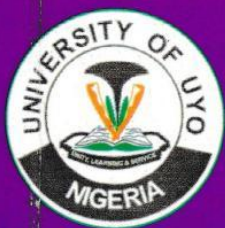


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UNDERGRADUATES' PERCEPTION OF CHEMISTRY EDUCATION AS A TOOL FOR NATIONAL DEVELOPMENT

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Abstract

The scientific and technological revolution witnessed in the world today anchors on science courses of which Chemistry education is in the center stage. The study examined undergraduate students' perception of Chemistry education as a tool for national development. A survey research design was adopted for the study. The population of the study comprised of all the 400 level undergraduates' students in 2019/2020 session in the Department of Science Education, Faculty of Education, University of Uyo, Akwa Ibom State. The sample size was 25 respondents consisting of 15 males and 10 females purposively used because of the low enrolment. Two research questions were raised to guide the study and one null hypothesis was tested at 0.05 level of significance. One research instrument titled "Undergraduates' perception of Chemistry Education as a tool for Development Questionnaire (UPCETDQ) was used for data collection. The instrument was validated by three experts from Educational Foundation, Measurement and Evaluation and Science Education Departments, University of Uyo Akwa Ibom State. The reliability of the instrument was calculated using Cronbach Alpha statistic and the reliability coefficient of 0.88 was obtained, which was deemed adequate for use. Mean and Standard Deviation was used to answer the research questions while independent t-test statistic was used to test the null hypothesis at 0.05 level of significance. Findings showed that undergraduate Chemistry students agreed to all the 20 items as a tool for national development. It was also revealed that male undergraduate Chemistry students have a higher perception about Chemistry education as a tool for national development than the female counterpart. Based on the findings, it is therefore recommended among others that Chemistry education should be taught in such a way that students understand its relevance and use the knowledge and skills to improve their economic life and the socioeconomic status of the country.

Keywords: Perception, Chemistry Education, Tool, National Development

Introduction

Science education is critical in providing experiences through which students develop necessary scientific knowledge, skills and attitudes to become total person and contribute to the development of the nation. The need to systematically create positive perception about Chemistry as a tool for development is more important now than ever. Chemistry is one of

the science subjects that encompasses valuable utility and practical activities. Chemistry education is a comprehensive term that refers to the teaching and learning of Chemistry at colleges, polytechnics and universities levels. It is a course that can significantly develop students' abilities in terms of reasoning, problem solving, creative ability and positive attitude necessary for self-reliant and national development. Tarive (2013) defined Chemistry education as a systematic investigation of nature with a view to understanding and harnessing both human and materials resources to serve human needs. The fundamental principles of Chemistry is to enable students to investigate, explain and predict new phenomena in order to critically analyse regional, national and international issues.

According to Paul (2005), Chemistry education help to create self-employment opportunities for the youths to take up business ventures in any environment thereby reducing rural and urban drift. It is very clear that meaningful scientific and technological development can only take place when students perceive a course as being relevant and useful for the immediate and future life development. Chemistry education therefore, seeks to provide students at different levels of education with appropriate knowledge, skills, attitude and competencies that would ensure success in place of work as well as managing the emerging societal challenges. The National Policy on Education (FRN, 2013) emphasized that every individual should be self-reliant and contribute to national development amongst other objectives. Hence, Chemistry education plays an important role in the socio-economic development of the country by producing manpower for the various industries including pharmaceuticals and petrochemicals.

By all standard, a graduate of Chemistry education should acquire hard skills like logical reasoning, conceptual, and manipulative skills as well as soft skills like opportunity seizing, entrepreneurial, creative thinking and idea to product skills that can make them self-employed. Small scale production of dyes, chalk, cosmetics, soaps, detergent, perfumes and polymeric materials are peculiar ventures that knowledge of Chemistry can be applied. Unfortunately, this is not so as university graduates in general and Chemistry graduates in particular are becoming societal nuisance and political thugs roaming the street after graduation seeking for white collar jobs. Chemistry education can promote critical thinking and creativity to the point of applying the knowledge in novel situations for self-reliance and national development.

