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Report of the regional training for Anglophone Africa

Cracking the code: Quality, gender-responsive STEM education

The African Union recognized the importance of science, technology, research and innovation in stimulating socio-economic development in Africa in its Agenda 2063, and even earlier in the 2007 Addis Ababa Declaration on Science, Technology and Scientific Research for Development. There is a growing demand for professionals with science, technology, engineering and mathematics (STEM) skills in Africa, and the so-called fourth industrial revolution is expected to create a wide range of new jobs in these fields. However, unless efforts are made to address the mismatch between current skills and what will be needed for the future, this revolution will leave a large part of the continent behind.

One of the concerns of many African countries is the low participation and academic performance of girls in STEM studies.

UNESCO, with the financial support of the Government of Japan and in collaboration with the Rwanda Ministry of Education, the Rwanda Education Board, and the Rwanda National Commission for UNESCO, as well as numerous partners, organized a regional training to strengthen the capacities of education systems to provide gender-responsive STEM education where all children can learn, grow and develop to their full potential.

This brief report presents the results and next steps.

Education 2030

About the training

UNESCO, with the financial support of the Government of Japan and in collaboration with the Rwanda Ministry of Education, the Rwanda Education Board, and the Rwanda National Commission for UNESCO organized a regional training course for Anglophone Africa on quality, gender-responsive STEM education. The training was supported by the African Union International Centre for Girls' and Women's Education in Africa (AU/CIEFFA), Microsoft, and the Forum for African Women Educationalists (FAWE).

From 8 to 12 July 2019, the "Cracking the code: Quality, gender-responsive STEM education" training workshop was held in Kigali, Rwanda, with more than 50 people from 9 participating countries, including: Ethiopia, Ghana, Kenya, Nigeria, the Seychelles, the United Republic of Tanzania, Uganda and Zambia. The country teams were composed of representatives from the departments responsible for teacher education and gender equality; teacher trainers; teachers, head teachers and school principals in primary and secondary education. The training was facilitated by staff from UNESCO Headquarters, UNESCO's Regional Offices for Eastern Africa and West Africa, UNESCO's International Institute for Capacity-Building in Africa (IICBA), along with facilitators from FAWE and Microsoft.

This training was adapted from materials developed for a regional training for francophone Africa held in Senegal (12-16 November) with 12 countries (Burkina Faso, Burundi, Cameroon, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Madagascar, Mali, Niger, and Senegal), with the support from Master Trainers trained in Nairobi, Kenya from 3-14 September 2018. The training package drew significantly on UNESCO's seminal report, Cracking the code: Girls' and women's education in STEM, which was the first-ever to demonstrate the situation globally related to girls' participation, learning achievement and continuation in STEM studies, and factors that hinder or facilitate girls' engagement in these fields.

The overall goal of this initiative is to strengthen the capacities of education systems to provide gender-responsive STEM education, thereby increasing girls' participation in STEM education and careers. The specific objectives of the training are to:

- Better understand the factors that influence the participation, learning outcomes and retention of girls in STEM studies;
- Strengthen the capacity of Ministry of Education staff to undertake intentional and deliberate actions to create gender-responsive STEM educational environments that engage, empower and inspire girls;
- Create a support network among Anglophone African countries to share good practices, knowledge and intensify efforts to engage girls in these areas; and
- Develop a framework for monitoring and evaluating progress on STEM and gender.

The training created a safe space for learning, exchanging and testing new approaches

The training adopted a theory to practice approach to explore relevant issues, drawing on the UNESCO report, Cracking the Code: Girls' and Women's education in STEM, and used a mix of interactive pedagogies to strengthen skills and knowledge.

It included activities such as: a world café, a gallery walk, case studies, guided group activities, a field trip to visit schools, resource person presentations, practical exercises and critical analysis exercises, as well as several other activities before and during the training on an online platform.

The key modules of the training are shown in the diagram on the right.

Training modules

Delegates actively participated in various activities during the training

Highlights

The opening and introduction to the training recognized that the implementation of the 2030 Sustainable Development Agenda will require transformative thinking and action. STEM have already made improvements in many aspects of life, such as health and well-being, infrastructure, sustainable energy production, agriculture and other sectors. STEM have the potential to transform and improve people's lives while ensuring environmental sustainability and providing the basis for new approaches and solutions to new and current global challenges.

