LEARNITY

THESIS SUBMITTED TOWARDS THE PARTIAL FULFILMENT OF THE REQUIREMENT OF THE UNIVERSITY OF SINDH, FOR THE AWARD OF BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING

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ABSTRACT

Students have been facing problems in the online learning space due to the absence of a platform that covers the Sindh Board Curriculum. This project, "**LEARNITY**" solves this problem by providing students a platform that is focused on delivering dedicated courses and education, which are aligned with the curriculum of Sindh, which makes learning smart and hassle-free.

Learnity is designed to facilitate and build a direct connection between the subject specialist and student. Once a student registers on the website, he/she select courses of their own choice and start learning. Teachers also register on the website and offer student courses of their specialty, teacher are ranked based on their performance and teaching expertise. This project will also help with collaborative learning

The role of the administrator is that he/she will have full access of website and be able to access user data, control information between teachers and students, check profiles for errors and bugs, and supervise the system to ensure the safety of user data.

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CHAPTER NO. 1

INTRODUCTION

1.1 BACKGROUND

The educational department in Pakistan, especially in the province of Sindh, faces a growing need for a structured e-learning platform. With the rapid digital transformation in education, students increasingly rely on online courses and internet-based learning materials, which provide flexibility and broader access to knowledge [1]. International platforms such as Khan Academy and Coursera offer high-quality digital learning resources. However, these platforms are designed for an international audience and do not align with the Sindh Board curriculum requirements [2]. Furthermore, most e-learning platforms in Pakistan primarily focus on O-Level studies and higher education, leaving students from Grade 1 to 12 under the Sindh Board underserved.

Currently, many teachers and students rely on informal tools such as WhatsApp and YouTube for sharing lectures and study materials. While these tools provide accessibility, they lack centralized academic management, structured communication, progress tracking, and curriculum alignment [3].

To address this gap, this project proposes a localized tutoring website specifically aligned with the Sindh Board curriculum. The platform aims to connect teachers and students from various urban and rural areas of Sindh through a structured, role-based web system. By offering a curriculum-aligned digital network, the website enables teachers to share their expertise while ensuring students receive guided and organized learning support.

1.2 PROBLEM STATEMENT

The education system in Sindh lacks a structured and curriculum-aligned digital learning platform for students from Grade 1 to 12. Although international

platforms such as Khan Academy and Coursera provide online education, their content is not tailored to the Sindh Board curriculum [2].

In Pakistan, most e-learning platforms target O-Level or higher education students, resulting in a significant gap for Sindh Board students.

At present, teachers and students depend on informal communication tools such as WhatsApp and YouTube. These tools lack:

- Centralized resource management
- Academic performance tracking
- Structured teacher-student interaction
- Secure monetization mechanisms for teachers

Research indicates that structured online platforms significantly improve learner engagement, monitoring, and academic outcomes compared to informal digital tools [1][4].

Therefore, there is a need for a localized, organized, and curriculum-based e-learning platform that connects teachers and students across Sindh while ensuring accessible, structured, and quality education.

1.3 AIM AND OBJECTIVES

This section presents the overall aim of the project along with the specific objectives required to achieve it.

1.3.1 AIM

The main aim of this project is to design and develop a localized web-based e-learning platform tailored specifically to the Sindh Board curriculum for students from Grade 1 to 12, enabling structured digital learning and teacher-student interaction across Sindh.

1.3.2 OBJECTIVES

To achieve the above aim, the following objectives are defined:

- To develop a centralized resource hub for Sindh Board-aligned study materials and academic updates.
- To facilitate remote tutoring by providing an interactive digital space for teachers and students.
- To streamline academic management through automated handling of assignments, timetables, and performance tracking [4].
- To enable teacher monetization through a secure course and payment system.
- To improve learning accessibility and flexibility for students in both urban and rural areas of Sindh.

1.4 SCOPE

The scope of **Learnity** is to provide an e-learning platform specifically designed for the Sindh Board curriculum from Grade 1 to 12, where students and teachers can make accounts to interact with syllabus-aligned courses and video lectures. The platform have responsive web and Android-based interface. The teachers are empowered to manage their own specialized study materials and monetize their courses, while the students are able to access the study materials, participate in quizzes, and attend live classes. Additionally, the system is made for collaborative learning with chats, comments, and discussion forums that enable effective communication between teachers and students regardless of their location.

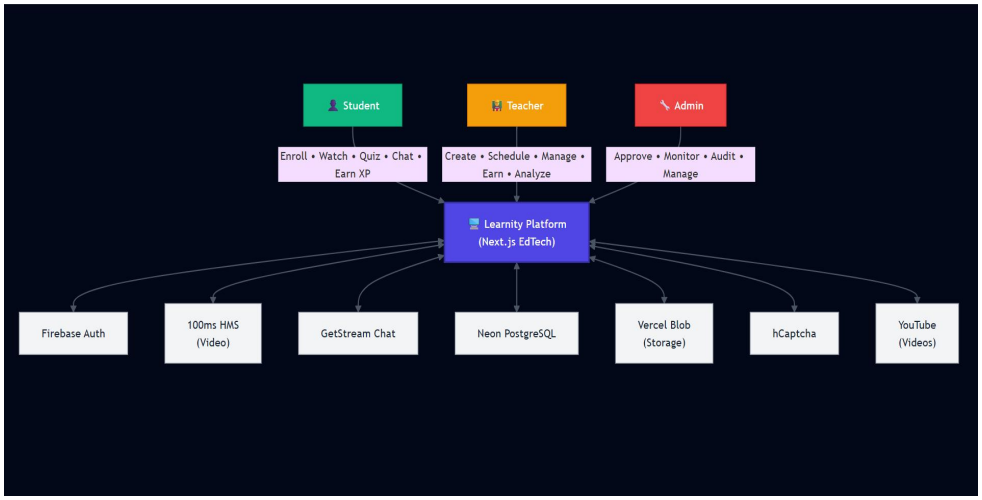

Figure 1-1: Context Diagram Of Learnity

CHAPTER NO. 2

BACKGROUND AND LITERATURE REVIEW

2.1 INTRODUCTION

The rapid evolution of digital infrastructure has transformed education from traditional brick-and-mortar classrooms to boundless digital ecosystems [6]. "Learnity" is situated at the intersection of three major technological trends: the shift towards localized educational content, the rise of synchronous real-time interaction in e-learning, and the integration of gamified mechanics to combat student attrition [7]. This chapter reviews the historical context of online learning, analyzes the specific educational landscape of Pakistan, critiques existing platforms, and justifies the modern technology stack selected for this project.

2.2 EVOLUTION OF ONLINE EDUCATION

Online education has undergone a significant transformation over the past two decades, evolving from simple digital content delivery systems to highly interactive and intelligent learning ecosystems [6]. Initially designed merely to replicate traditional classroom materials in digital form, modern e-learning platforms now emphasize engagement, collaboration, personalization, and accessibility. This evolution has been driven by advancements in web technologies, increased internet penetration, and the growing demand for flexible learning solutions worldwide.

2.2.1 FROM CONTENT DELIVERY TO INTERACTIVE ECOSYSTEMS

Early e-learning (Web 1.0) was characterized by static content delivery, digitized textbooks, and PDF repositories. The paradigm shifted with Web 2.0,

introducing interactivity through forums and basic quizzes. Modern "Web 3.0" educational platforms now integrate real-time video conferencing, adaptive learning algorithms, and peer-to-peer communities [6].

Research by Hamari et al. (2023) indicates that active learning environments where students engage in discussion and problem-solving result in knowledge retention rates of up to 90%, compared to only 5% for passive lecture consumption [7]. This data underscores the necessity of the "Classroom Community" model implemented in our project.

2.2.2 THE RISE OF EdTech IN PAKISTAN

The e-learning market in Pakistan has grown significantly, valued at USD 327.79 million in 2024 with a projected growth to USD 2.3 billion by 2033 (CAGR 24.43%) [8]. Factors driving this growth include:

- Increased internet penetration (4G/broadband expansion).
- The COVID-19 catalyst, which normalized remote learning [9].
- A massive "Youth Bulge," with millions of students seeking quality education outside traditional institutions.

However, a digital divide persists. Only 33% of households possess reliable internet access [10], necessitating platforms that are lightweight, mobile-optimised, and capable of functioning in low-bandwidth environments, a key non-functional requirement for our Progressive Web Application (PWA).

2.3 EXISTING PLATFORMS AND GAP ANALYSIS

To understand the necessity of the proposed system, it is important to evaluate the currently available e-learning platforms at both international and national levels. This analysis highlights their strengths while identifying the specific gaps that justify the development of a localized, curriculum-aligned solution for Sindh Board students.

