The AIMS Secretariat
District Gasabo, Secteur Kacyiru
Cellule Kamatamu, Rue G590 St
Kigali, Rwanda

Terms of Reference

Action Research on Math and Science for Sub-Saharan Africa – Rwanda Pilot Program

1. Background

The African Institute for Mathematical Sciences (AIMS) is a pan-African Network of Centers of Excellence offering quality postgraduate education, research innovation and public engagement/outreach programs for the advancement of STEM in Africa's transformation journey. Established in 2003 with one center in Cape Town, South Africa, the organization currently has five more centers in Ghana, Senegal, Cameroon, Tanzania, and Rwanda.

Through its one-year Masters' program in mathematical sciences, AIMS brings together Africa's most brilliant young talent in a highly interactive, culturally diverse learning environment where discovery, creativity and testing of mathematical solutions to development are encouraged. Consequently, AIMS has won global recognition as a center of excellence for postgraduate education and research.

In Cameroon and Rwanda, AIMS runs a gender-responsive teacher training program. As well, AIMS created two critical initiatives: Quantum Leap Africa to prepare Africa for the coming quantum revolution, and the Next Einstein Forum to propel Africa on to the global scientific stage.

2. AIMS Teacher Training Program in Rwanda

In line with Rwanda's Vision 2020, Economic Poverty Reduction Strategy II, and the Education Sector Strategic Plan, which emphasize the need for a competence-based curriculum for promotion of a knowledge and skills-based economy, in 2015 the Government of Rwanda introduced the Competence Based Curriculum (CBC) for primary and secondary schools. Now in its 3rd year, there is an urgent need to equip secondary school teachers with necessary competencies, tools, and resources to enable them to adapt, utilize and contextualize the CBC for improved student learning outcomes. From January 2016 and in partnership with the Government of Rwanda (GoR), AIMS is mandated to support the training of secondary school teachers in mathematics and sciences.

The Mathematics and Science Teachers Training Program is a five-year program (2018-2022) targeting in-service and pre-service teachers. The program is a collaborative effort with the University of Rwanda's College of Education (UR-CE), the Rwanda Education Board (REB) and in close partnership with the Mastercard Foundation's Leaders in Teaching Initiative (LIT). The program has four main pillars:

1. **Training of teachers and master trainers** on innovative gender responsive pedagogic approaches for improved performance of girls and boys in math and science. Under this pillar, the program will pilot the Mathematics and Sciences for Sub-Saharan Africa (MS4SSA) approach in 30 secondary schools spread out across all the districts in Rwanda for two years;
2. **Infrastructure, resources and ICT support** to equip secondary school science teachers with resources and tools needed for improved delivery of CBC for math and science in Rwanda;
3. **Outreach and public engagement** to enhance behavior change communication and increase public understanding and support for pursuing an education in math and science in Rwanda for boys and girls.
4. **Operational/Action research** for evidence generation that informs the project as well as policy dialogue for greater engagement on STEM issues by government, civil society, the private sector and academia.

3. MS4SSA Pilot

Initiated by the World Bank in collaboration with the Worcester Polytechnic Institute (WPI) and the New Jersey Center for Teaching and Learning (NJCTL), MS4SSA is an integrated approach to enhance learning outcomes for mathematics, physics, chemistry and biology among secondary school students. MS4SSA focuses on integration of four aspects of teachers' work crucial for improved learning outcomes: teachers' content knowledge, innovative classroom pedagogical practices, integration of ICT in teaching and continuing guidance, mentoring and support from school leaders, inspectors and others in the education system.

MS4SSA is being tested through a two-year pilot at the S1 Level in 30 selected secondary schools. The two-year MS4SSA pilot is embedded within the five-year teacher-training program. Despite having already piloted and tested the proposed MS4SSA approach in the Gambia and Lesotho, running a pilot in Rwanda within the framework of the overall teacher training program will positively inform the implementation on an ongoing basis and determine the feasibility of scaling up within the Rwandan context. The MS4SSA pilot within the broader program will provide early evidence of the effectiveness of the MS4SSA approach in Rwanda. To put in place a continuous learning mechanism an active action research component will accompany the pilot to generate evidence, document good practices, and eliminate the gap normally experienced between pilots and taking an approach to scale.

4. Objective

The main objective of the action research is to evaluate the impact of MS4SSA approach in the teaching and learning of math and science in the selected pilot schools. In doing so, the secondary objectives of the action research will be to:

1. Collect and analyze data on an ongoing basis to inform decision making, ongoing re-engineering of the program and production of evidence based white papers;

2. Document lessons learned, good practices, and make recommendations for improvements of MS4SSA approach considering contextual factors in Rwanda; and

3. Provide input to the summative evaluation of the pilot project, identifying its impact, key strengths, challenges and lessons learned.