"STEM in Rwanda has brought about many improvements in life, such as health insurance, ICT infrastructure, sustainable and renewable energy production, modern agriculture and others."

-Dr Isaac Munyakaz, Hon. Minister of State in charge of primary and secondary education

Globally, only 35% of higher education students pursuing studies in STEM fields are women. There are large differences between subjects. Women's participation rates the lowest in areas most likely to experience future employment growth namely, ICT and engineering.

The factors influencing this lack of diversity in STEM education were recognised as beginning far before higher education. Secondary education was felt to be a critical moment where students begin to select subjects for advanced studies and begin to imagine their future careers. Teacher specialization, professional development and support are critical factors that influence not only learning achievement, but also students' choice of future studies and careers. This training challenged participants to influence this educational process and combat gender norms that hold girls back.

The opening also recognized the importance of partnerships to improve education and advance gender equality. Ms. Alice Auma Ochanda called on participants to catalyse holistic and integrated responses that reach across sectors and that engage girls and women in identifying solutions to persistent challenges to ensure a better life and a better future for all.

"Together, we can break barriers to brilliance and ensure a bright and sustainable future for us all."

-Ms Alice Ochanda, delivering remarks on behalf of
Ms Ann Therese Ndong Jatta, Director of UNESCO Regional Bureau for Eastern Africa

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Opening ceremony with representatives from the Rwanda Ministry of Education, the Rwanda National Commission for UNESCO, UNESCO Nairobi and FAWE

During this module, participants discussed the importance of STEM education in advancing continental, regional and national development priorities and the achievement of the Sustainable Development Goals (SDGs) in Africa. It offered participants the opportunity to share more about the situation of STEM education and careers in their countries through interactive exercises.

In the first activity, SWAP-STAT, participants received cards containing a question on girls' participation, learning outcomes and continuation in STEM education and careers in Africa and beyond, and the accompanying answer. Each card contained a different question, allowing participants to examine, for example, the representation of women in different areas of STEM in higher education and STEM careers, countries where gender differences appear in learning achievement from primary school onwards and countries making great progress in closing gender gaps in STEM. The activity served both as an icebreaker, allowing participants to meet and discuss issues, while also gaining a better understanding of gender gaps in STEM education and the underlying factors for the present situation.

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Participants were able to examine the data more closely through a presentation of the situation globally, and in participating countries, as well as through a Gallery Walk. Each national delegation had prepared presentations on the situation in its country, which were printed in the form of posters. During the Gallery Walk, participants “travelled” from one country station to another to learn more about the situation and promising policies and practices aimed at closing gender gaps in STEM education and careers, and improving learning.

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Notable efforts shared during the Gallery Walk included the establishment of STEM model schools in Kenya and Rwanda, scholarships for STEM studies in Uganda and Zambia, strong female participation in STEM competitions in Ghana and Nigeria, and strong policies to advance participation in STEM studies in Ethiopia.

Key points:

- The African Union (AU) recognized the importance of science, technology, research and innovation in stimulating socio-economic development in Africa in its Agenda 2063. STEM education is included in the Continental Strategy for Education for Africa 2016-2025 (CESA) and the AU Strategy for Science, Technology and Innovation in Africa (STISA) 2024.
- There are significant gender gaps in STEM fields in higher education in Africa, particularly in ICT and engineering, manufacturing and construction. In most countries with data, women represent less than one in four students in these fields.
- The 2017 UNESCO Cracking the Code report revealed that differences in girls' and boys' educational and career expectations, gender discrimination in the teaching process and the scarcity of female role models (including female teachers) in STEM are among the factors involved in these gaps.
- Data is needed to advance policies and programmes for STEM education. Many African countries lack timely sex-disaggregated data for evidence-based decision-making.

GENDER AND STEM EDUCATION

This module provided an opportunity to reflect on key concepts related to gender, and how gender roles and expectations influence participation, learning outcomes, the pursuit of STEM studies and careers, and how education systems can address prohibitive factors and take advantage of enabling factors to increase the number of girls entering these fields.