Perception is recognition, identification and interpretation of sensory information in order to represent and understand the presented information or the environment. According to Schacter (2011), perception is the ability to see, hear, understand or become aware of the environment and organized, interpret and consciously participate in scientific activities. The ability to interpret and apply the knowledge, skills and values learnt from Chemistry education in solving day to day problems could lead to sustainable development of individual and the society at large. Students' perception of Chemistry education as a tool for development implies students becoming increasingly aware of the utility and application of knowledge, skills and values of Chemistry education to creating jobs, analyzing situations and solving day to day problems like insecurity, food scarcity, health related problems as well as participating in scientific and technological discussions among others.

Chemistry education can lead to national development. Development is the process of economic and social transformation that is based on complex cultural, environmental and scientific factors. Development is essential and critical to growth and sustenance human existence in any country. Gboyega (2003), defined development as an idea that embodies all attempts to improve the conditions of human existence in all ramifications. It involves improvement in materials and wellbeing of all citizens, in a sustainable way. National development according to Mohammed and Bello (2013), is growing or becoming industrialized towards improving the way of life of individual citizens. This can be achieved through meaningful Chemistry education that would enhance scientific attitudes, cognitive, psychomotor domains for higher order thinking skills. For instance, Chemistry education through appropriate enquiry based teaching and learning equip students with knowledge and skills and competencies as tools for solving societal problems.

The students think formally, logically and in abstraction. Unfortunately, most students are not able to apply knowledge and skills acquired in the classroom to other situations because of inability of realizing the utility value of the knowledge and skills gained from studying such subjects. According to Onwioduokit (2015), any knowledge of science that cannot be applied towards development of the society is not considered meaningful. National development in this study refers to development of social, economic and technological status of the country through application of the knowledge, skills and attitude acquired from Chemistry education. Chemistry education helps in equipping students with the relevant knowledge and competencies to manage emerging challenges in the contemporary society. It also promotes application of scientific principles, particularly those of Chemistry to solve societal issues, help to train Chemistry teachers, enable students to be aware of career choices, provide broad foundation in Chemistry that stresses scientific reasoning and analytical problem solving with relevant scientific and generic skills required by graduates to succeed in life (Udofia and Ekong, 2017).

Chemistry education is the systematic process of acquiring knowledge, attitude and skills through which man can use to shape and reshape the world. It is a needed tool scientifically for human, capital and national development. The healthy life many people are enjoying today is due to the variety of pharmaceutical products, agricultural products and food additives that are available as a result of advanced chemical researches in chemistry. Chemistry education according to Udofia (2017) promotes individual empowerment, economic emancipation, cultural preservation and social mobility. Production of different types of fertilizers and insecticides have been possible by chemical industries and these help to increase food production as well as preservation and storage of food for longer period. Many food substances today are enriched by chemical additives which are products from knowledge of Chemistry.

Adesoji and Olatubosun (2008) asserted that Chemistry is a veritable tool for national development and it bridges the gap among other science subjects. Owuamanam and Babatunde (2007) in a study on gender role stereotypes and career choice of secondary school students observed that boys showed interest on brain tasking careers while girls were more interested on courses that do not require much brain work. A study by Udofia and Ekong (2017) on Chemistry education and enhancement of Agricultural production implications for food security noted that the success of Nigeria in this 21st century depends on the perception

of the youth towards Chemistry education. This invariably makes Chemistry education a tool that could be used to promote ideas and entrepreneurial skills of its population to make informed choices in an increasingly technological world, boost employment and reduce rural and urban drift. Unfortunately, undergraduate Chemistry students seem not to have positive perception about using Chemistry education to address the technological, economic and social challenges of the nation. The paper therefore investigated the perception of Chemistry undergraduate students towards Chemistry education as a tool for national development.

The Problem

The slow rate of national development especially in a developing country like Nigeria despite the abundant natural resources is a source of concern to every right thinking citizen of the country. This is clearly demonstrated by the high rate of unemployment and youth restiveness experienced in the country. Studies have shown that many students still consider Chemistry as a difficult, abstract and of no relevance for the future development. This could be rightly linked to students' poor perception towards Chemistry education as a tool for self-reliance, socio-economic and technological development. In actual fact, the study of Chemistry is to provide knowledge, skills and attitude for economic, scientific and technological development. Hence, this study examined the perception of Chemistry undergraduates in the Department of Science Education, University of Uyo towards Chemistry education as a tool for national development in Nigeria.

