Gender Mainstreaming: A Strategy for Promoting Gender Equality in Science and Technology Education

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Abstract
The paper highlighted the discrimination against and exploitation of women at global level. Efforts made at global level in promoting gender equality in education and employment opportunities through gender mainstreaming were discussed. Women and girls under representation in science and technology education in Nigeria were discussed and instructional strategies for mainstreaming gender in science and technology classrooms in Nigeria were highlighted. Some recommendations were made among which were that science and technology educators should incorporate strategies for mainstreaming gender into the teacher education programmes. Furthermore, that government should set up gender units and focal point in each state of the country to address such gender issues as gender inequality in science and technology education, discrimination in employment opportunities and job security.

Introduction
Globally, women and girls are under represented in almost all sectors of development including education and employment opportunities despite the fact that women constitute more than half of the world’s population (Federal Government of Nigeria, 2004). The degree of under representation differs from country to country. In most societies, especially in developing countries, women and girls are denied access to life transforming opportunity as education and are discriminated against in employment opportunities, job securities and other benefits available to their male counterparts. Ehigiamusoe (2009) quoted the International Development Agencies (IDA) as stating that “nowhere in the world are women treated as good as men”. He further stated that at the International Women’s Conference in Copenhagen, Denmark, in 1980, the United Nations released some revealing statistics on the global condition of women as follows:

- Women make up more than half of the world’s population, produced 80 percent of its food, laboured for two thirds of its working hours, were paid 10 percent of its income, and owned one percent of its property.

These statistics show only a little of the many dimensions of discrimination against and exploitation of women all over the world. In India, for example, women make up over 40% of the labour force while in Nigeria women constitute over 60% of the labour force and participate in close to 90% of all farming activities (Ehigiamusoe, 2009). The United Nation Development Programme (UNDP, 1995) in a human development report stated that women were treated worse than men world-wide. Hence the under representation of women and girls in general and science and technology education in particular has remained a topical issue in all developmental discussions through out the world.

In Nigeria in spite of government huge financial investments on education, introduction of nine years free and compulsory basic education for all children of school age (FME, 2004) and determination to promote gender equity in science and technology education at all levels of the education system (FMST, 1986) gender disparity in access to education and employment opportunities still exist. Several research reports (Okeke, 2001; Ezirim, 2006; Okoli & Ifeakor, 2009) indicate that gender gaps exist in science and technology education and employment
opportunities in Nigeria. The reports further stated that Women and girls are under represented in science, technology and engineering fields, and the few women and girls that venture into such fields are discriminated against in employment opportunities. For instance, many multinational companies in Nigeria discriminate against female graduate engineers during recruitment. Women scientists and engineers are treated as unusual in industry and most academia. Okebukola (2004) reported that despite the fact that 50% of the population of Nigeria are women only 11% of personnel in science, technology and engineering professions are women. The under representation of women and girls in science and technology education is traceable to gender role stereotyping that is prevalent in different cultures.

**Sex Roles and Gender Roles:**
Quite often when the term gender is used it is misconstrued to mean “Sex”. Sex refers to biological or anatomical features in the human body which make it to be classified as male or female. Gender on the other hand, refers to the social or cultural construct, characteristics, behaviours and roles which society ascribes to females and males (Okeke, 2001). Sex roles however differ from gender roles. Often times gender roles are imposed on women as sex role. Sex roles are those defined roles for man or woman by nature. For instance, a women gets pregnant, give birth to babies and breastfeed babies; while it takes a man to get a woman pregnant. Gender Roles on the other hand, are roles and responsibilities that society assign to women and men and the values society assign to these roles. In other words gender roles are roles which society assigns to a man or woman in accordance with the culture and tradition of that society. Men and women therefore choose occupations or professions that are in accordance with societal expectations of their gender. Hence relatively few females venture into male dominated disciplines such as science, technology, engineering and other science based professions. The great majority of women and girls whose occupations such as nursing, hair dressing cooking and selling of food, clerical jobs and other minial jobs in industries and other establishments are in accordance with what society expect of their gender. In the past few decades the emphasis has changed. Promoting gender equality in science and technology education is now globally accepted as a developmental strategy for poverty alleviation and for improving the health and living standards for both women and men and for the socio-economic development of a nation.

