

Science Education and Challenges of Globalization in Igbo Nation

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This paper reviewed the scientific contents in Igbo culture. Description of the Igbos who constitutes an ethnic group occupying southeastern Nigeria was made. It x-rayed the pre-colonial, colonial, and post-colonial culture of Igbo people and identified the scientific cultural activities, which can be harnessed to meet the challenges of modern day globalization. The advent of science and science education in Igbo culture and its applications in various cultural activities of the Igbos both in the pre-literate and post-literate era were discussed. The implications of these for the development of Igbo nation were examined and recommendations were made on how the scientific cultural activities can be improved to enhance the integration of the Igbo culture into the modern-day globalization.

Keywords: Igbo, origin, culture, evolution, science education, colonial, globalization, challenges

Introduction

Igbo Origin and Cultural Evolution

The Igbo nation is not to be introduced in the community of nations. The University of Nigeria, the first indigenous university in Africa, south of Sahara and north of the River Limpopo, is Igbo contribution to world civilization. From the 18th century, three Igbo patriots had acquired international fame and reputation (Afigbo, 1981, p. 145):

(1) Olaudah Equiano (Gustavus Vassa the African) living in Britain published on March 1, 1789, his autobiography titled “The Interesting Narrative”, which made a great deal of noise in Europe;

(2) King Jaja of Amaiwo and Opobo (1821–1891) distinguished himself as a dogged fighter of British imperialism;

(3) In 1958, the great Igbo novelist professor Chinua Achebe published his monumental work “Things Fall Apart” now translated into several world languages;

(4) The Igbo computer wizard, Philip Emeagwali, is declared the best computer scientist in the world has ever produced in the last 50 years. A worldwide poll conducted by Internet stated that Emeagwali is the best scientist in the world ever produced. The world richest man and the greatest American computer wizard Bill Gates confessed that Emeagwali has overtaken him in the art of computer (Amzat, 2004).

The world will not forget that Igbo prodigy and Biafran Warlord-Emeka Odumegwu Ojukwu (1933–2011)—the leader of the short-lived, ill-fated Biafra (May 30, 1967–January 15, 1970) recognized by

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five sympathetic weak, supine, pauperized, and imperialized nations, namely, Zambia, Tanzania, Haiti, Gabon, Cote d'Ivoire (Ivory Coast). Biafran nationalism was a gallant resistance against three world powers—USA (United States of America), UK (United Kingdom), and USSR (United Soviet Socialist Republic), as well as the entire Arab world. American public was in sympathy with Biafra. But American government damned public opinion and gave support to Nigeria to crush Igbo political revolution.

But Then Who Are the Igbos? And Where Did They Come From?

Niven C. R., a colonial political officer, stated that tribes living along Rivers Niger and Benue had no tradition of origin except that they came from East, Mecca, and Egypt (Afigbo, 1981, p. 145). English M. C. (1959), a colonial education officer and principal government secondary school Owerri, stated that the Igbos among others came from Egypt. All the above reports point to the oriental origin of the Igbos. The fact is that Igboland lies in the tropical forest belt of West Africa. Archeological study of Igboland yielded evidence that Igboland was under effective occupation by the third millennium (Afigbo, 1981, p. 145). Antiquity of Igbo origin is important. But of greater importance is the question of original homeland of Igbos. We return to this later.

Igbo People: Ecological Background

Igbos are tropical rain forest inhabitants in southeast Nigeria. They are found east and west of the lower Niger. The people share a common language described by linguists as the Kwa language family of West African languages (Ugwu, 2007, pp. 28-30). Hence, "Kwa Ibos" of colonial records refers to the Igbos who are living around Kwa River. It is wrong to say that it refers to Ibibios (Afigbo, 1981, p. 145). Onitsha Igbos refers to Igbos who live in Onitsha. Owerri Igbos refer to Igbos who live in Owerri. Niger Igbos refer to the Igbos living in Niger basin. Therefore, Kwa Igbos refer to the Igbos who are living in Kwa River basin.

