

**GENDER GAP IN SCIENCE, TECHNOLOGY AND MATHEMATICS (STM) EDUCATION: IMPLICATIONS TO ENTREPRENEURIAL SKILLS DEVELOPMENT**

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**ABSTRACT**

*Gender differentials in schools, workplaces and business still exist in Nigeria. Girls and women remain substantially under – represented in Science, Technology and Mathematics (STM) education. Although the problem is recognized, but its implication is under estimated. This paper reviews the existing gender gap in Science, Technology and Mathematics (STM) education. The paper also examined the implications of gender gap to entrepreneurial skills development. Finally, we share the same believe with (Wasagu & Muhammed, 2007:88) who believed that “today more than ever before, females need to be provided with access quality Science, Technology and Mathematics Education.” Suggestions were offered on how to close the gender gap in STM education that will lead us to a viable, qualitative entrepreneurial skills development that could be free from gender bias.*

**INTRODUCTION**

Science, Technology and Mathematics (STM) education is the bedrock of national socio-economic and cultural development. Therefore, massive STM education of the citizenry of any nation is an imperative for national development. (Njoku, 2007). All children should have equal accessibility of STM education regardless of sex, race, socio-economic background or disability.

Yet, girls and women remain substantially under-represented in science, technology and mathematics in schools and in working place (Acker & Oatley, 1993). Although there is a general consensus that females less often study mathematics, physical sciences, engineering, computer studies and allied fields at every level of education from elementary school to graduate school (Robertson, 1988). Initiative concerned with gender issues, majority of which focus on access to or outcomes in science, technology and science, have become fairly common as theme and sub-theme in recent years in number of countries – Nigeria inclusive. It is against this background this paper seeks to re-examine the existing gender gap in STM education and its implication to entrepreneurial skills development.

### **THE EXISTING GENDER GAP IN STM EDUCATION**

According to Njoku (2007) poverty and inability to afford the prescribed school fees and many other charges collected by the school, distance of the school from the home and the security concern of the parents especially when the girl-child is involved are some of the few factors underlying learning in general and learner's restricted access to, and in science, technology and mathematics education in Nigeria. Research also suggests that the gender gap in STM stem from factors outside the school which includes; cultural practices and gender stereotyping in Science, Technology and Mathematics as masculine subjects is very strong (Frieze & Hanusa, 1984).

The university also comes under attack for its preferential treatment of students. Several writers are of the view that women studying science, technology and mathematics at undergraduate level leave them at a greater rate comparable to the men (Matyas, 1988: Morrell, 1991), or defect to non-science courses (Nevitte, Gibbons, & Coddington, 1988). This very action confirmed the views of (Dukku, 1997:18) "In a world, where patriarchal values predominate, then gender inequality is where there are general sets of beliefs that women are inferior to men and therefore the power relations attached to these idea and beliefs give men power more than women in society."

On a study conducted to find evidence of the technology gender gap and gender bias (Sakamoto, 1994) found that gender gap exists between males and females in the use of technology in the ratio 4:1 in favour of males, this also reveals a gap between boys and girls participation in mathematics and science in elementary and secondary school to have been on the increase, but drop as women advance in higher education.

The gender gap in technology is a vicious cycle according to (Adelson, 1996). Girls are not as interested in computers thus fewer products are made for them and

less research is done to develop games for them. Other contributing factor to gender gap is early marriage of girls at tender age in northern part of Nigeria, Junaidu (1995) confirmed that parents generally prefer giving out their daughters for marriage at tender age in Sokoto State.

In answering the question whether gender is a factor in Mathematics performance among Nigerians Preservice Teachers. Arigbabu & Mji (2004) assert that it is common place to see gender stereotypes manifested in the day-to-day life of an average Nigerian. Certain vocations and professions have traditionally been regarded as men's (medicine, engineering, architecture), and others as women's (nursing, catering, typing, arts). This is in agreement with the identification of the factors reported by Aguele & Agwagah (2007) as being responsible for low participation of females in mathematics and science:

1. Attitudes and expectations of parents and teachers.
2. Instructional strategies, such as hands-on experience, group projects, field trips and interactions with role models, as opposed to traditional textbook methods.
3. Curriculum materials that perpetuate the stereotype of the white, male scientists and ignore the contributions of minorities and female scientists.
4. Involvement in out-school science activities.
5. Portrayal of scientists in the media as white males or as negative stereotypes.
6. Tracking or ability-grouped assignments.
7. Self-image and expectation that often change from high interest and low anxiety in the early grades to avoidance in the intermediate class.

