

Gender Equality and Female Undergraduates' Participation in Sciences in University of Calabar

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Abstract

This study focused on issues in promoting gender equality in order to enhance female undergraduates' participation in Science education in University of Calabar, Nigeria. The disparity in the science education of male and female youths is a national issue, particularly in developing countries like Nigeria. This study utilizes primary and secondary sources of data to highlight the participation of female gender in acquisition of knowledge and skills in science education. It also reviewed issues of females' limited participation in science in Nigeria and factors that affect girls' attainments and low enrolment in the sciences. Among the key factors identified as being responsible for the science gender gap are socio-cultural biases that manifested in science curricula, instruction and assessment. In promoting gender equality in science, gender equity training in teacher education, enhancing partnership with engaging girls early in science thus promoting female participation in science education were recommended.

Keywords: Gender equality, gender equity, science gender gap, policies, low enrolment pattern.

Introduction

Gender equality refers to equal treatment of women and men in laws and policies, and equal access to resources and services within families, communities and society at large. (World Health Organization {WHO}, 2009). Different roles and behaviours of female and male children, as well as adults, are shaped and reinforced by gender

norms within the society. These are social expectations that define appropriate behaviour for women and men. Differences in gender roles and behaviours often create inequalities, in which one gender becomes empowered to the disadvantage of the other. In many societies, women are viewed as subordinate to men and have a lower social status, thus allowing men to exercise control over them in terms of decision-making. On the other hand gender equity is expressed as fairness and justice in the distribution of benefits and responsibilities between women and men. Programmes and policies that specifically empower women are often needed to achieve this.

Gender inequalities have a large and wide-ranging impact on society. They can contribute to gender inequities in health and access to health care, levels of income, opportunities for employment and promotion, political participation and representation and even education (WHO, 2001).

The development of any nation requires the collective efforts of its citizens and all residents. More importantly, to achieve national development, both male and female members of the society need to be active participants. The world Conference on Education for All (EFA) held in Geneva in 1990 stressed the need for gender equity in education (Education for All Monitoring Report, 2013). The Beijing conference of 1995, the Millennium Development Goals (MDGS) of 2005 and the United Nations General Assembly Resolution 55/2 also emphasized gender equality. Similarly in Nigeria, the National Policy on Education acknowledges the need for equality in educational opportunities for girls and boys (National Policy on Education, 2004). More so, gender equity is a major issue in the ongoing reform programme embarked upon by the Federal Government of Nigeria and it is designed to address gender imbalance in education.

The gender composition of occupations in both the formal and informal sectors of a country is “important indicators of the economic opportunities open to women”. According to Salman, Olawoye and Yahaya (2011) the participating level of individuals in each sector could be determined by the enrolment of males and females in schools and their participation in certain school subjects and career.

Female participation in science receives attention in Nigeria's most recent Science, Innovation and Technology policy, but no specific objectives have been developed (Federal Ministry of Science and Technology, 2012). This on the other hand is due to a lack of awareness, in Nigeria, on the problem of the science gender gap and the importance of girls and women's participation in science. Future developments of societies are dependent on providing a high quality science education for all.

Achunine (2007) asserted that girl-child education is a powerful force of development, particularly in developing countries like Nigeria, where social welfare and economic advancement are constrained by population growth and a weakly developed human resource base, especially in the area of science and technology. Also, empowering women intellectually, socially and politically using education as an instrument is imperative for redressing gender imbalance and enhancing the participation of women in decision making, family life, community development and nation building (Adefunke, 2015). The authors agreed that this can be achieved through improved enrolment of female gender in schools in general and science education in particular.

Importance of Science in the Primary School Level

It is very important to cultivate interest in science among girls and to affirm from an early age that science belongs to them as much as to boys. Research on girls' and boys' engagement in the sciences reveals that disparity in participation and interest in science tend to widen as students transit to higher levels of education. In many African countries women transition to secondary school is in a lower number than boys and girls enrol in fewer science classes. Notably, those women who study science at the university level are less likely than men to concentrate on science especially in the physical sciences.