2.3.1 INTERNATIONAL PLATFORMS (Khan Academy, Coursera)

- **Strengths:** World-class pedagogy, high-quality video production, and robust mobile apps.
- **Weaknesses for Local Context:** Content is primarily in English, aligned with US/UK curricula (Common Core, GCSE). They lack alignment with the specific board requirements of Sindh (e.g., specific textbook chapters, local exam patterns).

2.3.2 LOCAL PLATFORMS (IlmKiDunya, Sabaq Foundation)

- **Analysis:** IlmKiDunya serves as a massive repository for past papers, results, and text notes. Sabaq Foundation offers excellent recorded video lectures in Urdu.
- **Critical Gap**: These platforms function primarily as "Digital Libraries", asynchronous and passive. They lack:
    1. **Synchronous Interaction:** No live video tutoring or real-time doubt clearing.
    2. **Social Learning:** No classroom communities for peer support.
    3. **Gamification:** No structural motivation systems (XP, streaks) to ensure daily engagement [7].

Learnity addresses these specific gaps by combining the curriculum alignment of local platforms with the interactive technologies (live video, gamification) of international leaders.

2.4 THEORETICAL FRAMEWORK: GAMIFICATION IN EDUCATION

Gamification is not merely adding "points" to a system; it is the application of game-design elements to non-game contexts [7].

- **Motivation:** Studies show a 30% increase in student motivation when learning goals are tied to visible progress indicators (XP, Levels).
- **Retention:** The "Streak" mechanic, popularized by Duolingo, leverages the psychological principle of "Loss Aversion"; students return daily to avoid losing their progress streak.
- **Implementation in Learnity:** We utilize an XP (Experience Points) architecture where every lesson completion and quiz success awards points, driving a positive feedback loop for student retention.

2.5 SUMMARY

The literature confirms that while the demand for online education in Pakistan is skyrocketing, existing solutions force a choice between "High-quality International" (but irrelevant curriculum) and "Static Local" (but boring/passive). Learnity fills this void by leveraging a strictly typed, relational tech stack (Next.js/SQL) to deliver a gamified, real-time, and localized learning experience.

CHAPTER NO. 3

ANALYSIS & DESIGN

3.1 REQUIREMENTS

A requirement is a condition or capability that a system must satisfy to meet the needs of its users and stakeholders. It defines what the system is expected to accomplish in order to be considered successful. During software development, requirements are usually expressed in terms of system functionality, focusing on what the system should do rather than how it will be implemented technically. Clearly defined requirements help ensure that the final product meets user expectations, remains practical, and aligns with project objectives.

Requirements are generally divided into two main categories: functional requirements and non-functional requirements.

3.1.1 FUNCTIONAL REQUIREMENTS

This describes what the system has to do. They define the services, behaviors, and functions that a system must provide to its users. The requirements are focused on systems, action, inputs, processing, and output, and do not describe how the system is technically implemented.

In many situations, when user requirements are written for the requester rather than the end user, functional requirements are often merged with non-functional requirements. This practice is common in organizations that have a strong Information Technology department responsible for developing and implementing the system. The functional requirement of Learnity is the following:

3.1.1.1 USER AUTHENTICATION

The system must provide a secure registration and login mechanism for Students, Teachers, and Administrators. Each user role must have distinct access

permissions and dashboards according to their responsibilities. The system should also support password recovery and account verification features.

3.1.1.2 PROFILE MANAGEMENT

Users must be able to create, update, and manage their profiles. Teachers can add qualifications, subjects, and experience details, while students can update their academic information such as grade and subjects.

3.1.1.3 MULTIMEDIA CONTENT MANAGEMENT

Teachers must be able to upload, edit, organize, and delete recorded video lectures and PDF study materials. The system should categorize content according to Grade (1–12), Subject, and Chapter to maintain structured learning.

3.1.1.4 SINDH BOARD FILTERING AND SEARCH SYSTEM

The platform must provide a search and filtering engine that allows students to browse content specifically aligned with the Sindh Board curriculum by selecting grade, subject, and topic.

3.1.1.5 DUAL LEARNING MODES

The system must support asynchronous learning through recorded video lectures and synchronous learning through live online classes with real-time interaction features.

3.1.1.6 SUBSCRIPTION AND MONETIZATION SYSTEM

Teachers must be able to offer both free and paid courses. The system should manage subscription access and integrate local payment methods such as JazzCash and Easypaisa for secure transactions.

3.1.1.7 EVALUATION AND ASSESSMENT TOOLS

The platform must include automated quiz modules with instant result generation. It should also provide a digital assignment submission portal where students can upload assignments and receive feedback from teachers.

3.1.1.8 NOTIFICATION AND COMMUNICATION SYSTEM

The system should send notifications for new lectures, live classes, assignment deadlines, and announcements. It should also support communication through comments or discussion features to enhance interaction between teachers and students.

These functional requirements ensure that Learnity provides a structured, interactive, and curriculum-aligned e-learning environment tailored specifically for Sindh Board students.

3.1.2 NON-FUNCTIONAL REQUIREMENTS

In software engineering, non-functional requirements focus on ensuring overall system quality rather than specific functionalities. Software systems are expected to demonstrate key quality attributes such as accuracy, performance, security, and ease of modification. Despite their importance, non-functional requirements are often challenging to define and implement in many projects, even though effective methods exist for addressing functional requirements that deliver the intended system behavior.

Non-functional requirements are a very useful reference for software practitioners, researchers, and students as they cover areas such as system performance, external interface requirements, design constraints, and overall software quality attributes. Non-functional requirements are not easily testable, and hence they are evaluated by subjective evaluation instead of objective measurement

The website Learnity has the following non-functional requirements

3.1.2.1 SECURITY

- User authentication with email/password and social login (Google, Microsoft) using Firebase
- Role-based access control with five user roles (Student, Teacher, Admin, Pending Teacher, Rejected Teacher)

- Password policy requiring minimum 8 characters with mixed case, numbers, and special characters
- Bot protection using hCaptcha and Firebase App Check on registration and login
- Rate limiting to prevent brute-force attacks across multiple time windows
- Input validation on all forms and API endpoints to prevent injection attacks
- Audit logging of all user actions, logins, and admin decisions with IP tracking
- Device fingerprinting and security event monitoring for suspicious activity detection

3.1.2.2 PERFORMANCE

- Server-side rendering and static page generation for fast initial load times
- Multi-level caching with automatic revalidation (60 seconds to 24 hours)
- Image optimization with modern formats (WebP, AVIF) and responsive sizing
- Database indexing, query optimization, and pagination for efficient data retrieval
- Debounced search inputs and memoized components to reduce unnecessary processing
- Skeleton loading placeholders and progressive content rendering for smooth UX
- Support for concurrent users in live classes and video streaming
- Backend API response time within 200–300 milliseconds under normal load
- Adaptive media streaming to maintain quality under varying bandwidth conditions

3.1.2.3 USABILITY

- Mobile-first responsive design with adaptive navigation for different devices
- Dark mode support across all interface components
- Real-time toast notifications for user feedback and gamification rewards
- Accessible interface with screen reader support, keyboard navigation, and high-contrast modes
- Animated transitions using Framer Motion for engaging and smooth interactions
- Simple and intuitive UI layout for easy navigation of courses, lectures, and materials

- Consistent visual design and clear labeling of buttons, icons, and menus
- Quick onboarding flow for new users to register, subscribe, and access content efficiently
- Interactive dashboards for students, teachers, and administrators for effective monitoring and management

3.1.2.4 RELIABILITY

- Standardized error handling with user-friendly error messages across all endpoints
- Firebase-to-database synchronization ensuring data consistency
- Retry logic with exponential backoff for external service failures
- Fallback UI components during loading and error states

3.1.2.5 MAINTAINABILITY

- Strict TypeScript with 25+ dedicated service modules following separation of concerns
- Modular component architecture organized by feature (28 folders, 40+ reusable UI components)
- Automated code quality enforcement using ESLint, Prettier, and type-checking scripts
- Environment-based configuration with startup validation

3.1.2.6 PRIVACY

- User-controlled profile visibility settings (Public, Friends, Private)
- Role-based data access ensuring users only see authorized information
- Complete audit trail for accountability and compliance

3.2 DESIGN OF LEARNITY WEBSITE

This section describes the functional design of the Learnity platform through diagrams. The Digrams shows how each role interact with system and how its process.

3.2.1 USE CASE FOR TEACHERS

Figure **3-1** illustrates the use case diagram for Teachers.

In order to use the platform, a teacher must first register and log into the system. After successful authentication, the teacher can upload video lectures, notes, and other study materials related to the Sindh Board curriculum. The platform also allows teachers to conduct live classes for real-time interaction with students. Furthermore, teachers can manage their course content and enable monetization to receive subscriptions from students. This use case demonstrates how the system supports teachers in delivering and monetizing their educational services digitally.

