



Toward Achieving Global Excellence in Science and Technology Education Among Secondary School Students in Niger State

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ABSTRACT

Science and technology has become a critical factor for economic emancipation and survival of any national. The wealth of any nation is measured by the level of it scientific and technological advancement. This paper examines the factors impeding the attainment of excellence in science and technology. To guide this study, four research questions were formulated. The study used a survey research design. A target population of 500 science teachers and 1000 students in 30 secondary schools in Minna Metropolis from which sample size of 24 teachers and 20 students were randomly selected for the study. A structured questionnaire with a four-points Likert scale was used for data collection. The questionnaire was validated by two senior lecturers and its reliability determined. Mean and standard deviation were used to analyze the data. The findings revealed that inadequate funding and supports, motivation, teaching methods, among others are responsible for dismay performance. The study recommends increase funding and in- house training for science teachers at all levels.

Keywords: Impediment, Global Excellence, Science and Technology

INTRODUCTION

Education has always been the keystone of socio-economic progress and socio-cultural development of all nations across the globe, as it produces the personnel that are required to function in various fields of national lives (Olorundare, 2011). Specifically, science education has assumed importance and relevance both as driver and vehicle for development towards a better life. Some educators believe that education is the most powerful weapon which can be used to change the worth of an individual or society. This is in line with the popular saying that "teach the ignorant as much as you can" society is culpable in not providing a free education for all, and it must answer for the night which it produces. If the soul is left in darkness, sins will be committed. The guilty one is not who commits the sin, but he who causes the darkness. This statement is self-explicit and therefore requires no further interpretation or clarification with regards to the relevance of education to man.

Abdullahi (2013) stated that the purpose of education particularly science and technology is to develop character, skills and values, that is, teaching people how to live and solve life's

problems and impact positively on the lives of others. Science tries to explain things or phenomena that occur on the earth surface, while technology enables mankind to improve his standard of living. Research findings across African continent have revealed a devastating performance in science and technology education especially at the primary and secondary school levels (Gana 2009 & John, 2014). This is evident in both internal and external examinations conducted by various bodies across the continent. Many factors have been identified as responsible for the underachievement in science particularly at the elementary level. These include the abstract nature of the subject, teaching methods adopted by science teachers, absence of well equipped laboratories, inadequate funding and support for science based initiatives, unfavourable government policies and negative students' attitude to the teaching and learning of the

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science among others (Lawal 2009; Aiken, 2009 & Segun 2012).

These factors constitute impediments to global excellence in science and technology and have hindered economic growth in all ramifications. Science and technology education in Nigeria has not yet been channeled successfully to the needs and interests of Nigerians as contained in the national policy document. The rating by United State non-governmental organization, US-eduwatch in 2012, revealed that strategic improvement/advancement in sciences among Nigerians is below average when compared to initiatives and innovations in countries like Russia, Japan, Iran, China, India, South Korea, Canada among others. The performance evaluation of students in sciences at secondary school level revealed that in spite of the education policy framework/guidelines not much has been achieved. It is therefore our collective responsibility to further interrogate why we have not measured up to global competitive standard in spite of our huge financial commitment and lofty policy on science and technology.

Science teaching and learning for global excellence and innovation have continued to be a dream yet to be actualized owing to numerous factors. Stakeholders are complaining bitterly about the poor quality of Nigerian education system, particularly science and technology education despite the huge investment in it. This is not only an indictment of the management bodies or the custodians of Nigerian education but also the government, the school system, parents, and the society at large. The need to strengthen research and teaching of science at all levels remains a collective effort of all stakeholders. This study sought to examine factors that limit excellent performance in science and technology among secondary schools students in Niger State.

This study was therefore aimed at investigating the impediments towards achieving global excellence in science and technology among secondary school students.

