بسم الله الرحمن الرحيم

Terms of Reference

Consultancy firm to provide the Physical Computing & Coding (PCC) program to selected 15 School.

Atoll Education Development Project (AEDP)

Ministry Of Education: (Reference: MV-MOE-302505-CS-CQS)

1. Background

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) Project. 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.

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.

Pilot Program: Physical Computing & Coding (PCC)

The Physical Computing and Coding program is designed to 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:

- Pilot STEM education component, physical computing and coding in 15 (most ready schools among 28 schools selected for AEDP project) schools using the existing infrastructure and resources available.

2. 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 introduce STEM learning. Thus, the goal of this activity is to support the pilot schools to teach the PCC courses identified as a starting point for introducing STEM education at the Maldives schools. The selected training provider will be responsible for providing the blended courses to selected students at schools as well as offer assistance to the selected STEM teachers/STEM ambassadors at the schools. At the end of the PCC courses, the STEM teachers/STEM ambassadors will be able to continue the project in the years to come making this project sustainable.
Therefore, to carry out the pilot phase of STEM education, NIE needs assistance of facilitators who would be able to deliver the PCC courses (refer to Annex) to students (grade 7 and 8) and the selected STEM ambassadors of the schools.

3. Scope of Services

- The firm will be responsible for providing blended learning for the students at the selected schools based on the PCC unit outlines provided with this TOR. The firm will also be responsible for training the selected teachers at these schools.
- The firm may use the following STEM and coding curriculum providers to select the blended learning resources for the courses:
    - Code.org
    - CodeCombat.com
    - Codehs.com
    - Tynker.com
- The firm will identify appropriate online teaching tools/resources to teach the courses with recommendations from the NIE staff. The firm will provide the following information on the courses prior to the start of teaching.
    - List of resources with hardware and software requirements for each course
    - Links to student learning materials on a learning management system
    - Teacher guide
    - Teacher resources (including handouts, activities and assignments)
    - Trainer’s profile (narrative)
    - Media (Videos, and tutorials/demos)
    - Projects and project rubric
- The firm will provide qualified trainers to teach the blended courses. The trainers will have experience in teaching computer programming/robotics and will be able to effectively communicate the concepts to

students. The trainer will manage the classroom, ensure students are engaged and on-task, and maintain a safe and respectful learning environment.

- The trainer will provide ongoing support to students, helping them to overcome any difficulties they may encounter during the course of their learning.
- The firm will provide regular progress reports to the school administration and the NIE.

Responsibilities:

Training Firm:

- Develop/identify a detailed curriculum for the Physical Computing and Coding (PCC) program based on the unit outlines provided.
- Responsible for ensuring that all necessary software resources including programming tools, the learning management system is available.
- Provide qualified trainers who have experience in teaching computer programming/robotics in a blended learning environment.
- Delivers the PCC courses to selected students at the pilot schools in a manner that is culturally appropriate and sensitive to the needs of the students and the school community.
- Provide regular progress reports to the school administration and the NIE.

Trainers:

- Facilitates in-person classes and assisting students with their projects.
- Collects pre and post-course assessments, observes and evaluates student projects, and provides feedback to the STEM teachers/STEM ambassadors.
- Manage the classroom, ensuring students are engaged and on-task, and maintain a safe and respectful learning environment.
- Communicate the concepts of computer programming/robotics effectively to students, ensuring that they understand and can apply the concepts.
- Provide ongoing support to students, helping them to overcome any difficulties they may encounter during the course of their learning.
- Keep records of students learning progress and provide regular progress reports to the firm, school administration, and the NIE.

4. Required qualifications:

Firm requirements: Mandatory documents.

1) Letter expression of interest.
2) Firm registration certificate (Valid)
3) Short company profile.
4) Curriculum vitae of proposed team.
5) Firm should have 3 year of experience teaching coding/robotics or computer science.
6) Provide that, firm has knowledgeable in python or other high-level programming languages.
7) Provide that, firm has experience working in a team and supporting youth.
8) Provide that, Familiar with physical computing devices such as Micro: bit or Arduino.

Key staffs and technical information will not be evaluated at the firm shortlisting stage

Key staffs and technical requirement:

- Methodology and understanding of the assignment.
- Quality and Clarity approach method.
- Key staff requirement: Key staff's minimum qualification is, Diploma or higher in computing science, software engineering or a similar major.

Technical Evaluation criteria.