The session began with an excerpt from a video describing how gender influences the behaviour and treatment of men and women, as well as their opportunities in life. Key concepts such as gender, sex, gender roles, gender identity, gender-stereotypes, gender equity, gender equality, and masculinities were clarified. Participants also explored the concept of toxic masculinity through a video, and the implications of toxic masculinity on the realisation of gender equality. An improved understanding of gender concepts emerged from the evaluation as one key take-away by participants.

Through a participatory exercise, participants examined the differential expectations of women and men at different times in their lives, from early childhood to adulthood, and how these expectations can be harmful to both boys and girls, and limit their ability to reach their full potential.

At around age...	Social expectations of boys/men	Social expectations of girls/women	Social expectations of **both**
5			
10			
15			
In adulthood			
At the time of your grandparents			

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In an interactive exercise, drawing on UNESCO's publication Cracking the Code, participants identified factors at the individual, family, school and societal levels that influence girls' participation, achievement and continuation in STEM studies. This included those that hinder girls' engagement in STEM studies, and those that facilitate their engagement in these fields. These were mapped on an ecological model, and the results shared in a plenary discussion. Prohibitive factors identified by participants included: low confidence among girls in STEM subjects, limited awareness parental awareness of STEM careers, lack of gender-responsive plans and budgets, and gender discrimination in STEM professions. Strategies identified to address this included: STEM extra-curricular activities to raise interest, family trips to science museums and shows, ongoing professional development for teachers, and the involvement of mass media to address stereotypes.

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Participants identify factors and strategies at the level of the individual, family, school and society

Key points:

- To ensure the elimination of gender disparities and promote equal access to education, attention must be paid to the roles that influence the expectations of girls, boys, women and men at home, in the community, at school, in the workplace and in society.
- Socially determined differences between women and men, boys and girls can affect their ability to access and control resources, and fully participate in society. Every society and era have gender norms that reflect gender relations and gender power structures.
- Targeted measures often needed to compensate for historical and social disadvantages that prevent women and men from otherwise being equals. Equity measures contribute to equality.
- Strengthening the capacity of education systems to undertake gender analysis and put in place measures to address inequalities benefits all students, communities and societies.

LEADERSHIP FOR GENDER-RESPONSIVE STEM EDUCATION

During this module, participants discussed the elements of effective institutional leadership to provide gender-responsive STEM education, good practices and the situation in participating countries related to institutional leadership at different levels.

The session began with an excerpt from a short feature presented by CNBC Africa that considers why Africa should prioritise STEM education, and the steps taken by Rwanda in this area. This video shows examples of leadership at the state level, in institutions, and even in the scientific community. Participants identified that leaders in the video: created a shared vision, used data to emphasise the issues, cultivated leadership skills among others, supported platforms for engagement, and linked their efforts to strategic initiatives and movements.

Participants recognized that leaders of educational institutions are important in all aspects of education, including teacher motivation, the creation of supportive teaching and learning environments and positive interactions with students, parents and the community at large. School leadership, staff collaboration and a positive school climate are among the essential institutional elements necessary for quality, gender-responsive education.


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Dr Marie-Christine Gasingirwa was invited to share more about her own leadership to ensure girls and women in Rwanda have the opportunity to get involved in STEM education. She spoke of her life as a leader in different roles in the field of wducation – from a classroom teacher to a Director of the Directorate of Science and Technology in the Ministry of Education, to the Recteur of Kigali Institute of Science and Technology and finally to her current role as the Director of Quality Assurance for Higher Education in Rwanda. She was instrumental in seeing the establishment of the Rwanda Association of Women in Science and Engineering (RAWISE) in 2017 and is also a founding member of FAWE Rwanda. Dr. Gasingirwa confirmed her personal commitment to ensuring change and seeing the closure of the gender gap in STEM in her country.