METHODOLOGY

Research Design

The research design for the study was a survey design aimed at sensitizing science teachers and students on factors influencing effective

teaching of science and technology at secondary school level. The questionnaire was given to some experts in science education for validation. The reliability of the instrument was determined using split half spearman Browns prophecy formula. A reliability coefficient of 0.75 is obtained. This means that the items of the questionnaire are consistent and reflect the objective of the study.

Population

The target population for this study was all the secondary school students in Minna metropolis. There are about (146) senior secondary schools in Niger State with estimated population of 256,732 students.

Sample and Sampling technique

Simple purposive sampling method was used to select twenty four (24) teachers and 120 science students from 6 secondary schools within Minna Metropolis. The qualification of science teachers were NCE, B.Ed and B.sc(ed).

Instrumentation

The instrument used for the study was a questionnaire designed by the researchers to collate information from students and teachers on their ratings of the factors impeding excellent performance in science and technology education. The questionnaire consisted of two parts A & B: Part A was on Bio data of subjects while Part B was on selected factors for achieving global excellence and had twenty five items on the knowledge of subject matter teaching, qualification, student academic appraisal in science and technology, and impediments to Global excellent practice in science and technology. The questionnaire was designed using Likert four point scale with options below average, average, above average and excellent.

Strongly Agree (SA)	=	4
Agree (A)	=	3
Disagree (D)	=	2
Strongly Disagree	=	1

RESULTS AND DISCUSSION

The responses of the respondents were collated and analyze using mean and standard deviation and were used to answer the research questions.

R/Q 1: To what extent does teachers' qualification/working experience affects global excellence in science and technology?

Table 1: Rating of qualifications affecting science and technology excellence.

S/N	Items	Mean	SD
1.	Knowledge of subject matter by science teachers	3.40	0.67
2.	Teaching methods	2.49	1.22
3.	Use of varied illustrative materials and instructional aids by teachers	3.07	0.78
4.	High qualification and professionalization of science and technology teachers	2.69	1.83
5.	Character honesty and integrity of science teachers	2.47	1.00
6.	Salary and condition of services of science teacher	3.21	0.57
7.	Teacher's qualification and long service experience	3.91	1.05
8.	Training and support service for practical activities	3.76	0.60

Table 1 above indicate the mean and standard deviation values on factors affecting science and technology teaching as related to teachers' competency, qualification and experience. The high mean values of items 1,6,7 and 8 indicates good knowledge of subject matter, enhanced salary and long teaching experience with greater support for the development of practical skills will promote global excellence in science

education. On the other hand, low self esteem, poor motivation and confidence will lead to dismay performance thereby discouraging students' engagement.

R/Q 2: Does the use of instructional teaching materials promote science and technology education in Niger State?

Table 2: Analysis of science instructional teaching materials used in Niger State

S/N	Items	Mean (\bar{x})	SD
9.	Use of projector and optical lenses	2.25	0.45
10.	Adequate supply of chemicals reagents and demonstration kits	3.32	0.93
11.	Application of micro computers and tablets	2.50	1.21
12.	Charts, realia, pictures and other visual aids	3.75	1.76
13.	Use of computer assisted instruction supplement with lecture method	2.66	0.79
14.	Textbooks and other graphic materials	3.04	1.12
15.	Still motion pictures	3.42	0.88

Table 2 above revealed the mean values and standard deviation for items 9 to 15, on the use of instructional materials that promote effective learning of science and technology in secondary schools. Items 9, 12 and 15 with their respective mean and standard deviations as (2.25, 0.45), (3.75, 1.76) and (3.42, 0.88) respectively. These figures indicates that the use of teaching aids is essential in enhancing students comprehension

of scientific concepts. The finding of this study is in agreement with that of Jagaba (2009). The effect of science kits on the learning outcomes of junior secondary school students in Kano State.

