

THE ROLE OF CHEMISTRY EDUCATION IN COMBATING INSECURITY AND ECONOMIC CHALLENGES IN NIGERIA.

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Abstract

This paper reviewed the current precarious situation of insecurity and economic challenges facing Nigeria vis-a-vis the role of Chemistry Education in salvaging and redeeming the lost glory of the once Giant of Africa. Chemistry and Chemistry Education have been and still playing vital and pivotal roles in promoting economic growth of nations through trained skilled manpower and providing chemical raw materials for industries to strive towards total national industrialization. In terms of food security, studies revealed that Chemistry Education is a veritable tool for increased food production through chemical use in agriculture in the forms of fertilizers, herbicides, plant growth hormones, fungicides and pesticides. Furthermore, Chemistry Education all over the world is used in combating insecurity as it helps in crime detection as in forensic investigations, chemical warfare in which chemical weapons are engaged in incapacitating and decimating criminals. However, the paper cited poor government financing, poor working environment and lack of capacity for quality research as some barriers to the study of chemistry. The paper finally suggests increased government presence and funding coupled with the establishment of standard research laboratories in all institutions of learning, adequate and regular local and international capacity building for chemistry teachers among others as way out.

Keywords: Chemistry Education, Insecurity, Economic Challenges, Technology, Chemical Weaponry.

Introduction

The history of the study of Chemistry is as old as man. The impact of the science of chemistry has equally being felt in the development of mankind from time immemorial across the stone age, through iron age to the jet age of the present century. Chemistry can be described as the study and manifestation of man's environmental endowments for the purpose of creating wealth, health and safer environment. Obidiye (2011) explained chemistry as a science that deals with the composition, structure, and properties of substances with the transformation that they undergo for the benefit of man.

Ibrahim *et al* (2017) described Chemistry Education as the vehicle through which

chemical knowledge and skill reach the people who are in need of capacities and potentials for development. The role and application of chemistry education has been reticulated in agriculture, medicine, engineering, security, clothes, textiles, energy, oil and gas etc. These feats make Chemistry Education a veritable tool for combating insecurity and sustainable economic development. Conscious and calculated investment and application of Chemistry Education is a panacea to both insecurity and economic downturn as asserted by (Emendu, 2014).

The focus of this paper is to highlight the role chemistry education plays in combating insecurity and salvaging our economic crisis using information available from research

findings, history, journal articles and other literary academic literatures.

Concept of Chemistry Education

Chemistry is an integral part of secondary school curriculum among other subjects such as biology, mathematics and physics considered to be core science subjects. In the same token, chemistry blends well with education. Chemistry Education can be referred to the acquisition of knowledge in the realm of teaching and learning of properties of matter, their manipulations and reactions to yield other substances that benefit man.

Emendu (2014) for instance, explained Chemistry Education as the systematic process of acquiring the fundamental, rich and indispensable knowledge about the universe that enables man shape and reshape his world for his own benefit. Chemistry Education constitutes an excellent tool to catalyze the development of the necessary know-how, creative skills and attitudes among youths for enhancement of agricultural productivity (Theresa, & Antiabong, 2017). Many other studies have given credence to the benefits of Chemistry Education.

Chemistry Education enables students to acquire training in areas of synthesis and formulations of agricultural inputs such as inorganic fertilizers, improved crop varieties by genetic modifications, pesticides and herbicides, which has in no small measure brought about a revolution leading to increased food production as asserted by (Akpata, 2000). Through Chemistry Education, the requisite pedagogue, skills and know-how required for the effective teaching and learning is acquired. Adesoji and Olatunbosun (2008) advanced that chemistry has the potential of exerting a dominant influence on the life of an individual as well as on the developmental efforts of a nation. According to Danjuma & Adakole (2019), chemistry education is directed at acquiring sustainable development through the elements of critical thinking, experimentation, exploration of natural resources within

our environment. Olufumilayo (2018) posited that chemistry education is an agent of developing human capacity increased skilled work force for modernization and empowerment. With increased agricultural production acquired through chemistry education, food sufficiency for internal consumption as well as foreign exchange earnings through export of agricultural produce is guaranteed. By this, chemistry education is a major player in salvaging our economic predicaments as key driver of developments in the modern societies. As pointed out by Okebukola (2012), an increase in the average education of farmers by one year increases the value added to agricultural production by 24%. In summary, Imiko (2014) described chemistry education as indispensable in achieving national development.

Insecurity in Nigeria

Insecurity in its simplest term can be defined as a psychological and physical state of feeling unsafe. Insecurity challenge could be generic with the believe that any society with high illiteracy and poverty rate like ours is prone to insecurity due to methods adopted to curb the menace. For instance, porous borders, lack of patriotism, poor tactics and inappropriate weaponry are responsible factors. According to Aliyu (2021), insecurity is a critical issue that has hampered industrialization and sustainable development in Nigeria in particular and Africa in general. The security of Nigeria has been worsening since after independence and the Nigeria-Biafra civil war of 1967 – 1970. Mukhtar (2022) asserted that the country has been experiencing a rise in the level of insecurity since 1960 to the extent of threatening the country's corporate existence.

