IMPROVING GIRL–CHILD PARTICIPATION IN SCIENCE TECHNOLOGY AND MATHEMATICS EDUCATION: A BASIS FOR SUSTAINABLE NATIONAL DEVELOPMENT

Tela Adamu Bage and Gazali Muhammad Abdulhamid

Abstract

Educational statistics in Sub-Saharan Africa shows that women continue to lag behind men in general and specifically in science, technology and mathematics education. Stereotyping also continues in education with girls and women tending to study ‘Women’s related occupations such as nursing and secretary jobs. Girl Child Education has drawn the attention of the international community as conferences and seminars were held to discuss factors that militate against the right of girls and vulnerable children to acquire the basic necessities and right to education. Many researchers believe that gender disparity exist in school enrollments and participation in science, technology and mathematics courses. This paper identifies the factors responsible for these disparities. Strategies toward overcoming these challenges were suggested and measures towards sustainable educational development in the country were recommended.

Keywords: Girl-child participation, Science, technology and mathematics education, Sustainable national development.

Education is a powerful tool that enhances the socio-economic and political development of every nation. The constitution of the Federal Republic of Nigeria provides for equal educational opportunities for everybody irrespective of sex, ethnic, religious or socio-economic status. The National Policy on Education (NPE) (2008) spelt out this access and equity in Education. However, this laudable provision suffered a lot of setbacks due to some prevailing socio-economic, cultural, political and educational hurdles.

According to the National Policy on Education, it was estimated that 10.1 million children are out of school at the basic education level with a high prevalence of excluded girls in the northern part of Nigeria and boys in the south eastern Nigeria. Many communities in Nigeria and other parts of the world regard the education of girls as less important, unnecessary and deserve little attention when compared to boys. Researchers in Education believe that this attitude toward females education is responsible for the low participation of girls toward education in general and science, technology and mathematics in particular. No nation can develop in this era of science and technology when majority of the girls abscend from science oriented courses which form the bedrock of societal development of the developed nations.

Educational statistics in many Sub-Saharan countries has indicated that girls or females lag behind boys or males in many so called “hard sciences” which include mathematics, science and technology related courses.

Girls and women study courses leading to women related occupations such as secretarial jobs, nursing and home economics, while the science courses such as physics and engineering were largely dominated by boys (Verdiana & Butare, 2000). The issue at stake is what are the factors responsible for this gender disparity in enrollment in science technology and mathematics education? What are the necessary measures to be taken by the government, non-governmental organizations and individuals toward the solution of these societal problems? This paper tries to provide answers to these questions with a view to repositioning the school system so that girls will be given equal opportunities to fully utilize their potentials and contribute their quota to nation building.
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Definition of Terms

Girl – Child Education: - This is regarded as the basic education given to girls who have not exceeded the maturity age of 18 years. It is regarded as the education given to girls at the primary school, secondary school as well as early stages of tertiary education. Ibrahim & Bakori (2004) observed that in some societies particularly traditional societies anybody who has not reached the age of maturity is regarded as a child similarly in the contemporary modern society, a child at the age of (18) eighteen years needs help from the parents, relatives and the society as a whole if he/she is to become responsible in his/her lifetime.

On the other hand, Biala, Daniel and Halilu (2002) view girl child education as the education given to children between the ages of 3 and 14. It covers the girls within the pre – school, primary school and junior secondary school. Although the researchers above specified the age limits for girl child education, we should note that the education given to children within ages closer to eighteen years will also be regarded as girl child education especially with the present review of the basic education curriculum.

Participation

Participation literally means to take part in an activity, event or program. Wilcox (2003) defined Participation as a process during which individuals, groups and organizations become actively involved in a project. Based on this definition, we can regard girl child participation as a process through which girls will have opportunity, access and means to actively take part in the acquisition of education at the early stages of their childhood development.

Mathematics, Science and Technology Education

Odili (2006) defined Mathematics as the Science of quantity and space. It is a systematized, organised and exact branch of science. It is a creation of human mind concerned primarily with ideas, processes and reasoning.

Obinna (2000) asserted that science is interested in a systematic and ordered knowledge and the process of arriving at this knowledge has been described as scientific method. The scientific method is based on a solid foundation in mathematics and information.

On the other hand, Dagoli (2002) opined that technology generally deals with scientific and industrial methods and their practical uses in industries and societies which can be translated into or transformed into economic, cultural social, political or physical progress.