Igbo Culture Areas

Early European anthropologists who worked in Igboland divided the Igboland into five culture areas:

- (1) Onitsha Igbos is known as northern Igbos;
- (2) Owerri Igbos is known as southern Igbos;
- (3) Delta Igbos is known as western Igbos;
- (4) Cross River Igbos is known as eastern Igbos;
- (5) Abakaliki/Ebonyi is known as northeastern Igbos.

Today, this five-zone structure has been criticized as poorly conceived and unsatisfactory. Niger Igbos or Riverine Igbos known as "Olu" is left out of the scheme. The four Niger kingdoms—Onitsha, Aboh, Osomari, and Oguta constitute a separate cultural zone. The Niger kingdoms are called Riverine Igbos, because they live along the banks of the River Niger.

Igbos of Nigeria are also found in the five states of southeast Nigeria, namely, Abia Anambra, Ebonyi, Enugu, and Imo States. The Igbos are also found in five other states of the federation, namely, Delta, Rivers, Bayelsa, Cross River, and Akwa Ibom.

Speculations on the Original Homeland of the Igbos

As mentioned earlier, Igbos have lived in Igboland for about three millennium. Some writers assert that they came from Hebrew land in Palestine, pointing to the real or imagined cultural similarities, such as male circumcision and naming ceremony as evidence. Another account pointed to Niger Benue confluence in Igala

kingdom as original homeland of the Igbos using linguistic similarities as cultural evidence. A third account pointed to ERI (an Igbo name) who fell down from the heaven/sky and paddled his canoe to Anambra River as the eponymous ancestor of Igbo nation.

Most historians who examined this issue were apologists of what Afigbo (1981) called oriental mirage. Afigbo defined oriental mirage as the tendency to trace Igbo origin from the east, mainly, Egypt, Yemen, and Mecca. For instance, Olaudah (1794), an Igbo ex-slave was the first to claim that Igbos originated from the Jews or the Hebrew land. Basden (1912, pp. 246-247) asserted that Igbos were of Hebrew extraction. Igbo culture, according to him, was an extension of Jewish culture and tradition.

Following Equiano and Basden's accounts, historians both local and foreign came up with the conviction that Igbo ancestors were Jews. They supported their views with the words "Uburu", "Ozuburu" (name of Igbo towns), and the word "Igbo" itself said to be a derivative of the word "Hebrew". This is why Jeffreys (1946), an ethnographer and ethnohistorian, argued that Igbos have Jewish origin. An Aro historian Ijeomanta traced Igbo origin to Egypt specifically in the Nile Valley (Afigbo, 1981, p. 204; Onwukwe, 1998a, p. 46, 1998b, pp. 15-33). These claims to oriental origin and impact were wide-spread and popular among the Igbo of southeast Nigeria. Afigbo (1981) warned that these wild claims and uncritical assumptions cannot be taken seriously by careful students of Igbo history. He based his rejection of oriental origin of Igbos on the following reasons:

(1) Igbos are Negroes. Archaeology established that Negroes came from the northern fringe of tropical grassland or savanna. This suggests that the Igbo homeland cannot be found as far north as Egypt, Mecca, or Yemen. The areas around south of Sahara and north of the River Limpopo are more authentic;

(2) A close study of glottochronology of Kwa language sub-family which includes Igbo nation revealed that members of this sub-family language group, namely, Igbos, Izon (Ijaw), Edo, and Idoma, separated from the cradle homeland between 5,000 and 6,000 years ago (Afigbo, 1981, p. 145);

(3) Language specialists held that it is likely that members of the Kwa sub-group otherwise called "Niger Congo family" separated in the Niger Benue confluence (Lokoja/Igala/Idah);

