DEVELOPMENT OF ONLINE KNOWLEDGE ASSESSMENT SYSTEM

TERMS OF REFERENCE

1.0. Introduction:

The Tertiary and Vocational Education Commission (TVEC) being the apex level policy making body for Technical and Vocational Education and Training (TVET) sector of Sri Lanka is entrusted with the task of planning, coordination and development of TVET at all levels in keeping with the human resource needs of the economy. In order to achieve this task, the TVEC expects to introduce online Knowledge Assessment for different occupations, Admission Selection Test for the applicants of the public and private training institutes under the purview of the Ministry of Skills Development and Vocational Training and Intelligence Quiz when required.

Currently the knowledge assessment is conducted through written examination and the entrants for the National Vocational Institutes are selected using an offline examination system. The proposed system will replace this system with an online examination procedure. A web application will be built to schedule exams, hold exams and to mark the answers for the exams. Entrance applicants will log in to the system at the time of the exam and answer the questions through the web. The answers will be automatically marked by the system and results will be stored in a database.

2.0 Requirements and Specifications

2.1 Building Quiz

2.1.1   Question Category - Questions can be stored and retrieved from categories in the Question bank. There will be questions under units specified in each subject with version number (NCS and Revision Number) and subject medium. Furthermore, Students will have access to different categories levels (Easy/Medium/Hard) of questions according to their trade being specified. Questions can also be categorized as practicing quizzes, mock exam and final exam.

2.1.2   Question Types – Questions can be created in the following types;
Calculated, Drag and drop, Matching, Multiple Choice, Random Short Answer Matching, Select missing words, Short-Answer, Numerical, True/False etc.

2.1.3   Quiz layout - Quiz navigation, Flag Question, Base Mark and Answered Status are displayed in the Quiz navigation block. Questions appear to the student has to be randomized or shuffled.

2.1.4   Quiz reports – Basically the reports required for quiz such as; Centre wise test attempts, Grades report, Responses report and Statistics report.

2.2 Quiz Setting

2.2.1   Timing:

2.2.1.1 Open the quiz - Before the opening time the quiz will be unavailable to students. They will be able to view the quiz introduction but will not be able to view the questions. Quizzes with start times in the future display both the open and close date for students.

2.2.1.2 Close the quiz - After the closing time, the students will not be able to start new attempts. Answers that the student submits after the quiz closing date will be saved they will be marked.

2.2.1.3 Time limit - Specify a time limit, several things are done as below in order to ensure that quizzes are completed within that time.

- A countdown timer is shown in the quiz navigation block.

- When the timer has run out, the quiz is submitted automatically with whatever answers have been filled in so far.
- When time expires, Open attempts are submitted automatically.

    2.2.2   Grade:

        2.2.2.1 Grade to pass - Set a passing grade for the quiz. This may be connected with Activity completion.

        2.2.2.2 Grading method - the final grade is the highest grade in any attempt.

    2.2.3   Review options: Students will be shown when they review their past attempts at the quiz under mock exams or practicing quizzes. The various pieces of information that could be controlled are: Marks, Right answer, etc.

2.3 System Administration

    2.3.1   Security Features:

        2.3.1.1 The system must encrypt quiz data, usernames and password stored in the database using. Cryptographic techniques.

        2.3.1.2 Delivery of Username & Password - Super admin is able to create the admins and users for other training institutes (There will be four type of user categories available; TVEC, Training Institute, Assessor and Student) and it is needed to be adopted Role-Based Access Control (RBAC) to authorize system resources allocation to users based on roles.

        2.3.1.3 Password policy:

Usernames and passwords are utilized in order to access the testing system. The length of passwords must always be checked automatically at the time that users construct or select them.

- The system must enforce passwords of at least eight (8) characters.
- The system must enforce a password that contains at least: 1 lowercase and 1 uppercase letter, 1 special character (!@#$%^&*) and 1 number (0–9).
- The system should be able to prevent password guessing attacks, the number of consecutive attempts to enter an incorrect password must be three (3) unsuccessful attempts. The involved user account must be suspended until reset by the Systems Administrator.
- Passwords must always be stored in an encrypted format in the database.
- Developer must use universally accepted encryption standards that helps protect against the threat of malicious activity by performing real-time encryption and decryption of the database.

        2.3.1.4 The developer shall also adhere to following security requirements:

Information Security which is based on the following elements:

- Confidentiality - ensuring that information is only accessible to those with authorized access.
- Integrity - safeguarding the accuracy and completeness of information and processing methods.

- Availability - ensuring that authorized users have access to information when required.
- Compliant use - ensuring that the platform meets all legal and contractual obligations.
- Responsible use - ensure appropriate controls are in place to enforce ethical and law-abiding behaviour, conservation of common resources, and respect for other users within the system.