Science is a compulsory component of the primary school curriculum; thus girls' participation is not yet an issue. It is at this level that gender disparities in interest and academic performance begin to emerge in Nigeria and even in other countries. Few differences in children's engagement in science are documented at the earliest ages. Ekine and Abay, (2015) conducted a research on primary science teaching in Nigeria in 10 schools in Oyo state, Nigeria. They reported that disparities in interest in favour of boys begin to appear at the upper primary school level, and this was tied to academic performance.

Early science education particularly in primary school, is of immense importance. This is because acquisition of scientific skills that occurs in early childhood and primary school serves as the foundation for all future learning (Achunine, 2007). At this stage, children have the greatest opportunity to develop the cognitive and non-cognitive skills that can lead to greater achievement later in life. Similarly, research on brain development by Schiller and Smart (2012) showed that the thinking skills necessary for problem solving are best developed between the ages of four and twelve; this period coincides with primary school. The early years from birth to eight years are the period when the brain is most "plastic" (Schiller & Smart, 2002). Whitelegg (2001) also asserted that attitudes are highly malleable at this age but have a long – term impact on learning.

More children are now enrolled in primary school in Nigeria than ever before and all primary school pupils study Basic Science. Primary school therefore holds the potential to ensure that both girls and boys develop positive attitude towards science from the start, and develop a strong foundation for future learning. Therefore this means that gender equity must be promoted in science classrooms; and that practices, supporting girls' learning of science, must be employed. A gender equity approach, which goes beyond trying to treat girls and boys equally, recognizes the prevailing gender inequality in the field of science and in society. It advocates for a strategic focus on girls in order to promote their participation, achievement and interest in science.

Education Reforms in Nigeria

Education reform implies that the existing status-quo in education sector is unsatisfactory; therefore reform becomes necessary in order to improve or correct what is wrong, undesirable or unsatisfactory in the system. According to Encarta World English Dictionary (1999), reform is an "act that emphasizes change and improvement that will bring about development through the removal of inconsistencies and abuses, and adoption of modern methods and values". Adeniran (2009) defined education reforms as those practices and programmes that are designed to bring about positive changes and new development in one or more aspects of the educational system of a nation. Nigeria has been witnessing different forms of reforms in its education sector right from the outset of the colonial era (pre-independence), across the post-independence period and up-to-date. This is with a view to meeting both local and global challenges in the areas of science and technology.

The various educational reforms witnessed in Nigeria, among others include: the 1976 Universal Primary Education (UPE), the reform brought about by the National Curriculum Conference in 1969, which was the basis for the formulation of the National Policy on Education (NPE) by the Nigerian government in 1977. The National Policy on education was revised in 1981, 1996, 2004, 2007 and 2013 while the 6-3-3-4 system of education began in 1981. The six years of primary, three years of junior secondary, three years senior secondary and four years of university (6-3-3-4) education structure was re-aligned into 9-3-4 system to have the first 9 years of basic and compulsory education up to JSS III, 3 years in senior secondary and 4 years in tertiary institution. This structure emphasizes Universal Basic Education (UBE), which is one of the reforms programs of the Federal Government of Nigeria. The Universal Basic Education Act (2004) gave the meaning of Basic Education as early childhood care and education. The emerging issues from the MDGS such as value orientation, peace and dialogue, human right education, family

life, HIV and AIDS education etc were incorporated into the relevant contents of the 9-year Basic Education Science Curriculum. The programme was aimed at eradicating ignorance, diseases, malnutrition, unemployment, sectionalism, tribalism and political instability. Nigeria, being a member nation of the United Nations Organization, also lays emphasis on the training of girls and women as a means of achieving sustainable development and economic growth. Despite her commitment to the UN however, Olarewaju (2002) lamented that the girl-child education is still lagging behind than of boys. Agwagah and Aguele (2007) also observed gender imbalance in education as a major issue which deserves to be given needed emphasis in the ongoing education reforms in Nigeria.