Participants were encouraged to see themselves as leaders, and identify how they could

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demonstrate leadership upon their return to promote quality gender-responsive STEM education

Key points:

- Leadership exists at multiple levels, including within central and decentralized ministries of education responsible for establishing laws and policies to guide education, at the school-level among school administrators, principals, as well as among members of the school management committees. Young people can also be leaders in their schools calling for gender-responsive STEM education. .
- Institutional leadership affects all aspects of education, including teacher motivation, the creation of supportive teaching and learning environments, and positive interactions with students, parents and the community.
- Without the commitment and action of education authorities at different levels, initiatives to create educational pathways for both girls and boys in STEM will not be successful.

GENDER-RESPONSIVE PEDAGOGY

In this module, spread over two days, the concept of gender-responsive pedagogy and effective practices were discussed. Participants had the opportunity to explore how to model different pedagogies through a wide range of practical activities. School visits were organized to see the situation in Rwanda.


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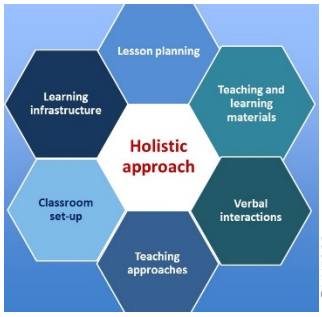
The module was introduced by Martha Muhwezi, the Executive Director of FAWE. FAWE developed the concept of GRP and since 2005, has been supporting teachers to develop their knowledge, skills and attitudes to respond to the learning needs of girls and boys through using gender-aware classroom processes and practices.



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This module reinforced that gender-responsive pedagogy considers gender in lesson planning, teaching and learning materials, pedagogical approaches, classroom design, and learning infrastructure, verbal interactions in the classroom, as well as school management. As management had been considered in the session on leadership, participants travelled through six "World Cafés" to identify good practices in each of its areas. For example, at the table on learning infrastructure, participants suggested the inclusion of gender-friendly washrooms, while in verbal interactions teachers were called on to avoid gender stereotypes.


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Participants sharing their thoughts on GRP during a World Café

Studies show that teaching that involves real-world experience and takes into account how science, mathematics and technology are applied to address real-world problems can improve students' understanding and interest in STEM fields. World competitions, such as "Technovation", presented in the film Code Girl, capitalize on this interest by helping girls to identify and develop technology-based solutions to address local problems. In 2018, a team from Nigeria was the gold scholarship winner, having created an app to help identify fake pharmaceutica drugs in Nigeria. Many countries spoke to similar efforts to engage girls through competitions at the national-level.

While many countries reported on efforts to establish inquiry-based learning practices, and engage learners in innovative and creative project activities, more was generally felt to be needed. Participants had the opportunity to consider how to improve learner-centred STEM education using the ASEI-PDSI approach (**A**ctivity, **S**tudent, **E**xperience and **I**mprovisation), **P**lan, **D**o, **S**ee and **I**mprove. This approach was modelled in a lesson on "Dancing Raisins", where participants placed raisins in a soft drink to hypothesise on the result, test what happens, and consider how to expand learning through modifications to the experiment.


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Participants applying the ASEI-PDSI approach through a "dancing raisins" lesson

This example demonstrated to participants how simple objects found around us can be brought into the classroom to enrich the learning experience at a low cost. It uses fruits accessible in the markets, and call on learners to predict, manipulate and record. Other strategies to integrate the ASEI-PDSI approach were shared in participants' manuals.

School visits

Two secondary schools opened their doors to participants, offering them the opportunity to observe how STEM education is delivered in Rwanda. It was a highlight of the training, where participants were able to meet school administrators, teachers and students, view classrooms and teaching facilities and to exchange about girls' participation, learning achievement and continuation in STEM studies in their respective countries. This included the FAWE Girls' School-Gisozi, a public boarding school identified as a centre of excellence, and the Lycée de Kigali, one of the oldest high schools in Rwanda that was established by the French in 1975 as a science-modelled high school, and under the Rwandan government mandate has become one of the best performing mixed high schools in Rwanda.

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In the last session of this module, participants reviewed lesson plans that applied the ASEI-PDSI approach and considered gender in the design, delivery and monitoring of the lesson plan. They identified different aspects to consider when lesson planning, including: number of male/female learners; how to engage male/female learners in activities, questions, and leadership roles; identification of practical experiments and real-life scenarios; and how to use locally available materials to raise learners' interest, curiosity and engagement.