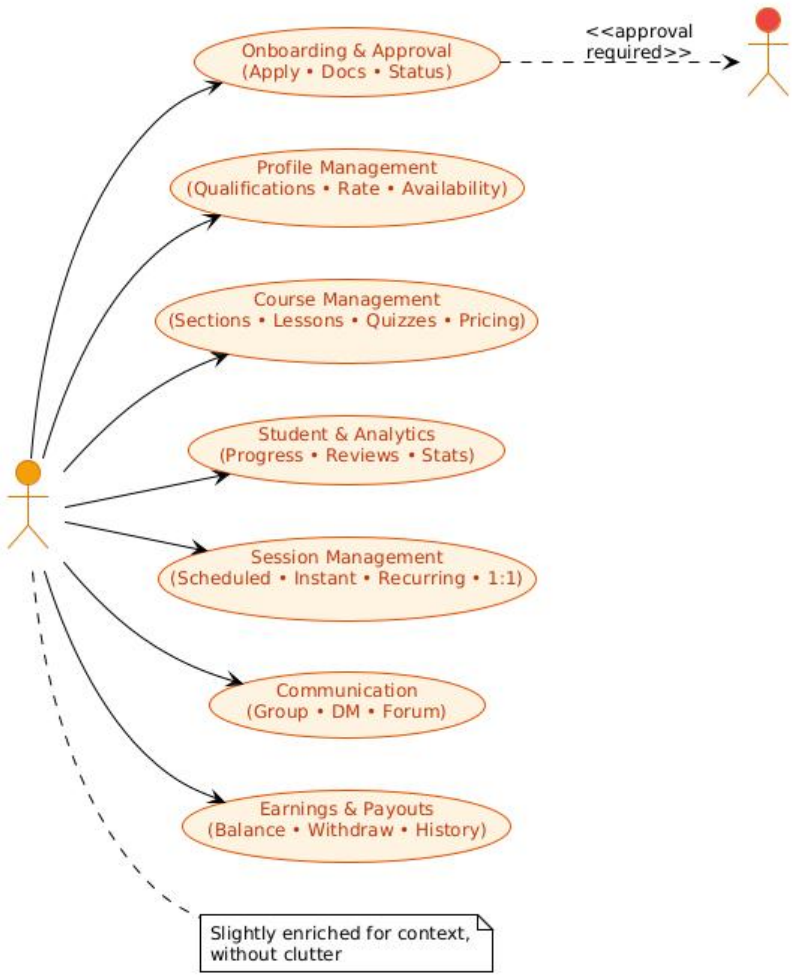

Figure 3-1: Use Case Diagram of Teacher

3.2.2 USE CASE FOR STUDENT

Figure **3-2** illustrates the use case diagram for Students.

A student begins by creating an account and logging into the platform. Once logged in, the student can search for teachers and subscribe to their courses in order to access learning content. After subscribing, the student is able to attend live video lectures, watch previously uploaded recorded lectures, and view or download study materials provided by the teacher. This use case highlights how the platform enables students to learn remotely through both synchronous and asynchronous learning methods.

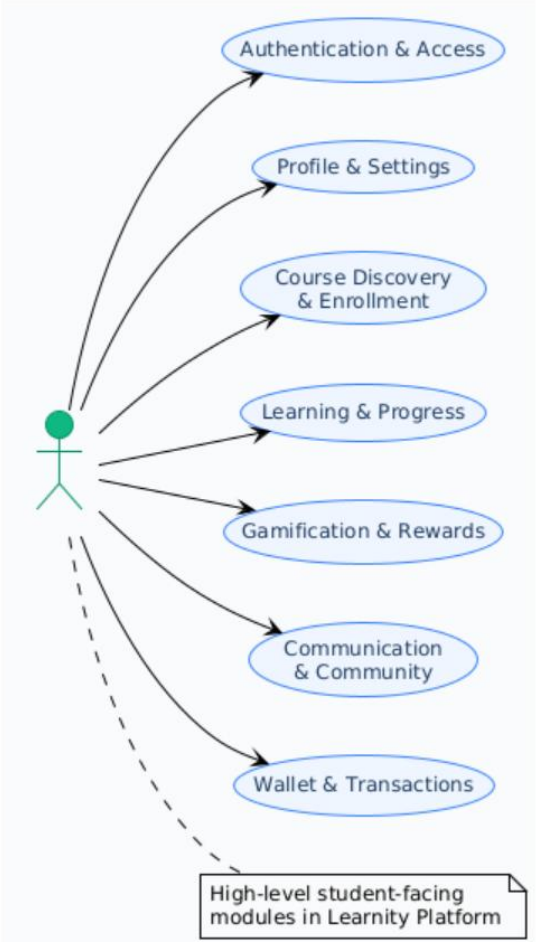

Figure 3-2:Use Case Diagram of Student

3.2.3 USE CASE FOR ADMIN

Figure **3-3** illustrates the use case diagram for the Administrator.

The administrator plays a supervisory role in managing the entire system. The administrator has full control over teacher and student accounts and is responsible for monitoring all uploaded content to ensure it complies with community guidelines. In case of inappropriate or irrelevant material, the administrator has the authority to restrict, modify, or remove such content. Additionally, the administrator ensures system maintenance, security, and smooth functionality of the website, thereby maintaining a safe and organized learning environment for all users.

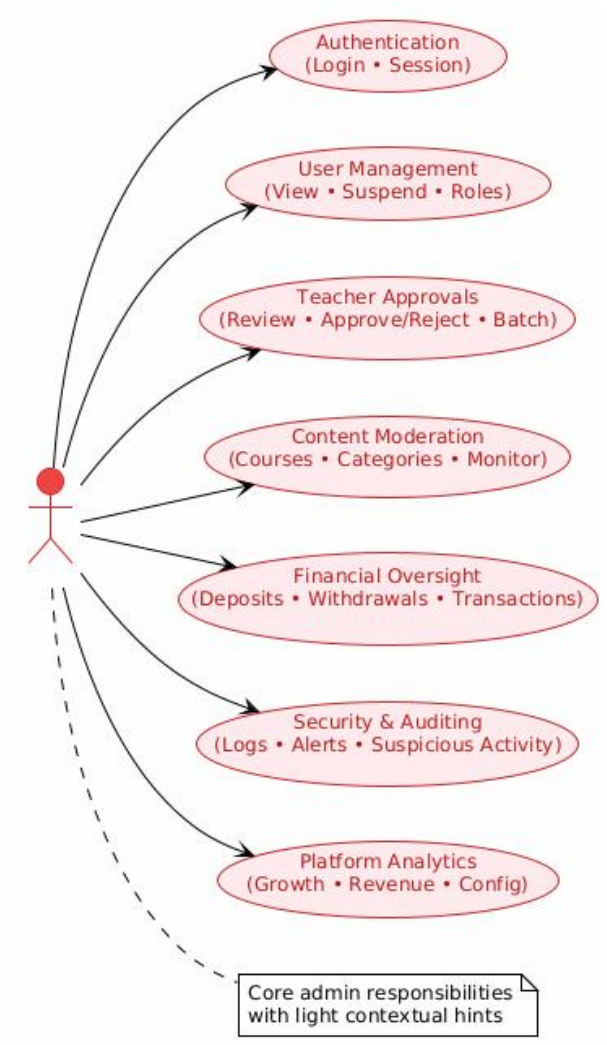

Figure 3-3: Use Case Diagram of Admin

3.2.4 ACTIVITY DIAGRAM FOR TEACHER

Figure **3-4** illustrates the activity diagram for the Teacher.

The process begins when the teacher logs into the system using valid credentials. After successful login, the teacher uploads video lectures and learning materials for students. The teacher may also conduct live classes to interact with students in real time. Once all required tasks are completed, the teacher logs out of the system, marking the end of the activity flow.