(4) The art historians supported this view pointing to Bida and Kotonkarifi as the watershed in the cultural development of Middle Belt and southern Nigeria which includes Igboland. The culture historian, Afigbo, emphatically asserted that until contradictory evidence emerges, Igbo historians had no choice than to continue looking for original homeland of Igbos and their Kwa neighbours in the area of Niger Benue confluence. In some of the traditions of origin of Igbo people, historians came across claims of Benin-Idah and Benue Congo origins. Igala tradition of origin claimed that the first Asadu of Igala was an Igbo man. Long range activities of Nri priests and diviners were ubiquitous in Igala land. Nri priests and diviners officiated during coronation ceremonies of Attah of Igala. To these claims pointing to cultural origin of Igbos, the Igbo culture historians stated that "Idah traditions were later developments associated with the rise of Igala kingdom as the dominant political power and controller of trade and politics in Niger basin" (Afigbo, 1981, p. 145). This gave Igala business men the impetus and courage to venture after off into the lower Niger (northern Igboland) and settled at different parts for trade and industry. Moreover, defeated Igala elements in the war of succession to Igala monarchy fled the kingdom outside the reach of Attah Igala. It has been established that Igala kingdom was an undeniable external power that made cultural impact on the northern Igbos. Nsukka plateau was an area of intensive and extensive Igala activity. This activity was in form of slave-raids, trade and commerce which led to cultural diffusion. Today, Nsukka dialect is full of borrowed

Igala words. After Igala, Igbo-Benin relations were another external factor that made impact on Igbos. Many communities inhabiting Awka-Orlu zone have traditions of origin claiming Benin origin and cultural impact. Afigbo (1981) stated that, of all non-Igbos who exerted influence on Igbos, the Benin kingdom was the most pervasive. Nri had never minimized its claim of dominion over Benin through the activities of its priests and diviners. These were generally known as “ojenamuo” medicine men (ojenamuo: long-range travelers in spirit world). Eze Nri told north-cote Thomas (1914, pp. 5-6) the first anthropological officer engaged by government of the colony and protectorate of southern Nigeria that among the areas subject to him was IDU (Bini Igbo group)—a common Igbo name for Benin. Hence, we hear of two medieval ballad in Igbo gathering and ceremonies: Igbo Kwenu (Igbo concur)... Yaa (Yes) (3ice) (3 times) and Idu Kwenu (Idu concur)... Yaa (Yes) (3ice) (3 times).

This shows that IDU or Ana-Idu na oba or simply Benin (Bini) was part and parcel of Igboland. Undoubtedly, Bini was originally a satellite state of Igboland. Before the advent of the white man, Obalike was Eze Nri and crowned Obas of Obodo Idu or Ana-Idu. This was the situation in the heyday of Nri ascendancy, ritual hegemony, and dominance, before the rise of Benin monarchy to imperial greatness (Jeffreys, 1941, p. 42). Jeffreys reported that when a new Oba of Benin was crowned Nri, man must be present. The Aro of Cross River Igbos claimed that they were already established and very active in Benin before the rise of Benin to imperial greatness. Chima (Chukwuma—an Igbo name), the founder of Umu Eze Chima in Onitsha was identified as an Aro commercial agent operating in Benin. The unforgettable encounter with the imperial forces pushing on all sides for imperial expansion of Benin Empire changed the migration direction and the course of Igbo which advance west of the River Niger.

Why Igbos Were Aggressive Emigrants, Migrant Workers, and Travelers

Population explosion among the early settlers of Igboland: Agriculture was the main economic mainstay. However, trade and industry flourished where population explosion and soil exhaustion were inhibiting factors. Land hunger and population pressure drove many of them to migrate to new lands in search of green pasture. Population explosion brought about westward migration of “land-hungry Igbo farmers”. As pressure on land did not build up one day, Igbo migrants travelling in little groups like desert caravans carried along with them the culture acquired from their original homeland. This, according to Afigbo (1981, p. 145), influenced cultural development of Igbos. The overall effect is lack of cultural homogeneity.

Another reason was agricultural revolution and iron technology which came into forest belt of West Africa and Igboland earlier than other parts of the sub-region. Important cultural changes/innovations followed in the wake of these revolutions. The most important of these changes was better land use. Institution of kingship became urgent so as to maintain law and order in the area of better land use. Eze Nri emerged and controlled agricultural cycles and equity in land use. With the institution of Eze Nri, Igbos attained giant strides in agricultural development, iron technology, and administration of long distance trade.

