nature of African sciences.

6.0 TUTOR-MARKED ASSIGNMENT

i. Discuss the relationships between African science and magic.
ii. Identify elements of science in African traditional science.

7.0 REFERENCES/FURTHER READING

Atadoga, M.M. & Onaolapo, M.A.O. (2008). A Handbook on Science Method (vol. One). Zaria: Shola Press.

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UNIT 2 THE MEANING AND REASONINGS FOR TEACHING INTEGRATED SCIENCE

CONTENTS

1.0 INTRODUCTION

Before going into curbing superstitious beliefs into integrated science, it is eminent to understand what is integrated science and reasons for it as a school subject. These give focus to this unit.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of Integrated Science.
- Define Integrated Science.
- Narrate reasons Integrated Science is taught in School.

3.0 MAIN CONTENT

3.1 Meaning of Integrated Science

In teaching-learning process, variety of strategies, approaches or methods are adopted. Generally, no course or subject that is taught exclusively without making references and applying gained knowledge or experiences from other disciplines. For instance, the language of classroom communication in Nigeria is English language. These expressions point to integrated science. Therefore, integrated science has more than one definition. However, any acceptable definition must contain certain basic elements.

Some of the generally accepted definitions include the following aspects:

- Fundamental unit of scientific thought. This definition emphasises the science that cuts across subject boundaries.
- Strategies and processes of scientific enterprise. By this, the teaching-learning process should involve novelty of approaches or strategies.
- Scientific study of the environment requirement of day-to-day life. This tends to explain Integrated Science as a human enterprise that employ learners' environment that is relevant to them. And that learners should be helped to discover them environments.

SELF-ASSESSMENT EXERCISE

As a science educator in training, what is your operational definition of integrated science?

Integrated Science is a foundation science in middle basic (i.e. Junior Secondary) level for field of science and technology (Bajah, 1978). Therefore, Integrated Science has a subject must patiently and gently introduce learners to what science is all about, and how scientists work.

3.2 Reasons for Teaching Integrated Science

The Integrated Science is taught on principles such as:

i. Fundamental unit of science
ii. Common approach to problems of scientific nature.
iii. Understanding of the role and functions of science in everyday life and the world one lives in (Atadoga and Onaolapo, 2008).

Based on the outlined principles, there are several reasons for teaching Integrated Science to learners. The reasons could be classified into two:
i. Shorter reasons; and
ii. Long-term reasons.

The short term reasons include acquiring basic skills and knowledge in science, developing attitudes of scientists, while the long-term reasons include preparing for careers in science and technology, and prescribed examinations. However, the reasons for teaching Integrated Science to learners include the followings:

1. Helping learners solve problems arising from perceptions of their immediate environment.
2. Developing high skill of observation.
3. Contributing positively to the development of their society.
4. Assisting the learners to learn on their own.

5. Equipping the learners to choose careers in science and technology.
6. Helping the learners to scientifically manipulate their world for good of all.

SELF-ASSESSMENT EXERCISE

Based on the reasons why Integrated Science is taught to learners, list the skills you think they will acquire.

If the objectives (reasons) why integrated science are taught to learners are achieved, they will acquired a number of skills. In addition to the skills you have listed, others include the followings:

i. Observing particularly, carefully and thoroughly.
ii. Reporting correctly and accurately things observed.
iii. Organising carefully and accurately information gathered from observation and reports.
iv. Testing the data collected.
v. Experimenting the data collected. Some of the experiment may go with control where necessary.
vi. Analysing the results of the experiment
vii. Tabulating the results of analysis
viii. Generalising the results
ix. Predicting
x. Concluding

The list of the skills is inexhaustible, the list constitute what is regarded as scientific skills. The order of the list is flexible.

4.0 CONCLUSION

Integrated Science means many things to many science educators and would-be scientists. But the common focus of integrated science as a discipline or subject or course of study approaches in science is as follows:

i. Fundamental unity of scientific thought.
ii. Strategies and process of scientific enterprise.
iii. Scientific study of the environment of day-to-day life.

5.0 SUMMARY

In this unit, we have explained the meaning of Integrated Science. Integrated Science has more than one meaning/definition. All the various definitions have in common interdisciplinary boundary, common approach to scientific problems and meaningful learning of the

environment through scientific approach. Reasons for teaching Integrated Science to learners are grouped into two: Short-term and long-term reasons. The short-term reasons include developing scientist's attitudes while long-term reasons include developing careers in science and technology.

6.0 TUTOR-MARKED ASSIGNMENTS

i. What are the principles for teaching Integrated Science to learners?
ii. Outline and discuss any six scientific skills learners will acquire by learning Integrated Science.

