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The Role of Chemistry Education in National Development

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----------ABSTRACT----------
Despite being one of the cornerstones of science, technology and industry, it is apparent that chemistry plays a greater role in national development through industry in the world. As such it helps to provide some socials amenities. The study examined the role of chemistry education in national development with reference to chemical industries. The study concentrated on chemical industries in Anambra State, Nigeria. Four industries with a sample of one hundred (100) workers were chosen by the researcher using simple random sampling. Instrument used for data collection was the questionnaire. Mean and standard deviation were used to analyze the data collected. The results of the analysis showed that chemistry education helped in national development of chemical industries. The findings showed that students should endeavour more time to learn about chemistry education, because it will help them in many fields of life especially in chemical industries. Recommendations were made.

KEYWORDS: Chemistry Education, National Development.

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I. INTRODUCTION

Throughout the world, education is considered to be the very important tool for attaining national goals. Education provides learners with skills needed for survival. In view of the federal Government of Nigeria introduction of the Universal Basic Education whereby education is free and compulsory for all citizenly at least to the secondary level of education, it is important to utilize the value of science.

Science and chemistry education in particular is a veritable instrument for national development. According to Okon – Enoh, (2008) science is a way of seeking information (process) and also an accumulated knowledge resulting from research (products). Okoro (2013) sees science as a systematic investigation of nature with a view to understudy and harnessing them to serve human needs.

Science may be regarded as the body of related courses concerned with knowledge. It consists among other component; Chemistry, Physics, Biology, Mathematics, Astronomy, Agriculture, among these, chemistry is vigorously described as the queen of science. Realizing the role science plays in achieving self reliance and intellectual development, one tries to find the place of chemistry in science.

Not withstanding the negative role chemistry education does play globally, such as pollution and drug abuse, the positive roles are well known. Chemistry is the central in the drive of global sustainable economic development. It plays the major roles in food (fertilizers and insecticides), clothing (textile fibers), housing (cement, concrete, steel, bricks), Medicine (drugs), Transportation (fuel, alloy materials). Presently, man is experiencing an era in scientific and technological development that affects his life in one way or the other. Virtually everything we use daily involves science.

II. CONCEPT OF CHEMISTRY EDUCATION

Chemistry is a popular subject among senior secondary school students in Nigeria due to its nature. It addresses the needs of majority through its relevance and functionality in content, practice and application. What many nations like Nigeria need now is a functional chemistry education that will assist in national development. Chemistry education has been identified to be one of the major bedrock for the transformation of our national economy.

Chemistry Education can be seen as the acquisition of knowledge or ideals relevant to chemistry. It is concerned with the impartment of knowledge on properties, components, transformations and interactions of matter.

Chemistry Education is therefore the systematic process of acquiring the fundamental knowledge about the universe. With these indispensable knowledge richly acquired, man can shape and reshape his world for his benefit. Hence, the development of the nation is usually measured by the degree and extent of growth brought to it through the enterprise of science education and a gate way to it is chemistry education. Chemistry education is the vehicle through which chemical knowledge and skill reach the people who are in need of capacities and potentials for development. In addition, chemical education addresses the social objective of substance development as education is now of the primary means for empowerment, participation, cultural preservation, social mobility and equity (Emmanuel, 2013)

The impact of chemistry on technology involves the process of bringing manufacturing inventories and sculpturing, designing etc. Technology can be seen as the application of scientific knowledge, skills, work, attitudes, tools and equipment in evaluation of new processes and adoption of these processes to the production of goods and services for the benefit of mankind (Hornby, 2010).

Chemistry education plays important role in enhancing the quality of teaching and research as well as ensuring that students are equipped with good knowledge to produce intensive goods and services to meet human needs for food, health care products and other materials aimed at improving the quality of life. Every single material thing in the universe is a chemical and the ability to understand and manipulate these chemicals is responsible for everything from modern food and drugs to plastics and computers. Conclusively, the ideas of chemistry are not getting the attention they desire in either formal or informal education provision. It is argued that an improvement in this position requires the further development of the nature and quality of chemical education to chemical industries through intensive and extensive research. Chemistry education is needed in the professional development of chemical industries required in the establishment of modern technology and operation of chemical industries.