Key points:

- Gender-responsive pedagogy is a holistic approach that considers gender in lesson planning, teaching and learning materials, pedagogical approaches, classroom design, learning infrastructure, and verbal interactions.
- The measures include the following actions:
    - Consider in lesson planning where to position yourself in the room and how to move around the classroom during the lesson to involve all students
    - Provide diverse experiences that integrate social and scientific issues, provide opportunities for real research, involve real-world experiences, and provide opportunities for practice, reflection and experimentation.
    - Integrate activities that focus on solving real-world challenges, developing 21st Century skills such as creativity, critical thinking and collaboration.
    - Ensure that boys and girls are able to interact and manipulate models or objects, and that the materials are free of stereotypes and prejudices.
    - Use classroom language that treats boys and girls as equal partners and provides them with a supportive learning environment.
    - Create structured learning opportunities that allow learners to test their ideas, fail and learn from their failure to try again and succeed.
    - Cultivate learning outside school; camps, extracurricular activities, and mentoring can encourage girls' interest by providing them with learning opportunities and improving their understanding of careers in STEM.

GENDER-RESPONSIVE TEACHING AND LEARNING RESOURCES

In this unit, participants considered common elements of gender-responsive teaching and learning resources, and reviewed their own materials. A mini professional development workshop was organized by Microsoft, with innovative and practical exercises. The unit concluded on human resources, and the importance of female role models in STEM, mentoring, and other learning opportunities outside the school walls.

A recent UNESCO analysis of more than 110 national curriculum frameworks in primary and secondary education in 78 countries revealed that many textbooks and learning materials in mathematics and science convey gender biases. In many contexts, girls and women were significantly under-represented and, when included, they played stereotypical roles at home rather than in professions such as engineers, scientists or others.

When reflecting on characteristics of gender-responsive teaching and learning resources, participants identified materials which: are free of gender stereotypes and show men and women, boys and girls in various professions and roles in the family and community; reflect the needs and experiences of men and women, boys and girls; and refer to men and women who have made a significant contribution to their field of study. Many indicated that, although efforts have been made to undertake gender analyses of textbooks in some contexts, much remains to be done.

This was confirmed by a practical exercise, during which participants reviewed textbooks and other teaching and learning materials that they had brought for the training. Using a simple tool provided by UNESCO, participants examined the representation of boys and girls, men and women in different aspects of the material, as well as their representation in non-traditional and equal roles. Many participants recognised that gender bias was still present in many of their countries' materials, and that further efforts were needed to undertake more robust analyses and address gender bias.

Participants undertaking a gender analysis of textbooks from participating countries

Building opportunities for extracurricular support, mentoring and access to female role models in STEM fields were identified as key strategies to build girls' interest and expand learning beyond the school walls. Lessons learnt were shared from UNESCO support in Kenya, Madagascar, Rwanda and Uganda to mentorships, teacher training on GRP, and expanded understanding of STEM careers through links to universities and industries as well as the establishment of STEM Clubs in schools and universities. UNESCO shared a video on its programme in Kenya, which has reached over 2,100 students with mentorship and skills training, trained over 150 teachers; and many of the Kenyan participants in the training highlighted the boost that this effort has made to increasing girls' participation in STEM fields. Key elements of the programme's success are: strong political will and commitment; robust partnerships with FAWE, the government, teacher training institutions and the private sector; together with strong monitoring and evaluation tools.

Resource persons were invited to share Rwanda's efforts to bring girls into science and engineering. Ms Ellen Simmons, Ms Hannah Gibson, Ms Lydie Irababarira and Dr. Josephine Malonza shared the experience of FemEng, a collaborative initiative between the University of Rwanda and students at the University of Glasgow. In 2019, FemEng is engaging 3,650 girls aged 12-15 in 12 schools with training and mentorship opportunities, and is interested in expanding its efforts to neighbouring countries. Participants were interested in the model, and its application to their own countries.

