

TECHNICAL SPECIFICATION FOR A LEARNING MANAGEMENT SYSTEM

1. Introduction

Purpose

This document outlines the functional requirements for a Virtual Learning Environment (VLE) / Learning Management System (LMS) designed to facilitate online education, course management, and student-teacher collaboration.

The LMS must present course completion certificates.

2. Scope

The system will support:

- Course creation and management
- User roles (Admin, Instructor, Student)
- Content delivery (videos, documents, quizzes)
- Assessments & grading
- Communication tools (forums, messaging)
- Reporting & analytics

3. System Overview

The LMS should be a cloud-based platform designed to manage, deliver, and track training and learning activities for employees within the organization. Preferably, the software architecture should provide scalability and flexibility, deployed with containerization and / or virtual machines.

4. User Management

- 4.1. ***User Roles and Permissions:*** The LMS platform should be able to define multiple user roles including Administrator, Instructor, student, with granular permissions for each role. The platform should support simple temporary username/password authentication for students, interns, and external participants. The LMS should allow users to manage their profiles, including personal information, profile picture, contact details, and preferences. The system must allow the students to self-register into classes available via the course catalog.

4.2. Course Management

4.2.1. *Course Creation and Publishing:* Administrators and instructors can create, edit, and publish courses, modules, and learning paths. The LMS should host ever growing curriculums and be able to build individualized learning journeys. The platform should enable upload or link to additional resources, like PDFs, audio and video media, digital learning guides, and online content.

4.2.2. *Course Catalog:* Provide a searchable course catalog with filters based on categories, tags, and skill levels, allowing learners to self-enroll in courses.

- The system must build a course catalog from the inventory of courses available in the system.
- The system must define prerequisites for courses in the course catalog.
- The system must store and archive training modules and artifacts.
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- The system must define prerequisites for courses in the course catalog.
- Discussion forum.

4.2.3. *Content Management:* Support various content types including text, images, videos, interactive simulations, SCORM packages, and external links. The system must accept training material in the following file types:

- Microsoft supported product formats for Word, Excel, and PowerPoint.
- Adobe Acrobat Reader (PDF)
- Standard video file formats (e.g. vob, wmv, mp4)
- Standard image formats (e.g. png, jpg, gif)

4.3. Learning Module:

The platform should allow multiple course instructors. There should be both real-time teaching and residual content:

- Live Training Sessions: The platform should be able to integrate a teleconference tool (such as ZOOM, Microsoft Teams, Google Meet etc).
- Offline or Recorded Contents: The contents could be in various formats (video, PPT, PDF, etc).

4.4. Content Management

- Provision of course material online by teachers.

- The system must allow downloadable content for users in various types of media (i.e. PowerPoint, MS Word, PDF) from a computer or mobile device.
- The system must associate tests and examinations to courses and curriculum.
- The system must Organize content into weekly/modules/topics.
- The system must store and manage training materials electronically and in print form for the following assets:
 - Job Aids
 - Instructor Manuals
 - User Manuals
 - Instructor-Led Presentations
- The system must upload certificates of completion, course registration sheets, and evaluations.

4.5. Learning Management Features

- 4.5.1. Progress Tracking: Track learner progress in real-time, including completion status, time spent on each module, quiz scores, and overall performance.
- 4.5.2. Assessments of individual lessons / learning activities and Online attendance.
- 4.5.3. Adaptive Learning Paths: Offer personalized learning paths based on learners' skill levels, preferences, and learning objectives.
- 4.5.4. Assessments and Feedback: Include quizzes, assignments, and assessments with automated grading and feedback mechanisms. Track and report user progress, compliance, and engagement metrics. Multiple types of assessments should be possible such as MCQs, true-false, matching, reason-assertion statements, image-based questions, video-based questions, written work submission, etc.
- 4.5.5. Track achievement of predetermined targets/ reminders for same (e.g. Thesis submission, exam due etc.).
- 4.5.6. Scheduling of optional/mandatory courses from a menu of dates.
- 4.5.7. Ability to reuse existing activities.
- 4.5.8. Automation – The LMS should enable administrators to automate repeated and tedious tasks. Examples include user grouping, new user population, create and deactivate users in bulk (CSV file), or group or batch wise.