Reasons for the Science Gender Gap

Some contributory factors have been identified for women's and girl's continued low rate of participation and underperformance in Science. Ekine, (2015) in her contribution towards the topic "Enhancing Girls Participation in Science and Technology" in Nigerian Television Authority (NTA) Programme "Good Morning Nigeria" of 7th October 2015 classified her argument under nature versus nurture debate. One of her arguments was that because girls' brains develop differently from boys, the biological differences could explain the gender gap in science. The developments in boys' brains could result in better developed visual spatial ability than that possessed by girls, and interest in mathematics and some science subjects. Others find the evidence inconclusive and dispute the argument that biological factors could cause gender differences in performance or interest in science.

Socio-cultural beliefs and practices

Formal and informal socio cultural norms and expectations about the role of females in society have a tremendous effect on girls' educational opportunities, learning outcomes, and decisions about study and work. At the basic level, obstacles to school access and retention remain fundamental barriers to girls' participation in science, both as children and adults (World Bank, 2013). Girls also face greater constraints on pursuing their studies due to household demands on their labour, threats to their physical safety, a lack of necessary sanitation facilities at school and societal beliefs about privileged investments in boys' education. Cultural biases that impede girls' learning and pursuit of science are significant. Gender biases and discrimination play out acutely with respect to science, particularly the physical sciences, engineering mathematics and to some extent computer science, which continue to be seen as the domain of males. Furthermore, education in general and science education in particular are often viewed as being of less value to girls, given the cultural expectations about their primary roles as wives and mothers, (Lewis & Lockheed, 2006). There is a prevalent view in Nigeria that women's and men's traditional roles in society should be preserved, and therefore girls should not

compete with boys in class. Such gendered stereotypes are often ingrained early in life and are difficult to overcome. The different forms of cultural bias and discrimination against girls in relation to their participation in science greatly exacerbate their lack of self-confidence, interest and lead them to drop out of science classes (Adeyegbe, 2000).

Classroom practices

A student's experience in the classroom, including interactions with the curriculum, teachers and peers, has a strong effect on her engagement and learning in a subject. In some science classes, the interest, motivation and achievement of boys is enhanced, while females experience is discouraged due to factors related to curriculum, instruction and assessment (Asuquo, 2003). Science textbooks in many countries have been noted for their male bias and frequent use of gender stereotypes. This bias is reflected in the narrative structure, images, examples and topics used in the texts and their related classroom activities (Elgar, 2004). A commonly noted bias is the portrayal of men as 'active' in the generation and application of science, while females are portrayed as passive and occupying subordinate positions. Contemporary and historical examples of contributions of women to modern science and local scientific knowledge are often excluded from textbooks used in African countries.

Teachers play an influential role in schools and act as a primary source of gendered messages received by student (Mungai, 2002). In many countries, teachers have a tendency to give boys more feedback than girls, call on boys more often, give them longer time to answer, and more frequently ask them higher order questions than they do to girls (Stromquist, 2008). Science is competitive and teacher centered manner, a fact that has tended to dampen girls interest in science education (Nnaka & Anaekwe, 2005).

Enrolment pattern of female participation in the study of courses in science

Gender is a contemporary issue in educational and psychological literature. This informed its inclusion in the new reform initiative, which specifically addressed the need to remove disparities that put the girl-child at a disadvantaged position (Adeyegbe, 2000). The improved awareness of the significant role of education has brought about some increase in school enrolment and literacy level among girls, particularly in developing countries such as Nigeria. Futhermore, Adeyegbe (2000) maintain that the disparity still remains an issue among males and females in the study of courses in science and career choice and workforce. There are reported cases of low enrolment of females in sciences and technology-related courses at the University level of education (Salman, 2001).

These authors therefore examined the enrolment pattern of full time students by faculty and gender for the period 2012/2013 to 2014/2015 in University of Calabar, Nigeria.

