ALL CHILDREN CODING INITIATIVE - DEVELOPMENT OF CURRICULUM

1.   INTRODUCTION

Information and Communication Technology Agency of Sri Lanka (ICTA), an agency established in 2003 under the Information and Communication Technology Act, No. 27 of 2003 and Amendment Act 33. The agency is mandated to ICT development strategies and programmes, in both the government and private sectors, including Legal & Policy reforms. ICTA was entrusted to implement "e-Sri Lanka Development Project" from 2005 which was completed in 2012.

ICTA is now aligning its programmes and projects towards a new vision aiming to accelerate its ICT based development in Sri Lanka. One of the focus areas in the development is 'Technology to Citizens' and ICTA is currently formulating and have commenced some of the projects in this focus area. ICTA has taken several initiatives to bridge the digital gap through the introduction of a comprehensive eLiteracy program, delivered through national telecenter network (Nenasalas).

The Government has also taken steps to introduce IT education in schools. Subjects have been included in the national curriculum at the G.C.E. (O/L) and G.C.E. (A/L). However, penetration of ICT knowledge to school children is still limited due to lack of sufficient number of teachers and appropriate facilities at schools. The basic digital literacy rate of Sri Lanka is estimated at 35% as of 2014. However, in order to benefit from a technology driven knowledge based economy, it is imperative to train the population in higher-level digital skills. A desirable skill set in the work force include computational thinking, problem solving skills, lateral thinking, programming, entrepreneurship and an understanding of how and when to use correct technology. This is what employers want, and young people need to succeed in a digital world.

The need for digitally savvy workforce has been emphasized by The World Economic Forum (WEF) in its annual Global Information Technology Report in 2013. It notes that "a comprehensive digital boost could help lift over half a billion people out of poverty over the next decade". Thus, imparting high-level digital skills to our student population, starting at an early age, would contribute to up skill the Sri Lankan workforce that is suitably equipped and qualified. This is a prerequisite for government's plans for creating a knowledge economy. Such a workforce will contribute to the creation of an entrepreneurial eco system leading to economic growth and job creation.

2.   BACKGROUND

Already, some of the developed countries, particularly USA, are taking a keen interest in encouraging schools to teach computer science to their children. The code.org launched in 2013 as a non-profit initiative is running programs at the schools to train and motivate school children to be coders by conducting activities at schools. One such popular activity is 'Hour of Code' and has gained popularity among schools in USA. European Union has embarked on a similar coding initiative titled "All you need is C<3DE", with the aim of equipping young people with the skills to succeed.

"**COMPUTERS ARE EVERYWHERE AROUND US**: in our cars, cell phones and televisions. But here's a secret: they need a program to tell them what to do. Programmers are the people who dream up new things and then write the instructions that bring their ideas to life. We want to help people **UNDERSTAND WHAT PROGRAMMING IS**, **DIFFERENT JOBS** programmers can have, and how to **GAIN THE SKILLS** they need to become one someday.

"By 2020 there will be 1 million programming jobs left unfulfilled," –techprep website-

"Skills development does not come about as fast as technological development, which is why we are faced with a paradoxical situation: although millions of Europeans are currently without a job, companies have a hard time finding skilled digital technology experts. As a result, there could be up to 825,000 unfilled vacancies for ICT (Information and Communications technology) professionals by 2020.

Reference: https://ec.europa.eu/digital-single-market/en/grand-coalition-digital-jobs

"Computer coding taught in Estonian primary schools; Lessons in computer programming will be adopted by the national curriculum for primary schools in England from September.

Reference: http://www.bbc.com/news/education-25648769, 8 January 2014

Modern governments have a problem. The Internet is becoming increasingly important to the future of economies, and yet the skills associated with it remain – for the most part – far down the priority order in terms of education policy. Amongst these governments, only a handful are putting in formal, structural, systems in place to teach coding from the earliest levels – amongst them are New Zealand, South Korea, the US, Israel and the UK.

UK will be the first major G20 economy to place coding at the heart of the school curriculum on a national level. The government has ordered coding become compulsory for every child aged 5-16 years old.

The Year of Code is a great initiative to promote technology, entrepreneurship and creative thinking.

Reference: http://techcrunch.com/2014/02/04/uk-government- backs-year-of-code-campaign-boosts-funds-to-teach-code-in-schools/

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Sri Lanka itself is planning to have 1000 IT startups by 2020. And to realize US$ 5 billion export revenue (as envisioned by the IT industry) and Sri Lanka will need around 200,000 personnel. Currently there are about 70,000 and need to find 130,000 IT jobs in 5 years or 26,000 IT personnel /year.

Therefore it is proposed that an island wide initiative be launched to equip the school children with the necessary knowledge, skills and attitudes to cope with the requirements of future job market in the IT industry. In addition, the skills acquired through programming, like logical thinking, problem solving, persistence, collaboration, and communication, can be applied to any grade level, any subject area, and in every part of life. Programming isn't just limited to computer science majors in schools. They can contribute to all aspects of economic activities by providing the required support by developing computer programmes and applications as well as have the necessary knowledge to select the best technologies for each activity. This will facilitate the move of Sri Lanka into a knowledge based economy that leverages on the benefits of the technological advances to support the growth of Sri Lankan economy. A readily available technology-savvy work force would also create an environment that encourages investments in the country.

By aligning to the global movement, Sri Lanka too should adapt this concept and utilize existing infrastructure such as school labs, Telecentres, other computer labs to introduce computer coding to school children. The program should be designed in such a way that by learning basics of coding, students will also acquire a complementary set of desirable skills, become creative and entrepreneurial. This will eventually develop a critical mass of talented employees and entrepreneurs in all parts of the country eventually contributing to the growth of the IT industry as well as improve efficiency of other services through the use of technology.