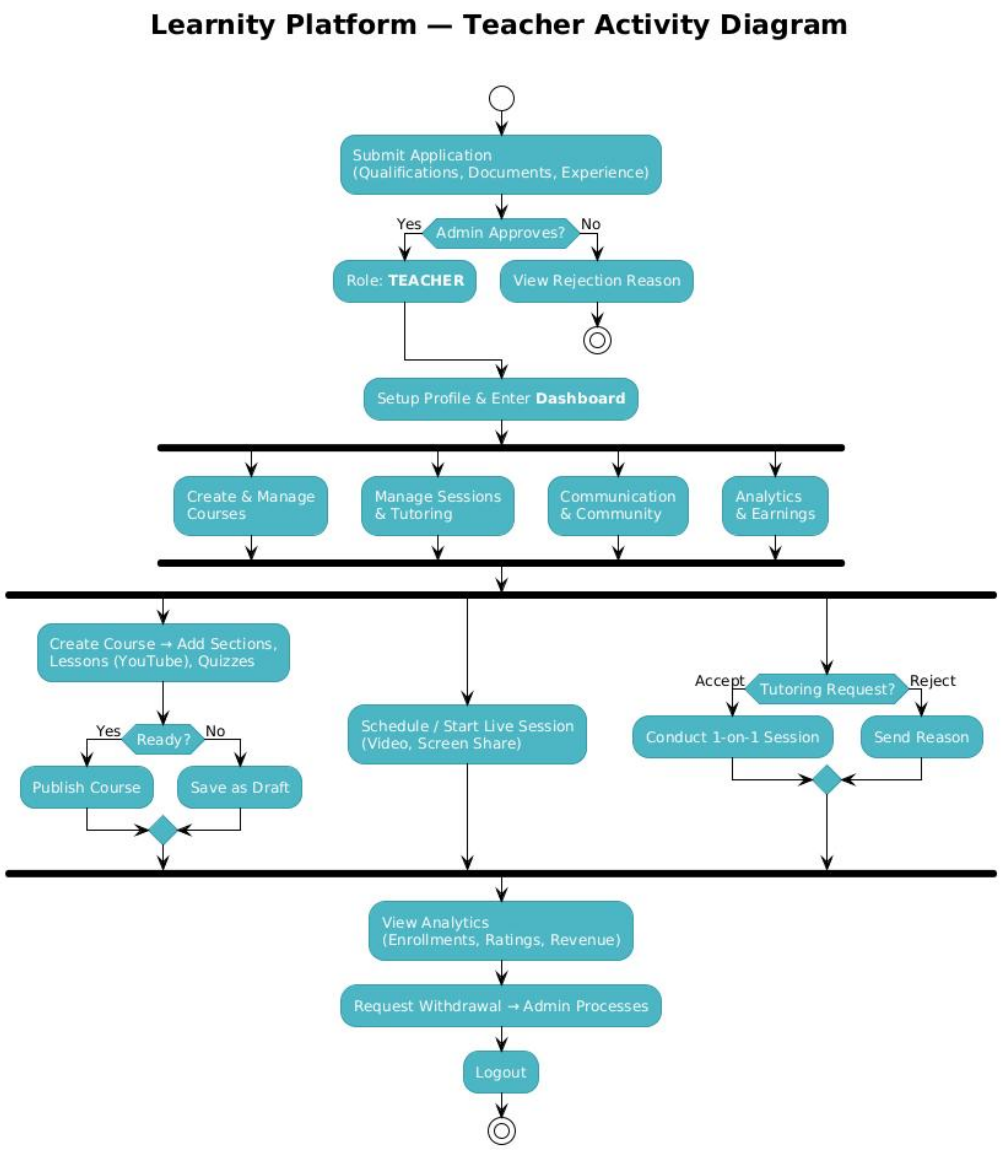

Figure 3-4: Activity Diagram of Teacher

3.2.5 ACTIVITY DIAGRAM FOR STUDENT

Figure 3-5 illustrates the activity diagram for the Student.

The activity starts when the student logs into the platform. After authentication, the student browses the list of available teachers and subscribes to a teacher of their choice. Upon successful subscription, the student can attend live video lectures, watch recorded lectures, and access notes and study materials uploaded by the teacher. After completing the learning session, the student logs out of the system, concluding the process.

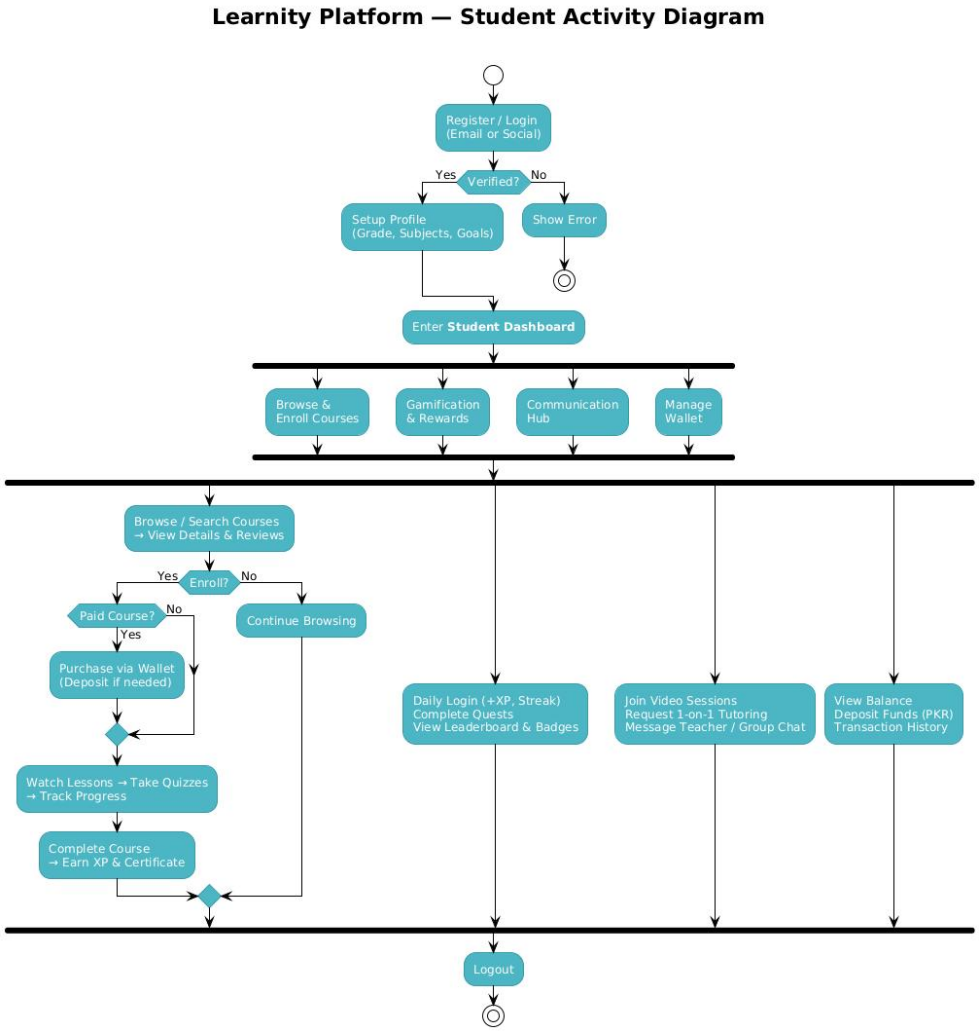

Figure 3-5: Activity Diagram of Student

3.2.6 ACTIVITY DIAGRAM FOR ADMIN

Figure 3-6 illustrates the activity diagram for the Administrator.

The administrator begins by logging into the system. After login, the administrator manages teacher and student accounts, reviews and monitors uploaded content, and controls overall website settings and activities. Once administrative tasks are completed, the administrator logs out, ending the activity sequence.