Participants were also oriented to resources to build their own knowledge. Dr. Omololu Akin-Ojo, the Director of the ICTP-East African Institute for Fundamental Research, a UNESCO Category II Centre based in Rwanda, shared the work undertaken by the Institute and opportunities for MSc, PhD and in-service learning opportunities. The Institute aims to train 100,000 Africans across 10 years, and solve many challenges facing the continent.

The activities undertaken by Microsoft were one of the highlights of this module. Participants were introduced to the Microsoft Certified Educator programme, a professional development programme that helps educators integrate ICT into STEM teaching and build 21st Century skills in STEM, including real-world problem-solving, creativity, collaboration, problem solving. Mr David Muya, with Microsoft's International Education and Resource Network (iEARN) in Kenya, introduced Microsoft's 21st Century Learning Design (21CLD) for Educators, a collection of courses with lesson plans that support collaborative, practice-based, enriching learning activities and self-assessment materials.

During practical activities, teachers, teacher educators, school administrators, ministry officials and NGO representatives also became students again. They deepened their understanding of computer science and coding. In Microsoft's Hour of Code tutorial, they learned the basics of coding and were exposed to a set of tools and lesson plans that could be incorporated into the teaching of STEM subjects. The Minecraft-game inspired activities introduced participants to basic coding concepts, and enabled them to do practical activities online to build their own digital skills and literacy. Participants were able to receive certificates for completing different parts of the tutorial, and access online tools for educators to deliver content at different levels of education. Participants also saw how programmable robots, using inexpensive programmable hardware like Arduino circuit boards, can support STEM learning. The demonstration demonstrated how activities highlighting the intersections of science, technology and mathematics can build interdisciplinary knowledge and interest in these fields.

Participants developing their skills in coding through practical online activities

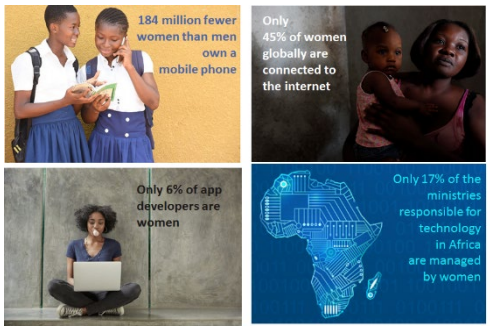
Key points:

- In many contexts, women are severely under-represented in resources and, when included, they play stereotypical roles at home rather than in professions such as engineers, scientists or others.
- A gender analysis of educational resources can enable decision-makers to restore equality in both the presence and the quality representation in textbooks and learning materials.
- Beyond curriculum and textbooks, there is a wide range of resources that teachers can use to cultivate girls' interest in STEM. This includes online resources, locally-available resources, including those in the natural world, as well as students' exposure to extracurricular activities, clubs, camps and role models to better understand STEM studies and careers.

DIGITAL SKILLS AND ICT INTEGRATION IN STEM EDUCATION

This unit allowed participants to explore how to develop digital skills much in demand for the future of work in Africa and around the world, and ensure a better integration of ICT into STEM education, and into education in genaral through exposure to online tools and resources.

Participants examined the gender digital divide in terms of access, skills and leadership in ICT. Women represent only 28% of ICT graduates worldwide, an unprecedented disparity in other disciplines. In many contexts, men are four times more likely than women to have advanced ICT skills, such as the ability to program computers. They are even 25% less likely than men to know how to use ICT for basic purposes, such as using simple arithmetic formulas in software.

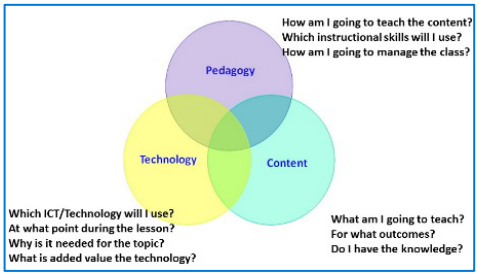


The development of digital skills appears in Sustainable Development Goal 5 (SDG 5), which urges governments to "strengthen the use of key technologies, especially information and communication technologies, to promote the empowerment of women". Similarly, SDG 4, the education goal, calls on countries to "increase the proportion of young people and adults with information technology skills" and "eliminate gender disparities in education". As the World Economic Forum has pointed out, equipping a girl with even rudimentary ICT skills can make a difference in her future income as she grows older, with intergenerational benefits for the education, health and well-being of her children.