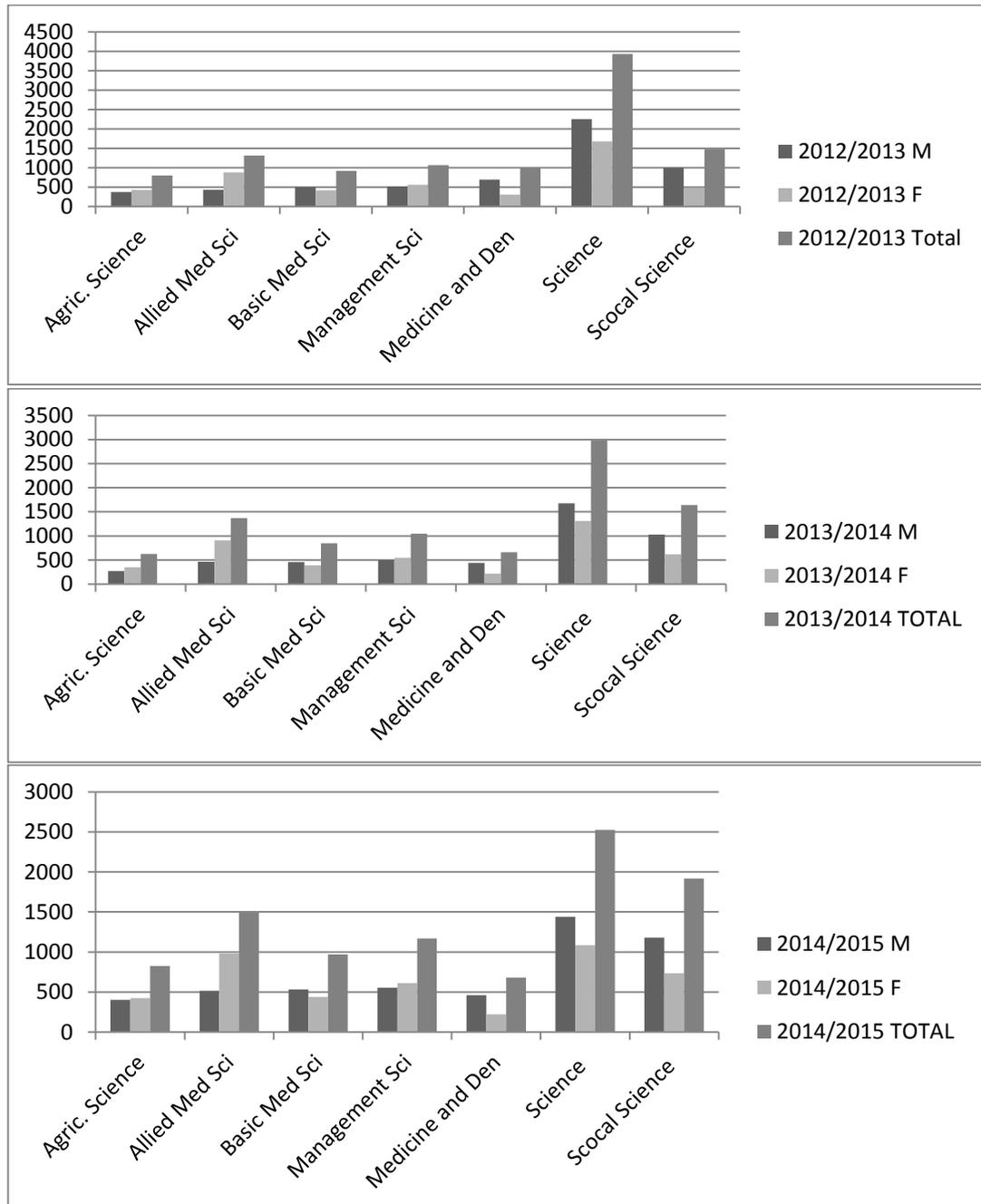
Table 1: Fulltime Undergraduate Students' Enrolment by Faculty and Gender for 2012/2013 – 2014/2015