Obinna (2000) considers the organic linkage between mathematics, science and technology as follows: Science is interested in systematic and ordered knowledge and the process of arriving at this knowledge has been described as the scientific method. On the other hand, the beauty and elegance of mathematics in science are exemplified in the profuse use of mathematical formulas by scientists. In like manner, technology depends mainly on science. In fact technology is the end product of scientific inquiry. From these statements, we discover that science depends on mathematics and technology depends on science. The channel moves in this order: Mathematics Science Technology i.e. (MSTE), Science is impracticable without mathematics and the rate of scientific development today is determined by the advancement in mathematics. On the other hand, technology is the end product of scientific enquiry. Every meaningful technological development is attributed to science.

Development

Aliyu (2013) sees development as the ability to increase goods and services, increase access and opportunities, increasing freedom and choices and sustaining those gains overtime.

Dagoli (2001) consider development as a process that enables human beings realize their potentials; build self confidence and lead lives of dignity and fulfillment. It also frees nations from fear of want, exploitation, political, economic and social oppressions.
Sustainable Development

To Bruijtland Commission (1987) as cited in Ijalunyi and Orayela (2013) sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Existence of Gender Disparity and Low Participation of Girls in Schools, Science, Technology and Mathematics Education

In many communities especially in developing countries like Nigeria some people believe that education of a woman ends in the kitchen. Alabi & Alabi (2014) observed that: disparity in education of male and female youths is a global issue particularly in developing countries like Nigeria. The dominance of the male gender in schools in general and the study of many school subjects or careers in particular has been affirmed by research reports.

They went further to assert that in most societies women are deprived of property, education and legal status. They are made the responsibility of their husbands if married or of their fathers or other male relations if not married.

Table 1: below shows the Gross enrolment ratio of male and female students in 1999/2000 around the world.

<table>
<thead>
<tr>
<th>Region</th>
<th>Male in %</th>
<th>Female in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arab States</td>
<td>62.6</td>
<td>57.7</td>
</tr>
<tr>
<td>Central Asia</td>
<td>43.3</td>
<td>43.7</td>
</tr>
<tr>
<td>East Asia &amp; Pacific</td>
<td>66.9</td>
<td>62.9</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>79.6</td>
<td>85.9</td>
</tr>
<tr>
<td>Northern America and Western Europe</td>
<td>104.3</td>
<td>107.2</td>
</tr>
<tr>
<td>South and West Asia</td>
<td>58.8</td>
<td>44.3</td>
</tr>
<tr>
<td>Sub Sahara Africa</td>
<td>26.4</td>
<td>22.4</td>
</tr>
</tbody>
</table>


From table 1 we discover that female enrollment ratio is lower than male enrollment in Central Asia, South and West Asia and Sub-Saharan Africa. However, female enrollment is higher in Central and Eastern Europe, Latin America and the Caribbean North America and Western Europe.

Table 2: below shows the enrolment in primary schools by gender in Nigerian from 2000 – 2010.

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>10,738,025</td>
<td>8,413,413</td>
<td>19,151,438</td>
</tr>
<tr>
<td>2001</td>
<td>10,583,411</td>
<td>8,457,812</td>
<td>19,041,223</td>
</tr>
<tr>
<td>2002</td>
<td>11,070,610</td>
<td>9,406,189</td>
<td>20,476,799</td>
</tr>
<tr>
<td>2003</td>
<td>14,434,764</td>
<td>11,338,280</td>
<td>25,773,044</td>
</tr>
<tr>
<td>2004</td>
<td>11,824,494</td>
<td>9,571,016</td>
<td>21,395,510</td>
</tr>
<tr>
<td>2005</td>
<td>12,189,073</td>
<td>9,926,369</td>
<td>22,115,442</td>
</tr>
<tr>
<td>2006</td>
<td>12,492,091</td>
<td>10,369,793</td>
<td>22,861,884</td>
</tr>
<tr>
<td>2007</td>
<td>11,683,503</td>
<td>9,948,567</td>
<td>21,632,070</td>
</tr>
<tr>
<td>2008</td>
<td>10,768,742</td>
<td>9,223,567</td>
<td>19,992,309</td>
</tr>
<tr>
<td>2009</td>
<td>10,791,896</td>
<td>9,288,980</td>
<td>20,080,876</td>
</tr>
<tr>
<td>2010</td>
<td>11,027,686</td>
<td>9,636,119</td>
<td>20,663,805</td>
</tr>
<tr>
<td>2011</td>
<td>11,705,330</td>
<td>10,420,087</td>
<td>22,125,017</td>
</tr>
<tr>
<td>2012</td>
<td>12,571,483</td>
<td>10,905,456</td>
<td>23,476,939</td>
</tr>
</tbody>
</table>