Science according to Okeke (2007) is a systematic process of obtaining verifiable and testable knowledge about nature and natural occurrences utilizing careful observations and experiments. She also defined technology as the practical application of science in solution of problems encountered in the environment. Science and technology are, therefore, veritable tools for socio-economic development of modern society. As such gender equality in science and technology education should be promoted at all levels of education.

Gender equality is a system where both sexes enjoy the same opportunities for realizing their human rights, and rights to contribute to all spheres of national development, and benefits from such development (Sadker & Sadker, 1982). Hornby (2000; 390) defined equality as the fact of being equal in rights, status and advantages. The achievement of equality between women and men in science and technology education is a matter of human rights and a condition for social justice and should not be seen as women’s issue.

Gender became an important issue in science and technology in 1993 through the activities of the United Nations Commission on Science and Technology for Development. The gender dimension of science and technology came as a result of series of reports on international
conferences (such as world conference on International Women’s year; World Conference of the United Nations Decade for Women Equality, Development and Peace) and concerns expressed by science and technology experts about the situation of women in the fields of natural science, education, health and food security. These reports all point to the fact that there are gender gaps in the fields of science and technology.

For several decades efforts at global level have been directed at ensuring gender equality in science and technology through various strategies. In recent years gender mainstreaming has been globally recognized as the most effective strategy to achieve gender equality and justice in all fields of life and in all sectors of development. This paper, therefore, discusses instructional strategies for mainstreaming gender in science and technology classrooms, so as to promote gender equality in science and technology education in Nigeria.

Gender Mainstreaming

Mainstreaming implies making a particular idea or opinion accepted by most people (Hornby, 2006: 891). Gender mainstreaming is a strategy for bringing gender issues into the mainstream of society so as to ensure gender equality. Gender mainstreaming was established as a major global strategy for the promotion of gender equality in the Beijing platform for Action emanating from the Fourth United Nations World Conference on Women in Beijing in 1995. The Economic and Social Council (ECOSOC, 1997/2:98) defined gender mainstreaming as “the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes in any area and at all levels. It is a strategy for making the concerns and experiences of women as well as men an integral part of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated”.

The ultimate goal of gender mainstreaming is to achieve gender equality: specifically, gender mainstreaming aim at:

- ensuring that the rights, roles and needs of women and men are given equal attention in all programmes and activities
- paying attention to the rights, roles, needs and aspiration of women and men.
- respecting cultural differences and ensuring the equal participation and protection of rights of all people – women and men alike (ECOSOC. 1997/2:98).

The objective of introducing gender mainstreaming into science and technology teacher education programme is to build the capacity of science and technology teachers to address gender issues in science and technology classrooms.

Strategies for mainstreaming gender in science and technology classrooms:

To mainstream gender in science and technology classrooms the following instructional strategies should be adopted:

i. Use of teaching strategies that promote cooperation.

The use of teaching strategies that promote cooperation rather than competition in science and technology instructions should be adopted while those teaching techniques that reflect the pattern of male needs only should be avoided in science and technology classrooms. For instance, the use of competition as a learning style illustrates the ways in which male development guides instructions. The “I win, you lose”, philosophy embedded in school competitions should not be reinforced in science and technology classrooms as is usually the
case in playfields. According to Giligan, Lyons and Hammer (1998) the “I win, you lose” philosophy is a male orchestration which is not the best environment for science and technology education for both boys and girls. Cooperative learning strategies have been found to enhance achievement and interest in science for both boys and girls (Okebukola, 1985a; Okoli, 1995). Other gender inclusive strategies which science and technology teachers could use include games, simulation, role-play, discussion and career oriented teaching.

ii. Use of gender inclusive languages or expressions
The use of gender inclusive languages or expressions is recommended as a strategy for mainstreaming gender. Often times, female students are neglected during lectures or discussions through the use of male exclusive languages or expressions. The use of masculine nouns and pronouns like “he” to mean everybody while “she” means females only and the use of nouns like mankind, chairman to stand for both male and female during science instructions should as much as possible be avoided as both are coded by both male and female to mean males only. The nouns chair-person, human kind could be used in place of chairman and mankind respectively during science and technology instructions.

