

InstituteHub: A Web-Based Learning Management System for Educational Institutes

Om Chaudhari¹ Onkar Darade² Aniket Dhayre³ Vivek Salunkhe⁴ Shubhangi Shiwankar⁵
⁵Guide

^{1,2,3,4,5}Department of Computer Engineering
^{1,2,3,4,5}D Y Patil Polytechnic, Ambi Pune, Maharashtra, India

Abstract — Educational institutes often face challenges in managing academic operations such as student records, attendance tracking, fee collection, and communication. Traditional methods rely on manual processes and paper-based systems, which are time-consuming and error-prone. This paper presents InstituteHub, a web-based Learning Management System (LMS) designed to automate the academic and administrative workflows of educational institutes. The system provides role-based dashboards for Admin, Teacher, Student, and Parent users with specific functionality tailored to each role. The system uses modern web technologies including HTML, CSS, JavaScript for the frontend and Supabase (PostgreSQL) as the backend with real-time capabilities. Key features include course management, lecture uploads, assignment submissions, quiz management, attendance tracking, fee management, real-time messaging, and an AI-powered chatbot. Experimental results demonstrate that InstituteHub significantly improves operational efficiency by automating repetitive tasks, reducing errors, and providing real-time access to academic data. The system provides a simple and scalable solution for modern educational institute management.

Keywords: Learning Management System, Web Application, Educational Technology, Supabase, Real-Time Communication, AI Chatbot

I. INTRODUCTION

Educational institutes manage a wide range of operations including student records, teacher assignments, course scheduling, attendance tracking, and fee management. Over time, the volume and complexity of these operations increases significantly as the institute grows.

Traditional management methods involve manual record-keeping using paper registers and spreadsheets. These methods are slow, error-prone, and difficult to scale. Retrieving past records and generating reports requires significant time and effort.

With the advancement of web technologies and cloud computing, automated Learning Management Systems have become a practical solution. These systems digitize academic workflows, provide centralized data management, and enable real-time communication between stakeholders.

InstituteHub is designed as a comprehensive web-based LMS that provides role-based dashboards for Admin, Teacher, Student, and Parent users. Each dashboard offers specific tools and features relevant to the user's role.

The main objective is to develop a scalable and user-friendly platform for managing all academic and administrative operations of an educational institute. By using modern web technologies, InstituteHub aims to reduce manual effort and enhance the learning experience.

II. LITERATURE REVIEW

Learning Management Systems have been widely studied in educational technology. Early LMS platforms focused on basic content delivery and course management. These systems lacked advanced features such as real-time communication and automated grading.

With the development of web technologies, more advanced LMS platforms such as Google Classroom, Moodle, and Canvas have been introduced. These platforms provide features including assignment management, quiz creation, grade tracking, and communication tools using cloud infrastructure.

Recent research has focused on integrating artificial intelligence into LMS platforms. AI-powered chatbots and automated grading systems have been shown to improve student engagement and reduce teacher workload.

Several studies have explored real-time database technologies in educational platforms. Real-time features such as live messaging and instant notifications improve communication between teachers, students, and parents.

Overall, the literature indicates that modern LMS platforms with AI capabilities and real-time communication provide more effective solutions for educational institutes. These advancements motivated the development of InstituteHub.

III. METHODOLOGY

The InstituteHub system follows a structured workflow for managing educational institute operations.

First, the system requirements were analyzed to identify key operations including student management, teacher management, course and batch management, attendance tracking, fee management, and communication.

Next, the system architecture was designed using a client-server model with HTML, CSS, and JavaScript for the frontend and Supabase (PostgreSQL) as the cloud-based backend with real-time capabilities.

The system implements role-based access control with four user roles: Admin, Teacher, Student, and Parent. Each role has a dedicated dashboard with specific features and permissions.

Finally, the system was tested with sample data to validate all features including authentication, CRUD operations, file uploads, real-time messaging, and report generation. The system was deployed on Vercel for hosting.