R/Q 3. Are there variations in science and technology students' performance arising from gender difference

Table 3: Effect of gender difference in science and technology

S/N	Items	Mean (\bar{x})	Standard Deviation
16.	Female learn gender than males in solving mathematical equation	2.33	0.73
17.	Mastering of content and display of competencies in equipment installation and managed favoured male than female	3.40	1.23
18.	Females are better off in modeling and manipulative activities	2.16	0.89
19.	The male gender has more physical power for welding, metal work, wood work than females	2.46	0.67
20.	Females are more include to art and decorative work than their male counterpart	3.22	1.57

Table 3 above indicate that the male gender outperformed in equipment installation/operation than their females counterpart as indicated in the mean value of 3.40 and 1.23 for standard deviation. On the other hand, female outperform than their males in knitting, sewing and other decorative activities as indicated in the mean and standard deviation of 3.22 and 1.57 respectively. On a whole there is no significant difference in the

science and technology achievement of both male and female students in Niger state. This finding indicates that irrespective of gender, global excellence in science education can be achieved with teacher's resourcefulness, leadership and commitment to duties.

R/Q 4: What factors constitute constraint to global excellence in science and technology education?

Table 4: impediments to global excellence in science and technology

S/N	Items	Mean	Standard Deviation
21.	Inadequate exposure to global trends in research	2.99	1.48
22.	Erratic power supply and distribution system	3.06	0.89
23.	Government lip-service attitude towards the promotion of science and technology	2.911	2.15
24.	Absence of well – equipped laboratories and workshops	3.22	0.67
23.	Shortage of qualified science teachers and use of obsolete teaching methods	3.19	1.34

Table 4 above revealed the mean and standard deviation values of items 21 – 25 on impediments to global excellence in science and technology education in Niger state. The finding revealed a consensus on the factors such as inadequate training, absence of teaching facilities, poor motivation, inadequate funding and support among others as seen in their mean values as impediments to good performance.

Conclusion

The fact that good personal qualities of science teachers were rated high by both the students and teachers is a pointer to the need for closer attention to be paid to the emotional qualities so that better achievement might be seen in

students. Government intervention in all respect was rated low and accounted for the dismay performance in science and technology. Global excellence in science and technology can only be attained with concerted efforts and supports from all stakeholders in education.

Recommendations

Based on the finding of this study, it is hereby recommended that:

- i. The federal and state government should continue to improve the condition of services of science teachers and supply appropriate teaching/learning facilities for classroom instruction.

- ii. Teacher training institution should review their curricula for science teacher training by strengthening the areas of teaching methods, laboratory experiments, leadership qualities, skills development and application among other for enhanced performance.
- iii. Government should ensure that only professionally trained science teachers with outstanding personal qualities are recruited in teaching profession especially at the secondary school level.
- iv. Science teachers should be adequately motivated through enhanced salaries and allowances, sponsorship to workshops and seminars among others, so that their attitude to teaching and learning of science and technology will be broaden.

REFERENCES

- Abdullahi, A. (2013). *The Nature of Science Teaching in Nigeria*. Dickson Publishing Company. 44 – 86.
- Aiken, P. (2009). *Global Excellence in Science for Strategic Economic Planning*. Lead paper Presented at National Conference on Sustainable Education 22 – 38
- Audu, B. (2012). *Assessing the Impact of Science and Technology on Nigeria Economy*. *Journal of Business and Social Sciences*. 3(2), 38 – 43.
- Gana, E. (2009). *Science Education for Manpower Development* Schleppey Publishing Company.
- John, O. (2014). *The challenges of Science and Technology Education in Nigeria's Economic Goals of Vision 2010. Implications for Secondary School Science: Lead Paper Presented at the 36th Annual National Conference of Science and Humanities*.
- Lawal, E. (2007). *Science for Life: Implications for educators and researchers*. *Journal of Physical Sciences* 2(4), 11 – 28.
- Olorundare, (2011). *Science, Technology and Mathematics Education Issues, Trends and Challenges in Nigerian Secondary Schools*, *Journal of Science Education* 2(3), 14 – 89.
- Segun, O. (2012). *Research and Development for Enterprise Innovation and Growth in Nigeria*. *Journal of Physical Sciences and Business* 5(1), 54 – 58.