2.3.1.5 Include up-to-date CAPTCHA program as a remedy to stop spam and other intrusions wherever required.

2.3.1.6 Handle session hijacking and session replay.

2.3.1.7 Input validation to prevent attacks such as buffer over -flow, cross-site scripting and SQL Injection.

2.3.1.8 Uploading of Questions - This feature is only authorized by TVEC.

2.3.1.9 Delivery of Exam - Final exam can only be scheduled and delivered by TVEC. However mock exams, practicing quiz, chats and forums can be handled by the admins of the training institutions.

2.3.1.10   Communication - All communication between the server and client will be done over SSL and All request and data transfer between the server and the database must be done over an SSL connection.

2.3.1.11   Random authentication test such as; snap shots, 30 seconds audio files, Geo tagging, Timestamp all candidates records.

2.3.1.12   Bio-metric authentication based on fingerprint scanner facility.

2.3.2   General Features:

2.3.2.1 Super admin has the Dashboard for the online test system.

2.3.2.2 Upload Student information by CSV file and assigned into group of batches to the central database.

2.3.2.3 Ensure compatibility to all the browsers (Mozilla Firefox, internet Explorer, Google Chrome, Opera, Safari).

2.3.2.4 Implement data validation for both client and server.

2.3.2.5 The portal should run on a PC connected to a network with minimum bandwidth of 512 kbps.

2.3.2.6 Provide user help functionality on major components. (e.g. FAQs)

2.3.2.7 Maintain consistent aesthetics in UI of the system.

2.3.2.8 Welcome window for the exam with the facility of customization of its content.

2.3.3   Backup & Recovery: The system should automatically perform regular backups of all critical items including; quiz data, system logs, reports and the database in an encrypted format. The backups shall be stored in an off-site storage location or preferably a secure cloud storage. The backups will regularly be tested to ensure integrity of the backups.

2.3.4   Disaster Recovery/Management: The developer shall provide a disaster recovery plan which is properly documented, tested and maintained to ensure that in the event of a major failure of the testing system or a corrupted database, essential level of service will be provided. The disaster recovery plan should include:

- Emergency procedures, describing the immediate action to be taken in case of a major incident.

- Fall back procedure, describing the actions to be taken to relocate essential activities or support services to a backup system.
- Restoration procedures, describing the action to be taken to return to normal operation at the original system.
- Periodic training of personnel and users associated with the testing system should be conducted defining their roles and responsibilities in the event of a disaster.

2.3.5 Customization: If the proposed testing system is a packaged software to meet individual requirements, it should be submitted a proposal for a method of customization and its limits.

2.3.6 Technology Transfer: The developer needs to engage with the TVEC team during the project period. However the developer must note that the TVEC has the limited IT staff. TVEC could do only the minor corrections with the assistance of developer.

2.3.7 Training: The developer require to provide training to all the users (Approximately 20 users in the district of Colombo) about the management and administration of the system. This is to provide an understanding of the system, its database and infrastructure configurations of the system.

2.3.8 Reports:

2.3.8.1 Institutions will be able to track student progress by grade book, activity completion, competencies.

2.3.8.2 Analyze statistics for each Test, Group and User.

2.3.8.3 Common report file format should be generated on the following arears; Backups, Logs, Live logs, Performance overview, Security overview, Statistics, Event monitoring rules.

2.3.9 Ownership;
The developer require to hand over the final product to TVEC. The final product has to be included; all source code, intellectual property permissions and other relevant documentation. (User manual, Database Diagram, etc.)

2.3.10 Warranty;
Provide two year warranty after the user acceptance signoff. During this period, the developer is responsible for the following technical support; Update patches, Fix bugs, and Make post-deployment changes to the system based on feedback from user experience and service warranty according to the agreed period of time.

3.0 Calling Web Services for Existing Systems
The Call Web Service allows to integrate data from web services within testing system and that will allow for more flexible mapping of web service inputs and outputs. The following two systems need to be linked with the testing system.

3.1 Institute Registration System
3.2 Certificate Printing System

3.2 Following technologies are used for the existing systems;
Operating systems: Windows server 2012
Database: MS SQL Server
Scripting Language: Php
Web Server: IIS
Programming language for certificate printing: .Net

3.3 All existing systems run on local servers.

4.0 Deliverable period

1. The first prototype need to be submitted within 4 weeks after the agreement signed.
2. Requirement validation within 2 weeks after the 1st prototype.
3. Pilot system implementation by end of May 2019.
4. Implementation of the system by 2nd week of June 2019.

5.0 Financial proposal

Financial proposal must indicate the expected fee including the taxes.

6.0 Qualifications and Competences

6.1 Company Profile - At least 5 years' experience in web-based software development.
6.2 Corporate experience demonstrating successful provision of services similar to the work described above.
6.3 Nationally or internationally recognized standards.
6.3 Project staff qualifications and details.
6.4 Commitment to act according to professionalism ethics when work with internal systems.

7.0 Evaluation Criteria

Evaluation will be based on competitive basis subsequently to a Technical Evaluation (TE) of the proposal. TE will consider technical capability of the firm and the feasibility of financial proposal submitted. Only the eligible candidates will be informed for further discussions and be asked for additional information. Based on the TE Committee and the Tender Board decisions, the most eligible candidate will be assigned to continue with the work.