Igbo Mythology: Basis of Nri Hegemony and Dominion

Eri came down from heaven (sky). Chukwu (Almighty God) fed him with special food from heaven. When Eri died, his first son, Nri complained of food scarcity. God of heaven asked him to sacrifice his first son and first daughter. Nri obeyed. After three weeks, yam germinated from the grave of the first son, cocoyam grew from the grave of the daughter. Later Nri killed male and female slaves. After three weeks, oil palm grew

from the grave of the male slave. Breadfruit tree grew from the grave of the female slave. Arrival of new food items meant bountiful supply of food. Food crisis ended with plentiful supply of food, economic property occurred. God then ordered Nri to distribute the new food supplies to people all over the world. He refused, because he got the food by sacrificing his children and slaves. Agreement was reached. Nri was to supply food items to all people. Nri had a number of rights and privileges granted to him by God as a reward and compensation:

- (1) The unalloyed right to cleanse every town of abomination or breaches;
- (2) Crowning of kings all over the world;
- (3) Putting on (of) ankle cords to title holders;
- (4) Making of yam medicine every year to ensure steady bountiful harvest of yam. All the vassal towns/tributary states would pay feudal fealty (annual tribute) to Eze Nri and his descendants;
- (5) Umu Nri had to be accorded automatic diplomatic immunity. They had right to travel unarmed freely without molestation throughout the world. No one would attack or hurt them (Jeffreys, 1956, pp. 122-123).

In the event of violation of this agreement, Nri agent would plant his ritual staff in the cultural soil of the offending community, pull it out, and the yams would follow the Nri ambassador. The result was hunger and starvation until fresh agreement was entered into with Eze Nri (Jeffreys, 1956, pp. 122-123; Thomas, 1913, p. 48). Armed with this information, Nri people became the culture carriers and ambassadors with plenipotentiary powers moving, travelling, traversing every nook and corner of Igbo world and its environs.

The Nri hegemony and dominance continued unchallenged until the rise of Benin Empire. War of expansion and succession in Benin, a highly-militarized community, flared up here and there. Rival claims were settled by wars of conquest and effective occupation. But among the Igbos, wars of conquest and effective occupation were virtually unknown. Benin acquired martial tradition and ruthlessness and quickly halted Igbo advance further west. The politically and militarily weak emigrants with Nri claims and pretensions were ridiculed and silenced like Spanish Armada of 1588 which was scattered by wind and battle. The ambassadors plenipotentiary and peaceful emigrants retreated (their steps). Some settled at Ika Igbo which was said to be the first area to be occupied by the retreating Igbo elements. Others settled at Asaba and around areas occupied by Aboh kingdom.

Igbo hawks that were faster than their legs had advanced farther than others, encountered the direct pressure of firepower of Benin and fled back to the east from where they came. Some, on retreating crossed over the Niger and founded the commercial city of Onitsha. These were the Umu Eze CHIMA (Children of King Chima) of Onitsha Ado na Idu. It is the "cross over" episode of Igbos who had gone west that survives today and is played up in the traditions of the four Niger kingdoms, the IKAS (an Igbo group) and riverine communities as "flight from Benin". This claim contains element of truth. But just like in all history, it is tainted with a patriotic desire to bask in the reflected glory and splendour of Edo kingdom. Some storytellers wanted to give dignity and luster to their cultural history in order to invest on it a halo and prestige which it may or may not possess. Be that as it may, Benin had cultural impact on Igbos especially in the choice of chiefs in western Igbo and riverine areas of Igboland. The Benin impact is conspicuous in the regalia of their chiefs and title systems (Afigbo, 1981, p. 145).

Cultural Impact of Benue-Congo-Speaking People of the Cross River Valley

Benue-Congo-speaking people were the inhabitants of Cross River Valley otherwise known as Cross

River Igbos. Benue-Congo-speaking peoples were politically weak like their Onitsha and Owerri counterparts. Their cultural impact in Igboland was in form of cultural borrowing/diffusion and assimilation. This penetrated early through trade language development and interracial marriages (intertribal). Two major social institutions were borrowed from Cross River/Benue-Congo-speaking neighbours. The first was the use of secret society as instrument of social control. Common or well-known secret societies were “MUO” (ancestral spirits), among southern Igbo communities and “Odo” or “Omaba” (ancestral spirits) prevalent among northern and northeastern Igbo people. Impersonation pretence/simulation is the game plan. By pretending to be the spirit of departed ancestors, they played a significant role in social control. By impersonating dead ancestors, they provided entertainment and relaxation. The second institution borrowed from Benue-Congo-speaking peoples was age-grade systems, headhunting, and martial tradition. A clash between enculturation and acculturation is visible in the cultural practices of Benue-Congo-speaking people and their next door neighbour especially in the area of dual descent. This is the clash between patrilineal Igbo and matrilineal Benue-Congo-speaking neighbours.

