Gender Gap in Science and Technology Education in Nigeria

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Abstract
This paper examines the gender gap in science and technology education in Nigeria. Base on the available literature review, the finding of this article reveal that female student in most educational system in Nigeria are underrepresented particularly in the area of mathematic, physics, chemistry and technology i.e. electrical, mechanical, and civil engineering. These differences in gender enrolment are as a result of cultural belief, traditional, early marriage, parental educational background and religious belief. Chiefs, imams, community leaders, traditional rulers should encourage the female to study sciences and technology, Mass medias should encourage the public about the importance of science and technology particularly for female, Community should encourage and sponsor their member to study science and technology particularly girls, girls should be encourage to study medical course i.e. gynecology

Introduction

Nigeria is a country with multi ethnic groups that speak different language, practice different religions and have different culture and traditions. These differences had an important role to play in development of science and technology education in Nigeria. Before the coming of western education into Nigeria the only system of education which is in practice is the traditional system of education and Islamic education. (Hassan, 2011).

In Nigeria the educational imbalance between the male and female in science and technology education is very wide due to cultural barriers, religions difference, early marriage etc. western types of education come to Nigeria in around 1840s in areas near the cost like Lagos state and it come to the northern Nigeria in 1906 these shows that based on the time of its spread it shows great imbalance between northern and southern Nigeria. (Chima, 2013).

Defining science and technology?

Science is deriving from Latin word scientia which means knowledge. Science is a systematic and logical approach to discover how things in the universe work by the process of observation and experimentation. The scientific processes are observation, questioning, formulating hypothesis, testing hypothesis (experimentation), analyzing the data and draw a conclusion. (Robert and Zimmermann, 2012).

Ramey (2013) define technology as an application of science to solve a practical problem. In a nutshell technology means systematic application of science practically.
Furthermore, National Policy on Education (2014) stated that science education shall emphasize the teaching and learning of science process and principles, this will lead to

fundamental research in sciences at all levels of education and technical and vocational education is used in comprehensive term to means technology education.

NERDC (2011) stated that the science courses in Nigerian secondary schools are biology, chemistry, physic, general mathematics, further mathematics, agriculture, physical education, and health education while technology courses are technical drawing, general metal works, basic electricity, electronics, auto mechanics, building construction, wood work, home management, food and nutrition, clothing and textile.

Historical Development of Science and Technology Education in Nigeria

Teaching of science and technology in Nigeria is dated back to the era of Christian missionaries who brought the western education in to the country and some rudiment of science education were injected into the school curriculum including arithmetic, algebra, geometry and physiology. The curriculum is mainly 4rs namely reading, writing, arithmetic and religion. The hope Weddell institute in Calabar 1861, st. Andrews collage in Oyo 1876, Wesleyan training institute in 1905, Baptist training center Ogbomosho 1899 e.t.c had science subject in their curriculum. Up to the year 1932, there was no post-secondary institute for learning of science and technology and the major development in science and technology takes place after 1932 like the establishment of Yaba collage which upgraded in 1963 to run courses in science and technology like engineering, medicine, agriculture, survey and teacher training. It also produces first set of graduate who taught sciences and technology in secondary schools and laid the foundation of science and technology in secondary schools in Nigeria. (Chima 2013)

The establishment of university college Ibadan in 1948 as college university in affiliation to collage university London and it start awarding degree in 1962 as university of Ibadan, Ahmad Bello university Zaria 1962 university of Nigeria Nsukka, federal collage of art science and technology Ibadan1952, Zaria 1952, Enugu 1954. The establishment of higher schools certificate (HSC) in 1951 it gave the schools the opportunities to offer chemistry, biology and physics at higher level (Chima, 2013).

Gender Gap in Science and Technology Education in Nigeria

UNESCO (2014) defined gender gap as a degree of imbalance between male and female in access and participation in sciences and technology courses or the differences between gross enrolment of male and gross enrolment of female in science and technology courses. UNICEF (2008) found that forty per cent of Nigerian children aged 6-11 do not attend any primary school in the northern region of the country and it recording lowest school attendance rate particularly for girls. In the northern Nigeria the gender gap remain particularly wide and the proportion of girls to boys in school ranges from one girl's three boys or 1:3 in some state. Jeanne (2011) as in UNESCO institute for statistics (UIS) has estimated that of the world total science researchers, only 27 per cent are women.

Table 1: Admission of Students in selected pure science and computer courses at the University of Mkar, Mkar Gboko, Benue State, Nigeria 2009/2010 session.

S/No	Department %	M	F	GAP
1.	Chemical Sciences	100	0	100
2.	Physical Sciences	100	0	100
3.	Math/Computer Sc.	91.3	8.7	82.6
4.	Microbiology	53.3	46.7	6.6

Source: Academic Office University of Mkar, as in Olorunda and Ngunan (2011).

Table 1 reveals that no female student applied for courses in Chemical and Physical Sciences. All the students admitted for those courses were males. Only 8.7% female students were

admitted to read computer science while negligible gender gap of 6.6% in microbiology enrollment.