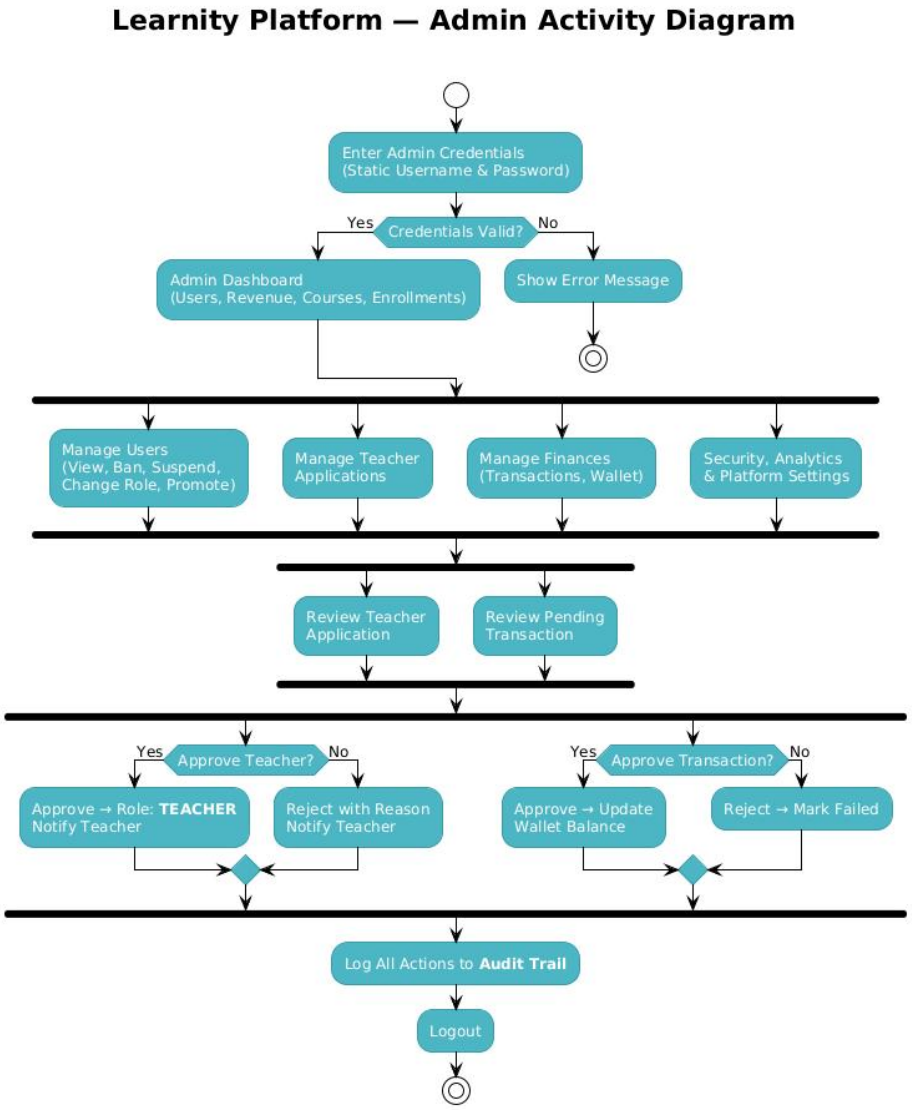

Figure 3-6: Activity Diagram of Admin

3.3 ENTITY RELATIONSHIP DIAGRAM

Entity Relationship Diagram (ERD) is a graphical tool that is used in database design to represent entities in a system and the relationships between them. Entities are real-world objects like users, courses, or payments, while attributes are descriptions of the characteristics of each entity. Relationships are used to describe how entities are related to each other, for example, one-to-one, one-to-many, or many-to-many. An ERD can assist a developer or designer in understanding the structure of a database, organizing data effectively, and establishing the correct relationships before creating a database.

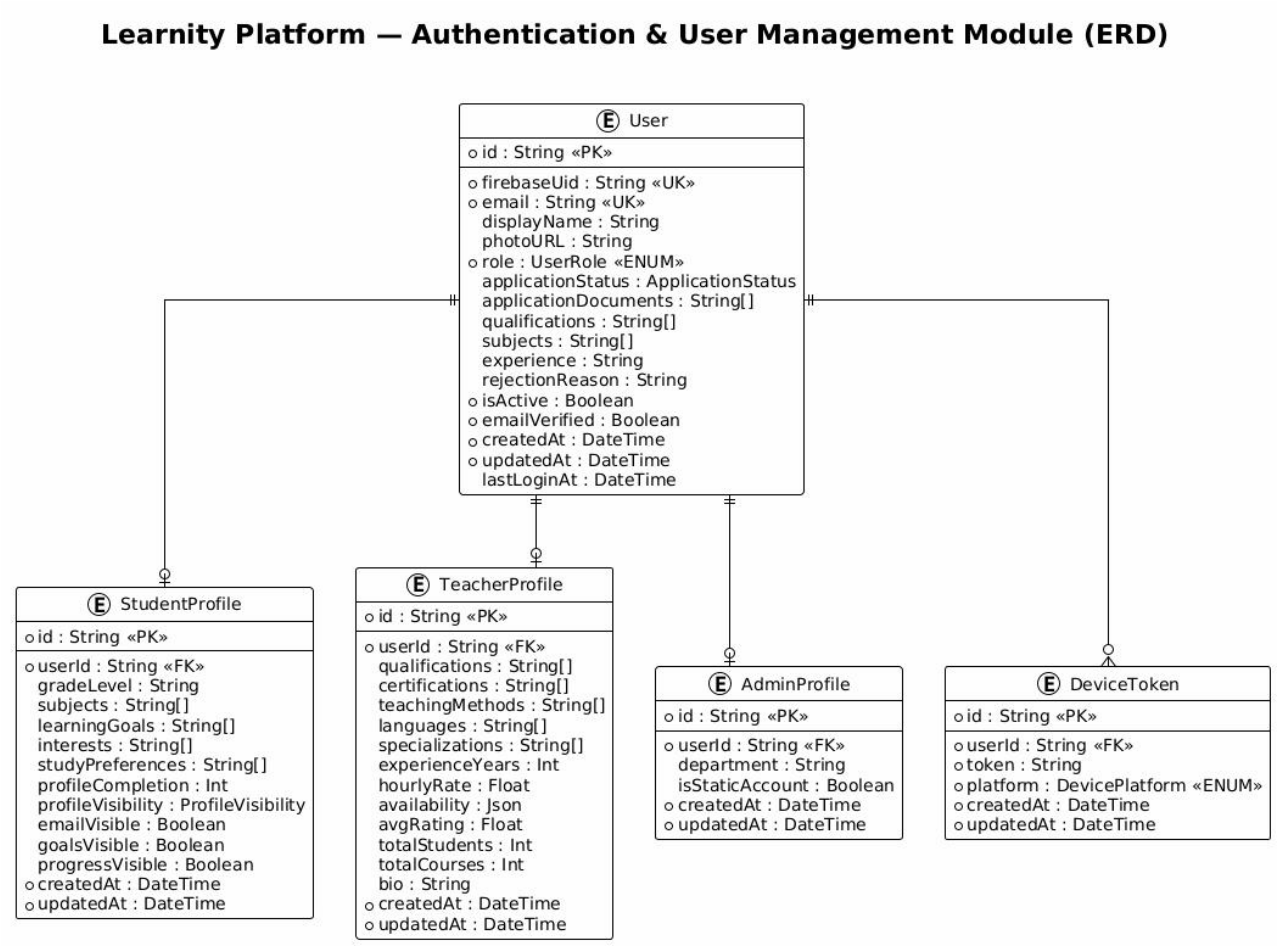

Figure 3-7:ERD Diagram of Authentication Module

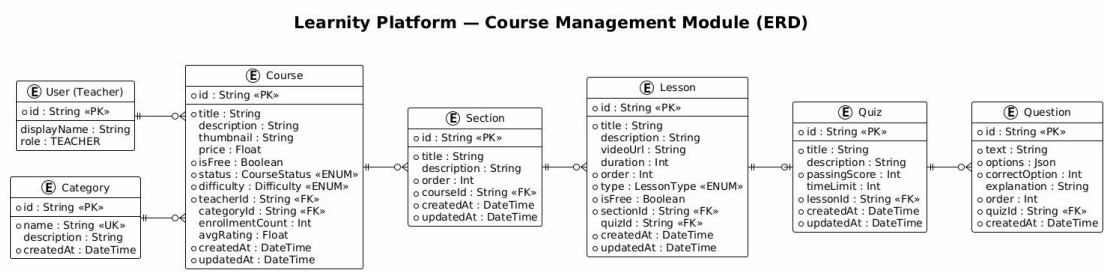

Figure 3-8: ERD Diagram Of Course Management Module

3.4 SYSTEM ARCHITECTURE

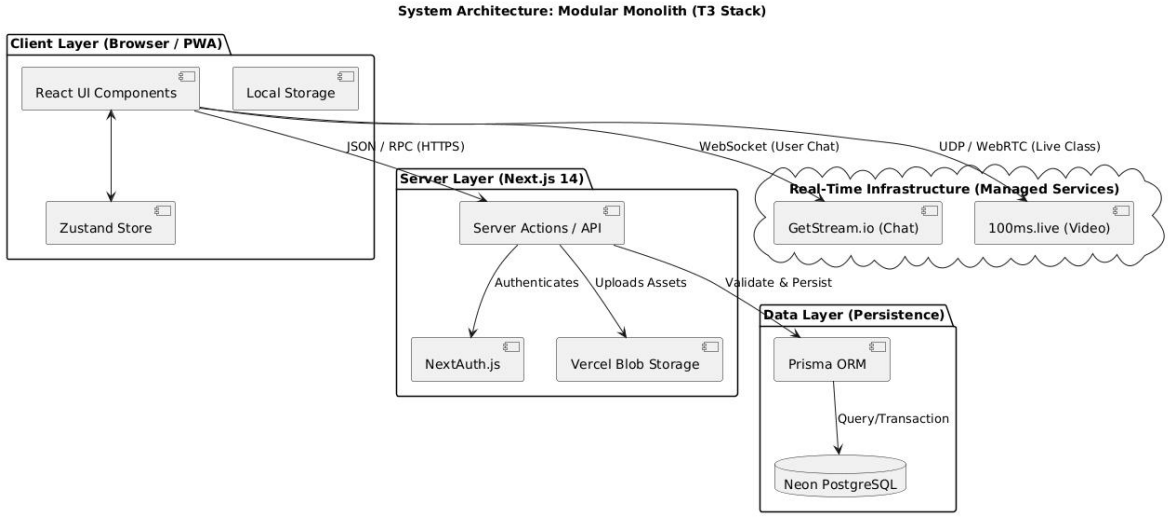

Figure 3-9: System Architecture

CHAPTER NO. 4

TOOL & TECHNOLOGIES

4.1 OVERVIEW OF TOOLS

Tools are softwarethat help developers during their software development processes. These tools help developers write codes, perform tasks during software development, and ensure that they create top-quality software [11].