Finally, ecological background of Igbos is given, cultural grouping, origin, and cultural evolution with emphasis on cultural impact of Igala, Benin and Benue-Congo-speaking neighbours have been highlighted.

The Advent of Science and Science Education in the Pre-colonial Culture of Igbo People

Science is relatively younger than the presence of man on the Earth (Emevon, 1985, p. 7). Man uses devices fabricated through trial and error. Thus, man learnt to use wood, stone, and animal skin. He made them into shapes and later he discovered fire with which he warmed himself and cooked his meals. Man’s activities could have improved rapidly but taboos and superstition hindered the progress. Igbo man is not an exception. Before science was introduced into Nigeria by the missionary educationalist, it was seen as a “magic”. The Igbos saw science as magic, a way by which people explained their relationships with the natural world (Dienye & Gbamaría, 1990, p. 131).

This may sound primitive and ignorant but to them science fell in line with their magical beliefs. The Igbos then believed that the world was controlled by spirit and other hidden forces that can be found in animals, trees, seas, mountains, wind, etc.. The magicians channel these forces to achieve man’s purposes. He did so by invocations, incantations, and preparation of magic portions. The magic principles held that the world was made up of visible and invisible human beings, animals, and plants. Some were spirits while others were spiritual forces. The manifestation can be seen in action like thunder and lightning or earthquake or flood. Diseases and sicknesses were signs of acts by evil spirits. So, man can now intervene to offer solutions to phenomena experienced by man. In order to find these solutions, the magician enters into manipulative acts which could lead to knowledge of the various substances. These processes were regarded as empirical, because they lead to preparation of magic portions. The formula and uses of these ingredients can be systematic leading to experimental results and remote ancestor of the modern science. The scientific knowledge of the Igbos developed to a level mystical qualities were acquired by sound people out of selfish gains and this led to witchcraft. Witchcraft were practiced and seen as forces from the evil spirits. Then priest craft came into protect the people from the witches and wizards. The priest craft was hereditary. The priests were so powerful that they acted as guardians of special knowledge (“scientific knowledge”). They interpreted the calendar of events and year of agriculture. They were knowledgeable in astronomy which was a secret only known to them. They controlled the people with much power. If events

like thunder occur, the priest will be consulted and he could interpret it as the divine anger of God. Priesthood and other vocations involved scientific processes. There was no formal curriculum but the training was relevant to the needs of the society. The method of learning was through apprenticeship. The science was not documented and some of the processes lacked adequate scientific explanations. People could not explain the causes and events observed in the natural environment. They only consult the priests and oracles. Science was practiced as traditional education activities in various vocations like farming, food preservation, clothing (textile, dyeing, and weaving), blacksmithing, salt making, pot moulding, traditional medicine, hunting, etc.. Boys and girls of about 13 or 14 years are recruited sometimes among close relatives or friends of the families. Sometimes, they work long distances with their load. This process separates them from their homes and parent care. In preparation for the separation, the parents especially the mothers made some preparations of food items to travel with. The fathers gave those words of wisdom and encouragement, as their success in life lies on their determination and hard work. As the apprentices leave home, there were usually weeping and sobbing.

There was science and technology in pre-colonial period. South eastern states (the Igbos) use science and technology to produce palm oil. They were able to produce cloths from cotton plants. They were able to extract drugs from herbs to cure diseases. Igbos are so indigenous technologists with many indigenous artisans with innovative and inventive spirit which requires only conducive environment to nature. Local gins were produced from crude palm wine. What happened during the war in the production of arms and war implements shows how innovative the Igbos are. Biafran science and technology during the Nigeria civil war attest to that. The Igbos produced tanks, rockets, mortars, anti-aircraft, guns, landmines, and shore batteries (Nkokelonye, 2005, pp. 11-12). During that time, the Biafran petroleum refinery was established.

