

EQUITY IN GENDER ENROLLMENT OF STUDENTS IN PRE-NCE SCIENCE PROGRAMMES IN NIGERIA: IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

By

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Abstract

The study investigated equity in gender enrollment of students in preliminary Nigerian Certificate in Education (Pre-NCE) science programmes and its implications for sustainable development. The descriptive survey design was adopted in the study. One Federal College of Education was selected out of 12 in the North East geo-political zone of Nigeria using purposive sampling technique. Students enrolled in five departments of Pre-NCE science programmes in the college used constituted the study sample and students' enrolment records for five years were analyzed. Two research questions and two hypotheses were used to guide the study. The research questions were answered with frequencies and percentages while the hypotheses were tested for significance with chi square statistic at 0.05 level. Findings of the study showed that for five consecutive years, the percentage enrolments of male students into Pre-NCE science programmes were between 73.30% and 76.70%, whereas, for female students, the percentage enrolments were between 23.30% and 24.90%. Furthermore, more male students (97.44%) enrolled into physical sciences department than female students (22.56%). Based on the findings of the study, it was recommended that considerable attention should be directed at the participation of females in science-oriented courses at the basic and secondary school levels of education in order to strengthen their access to the study of science-oriented courses at the tertiary level of education. The implications of the findings of the study for sustainable development were finally discussed.

Introduction

In most countries of the world, there is a disadvantaged position of women in science, science-oriented courses and careers. This has culminated in what is referred to today as gender gap or gender inequality in science education and in the job market. The issue of gender equity in science education has been an issue of great concern, contention and discussion for more than two decades (Olagunju & Akanbi, 2009). There is a growing realization that women who make up more than half of the world's population are underrepresented in scientific and technological disciplines. This may have necessitated the call by the participants of the 4th World Conference on Women in Beijing in 1995 for increase in the participation of women in industry and all other sectors in non-traditional areas to advanced industry (Chibuogu & Ezekannagha, 2009).

Gender equity as presented by Okoli (2012) in Sadkar and Sakar (1982) is a system where both males and females enjoy the same opportunities for realizing their human rights to contribute to all spheres of national development. Gender equity in science enrollment, therefore, can be seen as providing equal opportunities to male and female students to enroll into science disciplines in the nation's schools. Science educators and researchers have advanced some factors which to them are responsible for low enrollment and under achievement of females in science and its related courses. These include preference of early marriage to education, abstract nature of science concepts (Ozoji, 2010) and socio-cultural factors (Okeke, 2001).

Science as a field of knowledge plays a key role in the sustainable development of any nation. No wonder some nations of the world specified as one of the Millennium Development Goals (MDGs), attainment of gender equity come 2015, as well as, one of the goals of Education For All (EFA). Today's society is increasingly being science and technologically driven for countries to attain sustainable development and improved quality of life for their citizens. For Nigeria to drive her economy towards attaining sustainable development, there should be concerted efforts towards the promotion of science technology and mathematics education at all levels of education. It is in this regard that Ajale and Agwagha (2007) opine that if any nation must develop, the study of science, technology and mathematics should be given adequate attention at all levels of education. It is in this regard that, the Nigerian Policy on Education has one of its objectives as the provision of equal access to educational opportunities for all citizens in the country at all levels of education.

Okeke (2001) posits that both females and males should be exposed to sufficient knowledge of science and science-related courses in order to contribute meaningfully to any debate on them. Okeke further opines that giving such exposure to the citizens should enable them make best decisions for the comfort and survival of all, since women feel the impact of irresponsible applications of science differently from men. Hoffman-Barthes, Nari and Halpade (1997) also argue that there are compelling reasons for females to enroll and participate in science education. Such reasons include the changing nature of the job market in which girls can no longer rely on the traditional limited range of occupation, increase in numbers of technical occupations which might keep women to suffer from unemployment, and the application of technology which pervades every aspect of the society and lives of individuals. According to Hoffman-Balls et al., women's participation in this field can provide important knowledge in areas of food security, population growth, health care and community needs which are part and parcel of sustainable development. There is therefore, no gain saying the fact that the level of socio-economic development of a nation can be measured by the level of education of her women. This is true because research has shown that infant mortality rate, high maternal mortality rate, high fertility rate and high level of malnutrition correlate positively with low education of women.

Apart from the fore-going roles of women in the society, they bear the potential work force of the nation, yet, women appear to be grossly under-represented in science-

oriented courses in Nigeria. Moreover, studies seem to point to the prevalence of under-enrolment of female students in science courses. However, the findings are inconclusive. For instance, the study embarked upon by Ejifugha and Ogueri (2011) showed an increase in female enrollment statistics in science education for three consecutive years. In a related report by the United States Department (US, 2012), girls were shown to be evenly represented in biology (50%) and out numbered boys in chemistry (67%), though they were underrepresented in physics. Based on the fore-going background, the study investigated the issue of equity in Pre-NCE science enrolment in North East geo-political zone of Nigeria and its implications for sustainable development.

The study investigated the equity in gender enrolment of students in Pre-NCE science programmes in Nigeria and its implications for sustainable development. To facilitate the investigation, the following research questions were posed and the hypotheses tested for significance at 0.05 level.

