

UNESCO mentors girls in STEM to mark the Africa Engineering Week 4th and 5th September 2014 Nairobi, Kenya

“Technological gaps will keep on growing between developed and developing countries as long as new approaches are not adopted in the teaching of sciences and mathematics in primary and secondary schools. Most Kenyan secondary schools laboratories are ill-equipped for students to carry out experiments; thus they perceive sciences as dull, theoretical and abstract. They fail to relate what they are taught with its application in the real world. Science will remain an abstract pursuit to learners so long as they are not exposed to its real application in their daily lives. Technology will never be appropriate if students are not afforded means of contextualizing it – this should earnestly begin in our laboratories...” Prof. Shem Wandiga, Professor of Chemistry at the University of Nairobi

The above excerpt explains why we need to not only bring science closer to secondary school students but also to expose them to both the learning and working environments for increased interest in subjects that are becoming more and more distant from their daily lives. The situation is even worse for engineering courses where enrolment continues to decline and even those who enroll continue to dropout before completion of the course. It is as a result of this and many other factors that impact highly on the African continent that UNESCO has isolated the first week of September to be marked as the Africa Engineering week. Kenya marked the Africa engineering week with mentoring events on Science Technology, Engineering and Mathematics (STEM), on 4th and 5th September 2014. The events focused on exposition secondary school girls to the learning and working environments for engineers.

Engineering and the learning Environment

UNESCO Nairobi Office and its partners, the Ministry of Education Science and Technology, the National Commission for Science Technology and Innovation (NACOSTI) and the University of Nairobi organized a mentoring workshop on STEM for high school girls in their first and second years of secondary level education to not only raise their interest in scientific, engineering and



Figure 1: Demonstration in an mechanical engineering laboratory

technological courses but also to nurture them as Kenya’s future female scientists, engineers and technologists. The first mentoring event was organized on 4th September 2014. Seven public Girls’ secondary schools participated in the event which resulted in over thirty girls being mentored on the importance of STEM courses and professions

and the need for attitude change towards science

and mathematics subjects. The University of Nairobi’s

School of Engineering provided the girls with the opportunity to see the learning environment for the various engineering courses at the university level and organized demonstrations in the various

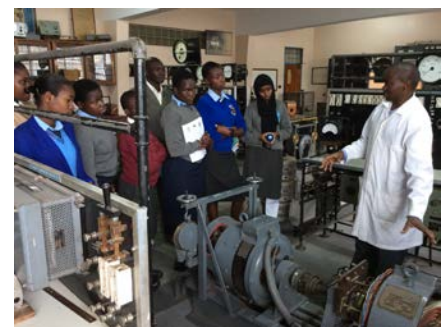


Figure 2: Demonstration to students in an electrical engineering laboratory



Figure 3: female students trying to learn by doing in an electrical engineering laboratory.



Opening the mentoring on STEM workshop at the University of Nairobi’s School of Engineering, on 4 September, Dr. Moses Rugutt, the Acting Chief Executive of the Kenya National Commission for Science and Technology (NACOSTI) emphasized the indisputable role engineers play in shaping the world that we live in, and stressed on the need to have more girls enrolling in STEM courses at the university level.



Figure 4: A student trying to repeat what has been learnt by demonstration

Dr. Rugutt highlighted the increasing need for more engineers and stated that there is a shortage of engineers in the world, which is a major concern in Africa where young people, especially women, continue to be less and less represented in engineering courses. The CEO emphasized NACOSTI’s

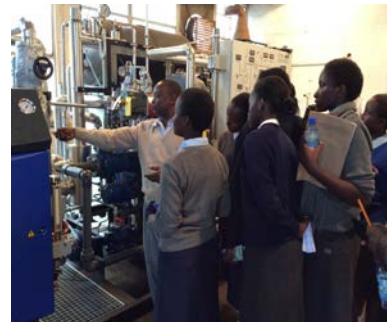


Figure 5: Demonstrations for the students in a mechanical engineering laboratory

commitment to supporting UNESCO’s efforts in ensuring that secondary school girls are mentored into STEM for increased participation in the courses at university level with a view to encouraging and creating awareness among the youth to study science, technology, engineering and mathematics in order to become part of the solution to emerging issues.”



Figure 6: Demonstrations for the students in a civil engineering laboratory

The programme for the event involved students being divided into groups and taken to explore the laboratories used by students at the university in the various disciplines of engineering (mechanical, civil, electrical, geospatial and space technology, environmental and bio-

systems).

The girls were able to use the machines and laboratory equipment to learn about the practical piece of an engineering degree. At the end of the day, some of the girls had these to say about the mentoring event:

Being a Muslim, my parents felt that I should not do any science courses; but since I love physics and have a passion for Engineering, I selected science subjects. After this mentorship program I am now even surer of my career choice. (Hafsa Aden- Our Lady of Mercy Girls' Secondary School, Shauri Moyo)

I have a passion for science subjects and am currently undertaking three science subjects despite my friends' warning that I will have a mental breakdown. The event has been very encouraging and has made me more focused in my career choice. I now want to be a Civil Engineer because I want to give back to her community by repairing the Roads that are dilapidated in my county of Bungoma. (Purity- Buruburu Girls Secondary School)

One of the teachers had this to say about the mentoring UNESCO event:

"As teachers we never set foot in a university to experience what goes on in there and especially in the laboratories and lecture theatres before being admitted. More learners should be given a feel of science oriented courses so that they become more informed. More of such events are needed to inspire students and especially girls to take sciences."