But then science was practiced, as traditional education activities in various vocations like:

(1) Traditional medicine—There were two sets of native doctors. One was the doctors who deal with magic medicines. These doctors invoke the supernatural to help the patients. They demand things or items for sacrifices and pray to god to drive away the enemies or evil spirit that caused the illness or to forgive the sin of our forefathers responsible for the diseases. The second set of doctors were the native physicians and surgeons who treat diseases with herbs and they can do all sorts of operations like the eye doctors, skin doctors, bone physicians, etc.. Among this set was herbalists that have the knowledge and application of herbs for the purpose of prevention and cure of diseases. For example, in the treatment of malaria, a combination of “dogoyaro”, pawpaw leaves, lemon grass, and lime and guava leaves can be boiled. The mixture can be steamed or drunk. There were herbs for purgatives or treatment of diarrhea, etc.. The orthopedic doctors treat all sorts of bone problems. They can pick broken bones, use leaves to bring them together and apply all sorts of invocations and rub mixture of herbs and the bone will heal. There were traditional midwifery specialists trained for pre- and post-natal skills in child birth. There were drugs mixed with “okro” and inserted inside the pregnant woman and it turns the baby that was coming out with legs and the baby comes with the head. There were traditional means of immunization. There were drugs like “ogwu egbe”, “ogwu mma”, “ogwu akpi”, “ogwu agwo”, etc. (Nwankwo, 2011);

(2) Blacksmithing—It is the craft of Awka people. They got their raw materials (pig iron) from “Agbaja” as explained by G. B. Basden missionary. This was confirmed by Jeffries in 1932, who stated that the “Agbaja” towns where the Awka blacksmiths obtained their raw pig iron were “Uyukwe”, “Okwe”, and “Umuaga”. This iron ore raw was called “aga” which was mined locally. The smelting furnace was called “ikishi”. It was a tall

oven of the 6th height, which was built of mud or clay and it had an outlet base where the smelted iron ore flowed out. The oven was connected to a tunnel leading to bellow (“eko”) made of animal skin. The apprentices took turn pumping or blowing the bellow. The fuel was charcoal made from “araba” and called “icheku”. Awka people and Agulu-Umuana are immigrants from Agulu-Awka, so also are the people of Ihakpo-Awka, a village far north of Igboland near University of Nigeria Nsukka Campus. The products were for farming, domestics, rituals, and ornaments. These were needles of all sizes, hoes, knives, cutlasses, ear-rings, ankles armlets, swords, iron gates with designs, guns, door locks of various kinds, metal gongs, bronze, bells, spoons, stuffs, spears, etc.. The charcoal is placed, burnt, and heated by bellows. The hammer was used to refine, improve, and furnish the products;

(3) Clothing (textile)—Dying and weaving was very common among the Igbos. Body decoration was common among the young girls and women. Black and dark blue dyes were obtained from “uri” plant. The fruits were grounded and the juice was used to make patterns on the body. The fruits of “uri” and the leaves of indigo could also be used to decorate floors walls, etc.;

(4) Carving—Igbo people by nature are decorative. Beds and chairs (stool) can be carved from “raffia” palm, bamboo (“otosi”) or other woods. Pestles and mortars for pounding “fufu” were carved. Spoons and cooking spoons (“eku”) were carved. Other items that were carved were walking sticks, combs, hoes, matchets, baskets, trays, brooms, cups, bowls, musical instruments, etc.;

(5) Soap making—Black native soaps were obtained from burning oil palm bunches to obtain “ngu”. The ash was dissolved in water, filtered, and boiled. The resultant solution was mixed with bleached palm oil. The mixture was stirred and allowed to cake and the soap was thus produced;

(6) Local pomade (“Ude Aku”)—Palm nuts were collected, washed, and placed in a dry open pot. The pot is heated and extraction by heating is done to collect the black liquid which is placed in a bottle and its liquidities into a cream (“Ude Aku”). “Ude Aku” apart from being rubbed in the body is also medicinal. It can be taken during convulsion, proclitics, and other upper respiratory diseases.