Table 2. Number of candidates by sex application/admission into vocational and technical courses in Nigeria Universities/Colleges of Education for the 2003/2004 session in Mid-west zone (Edo, Delta and Ondo State).

	Application		Admission	
S/No. Course	**Male**	**Female**	**Male**	**Female**
1. Agric. Science	11,582	3,139	3,154	738
2. Engineering/Tech,	22,780	2,409	6,801	770
3. Med. Science	44,277	13,493	3,593	930
4. Science	21,501	6,606	9,090	1,350
Total	105,142	25,647	22,638	3,788

Source: Field work (Egun, 2007). As in Egun and Tibi (2010)

From the above table it shows that female participation in sciences is very low compared with their male counterpart, the number of males admitted student is triple the number of female student.

Table 3: Student enrolments by discipline and gender at the University of Ibadan, Nigeria 2004- 2005

Faculty	**Female**	**Percentages**	**Male**	**Percentages**	**Total**
Arts	656	51.7	614	48.3	1,270
Social Sciences	477	36.6	828	63.4	1,305
Law	208	38.7	329	61.3	557
Science	248	36.3	1138	63.7	1,786
Technology	120	11.5	923	88.5	1,043
Agriculture and Forestry	473	42.6	637	57.4	1,110
Basic Medical Sciences	129	40.8	187	59.2	316
Clinical Sciences	464	41.5	655	58.5	1,119
Dentistry	59	44.0	75	56.0	134
Pharmacy	120	56.6	92	43.4	212
Vet Medicine	210	38.7	332	61.3	542
Education	682	50.8	658	49.1	1,340
Public Health	67	55.4	54	44.6	121
Total	4,313	39.8	6,522	60.2	10,835

Source: Odejide, Feminist Africa: 2007:46 as in Ibrahim and akudolu (2010)

Table 3: illustrates trends in the limited access of female students to professional degree courses in Nigeria. From this example, percentage female admission is highest in Pharmacy (56.6 per cent) and lowest in Science (36.3 per cent) and Technology (11.5 per cent).
In Nigeria, for example, in the 1999-2000 sessions, there were zero enrollments for females in technical courses such as mechanical engineering, plumbing, fabrication and welding (Federal Ministry of Education, Nigeria, 2005). Similarly, in Nigeria, in 1999-2000, female students constituted only 27 per cent of science and technology programs in the universities. Ibrahim and Akudolu (2010)

Table 4: Student admitted in to the science and technology courses at KUST Wudil 2014/2015 session

Courses	Male	%	Female	%	Gap
Math	131	98	2	2	96
Statistic	122	96	5	4	92
Civil eng	105	99	1	1	98
Elect eng.	109	100	00	00	100
mech eng.	110	100	00	00	100
Geography	75	88	0	12	76
Biochem	54	79	14	21	58
Biology	82	71	32	29	42
Chemistry	67	84	12	16	68
Physics	112	99	1	1	98

Source: www. Kustwudil.edu.ng. 2014/2015 admission

From the above table we can see that there is a wide gap between male and female in science and technology, female participate in biological sciences most then any other courses in sciences and technology and the female participation technology is below zero per cent.

Table 5: Msc (ed) Student enrolment in the department of science and technology education BUK 2014/2015 academic session.

Courses	**Male %**	**Female %**	**Gap**
Chemistry	4 (50)	4 (50)	0
Biology	12 (60)	8 (40)	20
Physics	6 (99)	1 (1)	98
Math	5 (62.5)	3(37.5)	25
Geography	5 (99)	1 (1)	98

Source: BUK 2014/2015 admission www.bukportal.edu.ng.

The table above showed that female participate most in biological sciences even at masters level.

Table 6: gender gap in science education courses at SLU Kafin Hausa 2018/2019 academic session

Course	Male	%	Female	%	Gap	Total (%)
Bsc (ed) Biology	48	54	41	46	7	89 (100)
Bsc (ed) Chemistry	48	75	16	25	32	64 (100)
Bsc (ed) Physics	19	76	06	24	13	25 (100)
Bsc (ed) Mathematic	06	100	00	00	06	6 (100)

Source: www.slu.edu.ng

The finding of the study in table 6, revealed that 48 (54%) of admitted biology education students are male, 41(46%) are female and the gender gap is 7. While 48 (75%) of admitted chemistry education are male, 16(25%) are female and the gender gap is 32. However, 19 (76%) of admitted physic education are male while only 6(24%) are female but in mathematics 6(100%) of admitted students are male and 0 (0%) the percentage of female.

Aremu and Michael (2014) found that male and female differ in perception not in the use of technology and there is no significance differences in acceptability and usability computer based learning package for electrical and electronic technology. This signifies that students male and female differ in the way they perceive technology courses, male perceive it not much difficult but female perceive it as very difficult, this is the reason why they are not participating in most of the science and technology courses.

The undergraduate enrolment in science technology and mathematic (STM) courses for all academic session recorded inadequate participation of female in STM, they Found that across the six geo political zones in Nigeria, the number of undergraduate that enrolled for mathematics education in the selected universities is still very low compared with the need of mathematics teachers in Nigerian schools (Yahaya, Adeware and Salman 2011).