Faculty	2012/2013			2013/2014			2014/2015		
	M	F	T	M	F	T	M	F	T
Agric, Forestry and Wildlife Resource management	370	422	792	273	352	625	402	423	825
Allied Medical Science*	430	879	1309	461	907*	1368	515	981*	1497
Arts	581	851	1432	483	785	1268	746	971	1717
Basic Medical Sciences*	499	418*	917	457	394*	851	531	438*	969
Education	1014	1349	2363	1044	1461	2505	1402	1986	3388
Law	341	247	588	356	245	601	356	257	613
Management Sciences*	509	556*	1065	501	548*	1049	566	612*	1178
Medicine and Dentistry*	688	301	989	441	219*	660	459	222*	681
Science*	2253	1679*	3932	1676	1313*	2989	1439	1086*	2525
Social Science*	998	478	1476	1026	617	1643	1180	736*	1916
Total	7683	7180	14863	6718	684	13559	7597	7712	15309

Source: Academic Planning unit, University of Calabar; September 2015

From the available data, females take the least resistance by opting for disciplines designated as feminine such as liberal arts, education, nursing, law and shy away from courses in Sciences, Medicine and Engineering as observed in Table 1. Also the asterisk (*) in the table indicated Science Programme in the University of Calabar and the number of undergraduate female students that enrolled in each Faculty. Gender parity in science enrolment is yet to show an appreciable increase over these years as shown in table 1.

Figure 1: Bar chart showing total student enrollment by faculty and gender – 2012/2013 to 2014/2015



The gender parity in science enrolment is yet to show appreciable increase over these years as presented in the bar chart. Majority of females who choose to pursue an undergraduate science degree pursue the life sciences. The data extracted from Table 1 point to the trend in which females have a greater preference for the biological sciences than males, who prefer the physical sciences or have a broader range of preferences including medicine, basic medical sciences, and social sciences.

Conclusion and Recommendations

Many pressing issues confront education in Nigeria. In view of the observations and research reports presented in this article, suggestions are made for the promotion of female undergraduates' participation in science education. This article examines the importance of science at the primary school level, education reforms in Nigeria as they affect the female Nigerian child, especially in terms of enrolment and participation in science education. Also the reasons for the science gender gap were highlighted and discussed. The recommendations presented focus on possible areas for advancing girl participation and learning in science in Nigeria with particular emphasis on tertiary Institution. The areas among others are considered relevant for the promotion of female undergraduates' participation and enrolment in the sciences. These are:

- **Incorporating Gender Equity into Teacher Education:** Given the influential role of teachers in students' learning, concerted action is needed in Nigeria to address gender inequities in teaching, to improve teachers' attitudes toward science in general and to encourage more women to go into science teaching.
- **Women helping Women in Nigerian Science:** Mentoring and role modelling are powerful; yet they are under-utilized in Nigeria. Many researchers agree that these types of interventions are important for supporting female participation in science from the early grades and throughout a woman's career in the sciences. Role modelling can be a powerful strategy in both mitigating the effects of gender stereotyping of occupations and increasing gender equality. Mentoring programmes between secondary and primary schools can lead to improvement in students' academic performance, attitude and self confidence; female scientists could serve as mentors for girls of university age, who could then serve as mentors for girls in secondary schools.
- **Enhancing partnership to promote girls participation in Science:** There is great potential for partnership with civil society organizations in support of girls' participation in science. The contribution of local organizations is vital in order to extend efforts beyond the school environment, and thus to involve parents and mobilize communities in challenging the prevalent cultural biases against girls. These efforts could include media campaigns (e.g. radio and television programmes) and cultural forums to raise awareness about the importance of female participation

in science. Also community based Science projects that highlight the relevance of science to local communities that link school children with community members who are knowledgeable about indigenous scientific practices including women can also enhance science education for girls and boys.

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