

COUNSELLING, EDUCATIONAL PSYCHOLOGY AND GENDER GAP IN SCIENCE EDUCATION: A RELIGIO-CULTURAL FACTOR

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ABSTRACT

Gender gap in teaching and learning within the courses that fall within the Science Education is becoming unbearable. The researchers found out that in spite of the laudable goals and objectives in education, Nigerian women still face a lot of challenges that hinder them from participating equally with their male counterparts in science education. Gender gap was greatly noted in many science related areas and this has been of great concern to many educationists. Another problem of the study is that religion and culture which are supposed to be unifying factors have appeared to be

major factors creating gender gap in Science Education in Nigeria. Therefore culture as well as guidance/counseling, education psychology is found to be a solution provider. It is discovered that involving reflective teaching as a method of teaching these sciences will be of great importance and help in boosting the number of females in science education and thus reduce if not eliminate the existing gap. The researchers aim at achieving gender equity in science education which will promote greater equality in employment help to control early marriage, give the girl child and women a voice and financial independence, improved health and education for the next generation. Thus, the paper recommends among others things that government should involve women in policy formulations to take care of any gender issue or bias and equally give employment to Nigerian female youths who studied sciences to encourage more female participation in science education. The research employs reflective and phenomenological methodologies. The research uses descriptive style of data analysis. Data were got from secondary materials.

Keywords: Science Education, Educational Psychology, Gender Gap, Guidance/Counseling, Religion, Culture.

INTRODUCTION

In the control of gender gap in science education, education psychology and counseling have a pivotal place in the issue.

Eyo (2003:28) posits thus:

...The appropriateness or inappropriateness of the circumstances referred to here are to be found in our various social, cultural, and environmental contexts. Some context are exciting, motivating, nurturing, enriching, positively reinforcing, while others are depressing, non-motivating, depriving, discouraging or just drab, etc. Think, for instance, of how many potential scientific, artistic and technological geniuses there are in our villages that end up their lives as peasants.

It is pertinent to note that culture which is also the umbrella, in which religion and other social lives are sheltered, should be encouraged to be motivating, enriching, positively reinforcing. Any force or integral of Nigeria's religions or cultures that appears to be depressing, non motivating, depriving or drab, etc. must be discouraged. In effect, one of the disciplines considered in this paper, to be used to work on these religious or cultural perceptions with negative effects on gender issues as it affects science education is educational psychology and guidance and counseling.

Education is a catalyst for bringing some radical changes to existing cultures and this is used for preparing the students for the future. It is also the method by which a society transfers its knowledge, culture and values from one generation to the next. Education serves the society in various ways, which include, preserving, rediscovering and transmitting knowledge. Nigeria is a country with multi ethnic groups that speak different languages, practice different religions and have different cultures and traditions. These differences played important roles in development of science education in Nigeria. Females are greatly underrepresented in the senior position in education as in many other occupations (Bush, 2006). He further stated that men dominate numerically in almost every sphere of life with exception of nursery and primary schools. Aina (2014) addressed that access to education is an indication of female

status in the nation. This was supported by Onokale and Onah (2016) and Duyilemi (2017) noted that the percentage of females in the academic sectors is still very low. This educational imbalance between the male and female in science education is wide due to the cultural barriers, religious differences, etc.

Millennium Development Goals (MDGs) were identified to be achieved between 1990 and 2015. These MDGs are concerned with promoting gender equality and the empowerment of women they include; to ensure basic education for all, with particular emphasis on scientific and technological literacy so that all women and men effectively use science and technology to meet basic needs, to ensure that men and women have equal opportunities to acquire advanced training in science and technology, to achieve gender equity within science and technology institutions, including policy and decision making bodies, to ensure that the needs and aspirations of women and men are equally taken into account in the setting of research priorities and in the design, transfer and application of new technologies, to ensure that all men and women have equal access to information and knowledge. These goals recognize the importance of gender equality and women's empowerment in effecting social changes and transformation. Thus aims of these goals are to measure progress towards ensuring that more women become literate, have more voice and representation in public policy and decision-making and lastly have improved job prospects in the non-agricultural sector. The national economic goals required that students acquire scientific and technological knowledge and skills that will enable them develop the ability to purposefully access information from a variety of sources, analyses and evaluate the information to be useful to oneself and the entire society (Ofuka, 2012). For this goals to be achieved Nigeria needs dedicated and well trained professional science teachers who will help transmit appropriate scientific and technological skills to the students using reflective education. Schools are challenged to provide effective and relevant education for students that will make them functional and productive in the society.

