

**United Nations Commission on the Status of Women
Fifty-eighth session
10 – 21 March 2014
New York**

INTERACTIVE EXPERT PANEL

**Access and participation of women and girls in education, training,
science and technology, including for the promotion of women's
equal access to full employment and decent work**

**Focus: Women's and girls' equal access and participation in science,
technology, engineering and mathematics (STEM) education**

Tuesday, March 18, 2014, 10:00 am - 1:00 pm

**Community: a Focal Point to Inspire Passion for STEM Education
in Girls ***

by

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Introduction

For years, they thought Benedict was mentally unstable. She walked back and forth several times a day on a dusty road, many times lamenting over her situation. Only after participating in the Young Nigerian Girls Science Tele-Academy at Youth for Technology Foundation (YTF) did the people in the community learn that she wasn't mentally unstable, but was suffering from breast cancer, a disease for which the 5-year survival rate in Nigeria is less than 10%, compared with over 70% in Western Europe and North America.

Science is the cornerstone of industrial development and the link between technology and socioeconomic progress, yet in many African countries there is an enormous gender disparity in terms of who chooses to pursue it professionally. Nigeria's ability to ensure good public health, protect the environment, produce food for its people and develop new industries is dependent on the scientific breadth and skills of its people. Science and technology are among the seven learning domains that are foundational to lifelong learning for any child, including the girl-child¹.

The *Young Nigerian Girls Science and Health Tele-Academy* ("the Academy") is a gender based information and communications technology (ICT) program designed by Youth for Technology Foundation (YTF). The program connects with girls between the ages of 10-18 and demonstrates how an understanding of issues in their community can influence and inspire a passion for science, technology, engineering and math (STEM). The Academy combines hands-on activities, interaction with role models, mentoring, and career exploration to improve girls' self-confidence and inspire them to become science and technology leaders. The Academy utilizes stories and storytelling to teach girls about subjects in STEM, building on their strengths in soft skills like empathy, communication and leadership.

The *Young Nigerian Girls Science and Health Tele-Academy* uses a blended learning methodology that incorporates online training with on-site education. On-site instructors consult with learning experts in the science, technology, engineering and math team to increase knowledge transfer and multicultural understanding. The program focuses on a real community issue, allowing the girls to learn more about an issue which affects them while also sparking their interest in science as they perform research to determine possible solutions to the problem.

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The Region

In Nigeria, social and cultural patterns combined with relatively poor quality of schooling place girls, their education and their development in a vulnerable position. In the home, girls are burdened with the majority of household responsibilities, including care of sick parents and siblings. They are the first ones to drop out of school. At the secondary school level, the enrollment ratio of boys is consistently higher than that of girls. Despite government programs for education, there are still significant gaps. In a 2004 National Information Technology Development Agency (NITDA) report, secondary enrollment for boys in Nigeria was 1,567,011 (56.5%) compared to 1,204,623 (43.7%).

In the Niger Delta region of Nigeria, a region where YTF works extensively, in states like Imo and Abia, the total population of women exceeds that of men. Greater numbers of women were also reported for the 15 – 49 age group responsible for making the greatest input to the economy². There are many factors responsible for the lower enrolments of girls in STEM. These include societal attitudes, socialization patterns, gender-stereotyping of occupations, absence of female mentors and role models, influence of the school environment and the perceived *masculinity* of the STEM fields. A girl's choice to study science is seen as weakening her identity as a girl and making her appear less feminine. In situations where a girl's material circumstances, as well as those of her family, are tied to her marriage prospects, the implications of challenging the dominant construction of her femininity are not ignored.

Basic Education and Culture in Nigeria

There are 10.5 million children not enrolled in school in Nigeria³, the highest amount of any nation in Sub-Saharan Africa. Of the children who are enrolled in primary school, 47 percent are girls. Girls' enrollment declines to 44 percent as they go from primary school to the junior secondary school level⁴. The quality of education for these girls, and for all children, at this stage of their development is of great consequence. It serves as a pull factor that will bring children to and keep them in school. There are 69 million women and girls in Nigeria.⁵ Their exclusion from participation and high achievement in STEM subjects is a tremendous waste of human potential and means that opportunities to access careers in one of the region's fastest growing fields are extremely limited.

In Nigeria, most students have their first introduction to science through classroom lectures in which teachers dictate facts and information. This does nothing to engage students' interests. Knowledge of STEM among girls is minimal. This is a direct effect of the basic problem of gender stereotyping. These fields are perceived as masculine, and most girls do not realize their potential in these areas due to a lack of proper guidance, counseling and exposure to STEM

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subjects. Culturally, Nigerian girls tend to take up non-science courses at the senior secondary school level. By the time a girl is 13, she has to make a decision as to what “track” to pursue in senior secondary school: arts or sciences. For a 13 year old, this is a serious decision. Without parental guidance, the girl often leans towards what appears easier. YTF recognizes the importance of developing girls’ courage, confidence and character through engagement in hands-on STEM programs that begin early in a girl’s life.

The Intersection of Science and Community

STEM education is most successful when students develop personal connections with the ideas in the STEM fields. This can occur not only in the classroom but also through individualized and group experiences outside the classroom and through advanced courses. In science classroom environments throughout Nigeria, girls are often actively discouraged from engaging in science subjects and activities, their self-confidence is eroded, and very little is done to inspire and enhance their motivation to pursue science.