Integrated Development Environment is the complete development environment that consists of various tools or components, i.e., the code editor, compiler or interpreter, and debugger, etc. It also facilitates the development of the programming language by providing the coder with various options like syntax highlighting, automatic code completion, etc [11].

Tools include testing tools that aid in verifying software functions, build tools/deployment tools that aid in packaging/deploying software applications, and database management tools that aid in storing data. Consequently, these tools aid software developers in every stage of their software development process, and they are essential in the world of programming [11].

4.2 NEXT.JS 16 (FRAMEWORK)

Next.js is a React framework that enables extra features, including server-side rendering and static site generation [12]. React is a JavaScript library for building user interfaces, but Next.js extends it by providing a structured environment for full-stack development.

Why we used it: It allows building both the frontend (user interface) and backend (API logic) within a single project architecture. Its App Router improves navigation performance and enhances user experience [12].

4.3 SHADCN WITH TAILWIND CSS (STYLING)

Tailwind CSS is a utility-first CSS framework. Unlike traditional CSS, it provides low-level utility classes (e.g., flex, pt-4, text-center) that can be directly used in markup [13].

ShadCN provides pre-built UI components designed to work seamlessly with Tailwind CSS.

Advantage: It dramatically speeds up the design process and ensures that the website looks good on mobile devices without writing complex media queries.

4.4 POSTGRESQL & NEON (DATABASE)

PostgreSQL is a powerful, open-source object-relational database system. It uses and extends the SQL language, combined with many features that safely store and scale the most complicated data workloads [14].

4.4.1 Neon:

Neon is a serverless PostgreSQL provider. It eliminates the need for manual database server management and automatically scales resources based on application demand [14].

4.5 PRISMA (ORM)

Prisma is a next-generation Object-Relational Mapper (ORM). It acts as a bridge between our Next.js code and the PostgreSQL database [15].

Usage: Instead of writing raw SQL queries, we write simpler JavaScript functions. Prisma also provides "Type Safety," meaning if we try to save a

Student's data without an email address, the code will show an error before we even run it [15].

4.6 GETSTREAM (CHAT SDK)

GetStream is a powerful API for building scalable chat and activity feed applications [16].

Implementation: We used it to build the "Classroom Community" chat. It handles storing messages, showing who is online, and typing indicators, saving us weeks of development time.

4.7 100MS (VIDEO SDK)

100ms is a live video infrastructure platform that enables developers to build real-time video conferencing systems [17].

Role in Project: It powers our live video classrooms. It automatically handles video quality, adjusting it based on the student's internet speed so the connection doesn't drop.

4.8 VISUAL STUDIO CODE (IDE)

Visual Studio Code is a source-code editor made by Microsoft. It includes support for debugging, embedded Git control and GitHub, syntax highlighting, and intelligent code completion [11].

Role: This was our primary workspace for writing code. Its extensive ecosystem of extensions (like "ESLint" and "Prettier") helped keep our code clean and error-free.

4.9 GIT & GITHUB (VERSION CONTROL)

Git is a distributed version-control system for tracking changes in source code during software development [11]. GitHub is a cloud-based hosting service for Git repositories.

Workflow: We used Git to save versions of our project. If a new feature broke the site, we could easily "undo" the changes and go back to a working version.

CHAPTER NO. 5

IMPLEMENTATION

5.1 INTRODUCTION

This chapter documents the practical implementation of the "Learnity" project. We have successfully translated the design diagrams from Chapter 3 into a fully functional, multi-role web application. Below, we present the comprehensive set of user interfaces developed for each module, validating that all functional requirements have been met.

5.2 PUBLIC INTERFACE MODULE

The public interface is the first point of contact for all users. It is designed to be accessible, fast, and SEO-friendly.

5.2.1 LANDING PAGE (HOME)

The Figure **5-1** shows the main landing page serves as the gateway to the entire ecosystem. It features:

Hero Section: A clear value proposition ("Localized Education for Sindh").

Call to Action: Distinct buttons for "Find a Tutor" and "Start Teaching."

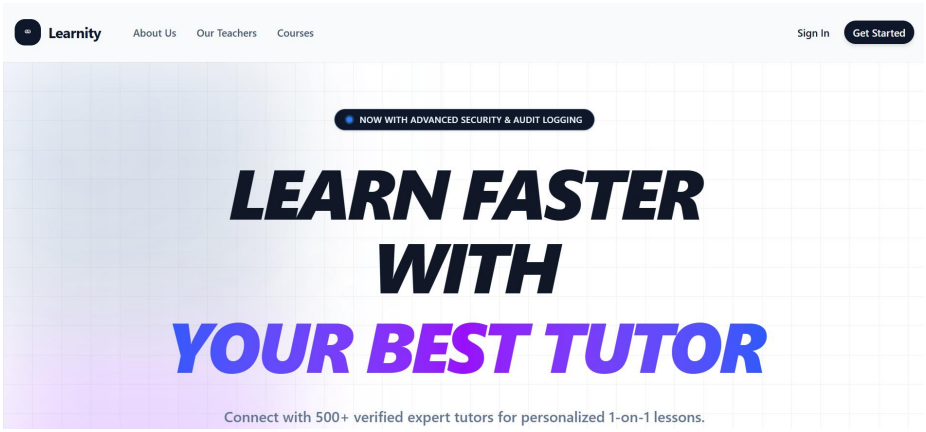

Figure 5-1: Landing Page

5.3 AUTHENITICATION MODULE

Security is paramount. We implemented a robust authentication system using Firebase.

5.3.1 UNIFIED LOGIN SCREEN

Figure **5-2 and 5-3** shows a single, secure login portal for all user roles (Student, Teacher, Admin). It supports:

- **Email/Password:** Traditional secure login.
- **Google OAuth:** One-click login for ease of use.

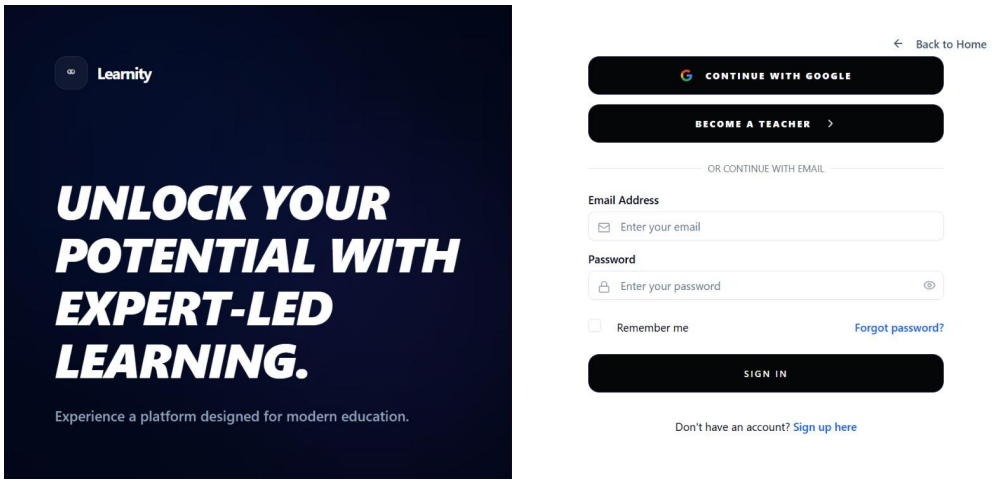

Figure 5-2: Login Screen

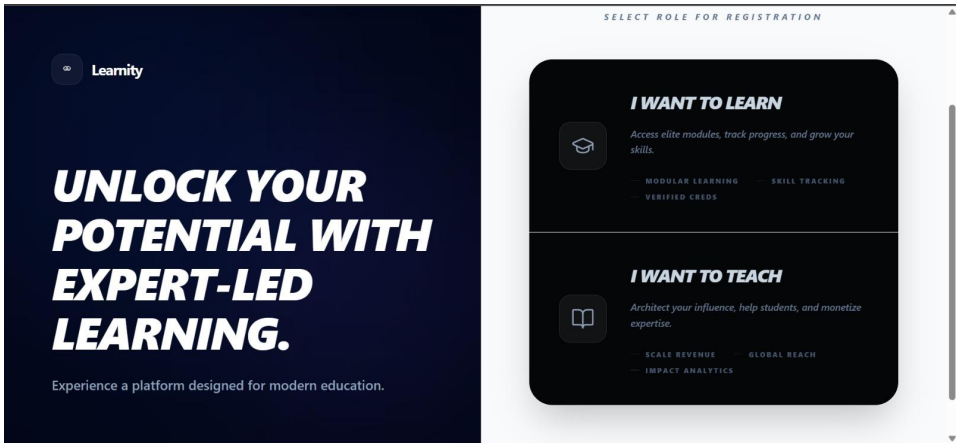

Figure 5-3: Role Selection Screen

5.3.2 USER REGISTRATION (SIGN UP)

Figure **5-4** and **5-5** illustrates that the registration flow collects essential user data (Name, Email, Password) and creates the initial User record in the PostgreSQL database.

