

**SECONDARY STEM (SCIENCE, TECHNOLOGY, ENGINEERING AND MATH) TEACHERS
PROFESSIONAL DEVELOPMENT & TRAINING WORKSHOP TO IMPACT 120 TEACHERS &
FACILITATORS IN NIGERIA**

WAAW (Working to Advance STEM Education for African Women) Foundation is pleased to present this proposal for support to expand and continue its efforts to implement a comprehensive Secondary STEM Teacher professional Development & Training Workshop in Nigeria.

We are very excited about the positioning and the objectives of WAAW over the next few years. Our Big Hairy Audacious goal is to train over 10,000 teachers (in Nigeria and Rwanda) who will impact over 1,000,000 young people in the next 5 years.

Over the past two years, we have piloted, designed, implemented and trained over 200 teachers and principals/school administrators in Nigeria in Gender- Sensitive STEM curriculum. We have continued to build partnerships, engage with these teachers, provide STEM curriculum and after training engagement, and we have recently started to develop an SMS-friendly Mobile App and providing peer support. These teachers are now having significant impact in their schools.

With each STEM teacher in Africa often reaching over 100 students each year, we believe this model has the impact of changing the educational system for STEM massively, with a potential of reaching one million children each year (over the next 5 years). This program will provide on-going STEM and digital literacy programming training to ensure that during the grant period, over 12,000 secondary school students are successfully trained and guided to employ their acquired skills and engage technology to Improve job readiness and employability skills; Improve potential for digital entrepreneurial activity on the internet using digital skills; and Improve continued progress by connecting to peer networks, additional learning platforms, opportunities for jobs or funding for entrepreneurial activity on the internet.

Project participants will gain digital literacy skills that boost their self-confidence and expose them to the vast opportunities for self-learning, advancement and digital entrepreneurship that technology offers. The overall objective of this project is to increase the number and strengthen the capacity of African girls who use internet communication and technology skills to improve their lives by providing world-class digital literacy and internet technology training that will enhance their economic capacity and motivate girls to employ technology to advance self-learning, access resources and solve problems in their communities. The long term benefit is economic empowerment for girls through increased awareness and participation in the digital and internet economy. This contributes to enhanced employability skills for women who use the internet and digital skills to improve access to information, capital and job readiness, ultimately reducing poverty in Africa.

We believe Africa is Rising and training the youth in Africa with critical thinking skills and globally relevant STEM education will ensure they contribute to solving the lack of job issue; creating employment and innovations that will solve the global challenges of the 21st century (instead of contributing to the problem).

CONTEXT AND ISSUE

In Sub-Saharan Africa, the gender disparity in STEM discipline significantly widens further, due to several factors including a huge lack of sufficiently trained and gender sensitive teachers, dire absence of female role models, reluctance of females students to enroll in STEM courses due to lack of family support and societal stigma. Teachers and school administrators can play an important role in closing the gender gap in STEM fields by reworking curriculum, adopting fun hands-on teaching methodology and creating gender sensitive classroom environment to foster an interest in technology among girls at an early age (in secondary school) when career decisions are formed, so that they can acquire and strengthen the skills needed to fulfill new STEM jobs, create jobs and compete in the 21st century innovation economy. Our project showcases an effective model of attracting girls and motivating teachers and students in STEM, thus addressing the Millennium Development Goal to promote gender equality and achieve quality education for all.

Teachers are the biggest influence on our young population, If we do not train them effectively, it would be difficult to have a national impact and train the next generation contributory workforce that will strengthen the African nation's economy through technology and Engineering innovation. In Sub-Saharan Africa public schools, students often perceive science as abstract and theoretical as a result of the way teachers present STEM by dictating facts and information from assigned textbook reading that does little to engage students' especially girls interests or promote innovation. Key among the factors contributing to poor STEM teacher ineffectiveness in classroom includes inadequate professional development courses for teachers, obsolete gender insensitive curriculum, unavailability or insufficient science kits and hands on experience and unmotivated teachers. Also, there is a gender gap in STEM due to unconscious negative bias from educators that undermine girls' success in STEM pursuit, for instance, Teachers rate boys to be better in Math than girls with similar grades.

It is widely known that the key factors that impact female engagement in STEM include: (1) Regular mentoring and exposure to female role models in STEM careers; (2) Peer-to-peer support networks; (3) Exposure to qualified teachers with exciting teaching techniques; (4) Hands on, inquiry based and practical learning methods rather than rote learning; and (5) Greater personal access to learning and teaching resources.

Therefore, there is an urgent need to provide teachers with hands on training in new STEM topics and equip them to help organize extra-curricular hands – on activities in STEM to grab their students' interest at an early age (in secondary school) when career decisions are formed.

OUR SOLUTION AND CALL TO ACTION:

The proposed project addresses the identified challenges by providing professional development training to STEM Teachers in Public Secondary schools in low resource and poverty affected regions in Nigeria to improve gender- sensitive and project based pedagogy aimed at eliminating gender biases and employing an innovative thinking to solve community-driven, real world

problems. Teachers are then motivated to train young public secondary girls aged 11 – 18 years in short relevant STEM and computer programming courses that will help them gain globally relevant skills and build their capacity in engineering and technology.

In addition, our project manufactures and distributes gender--sensitive, affordable African-made STEM kits and lesson plans to be utilized by secondary school teachers to aid in students' understanding of STEM subjects. The kits are available as complete "STEM in a Bag" modules that include Arduino circuit design, Robotics, Web Development, Gaming, 3D printing, Renewable Energy, and Climate Change. Till date we have trained over 320 African teachers in the use of STEM in a bag kit and corresponding lesson plans, and distributed over 90 kits. 90% of teachers report using one or more modules from the kits an average of 10x per semester and report significantly improved student excitement, engagement and understanding.