7.0 REFERENCES/FURTHER READING

Atadoga, M.M. & Onaolapo, M.A.O. (2008). A Handbook on Science Teaching Method (vol. One). Zaria: Shola Press.

Bajah, S.T. (1983). Teaching Integrated Science Creativity. Ibadan: Salem Press.

UNIT 3 CONCEPT OF AFRICAN SCIENCES AS DIFFERENT FROM INTEGRATED SCIENCE

CONTENTS

1.0 INTRODUCTION

Science of what kind, region or people is part of human activities. African as a people acknowledge science since science is also a way of life. To this end, this unit exposes you to concept of African science as different from integrated science.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain African concept of science.
- Define African concept of science
- Identify and explain the difference between African concept of science and integrated science.

3.0 MAIN CONTENT

3.1 Meaning of African Concept of Science

In our contemporary world, we find all around us numerous products of African science. This include woven clothing materials, beads, mats, agricultural implements, beds, Dane guns, talking drums and musical instruments, among others. Also other products of African science are herbals. They equally have products such as laws, formulae, principles and concepts. Then, the question that comes to mind is: What exactly is African concept of science? To some it is what African scientists do. This means there exist many definitions of African concept of science. However, any definition is acceptable provided certain conditions are satisfied.

Some of the generally accepted definitions include:

i. African concept of science is a systematised body of knowledge. This definition places emphasis on the product of African concept of science and processes involved in the acquisition of knowledge.
ii. Just like modern sciences (American Science), African concept of science is defined as the process by which knowledge is acquired. This view, acknowledges African concept of science as "doing thing". Therefore African concept of science is human enterprise.
iii. Furthermore, another definition of African concept of science is that, it is a way of life. Therefore, this definition associates African science with the culture of a people.

SELF-ASSESSMENT EXERCISE

What is your operational definition of African concept of science?

The basic aim of African concept of science is to find answers to questions of: "What?", "How?" and "why?", find solution(s) to problem(s).

3.2 Concept of African Sciences as Different from Integrated Science

Concept of African sciences differ from Integrated Science in a number of ways though both tend to be a fundamental science which cuts across subject boundaries that provide meaningful work for the learners that give 'birth' to chemical and physical science, technology and other elated disciplines. The teaching of Integrated Science is basically activity based and exploration of the learner environment. This approach enables the learners to acquire knowledge, understanding, skills, values and positive attitudes in such a way that ideas of relationships are made clear and easier. In the teaching of concept of African science, the activity based and exploration approaches are not vigorously adopted.

Integrated Science provides broad generalisation that services as advance organisers which later graduates into specific knowledge. The concept of African sciences on the other hand do not provide broad generalisation. Theirs is specific.

In the concept of African sciences, learners are not involved in open ended field of laboratory exercises or activities which can be used to verify or prove certain scientific laws and theories. But integrated science on the other hand involves in open ended field of laboratory exercises or activities. This may be used to verify or prove certain

scientific laws and theories. The concept of African sciences do not have elaborate laboratory; but Integrated Science has.

The teaching strategies and methods for Integrated Science include the inclusion of problem solving activities. This may be problems(s) identified by the learners through observations or interaction with materials or environment, or given by the teachers or found in the learning materials (e.g. texts, online). The concept of African sciences do not adopt this type of approach and strategy. Most of the findings in the concept of African sciences are not documented unlike Integrated Science. There are fewer texts and documentaries on the concept of African sciences than what we have in Integrated Science. African sciences are indigenous based majorly on African culture while Integrated Science curriculum is both foreign and indigenous.

African science depend tenaciously on who is performing: Personality, parents are expected to pass on their knowledge of traditional herbs to some carefully selected children in their family. This principle of selectivity and exclusiveness in knowledge transfer is not teaching and learning of integrated science. The knowledge in integrated science is open to all who are willing to learn.

The concept of African science approach to problem is considering it as a whole and do not believe its possible to isolate and control variables in all situations. This is the opposite in the Integrated Science approach to problem(s). African sciences accept paradoxes and work with them (Murfin, 1992). This is not true with Integrated Science.

4.0 CONCLUSION

Though African sciences and Integrated Science are both sciences, and are concerned with questions of “what?”, “How?” and “Why?” and finding solution(s) to problem(s), they differ in a number of ways. These include their strategies in imparting knowledge to learners and issue of science laboratories. They have different syllabi and curricula.

5.0 SUMMARY

In this unit, you have been treated to the concept of African sciences and integrated science. There exist differences between African Science and Integrated Science. African sciences are indigenisation sciences while integrated science more or less is foreign science. Other areas of their differences include teaching strategies and methods, and curriculum.

