

LearnHub – Online Learning Platform



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LearnHub – Online Learning Platform

1. Introduction

Overview:

LearnHub is a MERN-stack (MongoDB, Express.js, React.js, Node.js) based online learning platform that enables structured digital education. It supports teachers in course creation and assignment, while students can access content, track progress, and receive completion certificates. Admins oversee platform activity, ensuring security and scalability.

Purpose:

This document details the objectives, features, technical design, and execution plan of LearnHub. It serves as a reference for developers, testers, evaluators, and stakeholders, illustrating how the platform addresses key challenges in modern digital learning.

2. Ideation Phase

2.1 Problem Statement

Students' Perspective:

Students in remote or semi-urban areas struggle to access quality, affordable learning content. Existing platforms are either paid, poorly structured, or lack mentorship opportunities.

Teachers' Perspective:

Educators lack centralized, intuitive tools for digital course creation, management, and student interaction. Many tools are complex or not designed for academic delivery.

2.2 Empathy Map (Key Insights)

- **Says:**
 - "I want easy access to learning content."
 - "Managing students and courses should be simple."
- **Thinks:**
 - "Is this platform secure and reliable?"
 - "Can I track my learning or teaching progress?"
- **Does:**
 - Logs in regularly, watches videos, creates or takes tests, communicates with peers.
- **Feels:**
 - Motivated by ease of use, confident in content quality, satisfied with tracking and feedback.
- **Goals:**
 - Structured learning, easy course creation, certification.
- **Frustrations:**
 - Complex UIs, no dashboards, unreliable streaming, and lack of feedback.

LearnHub's Response:

- Role-based dashboards
 - Secure, simple login
 - Multimedia course delivery
 - Progress tracking & certification
 - Scalable backend
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2.3 Brainstorming & Feature Prioritization

Core Ideas:

- Centralized dashboard for all roles
- Course & section management
- Role-based access (JWT)
- Certificate generation
- Embedded videos/articles

- Bulk course assignment
- Admin controls (delete/view stats)
- Clean and responsive UI

Prioritization (MoSCoW Method):

- **Must Have:** Dashboard, Auth, Course Creation, Embedded Media, Clean UI
- **Should Have:** Certificate generation, Bulk assignment, Admin panel
- **Could Have:** Analytics, AI integration, Gamification (future scope)

3. Requirement Analysis

3.1 Functional Requirements (FR)

FR No.	Feature	Description
FR-1	User Registration	Form-based and API-based registration
FR-2	Role-Based Login	Redirects users by role (Student/Teacher/Admin)
FR-3	Course Creation	Teachers can create and edit courses
FR-4	Course Enrollment	Students enroll; Teachers assign
FR-5	Section Management	Add sections, embed videos/articles
FR-6	Completion & Certification	Students mark complete, download certificate
FR-7	Admin Controls	User/course management, platform stats
FR-8	Dashboards	Role-specific views
FR-9	Navigation & Routing	Protected routes, dynamic Navbar

3.2 Non-Functional Requirements (NFR)

- **Usability:** Intuitive, responsive UI
- **Security:** JWT, bcrypt, route protection
- **Reliability:** Error handling, schema validation
- **Performance:** Async backend, API efficiency
- **Availability:** Local/cloud support
- **Scalability:** Modular folder structure, future-ready

3.3 User Stories Summary

Students: Register → Browse → Enroll → Learn → Mark Complete → Download Certificate

Teachers: Register → Create Course → Add Sections → Assign → Monitor

Admins: Login → Manage users/courses → View analytics

3.4 Technology Stack

Component	Technology
Frontend	React.js, Bootstrap
Backend	Node.js, Express.js, JWT
Database	MongoDB / MongoDB Atlas
File Storage	Cloudinary / AWS S3
Security	bcrypt, JWT, Helmet
Future Integration	TensorFlow / scikit-learn

