بسم الله الرحمن الرحيم

Maldives Atolls Education Development Project (AEDP: P177768)
Ministry of Education
Republic of Maldives

TERMS OF REFERENCE

STEM Education Facilitator (Consultant) for AEDP Schools - Cluster 02 (N. Meyna, R. Hulhudhuffaaru, B. Atoll Education Centre and Lh. Atoll Education Centre)

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1. **Introduction**

The Maldives Atoll Education Development Project (AEDP) is organized under five components: (a) enhancing curriculum delivery; (b) continuing teacher development; (c) measuring and enhancing system performance; (d) coordination, monitoring, capacity building and technical assistance; and (e) contingent emergency response. These components and the activities under them were prepared through a process of consultation and collaboration with the Ministry of Education (MoE); the Ministry of Finance and Treasury (MoFT); the atoll education agencies; public and private employers; academics and school principals, teachers, parents and students. The components and activities are also based on the knowledge and experience gained through the implementation of the Learning Assessment and Measurement (LAMP) Global Partnership for Education (GPE) trust fund.

The Government of Maldives (GoM) is implementing the "Maldives: Atoll Education Development Project (AEDP). The project is funded by the World Bank. The objective of the project is to increase access to education and enhance the quality of secondary education.

2. **Components of AEDP**

The AEDP is organized into 04 components

Component One: Enhancing Curriculum Delivery and Increasing Higher Secondary Participation.

The objective of this component is to promote strategic initiatives at the country level to strengthen and develop the general education system with a special focus on secondary grades. The activities under this component will be mainly implemented by schools with policy and technical support of the Ministry of Education (mainly PPR and School Administration Section), National Institute of Education (NIE), and the Department of Inclusive Education (DoIE).

STEM Education:
Science Technology Engineering and Mathematics (STEM) education aims to incorporate four specific disciplines, namely Science, Technology, Engineering and Mathematics as an interdisciplinary and applied approach in students learning and development. Instead of teaching the four subject areas separately STEM aims for a cohesive learning paradigm based on a modern, practical and a real-world application approach.

STEM Education which is also an essential aspect of the National Curriculum of Maldives, helps to foster ingenuity and creativity in students, assists in building resilience, encourages teamwork, collaboration & adaptation, develops problem solving skills, creates a platform for knowledge application, develops tech skills in students and prepare them for future job markets and meet the demands of the dynamic and evolving workforce of the nation.

3. Under this component the Project will assist NIE to:

Even though some components of STEM education are randomly taught in few schools and learning institutions, it is a relatively new concept in the Maldives Education System and NIE lacks the expertise needed to implement and integrate STEM in the existing subjects. Therefore, this project will assist NIE to develop, facilitate and conduct professional development programmes on STEM integration for in-service teachers in the Maldives.

Pilot Program: Physical Computing & Coding (PCC)

The Physical Computing and Coding program is designed for teaching the fundamentals of STEM by providing students with the opportunities to explore the exciting world of coding and physical computing and create electronic circuits that they can control with code. Students will be able to apply knowledge of basic programming concepts (control structures, variables, functions, etc.) to a physical device and create digital solutions that directly impact the real world. The devices are driven by real-world needs and solve real-world problems. It is designed to teach students (and teachers/adult mentors) at selected pilot schools as a team. Students will be from grades 7 and 8. Classes will be taught for two hours every week using a blended learning model with online resources and facilitated by a knowledgeable trainer at school. The PCC classes may occur before school, during school hours, or after school, depending upon which time slot best suits the school and the trainers' availability.

Under this component the Project will assist NIE to:

Provide teacher training on basic programming concepts using physical devices such as micro bits, assist the ambassadors in teaching STEM in the selected schools and support the ambassadors in planning STEM education.

Objectives of this Assignment

Most of our schools do not have dedicated computer science teachers nor the time and resources to build a computer science/coding curriculum to teach STEM learning. Thus, the goal of this activity is to support the pilot schools (28 schools) to teach the STEM concepts using micro bits and its add-ons. The selected training provider will be responsible for providing the blended courses to the selected STEM teachers/STEM ambassadors at the schools. At the end of the courses, the STEM teachers/STEM ambassadors will be able to continue the project in the years to come making this project sustainable.

Therefore, NIE needs assistance of facilitators who would be able to provide training and give support to STEM ambassadors of the schools.

4. Scope of Services
- The facilitator will be responsible for providing training using blended mode for the selected ambassadors of Meyna School - GS47, Hulhudhuffaaru School - GS57, B.Atoll Education Centre - GS01, Lh. Atoll Education Centre - GS22.

- The facilitator may use the following STEM and coding curriculum providers to select the blended learning resources for the courses:
  - Code.org
  - MakeCode.org
  - Micro bit.org

- The facilitator should provide ongoing support to ambassadors, helping them to overcome any difficulties they may encounter during the course (contact hrs; minimum 2 hrs per week for 3 months) of their learning.

- The facilitator should provide weekly reports to the school administration and the NIE.