Famolari (2014) gender gap for women in science and technology is well known today women hold less than 25 per cent of our country STEM jobs only 14 per cent want to become scientist. Furthermore, Lioyd (2014) found that mathematics and physics is seemed as irrelevant and are male courses. However, Hassan (2011) found that 82.7 per cent of the sample population agreed that it was not important for girls to study industrial and technical education courses and women were mostly enrolled in courses such as art, business, education, law and home economics.

Susan (2012) found that women have less access to resources such as technology and education needed to support active engagement in sciences and the female participation in biology, medical, and life sciences is very high above 50 per cent in some countries and in physics, computer sciences and engineering the participation of women is less than 30 per cent.

Huyer (2012) also found that even when women enroll in science and technology as many as 30% drop out due to lack of flexible work hours and child care. This means that even if women participated in science and technology most of them they do not complete their studies this also increase the gender gap in science and technology education in Nigeria

However, Lawal and Muhammed (2014) found that the socio-economic status of parent, parental occupation, cultural factors, socialization and early marriage, academic factor are the courses of gender gap in science and technology education. The study also found that there is no significance gender differences in chemistry performance among NCE graduate of Sadatu Rimi college of Education Kumbotso, Kano, indicate that male graduate performed better than female graduate in physics performance.

Furthermore, David (2010) found that the Participation of women in high prestige occupations, especially in the areas of technology and “hard” science, has been low in spite of the efforts made by many concerned countries and the under-representation of women has focused in the areas of mathematics, technology, physics and engineering. The study also shows that gender stereotype shows that men are perceived to be adventurous, strong, dominant, assertive, task-oriented, aggressive, enterprising and independent while women are seen as sensitive, gentle, dependent, emotional, sentimental, weak, submissive and people-oriented.

Causes of Gender Gap in Science and Technology Education in Nigeria

UNICEF (2005) found that many children do not attend schools in Nigeria because their labour is needed to either help at home or to bring additional income in to the family. Many parents cannot afford the costs of sending their children to school such as uniform and textbooks. For others, the distance to the nearest school is also a major hindrance, cultural bias; most of parents do not send their children especially girls to school and prefer to send them to Qur’an school rather than formal schools. Even when children enroll to school do not finish

primary cycle. The reason for this low completion rate include child labour, economic hardship and early marriage for girls. Davis (2008) in his study found that, the level of parented education, fear of science by girls and see science as difficult, lack of science self-confidence and interest are what courses gender gap in science education.

Moreover, Hassan (2011) survey the gender inequality in industrial and technical education in Nigeria; parents perspective in 21st century, the study found that traditional beliefs, parental educational background, culture, religion, early marriage, is what course gender gap in science and technology courses in Nigeria. Lawal and Muhammed (2014) they found that the socio-economic status of parent, parental occupation, cultural factors, socialization and early marriage, academic factor are the courses of gender gap in science and technology education.

How to Overcome Gender Gap in Science and Technology Education in Nigeria

Alarcon (2011) identifies the following as the ways of overcoming gender gap in science and technology education. In many developing countries including Nigeria, women science teachers become role models and play an essential role in attracting young women and girls in to science-inspiring them and giving them confidence and strength to do better and achieve more in life. Educating young women and girls in the science empowers them, giving them the tools and the confidence to confront the cultural attitudes and societal values that deter the full participation of women in society.

David (2014) stated that only when a country adopts a national program aimed to decrease the gap, when all girls, adolescent females, young women and older women have access to the program most suitable for them – only then will the prospects to bridge the gap increase. Without the talent, diligence, ambition and motivation of 50% of the population no education, cultural or financial system can flourish.

Conclusion

The gender gap in science and technology is the different between the growth enrolment of male and female in the accessibility and participation in science and technology education. Despite the importance of science and technology to the national development, female students are underrepresented in science and technology courses in Nigerian educational system from primary to the tertiary institutions. Gender gap started since from the initiating of western education in Nigeria around 1840s were it started in southern Nigeria for many years before it reaches northern Nigeria. Gender gap is as a result of different culture, tradition, early marriage, religions believes. A well clear gender gap can be seen in the areas of sciences like physics, mathematics, chemistry and technology courses like electrical, mechanical, mechanical and agricultural engineering.

Recommendation

1. Religious leaders, community leaders, traditional rulers should encourage the female to study sciences and technology
2. Mass medias should encourage the public about the importance of science and technology
3. Community should encourage and sponsor their member to study science and technology particularly girls
4. Girls should be encourage to study medical course i.e. gynecology
5. Government should encourage female to study sciences and technology by giving free education and scholarship.

6. Better funding for science and technology education is needed to train more and better science teachers especially women, this will encouraged other women and girls to study science and technology.
7. The traditional method of teaching like lecture method should be replaced with experimental method and practical or field trip method of teaching science, this will reduce the level of difficulty of the scientific concept and made science easy to learned by women and girls.

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