4. Project Design

4.1 Problem-Solution Fit

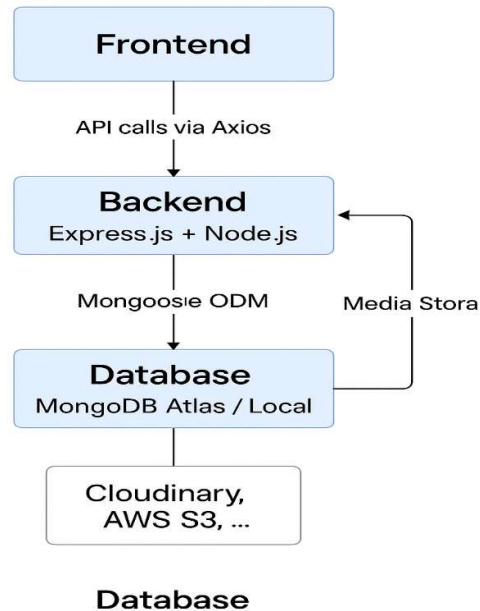
- **Customer Segment:** Students in Tier-II/III cities, freelance educators
- **Problem:** Limited access to structured, affordable platforms with mentor support
- **Solution:** Lightweight, intuitive LMS with course creation, certification, and dashboards
- **Value:** Role-based access, reusable modules, affordability, and certification

4.2 Architecture Overview

3-Tier Architecture:

- **Frontend:** React app with auth, course player, dashboards
- **Backend:** REST APIs for auth, courses, enrollments
- **Database:** MongoDB schemas for users, courses, progress

Security: JWT auth, bcrypt password storage, CORS, protected routes



5. Planning & Scheduling

Sprint	Features	Stories	Points	Priority
1	Registration, Login	USN-1 to USN-4	6	High
2	Dashboard, Course Create	USN-5 to USN-8	11	High
3	Enroll, Complete Course	USN-9 to USN-11	7	Medium
4	Admin & Assignment	USN-12 to USN-14	7	Medium

Tools Used: GitHub, Postman

6. Testing

Test Case	Scenario	Result
TC-01	Login under 20 users	1.2s → Pass
TC-02	Browse courses	1.6s → Pass
TC-03	Video load	1.8s → Pass
TC-04	Assign course to 50 students	1.7s → Pass
TC-05	100 concurrent API calls	Slight lag

Recommendations:

- Add Redis caching
 - Use CDN for static files
 - Lazy load images
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7. Advantages & Disadvantages

Advantages

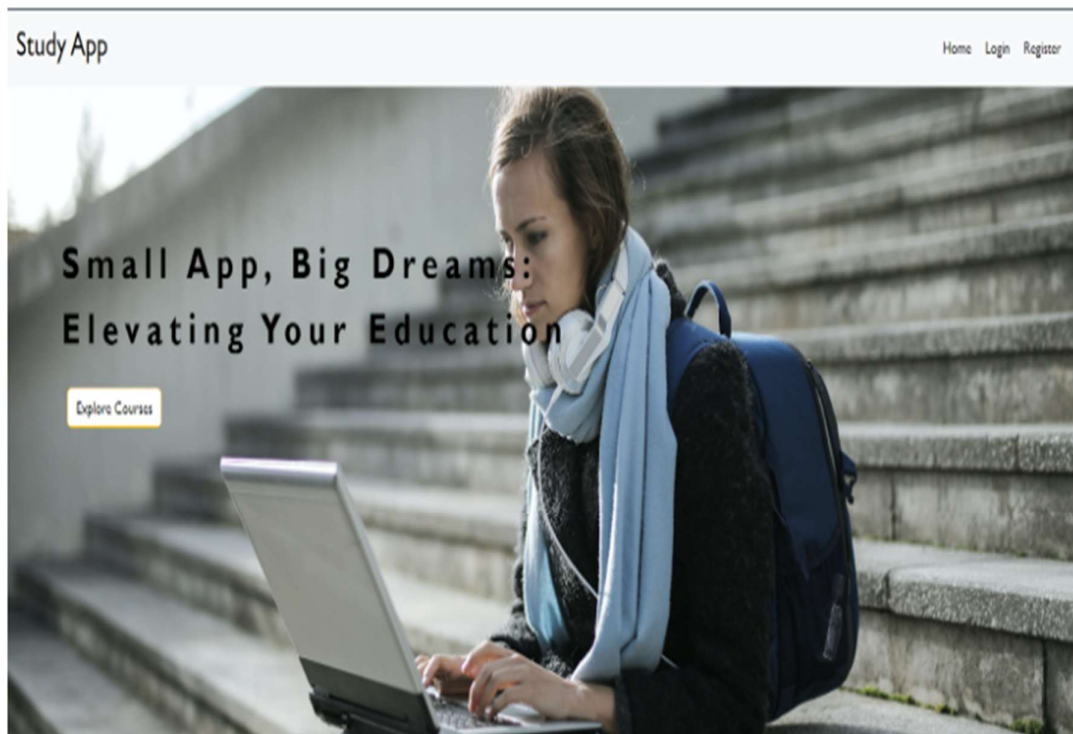
- User-friendly UI
- Role-based access
- End-to-end course lifecycle
- Certificate generation
- Scalable backend
- Secure authentication (JWT)
- Modular codebase