4.5.9. Localization - It is important for the LMS to include multilingual support features so the learning and training content can remain unaffected by language barriers.

4.5.10. Reports and analytics - This includes eLearning assessment tools. Instructors and administrators must be able to view and track their online training initiatives to determine if they are effective or need adjusting. This can be applied to groups of learners and individuals.

4.6. Notifications

- The system must send "reminder emails" to participants scheduled for a class. For example, supervisor training is 2 weeks away.
- The system must send confirmation and status emails to students, instructor, and/or training approver/s.
- The system must send notifications of "change in student status" to students, instructors, and/or approvers.
- The system must support sending a "change in class status" message. This includes the ability to generate emails to students, and instructors. Changes in class status such as location, start times, and instructor must generate a pre-formatted email.
- The system must flag mandated training.

4.7. Gamification Module

4.7.1. *Points System:* Award points to learners for completing courses, modules, assessments, and participating in discussions and activities.

4.7.2. *Badges and Certificates:* Issue digital badges and certificates to recognize learners' achievements, milestones, and skills acquired.

4.7.3. *Leaderboards:* Display leaderboards to showcase top performers based on points earned, course completion, and engagement metrics.

4.7.4. *Challenges and Quests:* Introduce challenges, quests, and missions with varying difficulty levels to motivate learners and encourage active participation.

Example features:

- Automatically captures and attributes experience points to students' actions;
- Block that displays current level and progress towards next level;
- Report for teachers to get an overview of their students' levels;

- Notifications to congratulate students as they level up;
- A ladder to display the rankings of the students;
- Ability to set the number of levels and the experience required to get to them;
- Images can be uploaded to customize the appearance of the levels.
- Offers a ranking of the learners with their points obtained for the completed activities;
- Displays performance graphs for group assignments.

4.8. Social Learning Features

- **Discussion Forums:** Enable learners to participate in online discussions, ask questions, share knowledge, and collaborate with peers and instructors.
- **Social Sharing:** Integrate social sharing features to allow learners to share their achievements, badges, and course completions on social media platforms.
- **Peer Recognition:** Implement peer-to-peer recognition mechanisms where learners can endorse and acknowledge each other's contributions and skills.

4.9. Security and Compliance

Data Encryption should be used in communication over the networks using SSL/TLS protocols to ensure data security and privacy. Also, Role-Based Access Control (RBAC) should be implemented to control access to sensitive features, content, and user data based on predefined roles and permissions.

4.10. Usability and Accessibility

When developing web based LMS, meticulous attention should be paid to Responsive Web Design. The user interface developed with responsive web design principles should ensure accessibility and usability across devices of all sizes, including Smart TVs, desktops, tablets, and most notably smartphones. Users should be able to access the LMS from whatever type of device they choose whether it's a desktop, laptop, tablet or smartphone. The LMS should automatically display the version best suited for the user's chosen device.

4.11. Testing and Quality Assurance

After deployment and before broader use of the platform, software testing should be undertaken, including integration testing, and end-to-end testing. Also, due to its

scalability requirements, performance testing should be done. Load testing and stress testing to assess the system's performance under various load conditions.

4.12. Documentation and Training

The developer of the LMS platform should also provide Comprehensive Documentation: Provide detailed user guides, administrator manuals, API documentation, and developer guides to assist users, administrators, and developers in understanding and using the platform.

Basic Required Checklist:

- User and Rule Management (bulk upload/ setup users)
- Course Management
- Responsive Design
- Live Classroom, Offline Contents
- Analytics with a Clean Dashboard
- Customize Report
- Course/Event Calendar Report
- Team Learning Collaboration: Group Discussion and Problem-Solving
- Daily Activity Monitoring
- Analytics and Feedback: Auto calculation of goods and allow the facility to analyze learning gaps, & share their feedback
- Course Personalization: LMS should be able to recommend training courses & program based on the learner's position and job duties
- Certificate(e-certificate)
- Learning Path: a direction the learner can follow to work through the course in increment on the same topic.