Purpose of the Study

The purpose of the study is to determine students' perception of chemistry education as a tool for National Development in Nigeria. Specifically the study sought to:

1. determine the undergraduates' perception towards Chemistry education as a tool for national development.

Research Questions

1. What is the perception of Chemistry undergraduates towards Chemistry education as a tool for national development?
2. What is the perception of male and female Chemistry undergraduate students towards chemistry education as a tool for national development?

Null Hypothesis

1. There is no significant difference in the perception of male and female Chemistry undergraduates towards Chemistry education as a tool for national development?

Methodology

Survey research design was adopted for the study. The population of the study comprised all 400 level Chemistry undergraduates' students in the Department of Science Education, Faculty of Education, University of Uyo, Akwa Ibom State. The sample size consisted of 25 respondents consisting of 15 males and 10 females purposively used because of low enrolment. One research instrument titled "Undergraduates' perception of Chemistry Education as a tool Development Questionnaire (UPCETDQ) was used for data collection.

The instrument consisted of two sections A and B. Section A sought information for students' demographic factors while section B consisted of 25 items structured on a 4-point Likert Scale of strongly agree (SA) = 4, agree (A) = 3, disagree (D) = 2 and strongly disagree (SD) = 1. The instrument was validated by three experts from Educational Foundation, Measurement and Evaluation and Science Education Departments, University of Uyo Akwa Ibom State. The reliability of the instrument was calculated using Cronbach Alpha statistic and the reliability coefficient of 0.88 was obtained which was deemed adequate for use. Mean and Standard Deviation was used to answer the research question while independent t-test statistic was used to test the null hypothesis at 0.05 level of significance. The means were interpreted using cut-off points of 2.50 and above as agree, while below 2.50 was disagree.

Results

Research Question 1: What is the perception of Chemistry undergraduates towards Chemistry education as a tool for national development?

Table 1: Means and Standard deviations of undergraduates students' perception towards Chemistry Education as a tool for national development

S/N	ITEMS	MEAN	SD	RMKS
1.	Chemistry education provides varying career choices for self-reliance.	4.00	.00	Agree
2.	Chemistry education equips graduates with hard and soft skills for self-reliance.	3.39	.29	Agree
3.	Provides quality job opportunities in both private and public sectors.	3.52	.30	Agree
4.	Chemistry education helps to reduce unemployment	3.56	.50	Agree
5.	Knowledge of chemistry education can help students to establish cottage industries.	4.00	.00	Agree
6.	Chemistry education can help graduates to become entrepreneurs.	3.69	.26	Agree
7.	Chemistry education helps in adoption of new technologies	3.26	.28	Agree
8.	Chemistry education helps in the production of domestic chemicals like insecticides and perfumes	3.04	.23	Agree
9.	Chemistry education has the potential of transforming the economy of the nation positively.	3.39	.29	Agree
10.	Chemistry education is a foundation of all industries.	3.17	.30	Agree
11.	Chemistry education is a course that promotes creativity.	3.65	.28	Agree
12.	Knowledge of chemistry education qualifies an individual to work in any industry	3.52	.30	Agree
13.	Without the knowledge of chemistry, industries will lack manpower.	3.30	.36	Agree

14.	Chemistry education helps in enhancing scientific breakthrough for creation of wealth	3.65	.34	Agree
15.	Chemistry education help to build a strong manpower in the country.	3.17	.30	Agree
16.	Graduates of Chemistry education are knowledgeable to take up any work and excel in it.	3.39	.29	Agree
17.	Chemistry education enable graduates to acquire skills to become entrepreneurs	2.91	.22	Agree
18.	Provide solutions to societal challenges like poverty.	3.04	.26	Agree
19.	Chemistry education helps in the utilization of material from the immediate environment for the development of small scale industries.	3.08	.36	Agree
20.	Chemistry education helps to reduce over dependence on government for employment.	3.52	.30	Agree

The result presented in Table 1 shows the mean responses of undergraduate Chemistry students' perception towards Chemistry education as a tool for national development. The result shows that the respondents agreed to all the 20 items with items 1 and 4 having the highest mean values of 4.00 and 4.00 with the standard deviation of (.00 and .00) respectively meaning that the students had the same response for the two items. In general the standard deviation were close indicating that the students did not differ much in their opinion. All the items have the mean values above the cutoff point of 2.50. This indicates that Chemistry education is a veritable tool for national development.