Form the above table in 2000, we discover that the total enrolment male and female was 19,151,438. In 2003 primary school enrolment rose up to 25,773,044. Then there was a decline with the figure dropping to 19,992,309 in 2008 and increased again to 20,663,805 in 2010.

Akinsowon & Asisenwo (2014) observed that the low participation of females in science, technology and mathematics education is due to feminine identities, ideologies of domesticity and gender stereotypes. Formal and informal socio cultural norms also play an important role in this regard.

In their own contribution, Imhanhahimi & Eloebhose (2006) cited the following as factors responsible for low participation of females in science, technology and mathematics education.

i. Socialization process
ii. Sex roles expectations
iii. Difficult nature of science and technology courses
iv. Teacher behavior/attitude
v. Guidance counselors.

Akujou (1989) as cited in Biala,Daniel and halilu (2002) pointed out that girl child education is hindered by some factors like sex discrimination, cultural biases, early marriages and religious factors. Issues such as finance, personal interest, traditional beliefs, family background and size as well as ignorance are contributing factors.

In a similar fashion, Ahmed (2013) asserted that. A non-governmental organization; Northern Education Initiative (NEI) funded by the United States Agency for International Development (USAID) said about 65.5 percent of girls lack access to basic education in the North East region of the country. This is attributed to religious and gender sentiments which militate against girl child education.

Dinatu (2000) in her analysis of factors associated with low educational enrollment of the girl child observed that sending girls to schools is a burden to some families. She also observed that the expectation of girls to be future house wives, as mothers has negative bearing on their formal educational opportunities.

Ways of Overcoming Low Enrolment of Girls in Science, Technology and Mathematics Education

To solve the problems associated with girls child education Alabi & Alabi (2014) suggested the following:

i. Government should promote an awareness campaign for the girl child.
ii. Mass media should be involved to sensitize girls on the need to go to school.
iii. Parents, community leaders, government, as well as guidance counselors should be involved in improving the socio economic status of girls.
iv. Stakeholders in women affairs and development should help girls to access credit loans to help them overcome their problems.

In their own contributions toward over coming gender gap, Asisanwo & Akinsowon (2014) suggested the following:

i. Girls should be given adequate attention to take mathematics inclined courses that are essential in science and technology programs.
ii. There is need to correct the impression that science, technology and mathematics education is for boys only.
iii. Girls should be given scholarship awards to study science, technology and mathematics education.

Imhanhahimi & Eloebhose (2006) suggested the following ways of overcoming the low participation of girls in science, technology and mathematics education.

i. More qualified science teachers should be employed to teach at the basic education level.
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ii. There should be closer interaction between boys and girls in classrooms and group assignments to help girls learn from the boys.

iii. Women professional associations such as the Nigerian Association of Women Scientists (NAWS), Nigerian Association of Women in Science, Technology and Mathematics (NAWSTEM) should promote female access to science, technology and mathematics.

iv. Women who excelled in science, technology and mathematics should be given award by the government to boost their morale.

v. Science laboratories should be built in schools.

Conclusion
Science, technology and mathematics education is essential for the overall development of every nation. Girls constitute a large percentage of the population of this country. It is high time that adequate measures are taken to mobilize them to study the so called ‘hard sciences or science related professions so that they can fully utilize their potentials and contribute to national development. Everybody has the right to acquire basic education. The government, nongovernmental organizations as well as private individuals should maximally contribute toward the elimination of gender gap in the study of science, mathematics and technology education in the country.

Recommendations
1. Science and mathematics teaching should be encouraged at the early stages of primary education.
2. Workshops, seminars and conferences should be organised for teachers at the pre-primary, primary and secondary schools in order to help them effectively teach science, technology and mathematics at the grass root level.
3. Instructional materials should be effectively used by science and mathematics teachers to make the subjects interesting to students at all levels of our educational system.
4. Indigenous technology should be incorporated into the school curriculum to effectively teach science and technology for the overall development of the society.

References