#### **THE IMPLICATIONS OF GENDER GAP TO ENTREPRENEURIAL SKILLS DEVELOPMENT**

The Wikipedia, the free encyclopedia defines entrepreneurship as "the practice of starting new organization or revitalizing mature organizations, particularly new business generally in response to identified opportunities. Entrepreneurial activities are substantially different depending on the type of organization that is being started."

However, Schumpeter (1950) sees an entrepreneur as a person who is willing and able to convert a new idea or invention into a successful innovation.

In their contribution to the meaning of entrepreneurship (Knight, 1967 & Drucker, 1970) described it as taking risk. And the behaviour of the entrepreneur reflects a kind of person willing to put his or her career and financial security on the line

and be ready to take risk in the name of an idea, spending much time as well as capital on an uncertain venture.

Knight (1967) further classified three (3) types of uncertainty.

- Risk, which is measurable statistically.
- Ambiguity, which is hard to measure statistically.
- True uncertainty or knightian uncertainty which is impossible to estimate or predict statistically.

But the Centre for Entrepreneurship Education & Development (CEED) viewed entrepreneurship as an act of using skills, aptitudes and attitudes to turn opportunities into reality.

Hence, what are the implications of gender gap to entrepreneurial skills development?

Aguele (2004) observed that the negative image of women towards STM has accounted largely for the low enrolment of females in these subjects particularly in the universities. He gave reference with the Nigerian universities enrolment ratio of males to females in STM for the academic years 1993/94, 1995/96, 1996/97 and 1997/98 which stood at 6:1, 3:1, 3:2 and 3:1 respectively to buttress his observations. This could have great consequences to entrepreneurial skills development if not checked.

Billings (2003) was reported by Aguele & Agwagah (2007) to have observed that despite efforts over the last 20 years to redress female under-representation, the percentage of women studying computing and related subjects continued to fall in between 1985 and 1990. This is another minus to national development.

Aguele & Agwagah (2007) cited (Ukeje, 1997:3) who observed that, without mathematics there is no science, without science there is no modern technology, and without modern technology there is no modern society. And we add without mathematics, science and technology and modern society there is no entire entrepreneurial skills development.

## **SUGGESTIONS**

As we have noted in the paper. The gender gap still exists and will continue to exist if not checked squarely. Apparently, this will continue to affect entrepreneurial skills development for the Nigerian Citizenry. Therefore, the paper suggests the following as a means for improving and closing the gender gap in

STM education that will lead us to a viable, qualitative and quantitative entrepreneurial skills development free from gender bias:

- The Federal Government should increase Educational access in primary, Secondary and Tertiary institutions.
- Effort should be geared toward improving the quality of teaching and learning STM education at every level i.e. primary, secondary and tertiary.
- Programmes for the girl-child and women whom are out-school should be increased and geared toward improvement of skills development especially entrepreneurial.
- Monitoring and evaluation should be taken seriously for sustainability of any designed Girl-Child & Women educational programme(s).
- Dukku (1997:21) suggests that the need to “strengthen women’s organizations and movements to make them sound movers in decision and policy making. Non-governmental organizations (NGOs) and more especially those concerned with women interest should fully involve themselves in the education of girls and women in the country with a view to modifying the social and cultural factors constraining women full participation in education and other activities.”
- Modern science, technology and mathematics education permeates every aspect of economic and social life. Hence, should received special attention and consideration in our national planning. (Bissel & Oral, 1995).
- We share the same believe with (Wasagu & Muhammad, 2007:88) who believed that “today more than ever before, females need to be provided with access quality science, technology and mathematics education.”

## CONCLUSION

In Nigeria economic growth could only be achieved and enhanced through Science, Technology and Mathematics educational policy. However, Science, Technology and Mathematics can play their role in any development effectively if and only if the gender gap that exist between males and females in STM has been reduced to the bearest minimum. And the simplest strategy is to give equal opportunities for both males and females Nigerians STM education.

In conclusion we believe that equal accessibility of girls in STM and entrepreneurial skills development can only come when the girls are ready and have interest in STM education and also when parents, teachers, administrators, policy makers, manufacturers, community leaders and religious leaders are willing to work together to enhance equal accessibility.

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