iii. Use of gender inclusive images, pictures and textual materials
The predominant use of masculine images, pictures and textual materials for illustrations or examples in science classroom should be avoided as all portray male dominance. Gender mainstreaming can be achieved through de-sexing science and technology instructional materials. This means that both male and female pictures, images and illustrations should be used during science and technology instructions to illustrate a doctor, a nurse, an engineer and a home economist. The findings from a study by Njoku (2000) noted that masculine image is often reflected in science and technology curricular materials resulting in perennial under-representation of females in science and technology. Science and technology teachers should therefore avoid the use of male exclusive textual materials for instructions in science classrooms. Male exclusive images and textual materials lower female self-esteem and affect the conduciveness of the learning environment.

iv. Use of gender inclusive teacher – student interactions in science and technology classrooms
Gender inclusive teacher-student interaction patterns should as much as possible be adopted in science and technology classrooms. Sadker and Sadker (1982) and Grayson (1988) investigated teacher-student interaction patterns and found that some teacher behaviours provide more instructional time to male students than their female counterparts. They maintained that male students receive more attention, and more encouragement from their teachers than do female students. In a male dominated classroom, male students are more likely to be praised and more likely to be reprimanded by their teachers. In such classroom, teachers instruct male students on how to perform a given task and encourage them until they succeed. In addition, teachers allow more opportunities for male students to respond to questions, talk more, interact more, receive more teacher-time and thus grow at the expense of their females counterparts. Science and technology teachers (whether male or female teachers) rely more on male students during classroom discussions, practical activities, question-and-answer sessions, excursions and field trips. They allow the male students to dominate the class activities by overtly expressing more confidence in them they give them leadership positions as well as more challenging tasks. These build self esteem in male students to the detriment of female students. On the other hand, female
students in such male dominated classrooms are neither encouraged, motivated, praised no reprimanded. When ever a task proves difficult the teachers do the task for female students instead of teaching them how to do it. In male dominated classrooms, the average female student is ignored. Hence girls grow with the impression that their opinions are not valid, their responses to questions are not worthy of attention and that they are not as clever and as important as their male counterparts. Furthermore, female students go about with the erroneous impression that their success in academic work is due to chance and not because they are clever and capable. All these lower the self-esteem of female students. Instructional strategies that are gender inclusive should be used in mainstreaming gender in science and technology classrooms. A gender inclusive classroom is one where equal opportunity is provided for male and female students to interact with their teacher as well as interact among themselves. In such classroom science and technology teachers should expose both male and female students equally to theory and practical lessons. The science and technology teacher should encourage, motivate, reprimand and praise the science and technology students irrespective of whether the learner is a male or female student. In other words gender equality should be maintained in teacher-student interactions.

v. Eliminating/avoiding behaviours or utterances that are gender sensitive in science and technology classrooms

During instructions in science and technology classrooms as much as possible avoid behaviours or statements that tend to forcefully or subtly encroach on the private affairs of male or female students. Avoid jokes, innuendos and other overt or covert behaviours that tend to negatively impinge on the personality or cultural roles of male or female students.

Conclusion

The problem of gender inequality in science and technology education is a serious educational problem that could affects the scientific and technological advancement of any nation and as such should not be seen as women’s issue or dismissed with a wave of the hand. To compliment government’s effort at ensuring gender equality in science and technology, science and technology teachers should mainstream gender in science and technology classrooms by using gender inclusive expressions in instructional delivery, interacting with both male and female students during practical activities or discussion sessions, using gender – inclusive textual materials, pictures, images and illustrations during science and technology lessons, avoiding utterances that are gender sensitive and use of instructional techniques that are gender friendly so that equal opportunity to learn is provided in science and technology classrooms for all students irrespective of their gender.

Recommendations

The following recommendations for mainstreaming gender in science and technology education are made:

1. Workshops and seminars should be conducted for serving science and technology teachers on regular bases to enable them learn instructional strategies for gender mainstreaming in science and technology classrooms.
2. Science teacher educators should build in instructional strategies for gender mainstreaming into the pre-service science and technology teachers programmes.
3. Government should set up gender units and gender focal points in various states of the country to address issues related to gender equality in science and technology education in Nigeria.

References