ICT-integrated STEM education can help fill gaps in digital skills and improve STEM teaching and learning. Teachers' use of ICT supports traditional learning methods by transitioning students from passive students to active producers who are able to participate in the learning process.

The unit started with a video profiling the FAWE Gisozi school, which participants had gone to during the school visit, that integrates ICT into the educational process as part of national efforts to make Rwanda a technology hub in Africa. Here, ICT is used as a teaching strategy and also as a potential career for students. Participants considered the benefits and challenges in integrating ICT in the teaching and learning process. Participants recognised that technology can create interactive classes and improve interest and motivation, but that limited infrastructure and connectivity in many settings, as well as limited opportunities for teacher professional development in this area remains a challenge.

Participants were introduced to the TPACK Model for ICT integration. TPACK is an acronym standing for Technological, Pedagogical and Content Knowledge. In teaching, you need subject content knowledge and how to structure and present it to learners (pedagogy) integrating technology. The TPACK approach was also elaborated through IICBA's ICT-enhanced Teacher Development (ICTeTD) model. Participants were encouraged to consider how technology could help develop higher-order thinking and promote active, contextualised processes of learning that construct knowledge based on experiences and the assimilation of information. Participants were encouraged to consider how technology could be integrated into the teaching and learning process to promote research, problem-solving, simulations, and what knowledge teachers would need to expand such processes.



Participants were also introduced to a wide range of online resources that can help teachers strengthen their teaching practice, including:

- PhET Interactive Simulations which allow live online simulations in many subjects
- GeoGebra a mathematical application that can inspire students
- Khan Academy, an online learning platform with a wide range of STEM courses from kindergarten to senior high school
- Educators' Community which allows teachers to connect with other teachers around the world to share lessons and learning materials
- Imagine Academy which offers online courses in technology education, and industry-recognized skills and certifications.

The participants' manuals included a long list of other resources, many of which were already known to participants and used in their teaching practice.

Mr David Muya, with Microsoft's IEARN shared a number of other apps for teaching and learning including:

- Class Dojo, an online behavior management system intended to foster positive student behaviors and classroom culture
- Socrative, an online assessment tool for teacher with options to create quizzes, polls, etc.
- Three Ring, a website that allows you to securely upload photos of students' work

Microsoft supports other programmes to strengthen digital skills such as:

- DigiGirlz offers high school students the opportunity to participate in hands-on workshops on computers and technology, and to meet Microsoft employees to learn more about careers in technology; and
- MakeWhatsNext which offers a series of events, mentoring sessions and training to engage and inspire girls to do more and make a real impact in their communities.

An online platform, created by the UNESCO International Institute for Capacity Building in Africa (IICBA), was also created for the training to share resources, and to encourage further monitoring of actions undertaken after the training. This platform was reported to be very useful for the francophone African trainings to understand the profile of participants and keep connected.

At the end of the module, participants were encouraged to reflect on how they could enrich their lesson plans with technology and, more generally, improve the integration of ICT into pedagogical practice.

Key points:

- Ensuring that everyone has the digital skills necessary to succeed in today's technology-oriented world is of global importance. ICTs, increasingly at the heart of work and education, and the acquisition of skills to take advantage of these technologies are necessary to address many of the global challenges outlined in the Sustainable Development Agenda 2030.
- There is a persistent and widening gender digital divide in many contexts. This is true in terms of access to the Internet and mobile technology, skills and commitment to technology development, as well as leadership positions.
- Teachers must have the opportunity to develop their own digital skills and understand how to use technology in their teaching practice. There are many online tools that can help them build their capacity, as well as educational resources for students.