Engineering and the work environment

The second mentoring event was organized in partnership with CISCO and the Ministry of Education Science and Technology on Friday, 5 September 2014. The event focused on exposing the students to the life of scientists, engineers and technologists in the work environment and the importance of technology for future collaboration and



Figure 8: Students engaged in group work to come up with solutions for a societal problem using new technology

cementing of partnerships. A separate group of girls from different high schools was introduced to the work environment and the various career

options as an engineer. This particular event was hosted by CISCO Systems at their Headquarters in Nairobi. During the



Figure 7: Students in discussions with the women scientists at CISCO from different countries through a video link arranged by CISCO

event, the girls had the opportunity of being mentored by female engineers from institutions such as Safaricom, Copycat and Westcon who encouraged them to follow their hearts and to take the careers they like.



Figure 9: One of the students sharing the group's project with the rest of the participants

Sarah Kabira, a business development engineer with Copycat had this to say to the students: "When you know what your strengths are, when you are passionate about doing something,

and when you really focus on it, you can absolutely do it...always remember you can be amazing at what you put your mind to do.”

Mentoring the girls on how to succeed in becoming an engineer, Engineer, Dr. Faith Karanja, Senior Lecturer, Department of Geospatial and Space Technology at the University of Nairobi informed had this to say to the students: *“Engineering is about combining problems with reality...Where there is a problem, there is always a solution. Where there is a limit there is always a breakthrough.”*

Technology and the Future of Collaboration

The girls were introduced to the technology behind communicating via telecommunication. The importance of technology in enhancing collaboration in future was emphasized and exposed through a telepresence which linked the students to women engineers in other parts of the world. A multi-way video call was initiated with engineers working at the CISCO offices in Switzerland, Belgium, Germany and Poland. These engineers– originating from China, Tunisia, Italy, France, Spain and Ukraine – shared their stories with the students and spoke of the “old fashion” ways through many beginning with a love attempting to repair it. They from Nairobi that they were that they have English as an and are able to speak it engineers in the English was a foreign speak it when they started made things more master the technological jargon of the profession in a new language.



Figure 11: An interactive session between the students and the CISCO female engineers

The girls had many positive comments at the end of each event. Several girls even mentioned that their dream professions had changed as a result of the mentoring event – with a positive attitude towards engineers after the mentoring events.

Reactions from some of the students

Buru Buru Girls’ High School

“I learnt about the steam power plant in the mechanical engineering sector and also how GPS receives signals from satellites in space in the department of spatial and space engineering. For sure now I am in love with sciences. I am inspired to be an architect but my plan B is being a space and spatial engineer.” Generally, the event has been really motivating throughout. I am inspired.” (Clementina Asiago Ayon)

“I learnt a lot about the machines and their purposes and the demonstrations were interesting. The lab visits have made me have a much better attitude towards STEM. The lab visits have influenced me well in choosing my career. The event was really good and helpful in my career choice and I would prefer more of the same events to help in choosing my career.” (Caroline Muthoni Mariga)

Huruma Girls High School

“Engineering is not as hard as we think and not only men succeed, but women succeed in it too - like Doctor Engineer Faith Karanja. I am going to study sciences. I have changed my career to mechanical engineering. The event has made me change my view on sciences and I am very sure I will do mechanical engineering and become a mechanical engineer.” **(Jackline Mbula Mauta)**

Nile Road Secondary School

“During the laboratory visits I learnt that I have to work hard for there are many career chances. The lab visits have positively influences my attitude and career choice. The lab visits have made me to make a decision of being an electrical and information engineer. The event was a motivating factor to most of us.” **(Irene Wamuyu)**

Raila Educational Centre

“I wasn’t so sure about myself and I feared STEM a little bit but right now my fear is gone and my attitude has changed for the better. The lab visits have made me gain the courage to face my career...The event was encouraging and arose the confidence and courage in me to stand up for and with the career I have always dreamed of having, which is electrical engineering.” **(Miriam Shannah Nadzua)**

Ruai Secondary School

“I have decided that no matter how people fear sciences I will prove to them that it is not hard. I have decided that I will do engineering since I was undecided. It was encouraging and we all learnt something that will change our thinking and life.” **(Musaura Esther Muthoni)**

“I used to say that physics is hard and not for women but now I have the idea how it’s helpful and I will do it. I think it had changed my mind and I am going to work hard. The event was awesome and what I wish is that it could be there every year or annually.” **(Faith Indekhwa)**

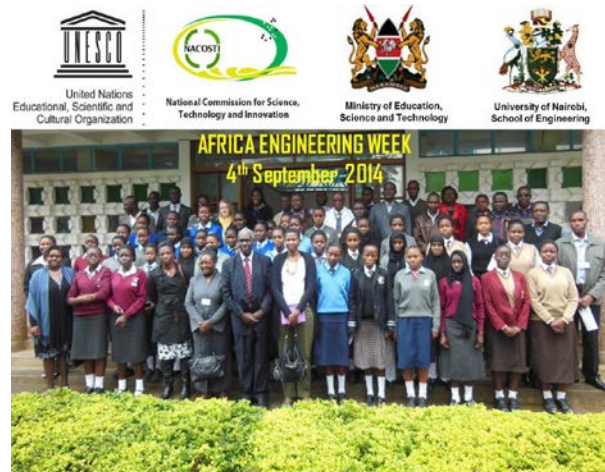


Figure 12: Group photo of the mentoring on STEM event at the University of Nairobi’s School of Engineering



Figure 13: Group photo at the CISCO mentoring event