DETAILS	MAXIMUM POINTS
Methodology and understanding of the assignment	**[30]**
Qualifications and experiences	**[70]**

Minimum score to pass the technical evaluation is 70/100.

5. Institutional Arrangements and Reporting

The work will be carried out under the guidance and direction of the implementing agency (NIE). The consultant will work at their own workplace. However, the consultant will be required to attend all the relevant meetings arranged by the implementing agency (NIE).

6. Duration of Services

The service is for a period of 6 months. The agreement could however be extended should the need arise and the conduct of the assigned is found to be acceptable. The Consultant will be paid based on the agreed rate by both parties in writing.

7. Confidentiality, Ethics and Conflict of Interest

The selected firm 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 Consultant 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.

ANEX:

Intro to Python Programming Syllabus

Course Overview and Goals
The introduction to Python programming curriculum teaches the foundations of computer science and basic programming, with an emphasis on helping students develop logical thinking and problem-solving skills. Once students complete the Introduction to Python programming course, they will be able to program using Python 3.

Total duration: 6 - 8 weeks

Learning Environment:
The course will utilize a blended classroom approach. The content is a mix of web-based and physical activities. Students will write and run code in the browser and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources online to leverage time in the classroom and give focused 1-on-1 attention to students.

Programming Environment: Students write and run programs in the browser using an online editor or Python IDE installed on the computer.

Quizzes: Each lesson will include at least one formative short multiple-choice quiz.

Prerequisites:
The Introduction to Python with Turtle course is designed for complete beginners with no previous background in computer science. The course will be highly visual, dynamic, and interactive, making it engaging for those new to computer science.

Course Breakdown

Unit 0: Welcome (1 day/.5 hours)
Objectives / Topics Covered
● Course Overview ● Goal Setting ● Variety of STEM careers ● Workplace Readiness

Unit 1: What is Artificial Intelligence? (.5 week/2 hours)
Objectives / Topics Covered
● What is Artificial Intelligence? ● Types of Artificial Intelligence ● The Ethics of Artificial Intelligence ● Exploring an Ethical Issue in AI

Unit 2: Getting to know Python turtle (.5 week/2 hours)
Objectives / Topics Covered
What is a command? ● How do we communicate with computers? ● Python turtle library ● Moving turtle ● Drawing circles ● turtle coordinate system

Unit 3: Moving turtle efficiently (1 week/4 hours)
Objectives / Topics Covered
● Turning Tracy at right angles ● For Loops ● Using coordinates and angles to move turtle's position

Unit 4: Designing and Communicating Solutions (1 week/6 hours)
Objectives / Topics Covered
● Commenting your code ● Naming rules in Python ● Functions ● Artistic commands ● Top Down Design

Unit 5: Controlling turtle with Variables (1 week/ 2 hours)
Objectives / Topics Covered
● Variables ● User input ● Parameters ● The value of i in for loops

Unit 6: Making Decisions (1 week/5 hours)
Objectives / Topics Covered

● If statements ● If/else statements ● While loops

Unit 7: turtle Challenges (1 week/6 hours)
Objectives / Topics Covered
● Control Structures ● Commands ● Defining versus Calling Functions ● Control flow ● Looping ● Conditionals ● Commenting code ● Top Down Design

Unit 8: Create a Chatbot(2 weeks /10 hours)
Objectives / Topics Covered
● What is a chatbot? ● Design Thinking Process overview ● Empathy ● Define ● Ideate ● Prototype ● Test ● Finalize

Intro to Physical Computing with micro:bit Syllabus

Course Overview and Goals
The introduction to Physical Computing with micro:bit course allows students to refresh their knowledge of basic programming concepts (control structures, variables, functions, etc.) in order to control a physical device. Students will perform basic physical tasks using LEDs, buttons, and sensors to see how computer programming gives physical devices the ability to interact with their environment.

Total duration: 7 - 12 weeks

Learning Environment:
This course utilizes a blended classroom approach. The content is provided through a mix of web-based and physical exercises, with students writing and running code in the browser and then downloading code to their physical devices for further testing and exploration. Teachers utilize tools and resources online to leverage time in the classroom and give focused 1-on-1 attention to students. Each unit of the course is broken down into lessons. Lessons consist of video tutorials, short quizzes, pseudocode exercises, physical explorations, example programs, and written programming exercises, adding up to over 30 hours of hands-on programming practice in total.

Programming Environment:
Students write and run programs in the browser using the MakeCode editor and will download their programs to their micro:bit devices for further testing.