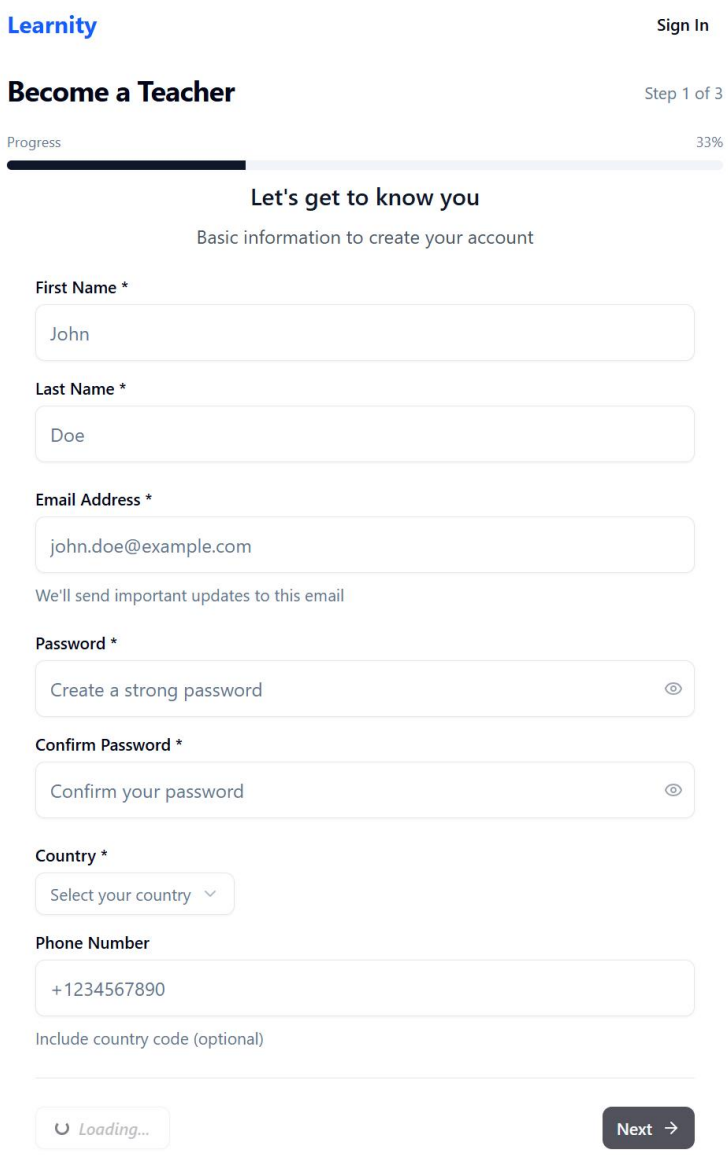

Figure 5-4: Teacher Registration Page

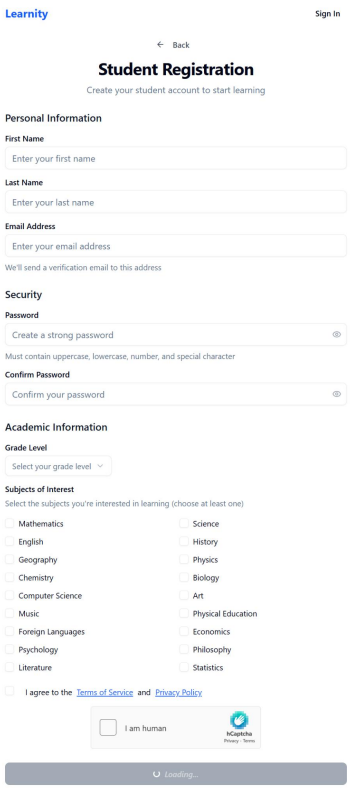

Figure 5-5: Student Registration Page

5.3.3 PASSWORD RECOVERY

Figure **5-6** shows a functional flow allowing users to reset their passwords via secure email links, ensuring account safety.

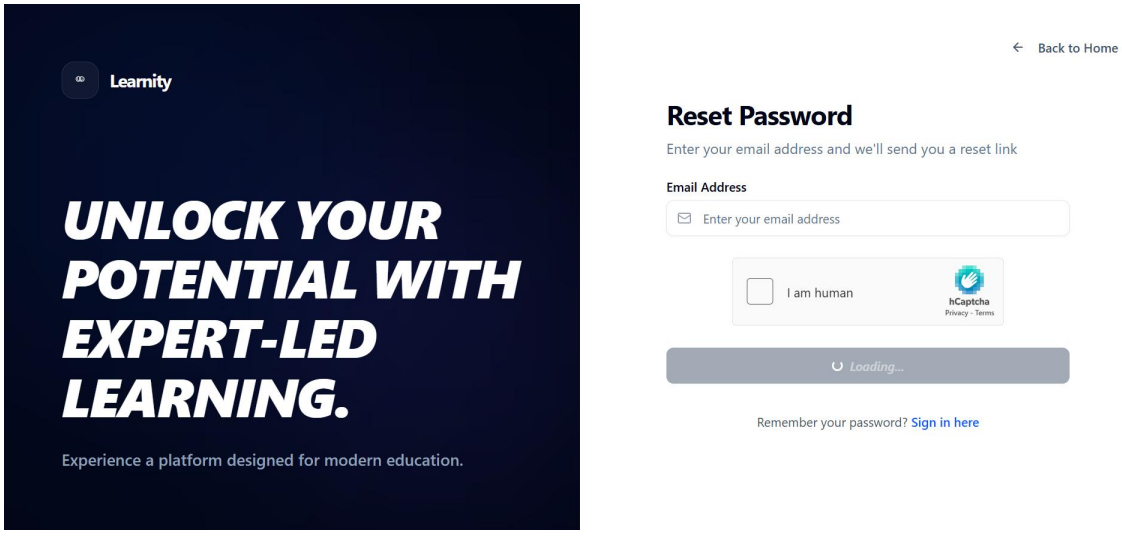

Figure 5-6:Password Recovery Page

5.4 STUDENT PORTAL

The student portal is the learning hub, designed for engagement and ease of navigation.

5.4.1 STUDENT DASHBOARD

Figure **5-7** shows the personalized home for every student. It displays:

- **Welcome Message:** Personalized greeting.
- **Active Courses:** Resume learning button for the last accessed course.
- **Gamification Stats:** Current Streak, Total XP, and Level.

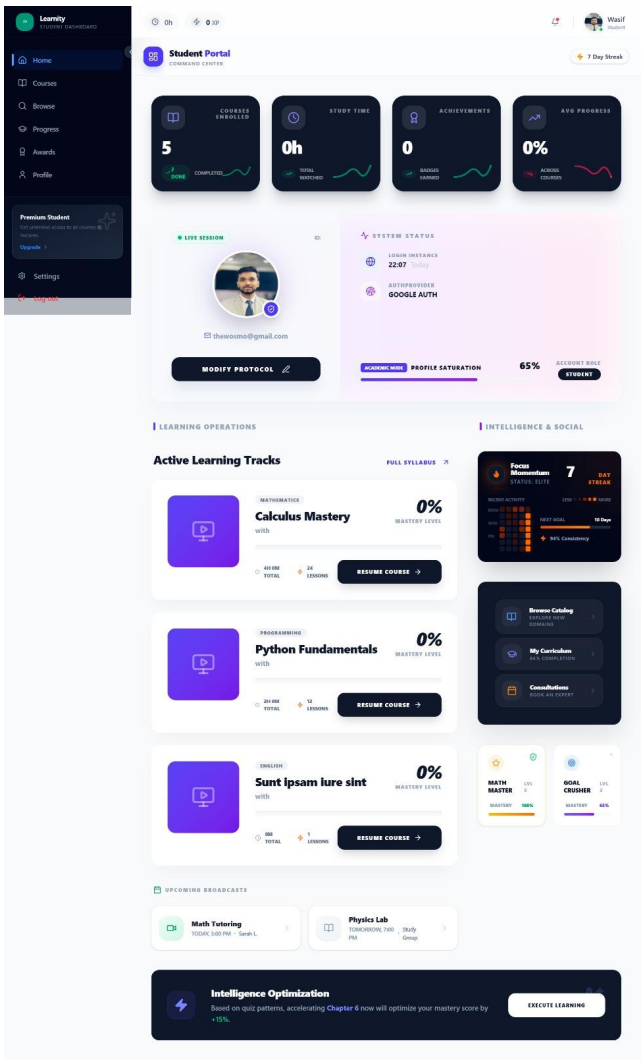

Figure 5-7: Student Dashboard

5.4.2 COURSE CATALOG (SEARCH & FILTER)

Figure **5-8** shows a powerful search engine allowing students to find content.