Research Question 2: What is the perception of male and female undergraduate Chemistry students towards Chemistry education as a tool for national development?

Table 2: Mean and Standard deviation of male and female undergraduate Chemistry students' perception of Chemistry education as a tool for national development

Variable	N	Mean	SD
Male	15	36.40	11.50
Female	10	35.78	12.00

The result presented in Table 2 shows the mean and standard deviation of undergraduate Chemistry students' perception of Chemistry education as a tool for national development. The finding indicates that the mean scores of male students is 36.40 while the mean scores of female students is 35.78. It therefore means that male undergraduate Chemistry students have a higher perception about Chemistry education as a tool for national development than the female counterpart.

Null Hypothesis: There is no significant difference between male and female undergraduate Chemistry students' perception towards Chemistry education as a tool for national development.

Table 3: Independent t-test summary of undergraduate Chemistry students' perception towards Chemistry education as a tool for national development

Variable	N	Mean	SD	df	t-cal	t-crit	Remarks
Male	15	36.40	11.50	23	4.40	2.03	*
Female	10	35.78	12.00				

*N=25, * = Significant at 0.05 alpha level*

The result presented in Table 3 shows that the calculated t-value of 4.40 is greater than the critical value of 2.03 at 0.05 alpha level of significance. Therefore, the null hypothesis which stated that there is no significant difference in the perception of male and female undergraduate Chemistry students towards Chemistry education as a tool for national development is rejected. It therefore means that there is significant differences between male and female undergraduate students' perception of Chemistry education as a tool for national development.

Discussion of Findings

The descriptive statistics in Table 1 shows that undergraduate Chemistry students agreed to all the 20 items as a tool for national development. The result such as Chemistry education provides varying career choices for self-reliance and helps to reduce unemployment were unanimously agreed upon as a tool for national development. The finding agrees with the statement of Paul (2005) who asserted that Chemistry education helps to create self-employment opportunities as well as enabling youths to take up business in any environment. The finding is in line with Udofia (2017) who maintained that Chemistry education promotes individual empowerment, economic emancipation, cultural preservation and social mobility.

The finding in Table 2 shows that male undergraduate Chemistry students have a higher perception about Chemistry education as a tool for national development than the female counterpart. This could be attributed to the interest showed by male students over the female counterpart. The finding is in agreement with the finding by Owuamanam and Babatunde (2007) who observed that boys showed interest on subjects like Chemistry that is brain tasking while girls were more interested on courses that do not require much brain work.

Furthermore, the finding in Table 3 shows that the calculated t-test value of 4.40 is greater than the critical value of 2.06 at 0.05 level of significant. This implies that there exists a significant difference between the male and female undergraduate students perception of Chemistry education as a tool for national development. Male students have the mean score

of 36.70 while the female students have the mean score of 35.72 on the perception of Chemistry education as a tool for national development. This finding agrees with the findings of Adesoji and Olatubosun (2008) who reported that Chemistry is a veritable tool for national development and it bridges the gap among other science subjects. The finding is in line with the view of Udofia and Ekong (2017) who found out that know Chemistry education enhance agricultural production and concluded that the success of Nigeria in this 21st century depends on the perception of the youth towards Chemistry education. The implication of these findings is that Chemistry education is an effective tool for national development, therefore undergraduate Chemistry students irrespective of gender should utilize the knowledge and skills to bring about the desired development.

Conclusion

Based on the findings of the study, it was concluded that chemistry education is a veritable tool and can contribute immensely to national development. The unique knowledge, skills and attitudes acquired from studying Chemistry would help in providing the necessary manpower for chemical and other related industries such as food, paper, iron and steel, petroleum, metals and electronic equipment among others. This means that undergraduates of Chemistry education students should apply the knowledge and skills to become self-reliant as well as providing solutions to the immediate and remote societal problems like food scarcity, pollution, health, poverty reduction among others.

Recommendations

It was therefore recommended that:

1. Chemistry education should be taught with emphasis on the application of knowledge and skills for national development.
2. Chemistry education should be taught in such a way that its relevance is known and understood as a tool for self-reliance to bring about the desired development the society.

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