Religion, Culture and Gender Gap in Science Education in Nigeria

Science is derived 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 hypotheses, testing hypothesis (experimentation), analyzing the data and draw a conclusion (Robert and Zimmermann, 2012).

Science Education is the teaching of science and the application of tools and materials by man to produce goods and services for the benefit of mankind (Imalahimi, 2010). Science education play a vital role in the lives of individuals and the development of the nation scientifically and technologically (Alebius and Ifamayiowa 2013). It is widely and generally acknowledged that the gateway to the survival of a nation scientifically and technologically is scientific literacy which can be achieved through science education. Quality science education and good performance in science education will go a long way in reducing illiteracy and poverty, which are impediments to national development (Nwachukwu, 2014). National Policy on Education (2014) stated that science Education emphasizes the teaching and learning of science processes and principles which will lead to fundamental process and principles, which will lead to fundamental research in sciences at all levels of education and vocational education. NERDC 2011 states that the science courses in Nigerian secondary schools are biology, chemistry,

physics, general mathematics further mathematics, agriculture, physical education and health education. These courses listed above need to be better thought in Nigerian secondary schools in order to make a mark in the sands of time of scientific and technological development.

Gender gap entails discriminatory practices that prevent the full participation of either gender in science education. Gender gap refers to the state of unfairness and injustice assigned to social and non-biological difference between male and female roles, attitude, interest and behaviour. Gender gap is also described as the principle and practice of unfairness and inequitable allocation of resources and opportunities to both males and females. UNESCO (2014) defined gender gap as a degree of imbalance between male and female in access and participation in science and technological courses or the differences between gross enrolment of females and males in science and technological course. Through gender gap, opportunities, resources and power become unequally accessible to all. Even among the educated ones, opportunity is always given to the males to offer science courses while the girls should go for any course at all. Herze, (2010) was in agreement that women are still lagging behind the men in science education. This is not surprising because in the absence or non enforcement of legislation on compulsory education for all children coupled with the tendency to value sons over daughters, girls are less likely than boys to go to school.

Africans have been found to be notoriously religious (Mbiti 1969:1). African Religion has permeated inside most parts of the fabrics of African culture. Even in Islam and Christianity there are some signs of gender gaps or even stratification, for example, the females are seated at the back of the Mosque as the Imam officiates. The Holy Bible, with the Old Testament has many records where the males are mostly entitled to kingship and priestly institutions. In African Tradition Religion, women restricted not to ascend to so many to so many offices or status and they are also discriminated from being parts of some cultural practices and activities, for example: the masquerading institution, etc. But such restrictions vary from one African Community to the other. All these religion and cultural observances are deemed as contributive factors to the problem of gender in science education in Nigeria. Kayode et al (2019:307-308) point thus: The Nigerian political environment is not immune from politics especially women's participation in politics in various communities during the pre-colonial era. Political participation during the colonial period in Nigeria as reflected discrimination and marginalization of women.

In Nigeria, particularly, since it is believed that the woman's domain was to be in the kitchen and cradle; their contribution to the male sphere were not seen as deserving of any attention (Okafor & Amaechi-Ani : 342). It is these gender sensitivities built in Nigerian religious and cultural wellbeing that have transcended into science education as a discipline or faculty in schools or institutions. On the contemporary academic states, (Ngwoke, 2020:257) asserts that, inequality in educational opportunities and attainment between males and females in Nigeria is gender based among other factors such as family background, socio economic factors and so on. For Odebanjo and Otiogede, (2020:202), gender differences are a recurrent theme throughout the literature in academic studies in general and in mathematics studies in particular. Mathematics is often considered to be a domain in which boys are higher achievers, both in terms of attitudes and self-concepts. These perceptions on differences in gender domain of science subjects or courses are more or less influenced by Nigerian traditional religious and cultural original conception of gender participation and restrictions. In many

states in Nigeria girls still have poorer educational attainments, especially at the secondary and tertiary levels. In the Northern Nigeria the gender gap remain particularly wide and the proportion of girls to boys on school ranges from one girl to three boys or 1:3 in some state. Najib, Musbahu and Ahmed (2019) as in Jeanne (2011), in UNESCO institute for statistics (UIS) has estimated that of the world total science researchers, only 27% are women. According to Najib, Musbahu and Ahmed (2019), the identified gender gap in some departments of pure science in some selected institutions of learning in some areas in Nigeria are as follows:

Table 1: M.Sc (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
Mathematics	5	62	3	37	25
Geography	5	99	1	1	98

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

Table 2: Gender gap in science education courses at SLU Kafin Hausa 2018/2019 academic session

Courses	Male	%	Female	%	Gap	Gap(%)
B.Sc (ed)Biology	48	54	4	46	7	8
B.Sc (ed) Chemistry	48	75	16	35	32	50
B.Sc (ed) Physics	19	76	06	24	13	62
B.Sc (ed) Mathematics	06	100	06	100	06	100

Source: www.slu.edu.ng

Gender gap percentage, identified in table two between male and female enrolment above stands as follows, Biology 20%, Physics 98%, Mathematics 25% and Geography 98%. The identified percentage of gender difference in the enrolment of male and female students in science and technology in 2018/2019 session is as follows; B.Sc ed 8%, B.Sc (ed) Chemistry 50%, B.Sc (ed) Physics 62% and B.Sc (ed) Mathematics100%.

GENDER GAP IN SCIENCE EDUCATION: CAUSES AND PANACEA

UNICEF (2012) found that many children do not attend schools in Nigeria because their labour is needed to either help at home or it brings additional income in the family. Many parents cannot afford the costs of sending their children to school due to their incapability to pay for items such as uniform and textbooks. For others the distance to the nearest school is a major hindrance, cultural bias, most parents do not send their children especially girls to school and they prefer to send the boys. Even when children enroll often times they do not finish, even primary school. The reason for this low completion rate include; child labour, economic hardship and early marriage for girls. Davis (2008) found out that the level of parental education, fear of science by girls, lack of science self confidence and interest are what cause gender gap in science education. Moreover Hassan (2011) surveyed education in Nigeria, parents' perspectives in 21st century; the researcher found out that traditional beliefs,

parental educational background, culture, religion, early marriage are contributory causes of gender gap in science and technology education in Nigeria. Also Lawal and Mohammed (2014) found out that socio-economic status of parents, parental occupation, cultural factors, early marriage, cultural and academic factors are the causes of gender gap in science education in Nigeria.

Reflective teaching is a means of looking at what you do in the classroom, thinking about why you do it and thinking if it works. It is a process of self observation and self-evaluation". Reflection involves "working towards a better understanding of the problems and ways of solving it. It is further seen as a number of steps in thinking, which are organized and linked and led to action. According to Ribuit 2012, posits that the steps involved cover "suggestions, problems hypothesis, reasoning and testing. Reflective teaching is also seen as the attitude of questioning the practice of teachers' profession. The ways to have teaching reflection could be done through peer observation, written account of experience, self-report, autobiography, journal writing collaboration, diary keeping and recording lessons (Richards in www.journal.co.uk) students feedback (Tice, 2011). Reflective teaching has been proven to have learning effectiveness by encouraging growth and improving pedagogical development for teachers. Reflective teaching is a practice that involves learning how to become a more engaging teacher by learning from your environment. Being able to reflect on what things work and what things do not can help a reflective teacher to improve.

Reflective teaching practices include being able to learn from your students, co-workers and even yourself. Many teachers do this by getting feedback from students. It may be as simple as asking the students their thoughts on the lesson or as elaborate as sending out survey to parents and students via Google forms. A central characteristic of transformative learning is the process of reflection which may be defined as those intellectual and effective activities that lead to exploring experiences in order to develop understanding and appreciation (Tomkins, 2009). Reflective learning is understood as a process that leads to reflection on all sources of knowledge that may contribute to understanding a situation including personal sources and experience. Reflective education focused on activities that contribute significantly to optimizing the impact of teaching science technology engineering and mathematical education (Sehellings, 2011). A professional reflective teacher is one who acquired some special knowledge and has gone through a long and intensive academic preparation in order to display the qualities that should characterized him or her as a teacher. In many countries anyone who wishes to become a good teacher first obtains specified professional qualifications or credentials from a university or college. Those professional qualifications may include: the study of pedagogy, ie the science of teaching.