Our project has a clear goal to carefully monitor, collate and evaluate data to help deepen knowledge about the impact of Teachers training and document best practice on students especially girls in Nigeria and Rwanda. Reports on the merits of this model along with quantitative impact assessment data will be made available to Government agencies and key stakeholders, and employed to highlight the importance of role modeling in STEM for teachers and students. This will hopefully serve as a template for policy makers to harmonize and integrate learning into the education sector.



WAAW foundation will recruit and train 120 junior and senior secondary teachers in public, federal or unity and private schools with the aim to equip teachers with pedagogy skills, digital skills, creative and problem solving skills, integrative teaching methods. Secondary school STEM teachers will participate in an exciting and technically challenging one week immersion in teaching STEM, curriculum development and introduction to 21st century digital literacy and computer programming. The workshop will use hands on activities, lectures, tutorials, experiments and field activities, led and presented by experts and professionals in the field, as an avenue to engage teachers and excite their interest in computer science. Emphasis will also be on introducing teachers to the internet and how they can explore useful and free resources found on the internet to help their students further engage in STEM and computer programming. There will be a strong focus on team and group participation to explore problem solving skills, leading to strong peer support networks.

In addition, WAAW foundation will introduce teachers to its online repository of lesson plans that employ affordable locally and easily available resources to empower teachers with tools and resources to go out and implement solutions after the training workshop. Strategies for self-learning in STEM will also be emphasized to encourage Teachers to keep learning after the training program is over.

The workshop will include training sessions focused specifically on STEM teachers working with expert trainers and pedagogical faculties from colleges of education on new teaching methodologies that emphasize inquiry-based hands on teaching. It is expected that the teachers will go back to their schools and implement what they have learned to impact even more students, each teacher impacting at least 100 students in STEM.

Teachers will be equipped with the STEM-in-a-bag computer lab kit as well as free online resources and science teaching kits to improve their impact in the classrooms. WAAW will support Teachers to launch After-school STEM clubs and programs in their respective schools to impact over 12,000 secondary school students (Low income, resource-constrained and/or public secondary girls between the ages of 13 – 17 years) within the 1 year. The STEM club will provide on-going weekly afterschool STEM and computer programming activities to engage the girls throughout the school session.



PROJECT OBJECTIVE

- Understand the importance of STEM and digital literacy in the new economy
- Learn & embrace strategies of implementing Technology focused lessons in their classrooms including using easily available and affordably local materials.
- Learn to teach interactively - hands on, away from the black board.
- Train in inquiry based learning - Encourage input from students (facilitate) rather than teacher led, information discharge methods.
- Encourage fun in classrooms as it promotes healthy learning and retention.
- Encourage project based, team learning and presentations in their classrooms.
- Provide a slew of samples of hands on learning and exposure to practical STEM lessons and resources

MONITORING AND EVALUATION

Success for this project will (i) clearly indicate that program participants demonstrate significantly greater gains than a control group; (ii) provide rigorous data to facilitate meaningful policy change. Success will be determined in the following ways:

- Number of trained students and participants impacted by program each year.
- Number of teachers who demonstrate increased confidence in experiential learning and using our STEM kits in their classrooms.
- Number of girls who express STEM kit usage as motivating factor for continued study in STEM in College or take up entry level job
- Number of Active Clubs (increased membership, activities).
- Number of innovative projects conducted in each Club/Competition.
- Number of teachers with improved STEM teaching methods.
- Percentage increase in student interest in STEM subjects.
- Number of students who continue to participate in related STEM programs or take advanced courses.
- Number of participants who created and maintain web presence (e.g. websites, blogs) and entrepreneurial activity.
- Number of students who successfully explore and receive funding for entrepreneurial activities or recognition of blogging, advocacy etc. based on training and resources provided.
- Participants' familiarity with concept such as engineering design process, science enquiry and problem solving.
- Number of participants who commit to civic engagement by returning as mentors & role model.
- Performance of students in their school academic STEM classes post engagement.
- Number of stakeholders engaged and supporting STEM activities.
- Local community perception of the benefit of females in STEM and Technology careers.

Reach, Impact and Multiplier: 100% of the target audience of STEM teachers and secondary students will be impacted directly. Indirect impact is expected on participants' families, school boards and principals, participants' social network of peers and friends, and the government, private institutions, education sector. Remote STEM teacher impact is also expected.

BUDGET

Teachers Training Program	
BUDGET	
6Operational	USD
Pre-program preparation	
YEAR 1	
Program preparation incl. transportation, school engagement, program design and management	\$400.00
Curriculum research and development	\$300.00
Teachers training and support	
Training venue (2)	\$2,000.00
Feeding	\$2,100.00
Additional Training kits and Activity materials	\$5,000.00
Facilitators (6) stipend and travel fare	\$3,000.00
Honorarium & souvenirs	\$100.00
Marketing and Branding	
Recruiting event (transportation), Fliers, and brochure	\$300.00
Branded T-shirts for Teachers, volunteers & facilitators	\$1,200.00
Advertisement/Publicity/media	\$550.00
Impact Assessment Tools and Metrics	
Develop database, processes, survey tools etc	\$500.00
Administration	
USD	
Internet subscription/Wifi	\$750.00
Total Expenses	
	\$16,200.00