- What are the percentage enrolments of male and female students in Pre-NCE science programmes of the institution used for the study?
- What are the percentage enrolments of male and female students in the physical science and Biology departments of the institution used for the study?
- There is no significant gender difference in the enrolment of students into Pre-NCE science programmes of the institution used for the study.
- There is no significant gender difference in enrolment of students into physical sciences and biology departments of the institution used for the study.

Method

The descriptive survey design was adopted in the study. The design was used to obtain information from documented records of students' enrolment from the academic records of the institution used in the study. A sample of 1538 students enrolled into Pre – NCE science programmes in the departments of Biology, Chemistry, Mathematics and Physics for five academic sessions (2005/2006 – 2009/2010) was used using the purposive sampling technique. Two research questions guided the study and three hypotheses were tested for significance at 0.05 level. The research questions were answered with percentages while the null hypotheses were tested for significance with chi – square statistic at 0.05.

Table 1: Percentage Enrolments of Male and Female Students in Pre – NCE Programmes for 2005/2006 – 2009/2010 Academic Sessions.

Gender	2005/06		2006/07		2007/08		2008/09		2009/11
	No	%	No	%	No	%	No	%	No %
Male	171	76.70	211	73.30	270	75.20	214	73.30	304 75.10
Female	53	23.30	77	26.70	89	24.80	78	26.70	101 24.90
Total	224	100.00	288	100.00	359	100.00	292	100.00	405 100.00

The data in Table I show that for the period under study the percentage enrollments of male students in the Pre – NCE Programme were between 73.30% and 76.70% while those of female students were between 23.30% and 24.90%.

Table 2: Percentage Enrolments of Male and Female Students in Physical Science and Biology Departments.

Department	No of male students	Percentage	No of female students	Percentage
Biology	410	68.90	185	31.10
Physical sciences	1171	97.44	215	2.56

The data in Table 2 show the percentage enrolments of male and female students in physical sciences as 97.44% and 2.56% respectively. In Biology department, 68.90% male students enrolled against 31.10% of female students.

Table 3: Chi square Test of Difference of Male and Female Enrolments into Pre – NCE Science Programmes.

Gender	No of students	χ^2 – cal	χ^2 – crit
Male	1171	3384.38	43.77
Female	397		

The data in Table 3 show that the calculated χ^2 -value of 3384.38 is greater than the tabulated value of χ^2 of 43.77. The null hypothesis was rejected, meaning that there was a significant difference in the enrolments of male and female students into Pre- NCE science programmes in the institution used for the study.

Table 4 : Chi square test of difference of male and female enrolment into physical sciences and biology department

Course	No of students		$\chi^2 - \text{cal}$	$\chi^2 - \text{crit}$
	Male	Female		
Biology	410	185	1634.90	11.07
Physical sciences	761	397		

The data in Table 4 show that the calculated χ^2 value of 1634.90 is greater than the tabulated χ^2 value of 11.07 at 0.05 level of significance. The null hypotheses were rejected because there was a significant difference between the enrolment of male and female students into physical sciences and Biology departments of the institution used in the study.

Discussion

The results of the study showed that there was a significant difference in the enrollment of male and female students into Pre-NCE science programmes of the institution used in the study to the disadvantage of the female students. The findings of the study further showed that the ratios of gender enrollment were in the neighbourhood of 9:1 and 3:1 in favour of male students in physical and biological sciences, respectively. The findings agree with those of Okeke (2001) which showed that enrollment of female students was poor, particularly in physical sciences and mathematics, but are at variance with the findings of Ejifugha and Ogueri (2011).

The revelation from the present study is worrisome bearing in mind the efforts made by the Nigerian government to see that the enrollment of male and female students into science programmes at all levels of education is promoted. From the findings of this study, the said efforts do not seem to yield the desired outcome. How does the nation hope to attain sustainable development and gender equity in education come 2015, when women who form the critical mass of the country's population are lagging behind. Women not having access to science-oriented programmes amounts to denying them the opportunity of contributing their quota to sustainable national development. It further means that much more needs to be done by relevant stake holders towards achieving gender equity in science enrollment and participation beyond 2015 in order to steer the country towards sustainable development. By so doing, the nation will with time, produce scientists, engineers and technologists who will form a formidable work force capable of driving the Nigerian economy to greater heights and global competitiveness.

The findings of this study imply that attaining sustainable development by 2015 is not practicable for Nigeria and even other nations of the world that are grappling with gender inequity in science education. They further imply that achieving rational use of land, protection of forests, handling economic management of water and preserving biodiversity are not feasible even beyond 2015 if Nigerian women who play vital roles in

these respects do not have sufficient access to science education. Attaining sustainable development therefore, might remain a mirage for Nigeria if decisive steps are not taken to ameliorate the dangerous trend.

Recommendations

In the light of the findings of the study, the following recommendations are made:

1. The Nigerian government should review its admissions policy into science and science-related courses in tertiary institutions to promote female enrollment and study of such courses.
2. Science, technology and mathematics teachers should employ gender-friendly techniques and instructional resources to invoke, sustain interest and motivate students to go all out to enroll in science and science-related courses. In other words, considerable attention should be directed at the participation of females in science-oriented courses at the basic and secondary school levels of education in order to strengthen their access to the study of science-oriented courses at the tertiary level of education.
3. The government and other relevant stake holders should provide scholarship schemes and merit awards for deserving female students in the sciences and related fields.
4. Female students should develop positive self concept of themselves and believe in their abilities to study and excel in the sciences since research has shown that female students are not deficient in their abilities to study science and its related fields..

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