Requirement Analysis

Smart Micro-Credential & Digital Certificate Verification Module

Contents

1 Project Name

Smart Micro-Credential & Digital Certificate Verification Module in Student Management System

2 Introduction

Student Management Systems (SMS) are widely used in universities and educational institutions to manage student records, courses, attendance, enrollment, and grades. These systems primarily focus on academic performance and administrative tracking.

However, in today's skill-driven world, employers and institutions increasingly value practical skills over grades alone. Traditional SMS platforms do not adequately represent the actual skills acquired by students during their academic journey. Certificates generated by these systems typically confirm only course completion and do not provide detailed skill validation or secure verification mechanisms.

To address this gap, integrating a Smart Micro-Credential & Digital Certificate Verification Module within SMS is essential. This module enhances the system by tracking verified skills, issuing secure digital certificates, and enabling instant verification.

3 Problem Definition

3.1 Identified Problems / Cons in Existing SMS

- **Certificates Do Not Reflect Skills**
  Standard SMS tracks only grades or course completion; actual skills acquired by students are not recorded.

- **Vulnerability to Certificate Fraud**
  Paper or digital certificates without verification mechanisms can be easily forged or misused.

- **No Centralized Skill Portfolio**
  Students cannot showcase a consolidated, verified list of all skills earned during their studies.

- **Time-Consuming Verification**
  Employers or educational institutions often need to contact the institute manually to verify certificates, causing delays.

- **Neglect of Micro-Credentials**

SMS focuses on full-length courses or semesters and ignores short skill-based modules or micro-courses.

4 Proposed Solution

The proposed module integrates with the existing SMS and provides the following functionalities:

- **Micro-Credentials:** Teachers can create and post short skill-based courses or modules.
- **Student Enrollment:** Students can browse, select, and enroll in available micro-courses.
- **Skill Wallet:** Maintains a record of all earned skills, showing skill levels and associated certificates.
- **Digital Certificate Generation:** Upon completing a micro-course, the system automatically generates a certificate containing:
  - Student Name
  - Course / Skill Name
  - Skill Level
  - Unique Certificate ID
  - QR Code for instant verification
- **Certificate Verification:** Employers, teachers, or other stakeholders can verify the authenticity and skill details using the certificate ID or QR code online, reducing manual verification time.

5 Stakeholders / User Types

5.1 Students

- Enroll in micro-courses
- Complete skill-based modules
- View and manage their Skill Wallet
- Download digital certificates

5.2 Teachers / Instructors

- Create and manage micro-courses
- Define skills and skill levels
- Evaluate students
- Approve certificate issuance

5.3 Institution / Administration

- Manage system operations
- Monitor courses and certifications
- Maintain data security and integrity

5.4 Employers / External Verifiers

- Verify digital certificates using QR code or certificate ID
- Validate student skills instantly

6 Functional Requirements

6.1 User Management

- Registration and login for Students, Teachers, and Admin
- Role-based access control
- Profile management

6.2 Micro-Credential Management

- Teachers can create, update, and delete micro-courses
- Teachers can define skills and skill levels
- Students can enroll in available micro-courses
- Teachers can evaluate and approve course completion

6.3 Certificate & Skill Wallet

- System automatically generates digital certificates upon completion
- Each certificate includes:
  - Unique Certificate ID
  - QR Code
  - Student information
  - Course / Skill name
  - Skill level
- Maintain a Skill Wallet for each student

6.4 Certificate Verification

- Public verification via Certificate ID or QR code
- Display certificate validity and skill details

6.5 Admin Functionalities

- Approve teachers
- Manage micro-courses
- Monitor issued certificates
- View system reports

7 Non-Functional Requirements

7.1 Security

- Certificates must be protected against duplication or tampering
- Secure authentication for users

7.2 Performance

- Verification process should be instant
- System should handle multiple users efficiently

7.3 Usability

- User-friendly interface for students and teachers
- Simple verification process for external users

7.4 Reliability

- System should maintain accurate records
- Minimal downtime

7.5 Scalability

- Capable of supporting a growing number of students and courses

8 System Constraints

- Must run on XAMPP / WAMP or any PHP + MySQL web server
- The module must integrate with the existing Student Management System
- Requires an internet browser for access
- Limited to managing micro-courses and certificates (full LMS features such as attendance or exams are out of scope)
- QR verification requires camera or QR scanner support

9 Assumptions

- All users (students, teachers, admin) have valid login credentials
- Teachers are responsible for posting accurate course and skill information
- Students complete micro-courses honestly; completion is verified through teacher validation or assessment
- The institution or admin will maintain and regularly back up the database
- QR-based verification assumes the device can read QR codes and connect to the server