Advent of Science and Science Education During the Colonial Period

Science only came to higher institutions in 1909 when Kings College, Lagos was established. In 1934, higher college, Yaba College of Technology was formed. The University of Ibadan as university college was established in 1948. These led to the first graduates in sciences in the 1940s.

The features of the education at the colonial period involved each denomination moving into all parts of Nigeria, establishing schools, which was aimed at training interpreters, catechists, and teachers. The schools should act as a catalyst to win converts and evangelize the people. The curriculum was concentrated on the 3RS (reading, writing, and arithmetic). The textbook was the Bible. Girls were introduced to cooking and sewing. The missionaries move with singing from house to house persuading parents to allow their children to come to school. The funding of the education then came from the missions abroad.

With the coming of Phelps-Stope’s committees in 1924, criticisms on the quality of education came in. There was no science subject. Then history and geography taught were following foreign examples. No attempt to localize the curriculum. Vocational subjects were excluded from the education. So many ordinances were established on the colony on matters of native education in 1926, the colonial development act of 1929, and educational ordinance of 1948. More indigenous teachers were trained and then government propounded policies and offered grants to the missionaries. These helped the missionaries in providing more schools,

payment of staff salaries, providing equipment, infrastructures, hospitals, and dispensaries. More scientific approach to break the cripple tradition came in like the provision of cloths to girls by the UAC (United African Company), stoppage of human sacrifices and twin murder, eradication of skin diseases, smallpox, and infant and mother mortality. Many superstition beliefs were destroyed. The Igbo people had taught that these processes and diseases were from the gods. These moves by the missionaries helped the schools to grow. The colonial government saw education as ways of ruling. The government established their own schools and government had to set standard of maintaining of hygiene. There were hostel inspections, inspection of teeth, hairs, nails, and toes. The use of chewing sticks and grounded charcoal was introduced for cleaning the teeth. The school children imbibed some scientific ideas and the move went to hinterland and to their parents. Some women with narrow pelvis, which was attributed to sin and adultery were operated upon and they gave birth to the life of babies. Some scientific revolution came to liberate the women.

Post-colonial Science Education in Igboland

In Igboland, science education was in the post-colonial education curricula. Science education in the post-colonial era was viewed as a way of life. This view had some relevance to science education in the western world. It involved training by observation and apprenticeship.

In Igbo language, the linguistically invented alphabets were used in writing Igbo sentences (see Table 1).

Table 1

Igbo Alphabets

a	b	ch	d	e	f	g	gb	gh	gw	h	i
ĩ	j	k	kp	kw	l	m	n	□	nw	ny	o
Ọ	P	r	s	sh	t	u	ụ	v	w	y	z

This was a great scientific achievement of the Igbo post-colonial culture.

The invention of Igbo numerals equating them to the Roman and Arabic numerals, in order to have a common base for understanding quantification in global terms was scientific. Thus, Igbo alphabets and numbers as “ofu” (one), “abua” (two), “ato” (three), “ano” (four), etc., emerged in the post-colonial Igbo culture.

The Igbo culture in the post-colonial era, thus, had arithmetic and language operatives for commerce and communication. These operatives are still being developed in this modern era in both depth and scope of understanding.

In the modern Igbo culture, science education becomes a tool for living. The life activities in the culture are becoming scientific and the traditional technologies are now explained in scientific terms. The traditional processes of shoe-making, salt production, pot-making, food preservation, black smiting, fishing, farming, erosion-control, and arts/crafts among others in Igbo culture have become scientific and compared to the western scientific technology.

The Igbo cultural belief/value systems are also affected by the science education. The Igbo beliefs in superstition had given way to scientific understanding of natural phenomenon. The beliefs are now being interpreted in a more scientific understanding. While Igbo values are not only formed in terms of scientific understanding, but also scientific purposes and objectives. Hence, the traditional monoculture farming is now taken over by agro forestry, a combination of animal husbandry and crop rotation.