- The facilitator should assist ambassadors with planning of the STEM lessons and provide ongoing support to ambassadors, helping them to overcome any difficulties they may encounter during STEM teaching and learning in schools.

- The facilitator should observe and evaluate student projects, provide feedback to the STEM teachers/STEM ambassadors, keep records of the progress and provide monthly progress reports to the school administration and the NIE.

- The facilitator should provide troubleshooting and other technical support for projects undertaken by students using the micro bit kits.

5. Deliverables

Deliverables	Payment %
1. A plan on training and supporting ambassadors to use micro: bit add-ons in STEM lessons. Deliverable: A step by step plan on how to train, monitor and support ambassadors to use micro: bit add-ons in STEM lessons.	10%
2. Training Deliverable: Conduct trainings on the details provided in the annex, at least 2 days in person training sessions (6hrs per session) followed by short trainings (1-2hr blended mode) based on the progression report and provide continuous support for STEM ambassadors in planning and delivering of STEM lessons. Document and demonstrate (using video or photographs) atleast 6 projects using the listed Micro: bit kits and other available resources.	60%
3. Project assessments Deliverable: Conduct weekly meetings with ambassadors and assess student's performance	15%

through their projects and provide feedback to ambassadors orally and in writing.	
4. Monthly reports Deliverable: Provide monthly reports on the progress of the training and performance of STEM ambassadors to school and NIE.	15%

6. **Required Qualifications and Experience**
   - Diploma or higher in computer science, software engineering or a similar major
   - Experience in python or other high-level programming languages
   - Certification of completion of Micro: bit course (at least 5 hours)
   - Familiar with physical computing devices such as Micro:bit or Arduino

7. **Other Competencies**
   - The facilitator should be able to effectively communicate the concepts to ambassadors
   - Experience in strategic planning and strong organizing capability
   - Ability to identify training needs and modify the training as the need arises
   - Experience in working in a team and supporting youth

8. **Institutional Arrangements and Reporting**
   - The facilitator should report to the STEM coordinator of NIE on the status of the deliverables on a regular basis.
   - The facilitator should be available to work in the schools for deliverables that require physical presence.

9. **Duration of Services and Terms of Payment**
   The service is for a period of 3 months. The agreement could however be extended should the need arise and the conduct of the assigned is found to be acceptable. The facilitator will be paid based on the agreed rate by both parties in writing.

10. **Confidentiality, Ethics and Conflict of Interest**
    The selected facilitator undertakes to comply with the World Bank's rules with regard to corrupt and fraudulent practices, conflict of interest and confidentially and the Code of Conduct specified in the Environment and Social Safeguards Frameworks of the AEDP project. The facilitator shall maintain confidentially on all sensitive information obtained during the assignment and shall not publish wholly or in part the findings or such information, without prior written consent by the Operations and Monitoring Support Unit of AEDP.

Annex

Physical Computing with micro: bit add-ons

Training objectives:
This training is based on micro: bit add-ons that will allow ambassadors to strengthen their knowledge of basic programming concepts (control structures, variables, functions, etc.) and use micro: bit add-ons to teach STEM lessons effectively. Ambassadors will perform basic physical tasks using LEDs, buttons, sensors and micro: bit add-ons to see how computer programming gives physical devices the ability to interact with their environment.

Course Breakdown

Unit 0: Welcome
Objectives / Topics Covered
● Course Overview ● Goal Setting ● Variety of STEM careers ● Workplace Readiness

Unit 1: Intro to Physical Computing with micro: bit
Objectives/Topics covered
● Intro to physical computing ● Goal Setting ● Comments ● Pseudocode ● Analog vs. digital ● Variables ● Connecting external components

Unit 2: Program Control with micro:bit
Objectives / Topics covered
● For loops ● While loops ● Variables ● Making sound ● If statements ● If/else statements ● Using buttons ● Using servo motors ● Operators (arithmetic, comparison, and logical) ● Using sensors (light, temperature, acceleration, distance) ● Functions and parameters

Unit 3: Advanced micro: bit
Objectives / Topics covered
● Challenges ● Explore a new sensor ● Build a step-by-step project

Use micro: bit to bring an idea to life using sensors and external components.
Guide ambassadors to use the following add-ons to teach STEM concepts in the classroom.

Microbit Robot Smart Cutebot Kit
Inventor's Kit V2 For micro:bit
Micro:bit 32 IN 1 Wonder Building Kit
Micro:bit Joystick:bit V2 Kit
Micro bit Tinker Kit
Micro:bit Smart Home Kit
Micro:bit Smart Agriculture Kit
Micro:bit Smart Science IOT Kit
Micro:bit Science Box Experiment Kit
Micro:bit Smart Coding Watch Kit

Micro:bit Beginner Basic Kit
BITCAR - Autonomous Line Following & Obstacle Avoiding Car for Micro:bit
Micro:bit Case
LED Strip Light Programmable WS2812 DC 5V

Unit 4: STEM Careers (0.5 week/ 2 hours)
Objectives / Topics covered
● Variety of STEM careers
● Workplace Readiness ○ Integrity ○ Professionalism ○ Valuing diversity ○ Time Management