There is now a shift from content alone to both content and competencies; the goals for learning has changed also from not only on knowledge of subject facts but also to ensure critical understanding of the core knowledge of the subject matter which will help them have the skills needed in the society. One should note that this reflective teaching makes sure that teachers do not only need or have the mastery of the subjects but also have a thorough understanding of how learning takes place and how to promote such in a variety of ways, positive attitude to work, healthy and personal commitment to the learners and how to keep growing in the profession. Mouboghare (2012), highlighted some of the competences to be possessed by a professional teacher. They include: profession of appropriate and relevant

knowledge of the product of science and technology, professional training on the pedagogy and oriented to teach science technology using reflective approach, possessions of ability to facilitate the development and acquisition of appropriate teaching aids, dedication to work and inventiveness in meeting the global challenges, capacity to stimulate and sustain students interest in science and technology through appropriate behavior and reaction to environmental stimuli, ability to carry out appropriate evaluation tests in cognitive psychomotor and effective domain and be able to analyze and interpret the test result in science and technology. Effective use of reflective teaching will remove bias from the girls concerning science and technology education that it is “masculine” and that the ability of females in these courses is innately inferior to that of males. It provides an in-depth look and solution to the challenges, improve learning achievement and progression. Ensuring that girls and women have equal access to science and technology education and careers are imperatives from the human rights, scientific and development perspectives. Gender equality in Science, Technology, Engineering and Mathematics (STEM) will ensure that boys and girls, men and women will be able to acquire skills and opportunities to contribute and benefit equally from the benefits of them.

BRIDGING THE GENDER GAP IN SCIENCE EDUCATION IN NIGERIA

Nigerian women still suffer challenges that prevent them from benefiting from all the laudable goals and objectives of science education. Alarcon (2011) identified the following as ways of overcoming gender gap in Nigeria science education. In many developing countries including Nigeria, women of female science teachers should become role models and play essential roles in attracting young women and girls into science, inspiring them and giving them confidence to confront the cultural attitude and societal values that deter the full participation of women in science and in the society. David (2014) stated that only when a country adopts a national programme aimed to decrease the gap, when all girls, adolescent females, young women and older women have access to the programme most suitable for them –only then will the prospect to bridge the gap increased. To successfully bridge the gender gap in Nigeria science education, certain strategies were formulated by the researchers to be put in place;

- a. **Deployment of Educational Psychology, guidance/counselors and Gender sensitization and advocacy:** There is need for thorough sensitization of the public on gender issues by the government through deployment of educational psychologist and guidance/counsellors. They should be meant to know that there should be no form of discrimination between boy and girl child in accessing science education and the like
- b. **Execution of National Policy on Education (NPE) to the letter:** The execution of the clauses in the NPE relating to equal opportunities for all Nigerians should be genuinely implemented for advancement of the Nation.
- c. **Teachers’ Method of Teaching:** The teaching approach of teachers should involve reflective teaching method which should influence the understanding and attitude of female students towards science education.
- d. **Involving Women in Curriculum Censoring Boards and Educational Policy:** it is critically important for policy makers to involve women in both policy making and curriculum formulation to take care of any gender bias that may be included either consciously or not against women in the curriculum.

The Nigerian Government: Government therefore should;

- i. formulate policies that will increase female enrollment in science education and forbid marriage of minors
- ii. give grant and scholarships to women and girls who demonstrate capability in science education
- iii. recognize and publish contributions of women scientist through the award of national honours
- iv. fund research projects on various aspects of the problems against women access to science education

Recommendations

The research therefore recommends that;

1. The government should give employment to Nigerian female youths who studied science to encourage more female participation in science education
2. Teachers should be sensitized to be gender friendly and use reflective method in teaching science in our secondary schools.
3. Government and school administrators should encourage healthy competitions among male and female students in sciences.
4. Deterrent laws should be promulgated to prevent early marriage and all forms of discriminations against the girl child.
5. Government should involve women in policy formulations to take care of any gender issue and bias mindedness.
6. Nigerian schools should deploy educational psychologists and guidance/counselors for proper orientations against unnecessary cultural and religious misconceptions of gender considerations.
7. Religious and cultural related bodies should encourage all gender participation in academics except where it has physiological implications.

Conclusion

Gender gap in science and technology is the difference between the accessibility and participation of male and female in science and technology education. Gender equity in science education is therefore important for healthy development of a nation. Achieving gender equality in the education sector in Nigeria will not only promote greater equality in employment, outcomes but also better the lot of women and families by postponing early marriage, financial independence, eradicate all forms of injustice against women and the girl child, improve health and equally give women voice in the society. It will equally help in the adjustment of Nigerians original and acquired traditional, religious and cultural convictions towards a better Nigerian academic, social and economic growth and development.

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