Traditional animal husbandry has changed from keeping of fowls and goats to full-scale modern poultry, piggery, cattle farm, etc.. The traditional technical crafts that produced only cutlass, hoes, pots, and wooden utensils have specialized to production of plates, spoons, grinding machines, gas/electric cookers, electric generators, UPS (uninterrupted power systems), radios, and audio-visional systems to mention just a few. These were made possible by the establishment of the NTAC (National Technology Adaptation Centre) at Awka in Anambra State, Nigeria.

In the modern Igbo culture, food processing has taken a scientific procedure. Food preservation through drying by open fire/sunlight has changed to sterilization, canning, bottling, use of refrigeration, and more modern approaches (Ihekeronye & Ngoddy, 1985, pp. 231-265).

The traditional methods of cloth wearing, which had produced the “Obakpa and Akwuete” cloths commonly worn by the affluent Igbo citizens in the pre-colonial era, have been modernized through the application of scientific knowledge to production of modern fabrics and dying technics of Baltic, Adire, and Otuogwu among others.

Science education was able to bring about these changes due to the inclusion of science as a subject in the modern school curricula at the primary and secondary school levels. The primary science based on natural observation was made to improve scientific understanding. This was changed from natural science to primary science, while science in the junior secondary school level changed from nature study to general science and to integrated science. This was made to train the students in the unified processes of science as a way of life, to make them understand that problems of life cut across subject boundaries. While at the senior secondary school, science was broken down into biology, chemistry, and physics for in-depth study of environment. The objectives of science education in the education policy remarkably stated that the attainment of scientific/technical knowledge/skills necessary for agricultural, industrial, commercial, and economic development (FRN (Federal Republic of Nigeria), 2004) are the sole aim of science education. These guiding principles have been utilized in the modification of Igbo traditional technology and culture.

Communication in Igbo culture has, as a result of influence of science, changed drastically. Traditional method of person-to-person imparting of information, which later changed to the use of “gong” (agogo) has changed in the modern Igbo culture to written/printed information circulation to the use of electronic media. Science has made it possible for globalization in electronic technology to influence communication in Igbo culture. Since majority of the Igbo citizens receive science education from the schools, the use of electronic media in communication in Igboland was made possible.

Challenges

The Igbos have, as a result of science education, been able to attain a reasonable level of scientific living. Science education has transformed the pre-colonial Igbo culture to a modern scientific culture and improved the living standard.

The challenges of the scientific enculturalised of the Igbo culture are the provision of certain basic amenities by the government. Apart from this, the Igbos are highly skillful and their function technologically and economically in Nigeria as Japan does in the world of technology and trade.

Igbos are Japan in Nigeria but they lack global leadership. The economic development is seriously affected by her remoteness from the world markets. Igbos are situated very far from the maritime. Thus, they

are geographically disadvantaged. Other factors responsible for the low economic growth are the poor transport system with bad roads, inadequate infrastructure, inefficient transit system, and low foreign direct investment that would have promoted industries, high cost of imports and no protection for traditional knowledge, etc..

All these problems pose some challenges for the Igbo nation to meet the global competition. With the economic and political situations in Nigeria, can the Igbos' talents, intelligence skills, courage, and culture be ever integrated into the worldwide economy. The obvious answer is very far-fetched. Most of the problems listed above can only be solved if we have Igbo leader in Nigeria, but the political situation right now suggests that it may not be possible.

Recommendations

There is the necessity for provision of technical facilities and other amenities in Igboland. The lack of regular power supply has hampered industrialization in Igboland. Transportation and communication which are vital for industrial development are vitally lacking. Therefore, transportation and communication processes are very important.

Provision of international airport is very necessary to help solve the problem of geographical handicap.

Attraction of foreign investment which will be accompanied with the establishment of industries that will use young talented Igbos in solving the problem of unemployment.

Rich Igbos should help to build our road network, thus, reducing cost of transportation and increase the expansion of local products.

Worldwide active communication systems can only get down to Igboland, if schools are equipped with computers, laptops, and desktops. This calls for the high Igbo elites to make donation of these items and provide scholarship for teachers to be trained and retrained in computer education.

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