3. OBJECTIVES

3.1 PROJECT OBJECTIVES
1. Develop a coding curriculum from basic to advance for children aged 6 -17 years.
2. Create awareness and interest among the school children on coding to make them logical and creative innovators.
3. Train IT teachers / Nenasala operators, and other private training providers on coding
4. Increase the level of computer literacy in the country
5. Recommend introducing coding as a subject in school curriculum in future.

3.2 SPECIFIC OBJECTIVE OF THIS ASSIGNMENT

- Development of a Coding Curriculum from Basic to Advance for children aged 6 to 17 years.

4. SCOPE OF SERVICE

i. Study available resources for coding – local and international.
ii. Identify curriculum development levels for children aged 6 to 17 years (Four levels desired)
   Note - *Consultants are expected to discuss and make proposals on most appropriate and effective teaching approach to deliver each children age group/category/level.*
iii. Develop the curriculum to master problem solving skills and computational thinking. Give emphasis to; breaking down tasks into a logical sequence of smaller steps, discarding unnecessary elements, diagnosing errors and inventing new approaches when designing the curriculum.
iv. Identify appropriate programming tools and techniques.
v. Develop the curriculum including both online and offline activities and develop a teacher guide.
vi. Develop the curriculum for each level in printable format (for print media to be published as 12 sessions).
vii. Run an adequate number of trials to test curriculum taking into account gender balance and socio economic spread.
viii. Provide a Monitoring & Evaluation (M&E) method to measure the effectiveness of learning coding, by children achieving desired outcomes throughout the project.
ix. Refine curriculum based on outcome of the trials.
x. Design coding competitions for each level.

5. OUTCOMES AND DELIVERABLES:

	Task	Deadline	Deliverable
1	Identify & study available material such as Open Education Resources / Apps for coding for different age groups, online and offline activities.	Commencement date +2 weeks	Report on literature review. Submit an initial outline of the proposed curriculum.
2	Identify different levels, age groups , content and content presentation methods.	Commencement date +6 weeks	Report on the breakdown of levels / age and content topics. Content presentation formats, appropriate tools and techniques.

3	Development of the Curriculum		
	3.1 . Completion of level 1. (25% completed curriculum)	Commencement date +8 weeks	Submit level 1 completion document and presentation to the expert group.
	3.1.1 Three trials of level 1 for three demographic groups (Urban, semi urban & rural) Design coding competition structure for level 1.	Commencement date +10 weeks	Feedback of the trials. Finalized curriculum of level 1 with teacher guide in both hard and soft versions. Report on coding competition structure for level 1.
	3.2 . Completion of level 2. (50% completed curriculum)	Commencement date +12 weeks	Submit level 2 completion documents and presentation to the expert group.
	3.2.1 Three trials of level 2 for three demographic groups (Urban, semi urban & rural) Design coding competition structure for level 2.	Commencement date +14 weeks	Feedback of the trials. Finalized curriculum of level 2 with teacher guide in both hard and soft versions. Report on coding competition structure for level 2.
	3.3 . Completion of level 3. (75% completed curriculum)	Commencement date +16 weeks	Submit level 3 completion documents and presentation to the expert group.
	3.3.1 Three trials of level 3 for three demographic groups (Urban, semi urban & rural) Design coding competition structure for level 3.	Commencement date +18 weeks	Feedback of the trials. Finalized curriculum of level 3 with teacher guide in both hard and soft versions. Report on coding competition structure for level 3.
	3.4 . Completion of level 4. (100% completed curriculum)	Commencement date +20 weeks	Submit level 4 completion documents and presentation to the expert group.
	3.4.1 Three trials of level 4	Commencement	Feedback of the trials.

		date +22 weeks	Finalized curriculum of level 4 with teacher guide in both hard and soft versions.
	for three demographic groups (Urban, semi urban & rural)		
	Design coding competition structure for level 4.		Report on coding competition structure for level 4.
4	Develop the curriculum for each level in printable format (for print media)	Commencement date + 24 weeks	Refine and submit printed document for all 4 levels with the soft version after expert group review and feedback.
	TOTAL	**6 months**	

Consultant will be supervised on the quality, quantity, contextually and timeliness of the project as per the agreed terms of condition and scope of work.

6. DURATION OF THE ASSIGNMENT

The total assignment to be completed within 6 months of award of the contract.

7. QUALIFICATION OR SPECIALIZED KNOWLEDGE / EXPERIENCE REQUIRED
Minimum Qualifications of Consultants;

Professional Staff	Academic Qualifications	Experience in the proposed role	Exposure to applications development & other experience
Consultant 1	B Sc in IT/Computer Science or equivalent	3 years in curriculum development experience / activity design.	Pedagogical Knowledge.
Consultant 2	B Sc in IT/Computer Science or equivalent	3 years' experience in application development.	Experience and knowledge on software tools and programing skills.
Consultant 3	B Sc in IT/Computer Science or equivalent	One year experience in creative content writing & 1 year curriculum development experience.	Basic programing skill.

Notes
- Consultants must meet all requirements stipulated in this document as per the above table.
- Marks will be given for minimum qualifications and any qualification beyond the minimum qualifications stipulated in the table.

7. **CLIENT INPUT**
   - Client will help identify the groups for the trial runs.
   - Client will nominate the expert group for review.

8. **REVIEW PROCEDURE:**

   The Consultant will be required to work closely with the ICTA appointed review committee and the respective Project Team of this project in finalizing the deliverables.