In 2016, out of the 6.7million internally displaced persons globally; 2.6million were from Sub-Saharan Africa and 501,000 from Nigeria due to internal conflicts (International Displacement Monitoring Centre (IDMC), 2017). Every region of the country is faced

with one or more forms of the so many insecurity forms in Nigeria. The North is confronted mainly with insurgency, banditry, kidnapping, armed robbery, farmers-herders' squabbles and communal disputes. The southern part of the country cannot be claimed to be of lesser proportion as oil bunkering and separatist insurgency are plagues. Aliyu (2021) submitted that Nigeria is faced with an unprecedented wave of different but overlapping security cases from kidnapping to extremist insurgencies in almost every corner of the country.

Pastoralist/Herder-Farmer incessant clashes and the Boko Haram insurgency have caused wanton destruction of lives and properties (Dunn, 2018). Studies have also shown that the insurgency in the North-East has led to malnutrition due to increased food insecurity resulting in infection, diseases and malnutrition (Brown, *et al.*, 2008). According to United Nation Human Right Commission (UNHRC) (2018) report, an estimated 1.8 million people affected and 5.8 million people needing assistance. Borno historical heritage, low socio-economic standard of the region and existing poverty among other factors are responsible the Boko Haram insurgency (Frederic, *et al.*, 2020). Insecurity in Nigeria has been identified to include Boko Haram terrorist group, farmers/herders' squabbles, kidnapping and banditry (more than 1,000 students have been kidnapped as at December, 2020 (Aliyu, 2021)).

This challenge has resulted in heightened economic hardship as business premises have been destroyed, farmlands abandoned and forms of livelihood disrupted. Hunger and starvation is now the bedfellows of most Nigerians. Nigerians now live in perpetual fear as no available safety net for anybody. Nasir (2021) added that thousands of Nigerians have been killed by terrorists, bandits and separatists. Nnabuife, Okeke & Ndubuisi-Okolo (2019) submitted that Industrialization in Nigeria is bedeviled by threats of insecurity, transportation facilities, power outages, finance etc.

The seeming intractable and demoralizing situation could be the results of applications of remedies that only end up addressing the symptoms of our ailment instead of the annihilating causative virus itself, hence they fester to now assuming a terminal disease status. In this connection therefore, the attempt to peruse history, available research finding in journals, textbooks, newspapers and other academic documents in providing a way forward through science and technology and chemistry education in particular in combating economic crisis and insecurity in Nigeria.

The Role of Chemistry Education in Combating Insecurity

Chemistry education plays the following roles among others in combating insecurity in Nigeria:

(1) Provision of qualified skilled man power: With the study of chemistry education, the individual is equipped to take up job as a teacher, a quality control staff or analyst in any chemical firm. This way the he/she is gainfully engaged and immune against use by evil mechanizations.

(2) Training in chemistry gives students the opportunity be an entrepreneur and employer of labor rather being a job seeker. In this way the chemist contributes to national coffers through taxes and export duties while at the same time reducing crime rate and providing livelihood to others.

(3) Forensic science: Manika (2016) declared that the knowledge of chemistry is one of the most important advances in criminal investigations. With the training through chemistry education, requisite knowledge required to unravel the crimes is made easy. Chemistry education enables crime investigation and crime fighting easy through training in very important areas of forensic science such as serological examination, blood stain pattern analysis and toxicology.

(4) Chemical Weaponry Agents (CWAs):

Chemical weapons involve the use of special chemical substances used in prevention and dispersion of criminals, war against criminal elements and prosecuting warfare against invaders and enemies of the land (Germany, 2001). The synthesis of the CWAs is achievable by undergoing training in Chemistry Education. They are in different categories for application in smoking out hoodlums from their safe havens, dispersing criminal elements, quelling uprising and engaging organized criminals in combat to protect territories, lives and properties. They are transported easily and may be delivered by a variety of routes (skin, eyes and respiratory tracts). Chemical agents often are difficult to protect against and quickly incapacitate the intended targets. Most civilian medical communities are inadequately prepared to deal with a chemical terrorist attack (Ganesan, 2010) and hence, solutions to them are not handy. Nerve agents, vesicating agents or blistering agents, choking agents or lung toxicants, incapacitating agents, Lacrimating or riot control agents, Vomiting agents, Bloods agents, choking agents, Riot-control agents, Psychomimetic agents (lysergic acid diethyl amide LSD) and Toxins (Ganesan, 2010) are the commonest of them all.

Another example of chemical weaponry are the explosives. Explosives are substances that undergo a rapid oxidation reaction with the production of large quantities of gases. It is the sudden buildup of gas pressure that constitutes the nature of an explosion. The speed at which explosives decompose permits their classification as high or low explosives. (Kholler *et al.*, 2001). Examples of such chemical explosives that can be of use in combating insecurity in Nigeria include: Trinitro toluene, (TNT), Gun powder and fireworks (NRC, 2004). Another form of explosive is the Weapon of Mass Destruction (WMD) is a nuclear, radiological, chemical, biological, or other device that is intended to harm a large number of people (Philip, 2013).