Disadvantages

- No native mobile app
- Relies on YouTube embedding
- No offline mode
- No quizzes or gamification
- Manual admin setup
- No ML personalization yet

8.Result

Landing page



Register page:

Study App

Home Login Register

Register

Full Name

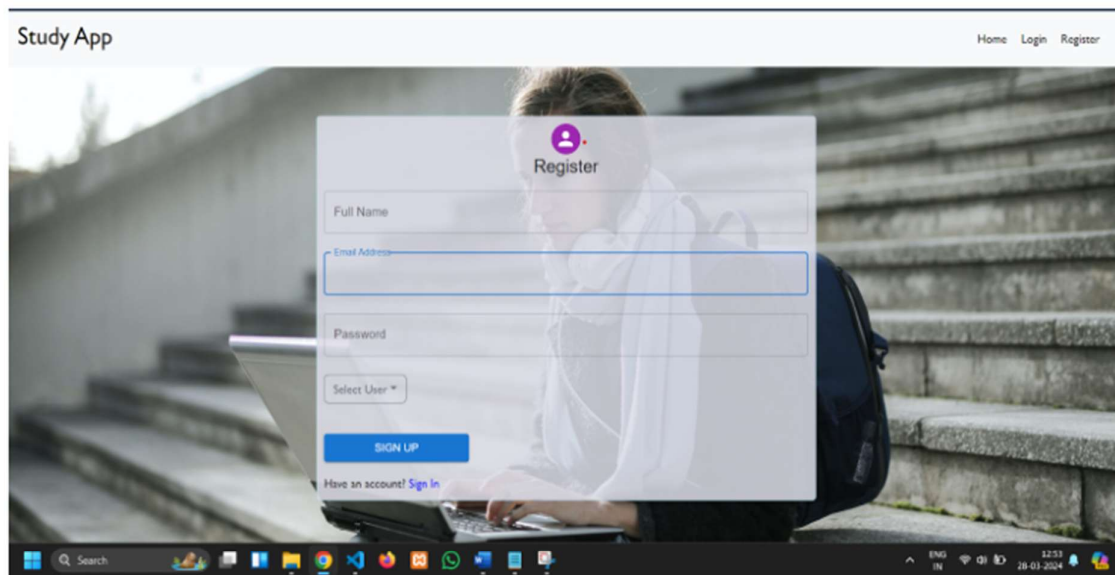
Email Address

Password

Select User

SIGN UP

Have an account? [Sign In](#)



Login page:

