**AI-Integrated Learning Management System (LMS)**

[**Demo Video**](https://youtu.be/zAOivkA4-hs)

[**Github**](https://github.com/india134/LikhilLMS)

**Overview**  
This project is a **Learning Management System (LMS)** built using **Flask and Supabase**, designed to streamline the workflow of tutors and students. It supports **student registration, class scheduling, attendance tracking, payment management, and personalized performance reporting**.

A key differentiator of this LMS is the **AI-powered student report generator**, where teachers can feed structured inputs which are processed by the **OpenAI API** to automatically generate personalized student performance reports. Additionally, the system integrates with **n8n workflows** to automate Google Calendar scheduling for classes and reminders.

**Features**

* **User & Student Management**  
  • Secure registration and management of students and classes.  
  • Attendance tracking with CRUD operations stored in Supabase.
* **Scheduling & Automation**  
  • Class scheduling and rescheduling with automated sync to **Google Calendar** using **n8n webhooks**.  
  • Self-hosted n8n setup on Hostinger for cost-effective, 24x7 task automation.
* **Payment & Fee Tracking**  
  • Records payments made by students or clients.  
  • Automatically calculates pending fees even when payments are irregular or partial.
* **AI-Powered Reports**  
  • Teachers can feed minimal structured inputs for each student.  
  • **OpenAI API** generates customized performance reports with a balance between personalization and minimal manual work.

**System Architecture**

(User – Teacher/Student) → **Flask Web App** → Supabase (Database) → Attendance/Payments/Student Data  
Flask → **OpenAI API** → AI-Powered Report Generation  
Flask → **n8n Webhooks** → Google Calendar Sync → Notifications

**Tech Stack**

* **Backend:** Flask
* **Database:** Supabase Postgres
* **AI Integration:** OpenAI API (for personalized student reports)
* **Automation:** n8n workflows (self-hosted on Hostinger)
* **Frontend:** HTML, CSS, JavaScript (Bootstrap templates)
* **Deployment:** Hostinger (Flask + n8n self-hosted)

**Project Structure**  
lms-flask/  
│── app.py: Main Flask application  
│── forms.py: Flask-WTF forms for input handling  
│── models/: Supabase integration logic  
│── templates/: HTML templates (frontend UI)  
│── static/: CSS/JS assets  
│── requirements.txt: Dependencies

**Challenges & Learnings**

1. **Database Integration**
   * Initially used **Google Sheets API** for quick prototyping, but it was slow and unreliable for handling multiple students and transactions.
   * Migrated to **Supabase Postgres**, which provided a scalable, fast, and developer-friendly backend.
2. **Designing Teacher Input for AI Reports**
   * Challenge: Teachers needed to feed enough detail for personalized reports without making the process too time-consuming.
   * Solution: Created a **structured input format** that balances customization with minimal manual effort, enabling OpenAI to generate accurate reports.
3. **Automation (n8n Hosting Decisions)**
   * Challenge: Cloud n8n was reliable but expensive; local hosting lacked 24x7 availability.
   * Solution: Opted for **self-hosted n8n on Hostinger VPS**, striking a balance between cost and continuous uptime.
4. **Handling Irregular Payments**
   * Challenge: Clients often made **random, partial, or delayed payments**, making fee calculation difficult.
   * Solution: Implemented a **dynamic pending fee calculation system** that adjusts balances based on transaction history.

**Author**  
Akash Gupta  
M.Tech Artificial Intelligence, IIT Kharagpur