The potentials of the chemical weapons not to be target specific notwithstanding, in a well-coordinated manner, they can be used successfully even when non-intended targets are affected. With the knowledge of their chemistry, the antidotes of the weapons can be prepared before their use and first aid treatment given to victims to revive and rehabilitate them before permanent damage is inflicted on the victim.

Nigeria's Economic Challenges

Economic depression has been plaguing the Nigerian state for many years now. These challenges appear to have defied several social-economic recovery plans and political solutions. These crises are beginning to create a state of frustration, depression and hopelessness in the vast majority of Nigerians. Hunger and starvation pervade the society. *The price of staple foodstuff such as rice, garri, maize, wheat is beyond the average Nigerians* (Theresa & Antiabong, 2017). According to Ofeche (2012), Nigeria, the most populous country in Africa and 14th largest oil exporting country in the world has been engulfed by socio-economic problems that have caused poverty and conflicts in the country due to consumptive cultures, weak institutions and fragile structures.

Terhemba (2021) submitted that Nigeria has been stagnated with a growth rate of 1% as against a population growth rate of 2.6% with about 40% of its population of over 200 million people living below poverty line. Olatunji (2021) posits that insecurity in Nigeria is growing exponentially and near 98million Nigerians live in extreme poverty, making the country, Nigeria the world's capital of poverty. The economic downturn is laced with insurgency, deadly farmers-herders clashes and separatists' agitations among others. Nina & Jackline (2022) traced the countries present economic woes to inconsistent economic policies, corruption, unemployment, poor human capital development and poor infrastructure among

others.

As a remedy to the quagmire Akajagbor & Oni (2018) posited that a non-dependence on external support for economic survival, and liberation from perpetual servitude of other countries, are hallmark of a developed nation, which Nigeria is striving to attain. Unfortunately, our conditions will continue to reduce our status to mere third world under-developed nation. The reversal of this demoralizing situation is predicated on change in our orientation, policy strategies and adoption of science education in general and chemistry education in particular which is the hub of high economic productivity and a harbinger for self-reliance and sustainable growth. According to ICCON (2000), the level of development of a nation is often measured by the extent of development of its chemical industries. According to Emendu (2014), Chemistry education has been identified to be one of the major bedrock for the transformation of our national economy. Chemistry through chemistry education is involved in agriculture, food processing and utilization of materials including bio-energy (Theresa & Antiabong, 2017). The knowledge of chemistry education helps students to be job creators rather than job seekers after graduation (Nleon & Anderson, 2020).

The role of chemistry in combating economic challenges may be summarized as 1) Increase in productivity and a consequent increase in both domestic and foreign exchange earnings increases GDP and elevates our international status, 2) Reduction in the number of low skill workers, which lead to increase in their wages, 3) Increase in number of high skill workers resulting in high and quality output and production, 4) Production of an enlightened work force equipped with a knowledge that makes them job creators rather than job seekers after graduation and 5) Opening doors for creativity, innovation and modernization which beget entrepreneurship.

Challenges Confronting Chemistry Education in Nigeria

The following are some of the challenges impeding the study of chemistry in Nigeria:

1. Poor implementation of educational policy, particularly as it affects chemistry education,
2. Poor development of entrepreneurial skills among chemists.
3. Poor or lack of quality chemistry research works.
4. Lack of capacity building trainings and workshops.
5. Poor funding of practical and laboratory-based works.
6. Weak professional bodies to regularly evaluate and monitor happenings in the profession, and interface with government on matters that affects chemistry education.

Conclusion

From the discussion above, it could be forwarded that the gains and supremacy of chemistry education in tackling national insecurity and economic challenges facing Nigeria cannot be undermined. Chemistry and chemistry education permeate all facets of our social and economic lives. In order for a fledgling and faltering democracy like ours to mature and achieve technological advancement and sustainability to be counted among advanced economies of the world, imbibing the tenets, cultures in the study of chemistry hook, line and sinker in our national policy in education is the way out. With chemistry education, industries will grow in numbers, size and strength, food sufficiency and affordability is ensured insecurity reduced to its barest minimum and national economy will soar to sky height.

Recommendations

In the light of the barriers limiting the application of chemistry in combating insecurity and economic challenges highlighted above, the following suggestions

are made:

1. Policies of government should emphasize the teaching and learning of chemistry that pave way for robust researches and innovations,
2. Capacity building workshops should be constant and regular for teachers to access both for local and international training to enable cross-fertilization of teaching pedagogy.
3. Standard research laboratories established in all institutions where chemistry as a subject is taught,
4. Adequate financing of laboratories for effective teaching and learning is recommended,
5. Non-Governmental Agencies, NGOs, corporate bodies and spirited individuals should be encouraged to partner with schools to support the study of chemistry,
6. Chemistry professional bodies such as Chemical Society of Nigeria (CSN) and Institute of Chartered Chemists of Nigeria (ICCON) should up their ante to be alive to their constitutional responsibilities.

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