5. Scope of Work

Given the objectives of the action research, the action research consultant/firm will accompany the MS4SSA pilot throughout its implementation period in 30 selected schools. The action research will involve collection and analysis of qualitative and quantitative data from the schools in addition to relevant data from sector, district and national levels. The researcher(s) will help in developing and implementing the research design including framing the research questions, defining the research and learning strategy, and develop tools and approaches to be applied in the action research. Specifically, the researchers will be expected to:

i. Fully understand the MS4SSA approach, TTP Rwanda, and the LIT initiative including their objectives and the relevant stakeholders;

ii. Identify suitable methodological framework and data collection methods to collect primary and secondary data, both qualitative and quantitative, on opinions, attitudes and observed changes by school leadership, teachers, sector/district/national education officials, students, and parents;

iii. Identify and apply suitable theoretical model(s) to review and analyze data that will identify changes to student learning outcomes and academic performance of S1 students in math and science, using comparable non- pilot schools in each district, as well as examining trends in students learning outcomes pre-vs-post MS4SSA pilot;

iv. Identify and apply suitable theoretical models and research methods to assess changes in teacher capacity in relation to teaching methodology and subject content;

v. Identify and apply suitable theoretical model/s and research methods to evaluate the immediate impact of the MS4SSA on the teachers': mastery of subject content, pedagogical content knowledge, and ICT integration in teaching of their respective STEM subjects.

vi. Incorporate a gender lens throughout the action research process;

vii. Use empirical evidence and theoretical understanding on STEM teaching and learning to identify and elaborate on strengths, weaknesses, opportunities, successes and shortcomings of the MS4SSA approach in improving STEM education in Rwanda;

viii. Investigate the feasibility of scaling up the MS4SSA methodology nation-wide; and

ix. Propose concrete, practical evidence-based and theoretically grounded recommendations based on the information identified above for the scaling up of the MS4SSA approach in Rwanda.

6. Deliverables

1. **Inception report:** Describing the consultant or firms understanding of the ToR, detailing the action approach strategy, work plan, list of possible stakeholders to be consulted, research tools.

2. **Action research plan:** Complimentary to the work plan embedded within the inception report, the action research plan will breakdown in detail the data and indicators to be measured, action research participants, and a comprehensive schedule of research activities to be undertaken and deliverables.

3. **Quarterly progress reports:** Regular update reports on progress of the action research and pilot implementation, including latest key findings and emerging challenges.

4. **Stakeholders' Learning workshop:** Facilitated by AIMS to present key findings from the action research findings, document comments and inputs for consideration and incorporation into the final report.

5. **Evidence based white papers for publication:** periodically consolidate key analysis and findings into theoretically grounded evidence-based white papers for sharing with relevant stakeholders.

6. **Final report:** A document compiling all the research findings and summative data analysis to inform the feasibility of scaling up MS4SSA in Rwanda. The report will include a synoptic analysis for each of the 30 pilot schools.

7. Roles and Responsibilities

AIMS

1. Provide and approve letters of support introducing the consultant(s) to stakeholders, a synopsis of the assignment and its rationale;

2. Project management and oversight of the study;

3. Review and approvals of inception report, quarterly reports, white papers and final report

4. Provide access to relevant information and data and liaise with relevant stakeholders to obtain data necessary for use by the consultant(s); and

5. Organize stakeholders workshop to enable sharing of findings and provide stakeholders with opportunity to input into the final report

Consultant(s)

1. Develop a technical action research proposal for the MS4SSA pilot;
2. Develop an inception report including a work plan and methodology;
3. Design and apply a wide range of action research tools for data collection and analysis;
4. Recruit and train research assistants/ field data collectors to support in data collection if needed;
5. Collect and analyse primary and secondary qualitative and quantitative data in-schools and from key stakeholders;
6. Submit quarterly progress reports on the state of pilot implementation and latest action research developments;
7. Develop periodic evidence-based theoretically grounded white papers from data collected through the action research process;
8. Develop a draft final report of the final report;
9. Present research findings to stakeholders via the stakeholders' workshop and collect inputs for incorporation into final report;
10. Produce final report for the action research.

8. Timeframe/ Duration

The work outlined in the assignment will begin on 08/02/2019 and continue throughout the life of the MS4SSA pilot. The final deliverable will be the action research report for the MS4SSA pilot, which will be due December 2019.

9. Requirements and Selection Criteria

Suitable consultant(s)/firm for this contract are expected to meet the following minimum requirements:

1. Experts to work on the assignment must hold at least a master's degree in education and research, development studies, social sciences or another relevant field;
2. Extensive and demonstrable experience conducting similar research activities in Rwanda and/ or Africa;
3. Exhaustive knowledge and understanding of the education sector in Rwanda is a plus;
4. Fluency in English (oral and written) and fluency in French as an added advantage;
5. Proven experience in quantitative and qualitative research designs, methodologies, conducting analysis, and developing high quality technical reports;

6. Good understanding of key trends and emerging issues in the field of education, especially secondary science education in Africa;
7. Capacity to carry out electronic data collection;
8. Strong statistical data analysis using STATA or SPSS; and
9. Excellent writing skills and ability to organize information in a concise and clear manner using a variety of tools
10. Knowledge and experience on conducting research and other assignments on gender and education.

The following criteria will be used to select the consultant(s) for this contract:

1. Robustness of the proposed methodology as presented in the technical proposal (30%)
2. Evidence of executing similar assignments (25%)
3. Strength of CVs of consultant(s), relevance of their skills, knowledge and experience as they relate to the assignment (25%)
4. Financial costs as indicated in the proposal (20%)

10. Application Procedures

All interested and qualified firms/consultant(s) are encouraged to forward their expression of interest (EOI) electronically to actionresearchttp@nexteinstein.org accompanied by a hard copy delivered to the AIMS secretariat reception desk (KG 590, House #1, Kacyiru, Kigali) no later than 20/12/2018.

The EOI should include technical and financial proposals, CVs of participating consultants and evidence of relevant work. Firms should also include a profile of the firm, trade license in the field of consultancy services, VAT registration and their Tax Clearance Certificate.

When submitting the EOI electronically, applicants should indicate the subject line as: "Action Research for MS4SSA Pilot".