6.0 TUTOR-MARKED ASSIGNMENT

Identify and discuss differences between African concept of science and integrated science.

7.0 REFERENCES/FURTHER READING

Bajah, S.T. (1980). African Science: Facts or Fiction. A Multidimensional Approach with Bias Towards Science Education. Intellectual Life Committee Mongraph Number One. California State University: Dominquez Hills.

Murfin, B. (1992). African and American – American Scientists and the School Science Curriculum. A paper Presented at NSTA. African Studies Centre, University of Pennsylvania (accessed online).

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UNIT 4 IDENTIFICATION OF ELEMENTS OF INTEGRATION IN AFRICAN TRADITIONAL SCIENCE

CONTENTS

1.0 INTRODUCTION

African as a people has his own science which is indigenous to him. In this unit, you will be exposed to worldview about African science and elements of integration in African traditional science.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the worldview of African traditional science.
- Identify and discuss elements of integration in African traditional science.

3.0 MAIN CONTENT

3.1 Worldview about African Traditional Science

SELF-ASSESSMENT EXERCISE

What do you think are the views of the world about African traditional science?

Compare your points (answers) to the observational and discussions in this unit. The primary goal of a pluralistic curriculum is to present a truthful rendition of whole human experience. This is not a matter of ethnic quotas in the curriculum, sciences for “balance”, it is purely and simply a question of validity (Murfin, 1992). Ultimately, if science curriculum is centred on truth, it will be pluralistic, for the fact that

human culture is the product of the struggles of all humanity in respective of colour differences or race, not the possession of a single racial or ethnic group.

Mainstream Americans have few opportunities to become free of cultural assumptions and perspectives that are monocultural, that devalue African and Asian cultures and considered poor even in knowledge. African traditional science is viewed primitive and limited in scope. Many Europeans view African culture as primitive while some Africans question the whole foundation of modern Western science. Some worldviews about African traditional science is that it is partly based on superstitious belief; as African traditional science accepts paradoxes and works with them. According to Bajah (1980), African traditional science has been so exclusive that it makes nonsense of any notion about the freedom to information.

3.2 Elements of Integration in African Traditional Science

African traditional science and Western science both have their uses and misuses. There is overlap between the two and they are not mutually exclusive. Elements of integration in African traditional science that be seen in thought process rational thinking. For instance, a herbalist cannot cure without a rational knowledge of the signs and symptoms of diseases. Therefore, rational thinking cannot be an exclusive pressure of a particular discipline at a particular period of time.

Elements of integration of African traditional science are basically conceived in terms of three interrelated and insuperable domains as forms:

1. The Natural World
2. The Social World
3. The Spiritual World.

The interrelated and insuperable domains is represented in figure 1.

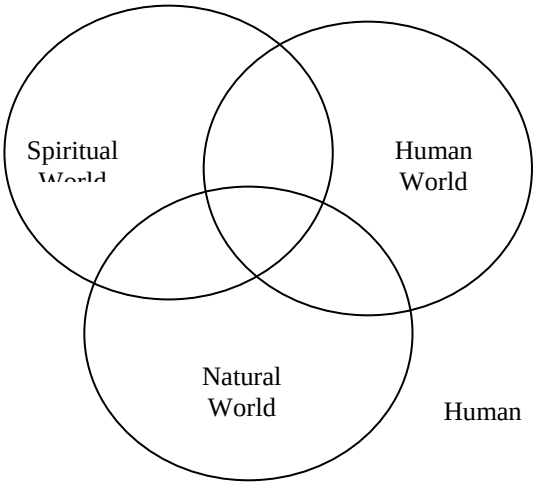

Figure 1: The interrelated and insuperable domain

In the elements of integration in African traditional science are the Natural, Social and Spiritual Worlds. In African traditional science ways of knowing, a notion of unity exists. Therefore, the natural, social and spiritual worlds are considered integrated.

Local knowledge in the natural domain includes thematic fields related specifically to agriculture, health and other practices. The social domain includes knowledge about local organisation, local leadership and management of natural resources, mutual help, conflict resolution, gender relations, art, and language. The spiritual domain includes knowledge and beliefs about the invisible world, divine beings, spiritual forces, ancestors, and translates into values and sense giving and the related practices such as rituals and festivals. The fact remains that none of these domains exists in isolation.

4.0 CONCLUSION

Three main elements are identified of integration in African traditional science. The elements are natural, social and spiritual worlds. They are inseparable in African tradition science ways of knowing.