Prerequisites
This course is designed to reinforce understanding of computer science concepts by applying them to physical devices. It is assumed students have an introductory knowledge of variables, control structures, and functions. Students should have completed (or be concurrently enrolled in) an introductory programming course - Intro to Python

Course Breakdown

Unit 0: Welcome (1 day/.5 hours)
Objectives / Topics Covered
● Course Overview ● Goal Setting ● Variety of STEM careers ● Workplace Readiness

Unit 1: Intro to Physical Computing with micro:bit (1-2 weeks/5-10 hours)
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 (2-3 weeks/10-15 hours)
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 (3-4 weeks/10-15 hours)
Objectives / Topics covered
● Challenges ● Explore a new sensor ● Build a step-by-step project
● Final project
- Use your micro:bit to bring an idea to life using sensors and external components.
- Present your project to peers, administration, and family!

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

Web Design & Cybersecurity

Course Overview and Goals
In today's world, web pages are the most common medium for sharing ideas and information. Learning to design websites is an incredibly useful skill for any career path. The Web Design & Cybersecurity course is a project-based course that teaches students how to build their own web pages and prepares students with crucial skills to be responsible citizens in a digital future. Students will learn what is cybersecurity and why cybersecurity is important, recent threats to cybersecurity, and different careers in the field. They will also learn about internet etiquette and how to stay safe on the world wide web. Students will also look at the potential effects of our digital footprints, how to protect information from online risks, and the implications of cyberbullying. Students will learn the languages HTML and CSS, and will create their own live homepages to serve as portfolios of their creations. By the end of this course, students will be able to explain how web pages are developed and viewed on the Internet, analyze and fix errors in existing websites, and create their very own multi page websites. Students will learn the foundations of user interface design, rapid prototyping and user testing, and will work together to create professional websites.

Total duration: 7 - 12 weeks

Learning Environment:
This course utilizes a blended classroom approach. The content is provided through a mix of web-based and physical exercises, with students writing and running code in the browser and then downloading code to their physical devices for further testing and exploration. Students will modify existing code and run it in the browser, investigate cyber related topics and reflect on them and discuss them, create digital presentations, and engage in in-person collaborative exercises with classmates. The content for Web Design is fully web-based, with students writing HTML and CSS in the browser.

Programming Environment:
Students modify and run programs in the browser using an online editor. Due to the fact that different browsers treat HTML and CSS differently, it is highly recommended that all student computers use an up-to-date version of the Chrome browser.

Prerequisites
There are no official prerequisites for the Web Design & Cybersecurity course. The course is designed for complete beginners with no previous background in computer science. The course is highly visual, dynamic, and interactive, making it engaging for new students. In the broader course pathway, the Web Design & Cybersecurity course is a great starting place.

Unit 0: Getting Started - What is the Web? (1 week/5 hours)
Objectives / Topics Covered
● Course introduction ● Goal setting ● The Internet ● URLs 2 ● How a web page gets to your computer ● Variety of STEM careers ● Workplace Readiness

Unit 1: What is Cybersecurity? (1-2 weeks/5-10 hours)
Objectives / Topics Covered
● Course Overview ● What is Cybersecurity? ● Impact of Cybersecurity ● The CIA Triad

Unit 2: Digital Citizenship and Cyber Hygiene (2-3 weeks/10-15 hours)
Objectives / Topics Covered
● Digital Footprint and Reputation ● Cyberbullying ● Internet Safety ● Privacy and Security ● Information Literacy ● Creative Credit and Copyright ● Hacking Ethics

Unit 3: HTML - Structuring Websites (3 weeks/15 hours)
Objectives / Topics Covered
● How do we build web pages? ● Markup Languages ● HTML ● HTML tags ● HTML attributes ● HTML elements ● The Anatomy of an HTML page ● Formatting text ● Hyperlinks ● Images ● Copyright fair use ● Lists ● Nesting tags ● Tables ● Styling with HTML ● HTML Colors

Unit 4: CSS - Styling Websites (2 weeks/10 hours)
Objectives / Topics Covered
● How do we style web pages? ● CSS vs HTML ● CSS Selectors ● Selecting by tag ● Selecting by class ● Selecting by id 3 ● The Cascade (order of selector precedence)

Unit 5: Project - Create Your Homepage (1 week/5 hours)
Objectives / Topics Covered
● Combination of the concepts learned thus far ● Allow students to think creatively about applications of the concepts they have learned ● Designing a web page from scratch