If children are to be acculturated to scientific thinking and behavior even before they attain primary school age, their parents, guardians and other adults in their lives must be involved. These are women. If the entire society is to be reoriented to scientific thinking, then women, who constitute more than 50% of the population, should benefit from science education. The curriculum and pedagogy of the *Young Nigerian Girls Health and Science Tele-Academy* focuses on real-world, interdisciplinary science, engineering and technology projects that combine math, science and ICT skills. Since YTF began implementing this program in 2011, participating girls have identified issues of importance in their communities. Health, water purification and hydro-power as a source of alternative energy are a few of the interest areas on which girls have focused.

Curricular materials often fail to develop the link between STEM subjects and other subjects in which girls are naturally interested. 97% of the girls that enroll in the Academy say they want to help people, and 98% say they want to change the world. They often do not think that studying topics in the STEM fields will help them achieve these goals. The Academy offers career days that target these problems and demonstrate to girls that a STEM education will empower them to use technology to improve the environment, to make life more efficient and to make people healthier. YTF recruits successful women across various disciplines as speakers who can encourage girls to explore fields in which they are underrepresented. Speakers are drawn from institutions like the Nigerian Society of Engineers, the Science Teachers Association of Nigeria, the Nigerian Association of Women in Science, Technology and Mathematics (NAWSTEM) and the Nigerian Nurses Association.

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The Academy utilizes:

- Web collaboration technology that brings live video, voice and data sharing to the teaching experience. This technology connects youth with e-mentors and with leading educational institutions.
- Customized training and mixed-media courseware with exercises in science and technology.
- Access to science, technology and health related courses online enabling on-site instructors to team-teach along with leading female scientists, health professionals, and educators.
- Customized research and development business and science templates for girls to develop real-world presentations about the community issue they are targeting.

To graduate from the Academy, the girls are required to create a research and development plan or a science plan incorporating the work of female scientists and educators and demonstrating the relevance of science to their lives and in their communities.

Strategies to Boost Girls Motivation in STEM

The following strategies are most likely to boost girls' motivation to pursue STEM fields:

- Real world content: When girls understand the link between the STEM material they are studying and the career opportunities in life, they will be more inclined to pursue careers in STEM.
- Engaged adults: Parents or guardians who believe in the potential of their daughters stimulate interest and create expectations. Educators also play a key role. As a result, it is imperative to include the community at multiple levels of girls' STEM education, especially at the onset of the program design and implementation.
- Personalization of approach: Student-centered teaching and learning methods, together with peer interaction and mentoring, are core approaches to the effective teaching of STEM concepts.

Recommendations

1. The Federal Government should support the creation of a STEM Teachers Corps, similar to the National Youth Service Corps, which places students graduating from one of the teacher education colleges or a university with a teaching degree in the program for the following year. Participants will receive training that will build their capacity to recognize gender biases in school settings and to address the inequality in their teaching of science.

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2. The Federal Government should create a mission-driven, open data agency for education (“OPEN-ED”) that reports up through the Ministry of Education and the Ministry of Women’s Affairs & Social Development and that should draw on the strengths of both agencies. OPEN-ED should propel and support: (i) a data-driven approach to improve data quality, ease of enrollment, science performance for girls, and the distribution of science teachers throughout the country. The adage is usually ‘If you can’t measure it, it doesn’t exist,’ but not in this case, and; (ii) the development of effective, integrated, whole-course materials for STEM education.
3. Science should be taught in a way that emphasizes social and societal connections early in life, before girls begin to lose interest and confidence. A good way to effectively convey scientific concepts to young girls is to make use of indigenous stories as examples to illustrate scientific phenomena, and to highlight the immense contributions of women in this area. Programs, like the *Young Nigerian Girls Science & Health Tele-Academy*, that highlight the relevance of science to local communities and programs that link girls with community members who are knowledgeable about scientific methods, especially women, can enhance learning for girls and boys.
4. Men have a role to play in supporting women and girls in STEM, particularly in the area of strengthening partnerships in the private sector. Much more can be done by private organizations to incorporate gender equity into their strategic focus. Since a higher percentage of men than women are working in private sector STEM careers, men can be internal advocates for women by encouraging more female STEM hires in order to build a more diverse team.
5. The Federal Government, in partnership with the private sector and civil society, should embark on media campaigns and cultural forums to raise awareness of the importance of female participation in science. Female role models such as Grace Alele Williams, the first female Vice Chancellor of the University of Benin and the first Nigerian woman to obtain not only a doctorate but a doctorate in mathematics education; and Francisca Nneke Okeke, a world renowned Nigerian female scientist and professor of physics at the University of Nigeria, should be emphasized through media campaigns that make the STEM field attractive to youth, specifically to girls.

The success of Nigeria in the 21st century – its wealth and welfare- depends on the ideas and skills of her population. Girls, not oil, are the country’s greatest assets. As the world becomes increasingly reliant on technology to function, the value of these national assets will be determined by the effectiveness of STEM education in Nigeria. Empowering girls and women is a breakthrough strategy for inclusive, sustainable development.

Gender equality is not just a development initiative. It is about fundamental human rights and dignity and is essential for more just and inclusive societies. If it is tightly aligned with national

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development strategies, scientific education for girls and women can become a driving force for Africa's renaissance. Nigeria has an opportunity to advance its national development and social equality by taking the steps necessary to increase⁶ the participation of girls and women in science and technology.

1 Brookings Institution's Learning Metrics Task Force

2 Azuogu. Uptake of science and technology courses by girls.

3 Education for All Global Monitoring Report, UNESCO (June 2013)

4Ekine, Abay. Enhancing Girls' Participation in Science in Nigeria

5 United Nations Department of Economic and Social Affairs, Statistics Division, Population and Vital Statistics, Report, 6