Study App

Home Login Register

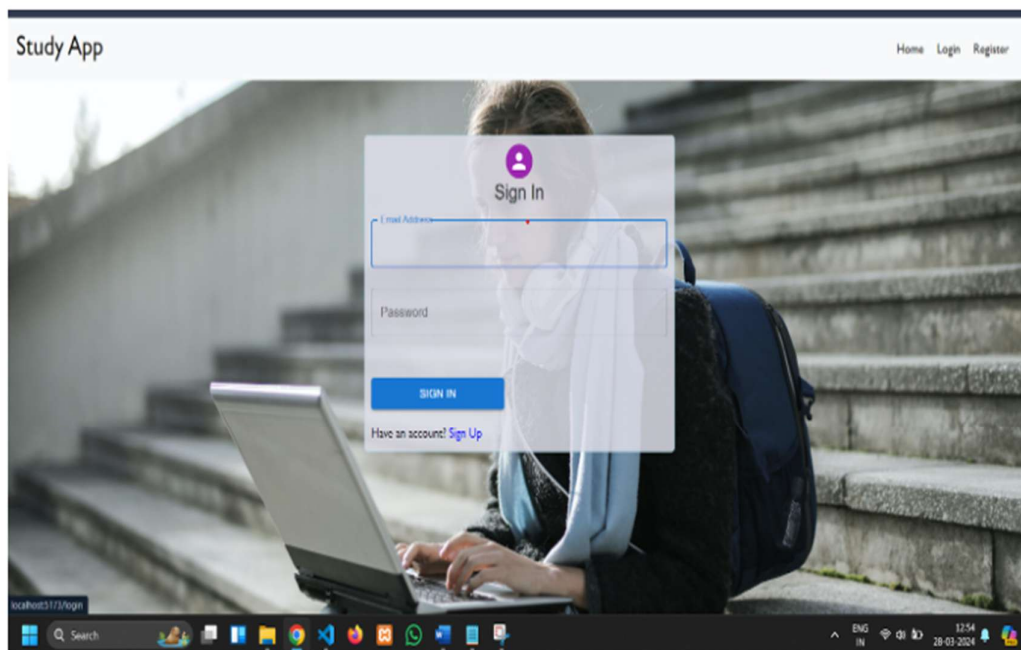
Sign In

Email Address

Password

SIGN IN

Have an account? [Sign Up](#)



Admin Dashboard:

Study App

Home

Courses

Hi Admin

Log Out

User ID	User Name	Email	Type	Action
652e2c7a142cc0b142f7b25	Admin	admin@mail.com	Admin	DELETE
652eaf64e508d404e07247	Teacher 1	t1@mail.com	Teacher	DELETE
652eaf70e508d404e0724a	Student 1	s1@mail.com	Student	DELETE
652eaf90e508d101e0724d	Student 2	s2@mail.com	Student	DELETE
65c00be20605918200624232	Teacher 4	t4@mail.com	Teacher	DELETE

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Search

ENG IN

12:56

28-03-2024

Teacher Dashboard:

Study App

Home

Add Course

Hi Teacher 4

Log Out

Add Course

Course Type

Select categories

Course Title

Enter Course Title

Course Educator

Enter Course Educator

Course Price(Rs.)

for free course, enter 0

Course Description

Enter Course description

+ Add Section

Submit

Student Dashboard:

Study App

Home Enrolled Courses

Hi Student I [Log Out](#)

Search By:

FRONTEND
COURSE

IT & SOFTWARE

BY: TRACHANH

Sections: 5

Price(Rs.): free

Enrolled students: 1

[Start Course](#)

© 2024 Copyright: Study App

Search

END IN 12:59 28-03-2024

Study App

Home Enrolled Courses

Hi Student I [Log Out](#)

Welcome to the course: Frontend Course

1

PLAY VIDEO

2

3

4

5

DOWNLOAD CERTIFICATE

QuizApp

Home Login Register

QUIZ

iStock Credit: akuzone

0:00 / 4:45

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9. Conclusion

LearnHub addresses key digital education needs by offering a full-stack, scalable, and user-centric learning platform. It demonstrates MERN proficiency, modular design, secure authentication, and real-world applicability. With built-in features like dashboards, certification, and admin tools, LearnHub lays a solid foundation for academic or corporate deployment.

10. Future Scope

- Mobile app with React Native or Flutter
 - AI-driven recommendations
 - Gamification (quizzes, badges, leaderboard)
 - Chat support and community forums
 - Blockchain certificate validation
 - Payment gateway (Razorpay/Stripe)
 - Offline learning mode
 - LMS integration (Moodle, Blackboard)
 - WCAG accessibility compliance
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11. Repository

GitHub: <https://github.com/vijaya-2005/Online-Learning-Platform.git>