The process of chemical transformation involves intra-chemical reactions within the same substances examples, sublimation, radio-active decay like uranium, plutonium etc and other chemical reactions when the substances react with other things which includes the evaporation of volatile substances like fuel, Mentholated spirit and even water when exposed to air. Really, chemistry can be used to find solution to problems of everyday activates in science, industry, technology, government, educational sector and economics. Some of the industries that obviously cannot do without chemistry include; cosmetics industry, brewery industry, chemical industry, textile industry, food processing and technology industry, forestry, Agricultural industry, petroleum, pharmaceutical industry etc. Man's success in the different realm of chemistry provides ones unquenchable source of hope for success in technology. Whatever technology is, be it monster, man is poised to face it challenges having gained courage, built in confidence in himself as he overcomes the seemingly impenetrable mysteries of chemistry. To be able to operate machinery involved in technology, good dosage of simple experimental concept like observation and recording, theory and principles and measurement to take record of events that are needed. Also market forces succumb to the supremacy of social chemistry which includes simple experiment formulation such as record and observation, profit and loss, minimum and maximum, to the more complex ones like optimization theory and also operation research such experimental expressions.

Development is the gradual growth of something so that it becomes bigger, more advanced and stronger (Hornby, 2010). Mohammed and Bello (2013) sees development as growing or becoming industrialized. National development is the ability of a country or countries to improve the social welfare of the people. The question is whether this could be done through the knowledge of chemistry education? Educational institutions everywhere are established to carry out the role of teaching, research and community services, thereby contributing meaningfully to the social, economic, cultural, political, scientific and technological development of any nation (Iji, Abch and Uka, 2013).

III. STATEMENT OF THE PROBLEM

Chemists and technologist concentrate their studies on chemistry and technological development that have eaten deep into the society. Despite the importance of chemistry in the overall development of any economy, its teaching and practice in Nigeria is grossly sufficient and plagued by poor infrastructure. The rate by which the social amenities are being developed in Nigeria is to show that one wonder if chemistry education is actively practiced in school at all. If it does is there any impact in the society? Is chemistry knowledge important for the development? Does technology has a machinery to be operated? Is chemistry education needed in the operation of such machinery? The current achievements in chemical industries are all based on the principles of classical machine. Can the knowledge of chemistry help in achieving national development?

IV. PURPOSE OF STUDY

This study focuses on the role of chemistry education in the development of chemical industries specifically, the study intends to find, the extent the chemistry education could function as a key player in technological productivity of chemical industries.

V. SIGNIFICANT OF THE STUDY

The role of chemistry education in national development with reference to chemical industries in Nigeria will be relevant to the teachers who are mediating factors in the teaching and learning process and will help them to inculcate in their students the vast potentials inherent in chemistry. Particular attention is concentrated on the role chemistry education can play in the much spoken technological development in Nigeria. The society in general will benefit as more people will be employed in this industries, also the government will benefit as the Nigerian economy will increase.

VI. RESEARCH QUESTIONS

The following questions were formulated to guide the study.

1. To what extent does chemistry education function as a key player in technological productivity of chemical industries?
2. What are the relationships between chemistry education and chemical industries?

VII. AREA OF THE STUDY

The area of this study is Anambra State, Nigeria. There are many chemical industries in Anambra state, but the research was carried out in four (4) selected chemical industries in Anambra State. The industries include Paint Industry, Plastic Industry, Petroleum Products Industry, and food Industry.

VIII. POPULATION OF THE STUDY

The population of this study comprises of all the workers in all the Chemical industries in Anambra State of Nigeria.

IX. SAMPLE AND SAMPLING TECHNIQUE

Simple random sampling was used by the researcher to select four (4) industries in Anambra State. A sample of hundred (100) workers was randomly selected from the four (4) industries irrespective of age and sex. Each of the industries comprised of twenty – five (25) workers. The sample consists of fifty-eight (58) male and forty-two (42) female workers. The sample size was considered enough and satisfactory to admit of the status of total computations.

X. INSTRUMENT FOR DATA COLLECTION

Questionnaire was the instrument used for data collection. The questionnaire contains sixteen (16) items constructed by the researcher dealing with the research questions. The items in the questionnaires were structured on four-point Likert rating scale of Strongly Agree (SA) – 4, Agree (A)- 3, Disagree (D) -2 and Strongly Disagree (SD) -1. The respondents were to tick (√) against their opinions. Thereafter decision role was taken as 2.50 and above as accepted and below 2.49 as rejected.

VALIDATION OF THE INSTRUMENT

To ensure the face and content validity of the instrument, the instruments were vetted by two lecturers in the Department of chemistry and one lecturer in Measurement and Evaluations, all in Nnamdi Azikiwe University Awka Anambra State Nigeria. They were given the topic, research questions, scope and questionnaire to validate. Corrections were made based on their recommendations.

