**Annex A. Functional, Non-Functional and Technical Requirements**

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| **s/n** | **Specification** | **Type**  **(Mandatory / Need to have / Optional)** | **Complied?**  **(Yes / No)** | **Note** |
| **LMS Administration Panel** | | | | |
| 1. | The LMS facilitates managing the system using admin panel and facilitate setting up and management of the LMS in terms of branding (icon, logo, color, header, footer…), selection of languages, access type (self-registration or registration by request). | Mandatory |  |  |
| 2 | The administrator should be able to configure fields for user profile (to facilitate analytics by background characteristics). | Mandatory |  |  |
| 3 | User Management – The System must allow role-based-user management in terms of administration of the LMS, category, courses and lessons. The administrator should be able to create groups and assign courses by groups. | Mandatory |  |  |
| 4 | The administrator should be able to generate notifications within the system as well as outside the system (sms,email) | Mandatory |  |  |
| **Learning content management** | | | | |
| 5 | The system should allow different ways of categorization of the lessons and courses (for example, by grade, subjects, by theme. | Mandatory |  |  |
| 6 | The LMS should allow seamless ways of uploading lessons (PDFs, Videos, HTML) and facilitate bulk uploads. | Mandatory |  |  |
| 7 | The LMS facilitates translation for UI and content as well as intuitive interface for localization (logo, graphics, icons, flags...).  The application handles the following components upon selection of region/country -  Calendar  Date Formatting  Time Formatting  Currency Formatting  Number Formatting  Units of measurement  Academic Year/grade Academic sessions  Font/RTL/Alignment | Mandatory |  |  |
| 8 | System allows creating course templates. | Mandatory |  |  |
| 9 | The system has content creation tools integrated to populate learning content using WYSIWIG or HTML editor. | Mandatory |  |  |
| 10 | The system facilitates courseware content repository management (adding, removing, updating enabling and disabling of content in the library). | Mandatory |  |  |
| **Assessment Management** | | | | |
| 11 | The LMS allows designing assessments including quiz, tests, exercises and case studies. | Mandatory |  |  |
| 12 | The system facilitate intuitive assessment methodologies like fill in the Blank, descriptive Answer, Matching, Multiple Choice, True/False, Word Scramble, crossword | Mandatory |  |  |
| 13 | The assessment management module allows setting parameters for tests and exercises (like duration, number of attempts allowed, passing scores), analyzes test results and produce auto-graded results. | Mandatory |  |  |
| 14 | The certification management module allows customizing of certificates and facilitate auto-generation of the certificates as set by the administrator. | Mandatory |  |  |
| 15 | The LMS facilitates intuitive interface to navigate the courses and lessons like categorization, search bookmark, lesson completion marks | Mandatory |  |  |
| **Learning Module** | | | | |
| 16 | The LMS facilitates playing interactive content like multiple choice quizzes, assessments, simulations, animation, drag and drop, match-the-pair, visual assessment, gamification like tic-tac-toe and crosswords. |  |  |  |
| 17 | Students should be able to integrate with social connections like facebook, LinkedIn, YouTube and Twitter | Need to have |  |  |
| 18 | LMS should facilitate platform for the students to be able to take notes (journaling), post questions regarding the lesson content, participate in discussion forums and report issues on the LMS. The posts from the students should be moderated. | Mandatory |  |  |
| 19 | The LMS offers blended learning that combines online educational materials and online interaction with traditional place-based classroom methods. The in-built and integrated tools offers a good learning experience and to keep the learners engaged. |  |  |  |
| 20 | The LMS should facilitate communications and collaborative tools like chat, voice call, whiteboard for interactive learning. | Mandatory |  |  |
| **Mobility** | | | | |