5.0 SUMMARY

In this unit, you have learnt worldviews about African traditional science. Elements of integration in African traditional science were identified and discussed. The three elements (domains) are natural, social and spiritual worlds. The three domains must be fully applied before solution(s) to problem(s) can be arrived at.

6.0 TUTOR-MARKED ASSIGNMENT

Identify and discuss elements of integration in African traditional science.

7.0 REFERENCES/FURTHER READING

Bajah, S.T. (1980). African Science: Facts or Fiction A Multidimensional Approach with Bias Towards Science Education. Intellectual Life Committee Monograph Number One. California State University: Dominguez Hills.

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UNIT 5 AFRICAN CONTRIBUTIONS TO SCIENCE, TECHNOLOGY AND DEVELOPMENT

CONTENTS

1.0 INTRODUCTION

Africa has impacted much into humanity. This unit, therefore, treats you to African contributions to science, technology and development.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Trace the history of African development.
- Identify and discuss African contributions to science, technology and development.

3.0 MAIN CONTENT

3.1 History of African Development

Scientific discovery and the application of technology to the natural environment have been essential to the history of Africa and the development of the African Diaspora throughout the world and especially in the Americans (Lovejoy, 2014). Africans migrated to America either under slavery or as voluntary travellers. They learnt to adapt successfully to specific ecological settings to survival.

Americans suffered severe population destruction through disease and European conquest after 1492. Europeans empires and the generation of enormous wealth depended upon the combination of the ingredients – virtually free and very fertile land, labour and technology, largely from Africa, and the ability to garner huge profits through the reliance on slavery. Major plantation crops in the Americas came from Africa.

Africa established “botanical gardens of the disposed”, in which they cultivated many familiar foods, including millet, sorghum, coffee, okra, watermelon and the “Asian” long beans. Africans in Diaspora planted many of the same crops that were grown in Africa for their own subsistence.

SELF-ASSESSMENT EXERCISE

Trace the history of African Development

3.2 African Contributions to Science, Technology and Development

The technology and the science behind these were not realised but cut across many cultures. The Nok culture of what is now central Nigeria displays an antiquity in art forms that reveal knowledge of metallurgy and stone sculpture that has similarities to other parts of the world. Those who built the pyramids include Africans from the middle and upper Nile River Valley, as well as people from the Mediterranean and elsewhere.

Africans could transfer the skills of blacksmithing to Americans because these skills were ancient in Africa. However, some skills were not transferred into Diaspora, such as the ability to work in other metals, including bronze and silver. Africans, many from today Ghana, constructed all the buildings in the colonial town Newport, Rode Island, as they did in Kingston, Jamaica, and elsewhere.

Agriculture, including animal husbandry, evolved independently in Africa, which in a real sense was not only the origin of all people but also the cradle of food production, crop specialisation and experimentation in systems of agriculture and transhumance livestock management. These great advances in the technology and agricultural production demonstrate the contribution of Africa in the evolution of the ancient world into the modern world.

Africans played an important role in the development of the commercial rice industry in colonial South Carolina and Georgia. Enslaved labourers of the South Carolina rice plantations were skilled. Throughout the 18th century, planters placed a positive value on slaves brought from rice-growing regions, which is revealed in newspaper advertisements by South Carolina planters searching for runaway slaves.

An examination of the textile industry in West Africa demonstrate indigenous innovation and development. This is clearly seen in the development of indigo dyeing, including the development of dye pits

using locally produced cement. Also, the production of indigo for industrial purposes spread to the Americans via the African Diaspora. Similarly, cotton production was also developed in the Americas, and especially in the United States in the 19th Century.

Salt were scarce in Africa before the 12th century. Salt was found in scattered deposits, mostly in the Sahara and in the desert area near the Red Sea but also released through rine springs in widely scattered locations. Salt was also extracted from sea water through evaporation. The most sophisticated production of salt developed in the Central Sudan and particularly in the area dominated by the State of Borno, and its predecessor, Kanem, in the basis of Lake Chad.

4.0 CONCLUSION

The exploration of technological innovation demonstrates the dimensions of African contribution to scientific discovery.

5.0 SUMMARY

In this unit you have been exposed to African contribution to science, technology and development. African transfer of skill was based on labour under slavery and exploitation. The African contributions of science and technology can be appreciated with respect to the impact on the development of the Americans.

6.0 TUTOR-MARKED ASSIGNMENT

Identify and discuss African contributions to science, technology and development.

7.0 REFERENCES/FURTHER READING

Kriger, C.E. (2006). Cloth in West Africa History. Lanham, MD: Altamira Press.

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