Looking forward

During the five days of the training, participants had time at the end of each day to discuss in their country teams the implications of the training for their work and the actions they would take to advance gender-responsive STEM education upon their return to their countries. More specifically, participants considered actions that:

- improve understanding of the state of STEM education and careers, as well as gender gaps in participation, learning achievement and completion;
- fill capacity gaps at different levels and strengthen the education system and staff capacities;
- promote gender equality and inclusive education, positive social norms, innovation, creativity and critical thinking;
- draw on good practices and evidence on what works to attract, retain and advance girls' education in STEM;
- develop multidimensional education that integrates science, technology, engineering and mathematics.

On the last day of the training, participants produced a national roadmap that identified short-term (next 6 months) and long-term (after 6 months) actions they would undertake individually or collectively. A grid was placed on the wall, allowing participants to share their roadmaps in a way that is visible to all. By indicating one action per card (yellow for the short term, green for the long term), participants placed their cards in the following categories: strategic data/information; leadership/policies and strategies; teacher training and support; teaching and learning resources; learning environment; and commitments outside educational institutions.

Participants share roadmaps to advance gender-responsive STEM education

It was recognized that some participants would like others to participate in the exercise or that they may not feel able to indicate actions without the validation of their supervisor, organization or school. Participants were encouraged to continue to develop their roadmap and submit it to UNESCO after the training, if further changes were needed.

UNESCO expressed its interest in facilitating further cooperation between countries to advance the actions identified and to facilitate the acquisition of resources (technical and financial) to advance this field of activity. UNESCO is also interested in making greater use of the online platform created for the event to share resources and tools, and has proposed the creation of a WhatsApp group to share more information, resources and progress. UNESCO is also aiming to expand training

opportunities to ensure a greater reach throughout Africa, including through online training platforms for initial and in-service teacher professional development.

The training concluded with a closing ceremony presided over Mr Albert B. Mutesa. Secretary-General of the Rwanda National Commission for UNESCO on behalf of the Rwandan Minister of State for Primary and Secondary Education, Dr Isaac Munyakazi, with the participation of Mr Takayuki Miyashita, Ambassador of Japan to the Republic of Rwanda, Dr Marie-Christine Gasingirwa, Chairperson of the Rwanda National Commission for UNESCO and Director of Quality Assurance for University Education and Ms. Justine Sass, Chief of the Section of Education for Inclusion and Gender Equality at UNESCO Headquarters. Remarks were delivered and certificates awarded by the Ambassador of Japan as well as the representative of the Minister of State for Primary and Secondary Education, Mr. Albert Mutesa.

"We need STEM skills and knowledge for better lives, jobs and an environment to live in. Japan is making a lot of efforts to put STEM at the centre of education, and promote gender-balance in STEM."

- Mr Takayuki Miyashita, Ambassador of Japan to the Republic of Rwanda

"UNESCO stands with you and your countries' efforts to expand interest, engagement and achievement of girls in STEM fields for the betterment of girls' lives, societies and the achievement of the SDGs."

- Ms Justine Sass, Chief of the Section of Education for Inclusion and Gender Equality at UNESCO Headquarters

Two representatives from the group of participants provided words of appreciation to the government of Japan for the financial support that made this training possible, the government of the Rwanda for hosting the event and their strong commitment, FAWE, AU/CIEFFA and Microsoft for their important contributions, and UNESCO for the development and delivery of this training in Rwanda. The closing remarks delivered on behalf of Hon. Minister of State in charge of primary and secondary education called on participants to expand learning and action upon return to their countries.

"Participants must be committed to report back to their authorities and find ways to reach more teachers and partners to advance gender-responsive STEM education."

- Dr Isaac Munyakazi, Hon. Minister of State in charge of primary and secondary education

The trainers, participants and organizers concluded the week tired, but with energy and commitment, to move forward and advance quality gender-responsive STEM education to realize the continent's aspiration of "the Africa We Want".

UNESCO Education Sector

Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development. UNESCO is the United Nations' specialized agency for education and the Education Sector provides global and regional leadership in education, strengthens national education systems and responds to contemporary global challenges through education with a special focus on gender equality and Africa.

The Global Education 2030 Agenda

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to ***"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."*** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

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Education 2030

ED/ESC/IGE/2019/04

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Sustainable Development Goals