| 21 | The LMS content, features, activities and general functions of the platform can be downloaded one time with internet connectivity and then accessed without having to be connected to the internet. | Mandatory |  |  |
| 22 | The LMS has a mobile version for learners that automatically syncs with the LMS. Students can download the related content whenever internet connection is there an then use it offline. | Mandatory |  |  |
| **Analytics** | | | | |
| 23 | The LMS facilitates engagement and involvement of the learners as well as content utilization and effectiveness | Mandatory |  |  |
| 24 | The LMS facilitates social learning analysis, content automation through analytics, profile analysis (characteristics that could impact the way students learn) and predictive analysis.  The application also collects and analyzes data about wide range of user experiences a person has, online and offline. | Mandatory |  |  |
| **Security** | | | | |
| 25 | Definition of roles and rights management - Identification, Authentication and Authorization | Mandatory |  |  |
| 26 | Audit Trail, logging facility & Log Management. | Need to have |  |  |
| 27 | Secure logon and authorization | Need to have |  |  |
| 28 | Multiple ways of login – SMS authentication, SSO, AD | Mandatory |  |  |
| 29 | Oauth Authentication Integration capabilities | Optional |  |  |
| 30 | Session Management/ Timeout | Optional |  |  |
| 31 | SSL Implementation / Encryption | Optional |  |  |
| 32 | Geo-location detection capability | Mandatory |  |  |
| **Usability** | | | | |
| 33 | UI Design Intuitiveness, Navigation and Number of clicks | Optional |  |  |
| 34 | Validation and alerts | Optional |  |  |
| 35 | Rendering and support of different devices and form factors | Optional |  |  |
| 36 | Available on major mobile stores, supporting different systems | Optional |  |  |
| 37 | Utilizing latest context sensitive features | Optional |  |  |
| 38 | Onscreen help / guides | Optional |  |  |
| 39 | Smart connection detection capabilities (eg. Low bandwidth -> low resolution file) | Optional |  |  |
| **Reliability** | | | | |
| 40 | Enable users to work offline and then synchronize data when data connection is available. | Optional |  |  |
| 41 | Enable a task to be canceled and rolled back to previous state. | Optional |  |  |
| 42 | Allow a task to be interrupted and resumed. | Optional |  |  |
| 43 | Enable backup of data so that information is recoverable in the event of a system or hardware failure. | Optional |  |  |
| 44 | Accommodate loss of connectivity to hosted application (network may become unavailable while a user is in the process of submitting a form) | Optional |  |  |
| 45 | Be able to reliably perform tasks within appropriate time with resistance to failures or deadlocks.. | Optional |  |  |
| 46 | Allow for devices with low bandwidth or irregular connectivity | Optional |  |  |
| **Maintainability** | | | | |
| 47 | Availability of strong support ensuring scalability and sustainability | Mandatory |  |  |
| 48 | Continuous enhancement and roadmap for improvements | Mandatory |  |  |
| 49 | Upgrade and maintenance support and resource requirement | Mandatory |  |  |
| 50 | Ease of upgrades | Mandatory |  |  |
| 51 | Be built using modern technologies | Mandatory |  |  |
| 52 | Well structured and classification of documentation | Mandatory |  |  |
| 53 | Support repair or upgrade of a component in a running system. | Mandatory |  |  |
| 54 | Maintaining unique version number for updates and releases. | Mandatory |  |  |
| 55 | Enable the system to detect incompatible versions of software running on different components. | Need to have |  |  |
| 56 | Have a support process that tracks and documents bugs from discovery to resolution. | Mandatory |  |  |
| **Compliance to e-learning Industry Standards** | | | | |
| 62 | SCORM v.1.2 | Mandatory |  |  |
| 63 | SCORM 2004 | Mandatory |  |  |
| 64 | xAPI (Tin Can API) | Mandatory |  |  |
| 65 | cmi5 | Mandatory |  |  |
| 66 | Package Exchange Notification Services | Mandatory |  |  |
| 67 | AICC | Mandatory |  |  |
| **Integration Capabilities & Compatibilities** | | | | |
| 68 | Language translation | Mandatory |  |  |
| 69 | Chat tools | Mandatory |  |  |
| 70 | Video calling | Mandatory |  |  |
| 71 | CMS | Mandatory |  |  |