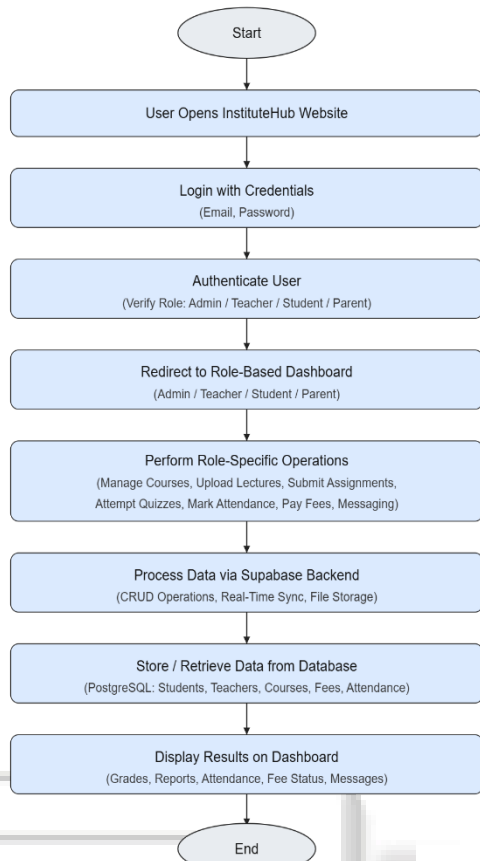


Fig. 2: Workflow of InstituteHub Learning Management System

F. Workflow

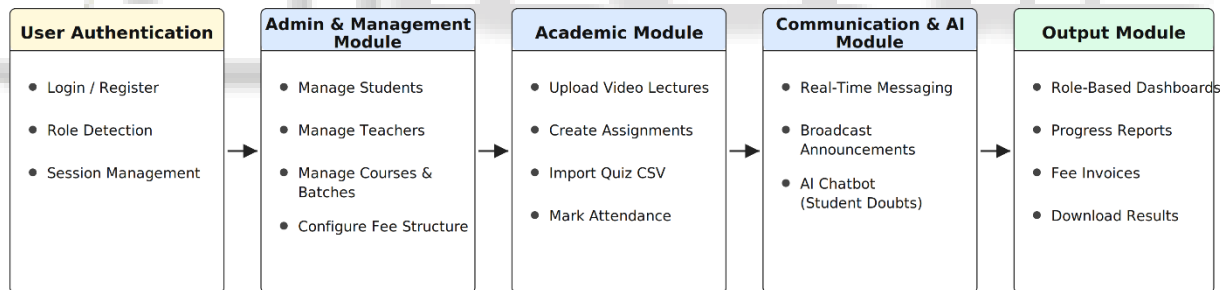


Fig. 3: System Architecture of InstituteHub Learning Management System

V. PERFORMANCE ANALYSIS

The performance of InstituteHub was evaluated using test scenarios covering all major system modules. The purpose was to determine how effectively the system handles academic operations.

During testing, sample data was populated and multiple users with different roles were created to test role-based access control and feature functionality.

A. User Authentication

The system successfully authenticated users with different roles and directed them to their respective dashboards. Role-based access control ensured users could only access features relevant to their role.

IV. SYSTEM ARCHITECTURE

The architecture of InstituteHub consists of several modules that work together to manage academic operations.

A. Authentication Module

Users login through the web interface with role-based access control for Admin, Teacher, Student, and Parent.

B. Management Module

Admin manages student records, teacher records, courses, and batches through the dashboard.

C. Academic Module

Teachers upload lectures, create assignments, import quiz questions, and mark attendance. Students view lectures, submit assignments, and attempt quizzes.

D. Fee Module

Admin configures fee structures. Students and parents view and track fee payments.

E. Communication Module

Real-time messaging, announcements, and AI chatbot for student doubt resolution.

B. Academic Operations

Teachers uploaded lectures, created assignments, imported quizzes via CSV, and marked attendance. Students viewed lectures, submitted assignments, and attempted quizzes. All CRUD operations functioned correctly.

C. Real-Time Communication

The messaging system delivered messages instantly between users. Announcements broadcast by Admin were received by all targeted users in real-time.

D. Data Integrity

The table below shows the comparison between manual institute management and the automated InstituteHub system.

VI. ADVANTAGES OF THE PROPOSED SYSTEM

InstituteHub automates repetitive tasks such as attendance tracking, fee management, and report generation, significantly reducing manual effort.

The system provides real-time access to information. Teachers, students, and parents can access academic data through their dedicated dashboards at any time.

InstituteHub offers a user-friendly interface with role-based dashboards. Users can easily navigate features without requiring technical knowledge.

The system improves communication through real-time messaging and announcements, ensuring important information is delivered instantly.

The AI-powered chatbot provides instant assistance to students for academic doubts, reducing dependency on teacher availability.

Overall, the system provides an efficient, scalable, and modern solution for managing educational institute operations.

VII. FUTURE WORK

Although InstituteHub provides effective management features, several improvements can be implemented in future versions.

One improvement is the integration of video conferencing for live online classes. This would allow teachers to conduct real-time lectures directly within the platform.

A mobile application for Android and iOS would make the system more accessible. Users could receive push notifications and access features from their smartphones.

Future versions may include advanced analytics with machine learning to identify at-risk students and provide personalized learning recommendations.

Integration with payment gateways such as Razorpay or UPI could enable online fee payments directly through the platform.

Gamification features such as badges, leaderboards, and achievement systems could improve student engagement and motivation.

VIII. CONCLUSION

InstituteHub presents an efficient solution for managing educational institute operations using modern web technologies. The system addresses challenges of manual management by providing an automated, cloud-based Learning Management System.

The system uses a structured architecture with role-based authentication, CRUD operations, real-time messaging, file uploads, and AI-powered student assistance. It eliminates the need for manual record-keeping.

Testing results demonstrate that the system successfully handles all academic operations including authentication, course management, lecture delivery, assignments, quizzes, attendance, fees, and messaging.

InstituteHub provides a user-friendly platform that allows administrators, teachers, students, and parents to manage academic operations easily and efficiently.

With further improvements including mobile app development, video conferencing, and advanced analytics, InstituteHub has the potential to become a powerful platform for educational institute management.

REFERENCES

- [1] Aldiab, A., et al., "Challenges in the Development of E-Learning Systems in Higher Education," Information Technology & People, 2019.
- [2] Dagger, D., et al., "Service-Oriented E-Learning Platforms: From Monolithic Systems to Flexible Services," IEEE Internet Computing, 2007.
- [3] Holmes, W., et al., Artificial Intelligence in Education: Promises and Implications for Teaching and Learning, 2019.
- [4] Watson, W. R., and Watson, S. L., "An Argument for Clarity: What Are Learning Management Systems?" TechTrends, 2007.
- [5] Supabase Documentation - <https://supabase.com/docs>
- [6] MDN Web Docs - HTML, CSS, JavaScript References <https://developer.mozilla.org>
- [7] Vercel Documentation - Deployment and Hosting <https://vercel.com/docs>