XI. RELIABILITY OF THE INSTRUMENT

The reliability of the instrument was done using test-retest method. In this method, the same instruments were administered to a different group not used in the study. The instrument was given to the same group after an interval of two weeks. The resulting test scores were correlated using Pearson Product Moment Correlation coefficient. The reliability coefficient for the test was 0.89. Hence, the test instrument was highly reliable because the first and the second tests measured the same attribute.

XII. ADMINISTRATION OF THE INSTRUMENT

The instruments were administered and collected from the personnel in the industries by the researcher using on the spot method of administration.

XIII. METHOD OF DATA ANALYSIS

The data collected were analyzed using means and standard donations (SD).

RESULTS

RESEARCH QUESTION ONE: To what extent does chemistry education function as a key player in technological productivity of chemical industries?

TABLE1: Mean and standard deviation on the function of chemistry education as a key player in technological productivity of chemical industries.

S/N	ITEMS	-	X	SD	REMARKS
1.		Chemistry education plays a major role in technological product of Chemical industries	3.60	1.27	Agreed
2.		Chemical Industry can exist without Chemistry education	1.58	0.8	Disagreed
3.		All Manufacturing Industries make use Of chemicals in their production	3.35	0.7	Agreed
4.		Knowledge of Chemistry education fasten technology productry of an Industry	3.43	1.30	Agreed
5.		Chemistry education aids in the inventory Of many products in industries	2.77	1.2	Agreed
6.		Raw materials used in chemically industries are chemically based	3.26	0.8	Agreed
7.		without the knowledge of chemistry Productivity in chemical industries Will be high	1.84	1.1	Disagreed
8.		Improvement in chemistry education Enhances the improvement in technology	3.11	1.12	Agreed
9.		Skill learnt in chemistry education is Also needed in chemical industry	2.86	0.90	Agreed
			2.86	1.02	

Grand Total

From Table 1, it can be observe that the means scores of the items 1, 3, 4,5,6,8 and 9 are greater than 2.5, therefore it is acceptable meaning hat Chemistry Education function as a key player in technology productivity of chemical industries but items 2 and 7 have the mean scores below 2.5, therefore it is agreed that without chemistry Education, productivity of chemical industries will not be high.

RESEARCH QUESTION TWO: What are the relationship between chemistry education and chemical industries?

TABLE 3: mean and standard deviation of the relationships between chemical education and chemical industries.

S/N	ITEMS	--- X	SD	REMARKS
10.	Negligence of chemistry education Hinders the growth of chemical Industries	3.09	1.0	Accepted
11.	There is no relationship between the Chemistry education and cosmetics Industries	1.94	1.0	Rejected
12.	Chemical industries cannot do Without chemistry education	3.02	0.9	Accepted
13.	Knowledge of chemistry qualifies An individual to work in Chemical industries	3.47	0.6	Accepted
14.	Learning of chemistry does not aids in acquisition of skills and chemical industries	1.70	0.8	Rejected
15.	Chemistry does not help in our daily lives	1.75	0.8	Accepted
16.	Inventors in chemistry education Were inventors in chemical industries	2.90	1.14	Accepted
	Grand Total	2.55		

From table 3, it can be observed that mean scores of the items 10,12,13, and 16 had mean greater than 2.5 therefore it is accepted that there is a significant relationship between chemistry education and chemical industries.

Items 11, 14, 15 had means below 2.5 therefore it is accepted that learning of chemistry aids in acquisition of skills used in chemical industries.

CONCLUSION

In the light of the findings obtained by testing each research questions, it is obvious that chemistry education plays a vital role in all aspect of technological practices with particular references to chemical industries. This study shows that the teaching and learning of chemistry is basic for the development of chemical industries. With sound industries in the country the economy will boost, the business will increase, and the environment in which they are processed will employ people in production. Teaching and learning is enormous in the development of chemical industries, that is chemical industries employ the knowledge of chemistry in their work for their development.

Chemistry education not withstanding helps in national development because chemistry helps in our daily lives. Without chemistry there is no chemical industry. Without chemical industry there is no productivity and without productivity there is no development. Hence, any government conscious of its responsibility should keep teachers and students at a reasonable motivational level towards learning of chemistry as this will encourage chemistry education which its role in chemical industries cannot be over estimated.

RECOMMENDATIONS

Seminars and workshops should be conducted for teachers to emphasize the role of chemistry education in chemical industries.

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