- **Filters:** Filter by Grade (1-12), Subject (Math, Bio, etc.), and Price (Free/Paid).
- **Search Bar:** Real-time text search for topics.

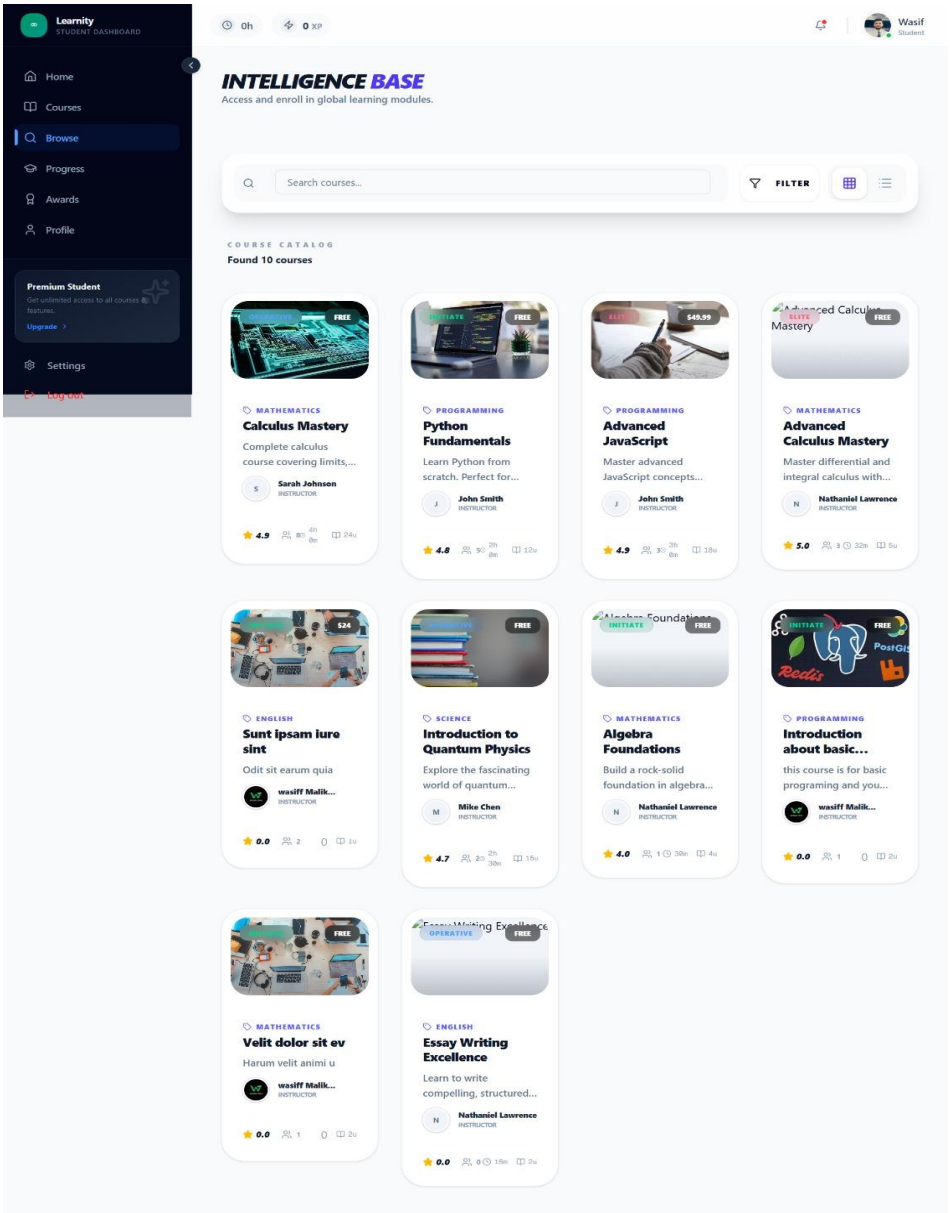

Figure 5-8: Course Catalog Page

5.4.3 INDIVIDUAL COURSE LANDING PAGE

In Figure **5-9** shows a student views before enrolling this detailed page containing:

- **Course Trailer:** A preview video.
- **Curriculum:** The full list of Sections and Lessons.
- **Teacher Bio:** Information about the instructor.
- **Enroll Button**: Triggers the enrollment (or payment) flow.

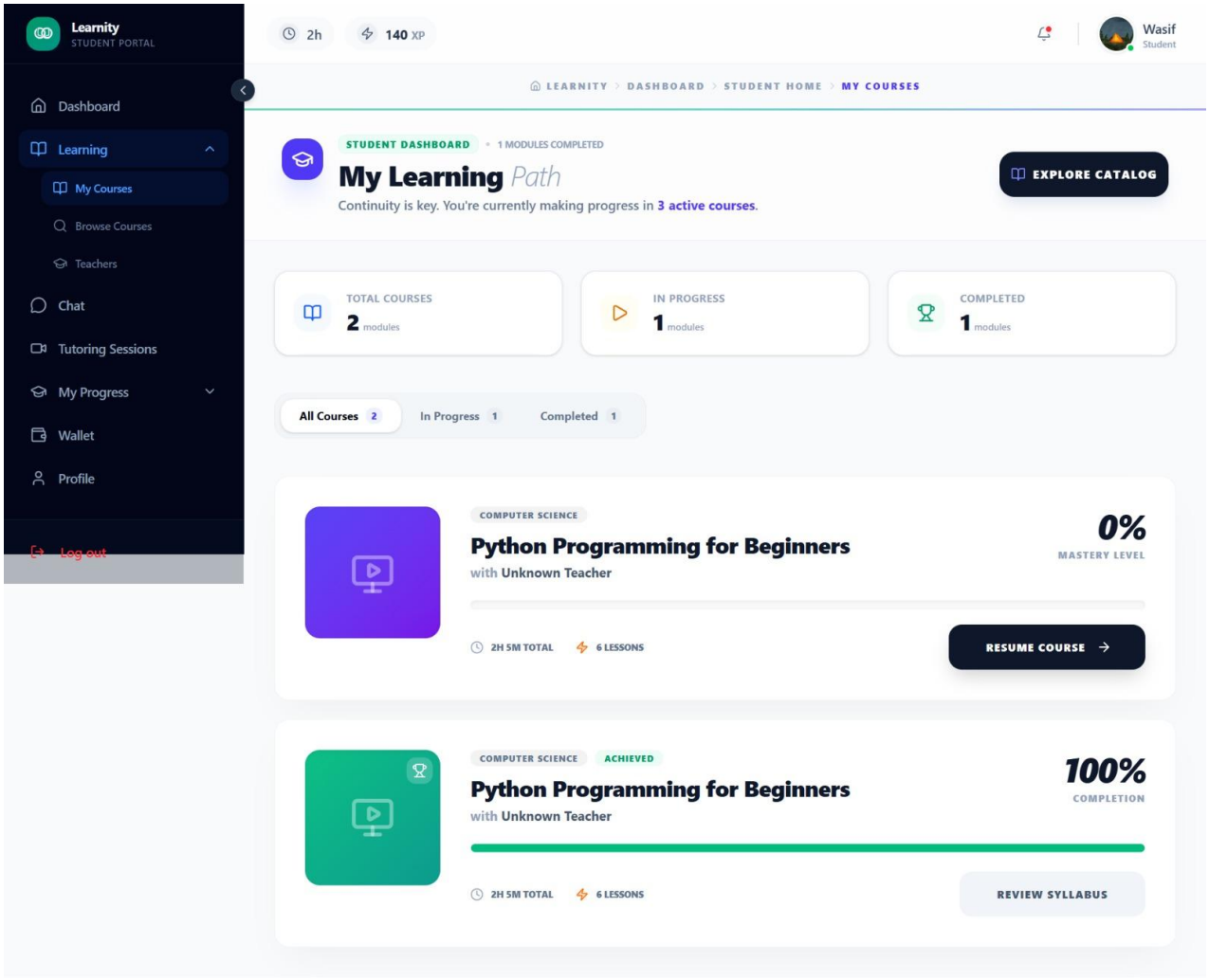

Figure 5-9: Individual Course Landing Page

5.4.4 STUDENT WALLET

Figure **5-10** shows that students can top up their wallet by transferring money via JazzCash or EasyPaisa and uploading the payment receipt as proof

- Deposits remain pending until an admin verifies and approves them
- Students can purchase paid courses directly from their wallet balance
- Course purchases are processed instantly without requiring admin approval
- Students can view their current balance and complete transaction history on their wallet dashboard

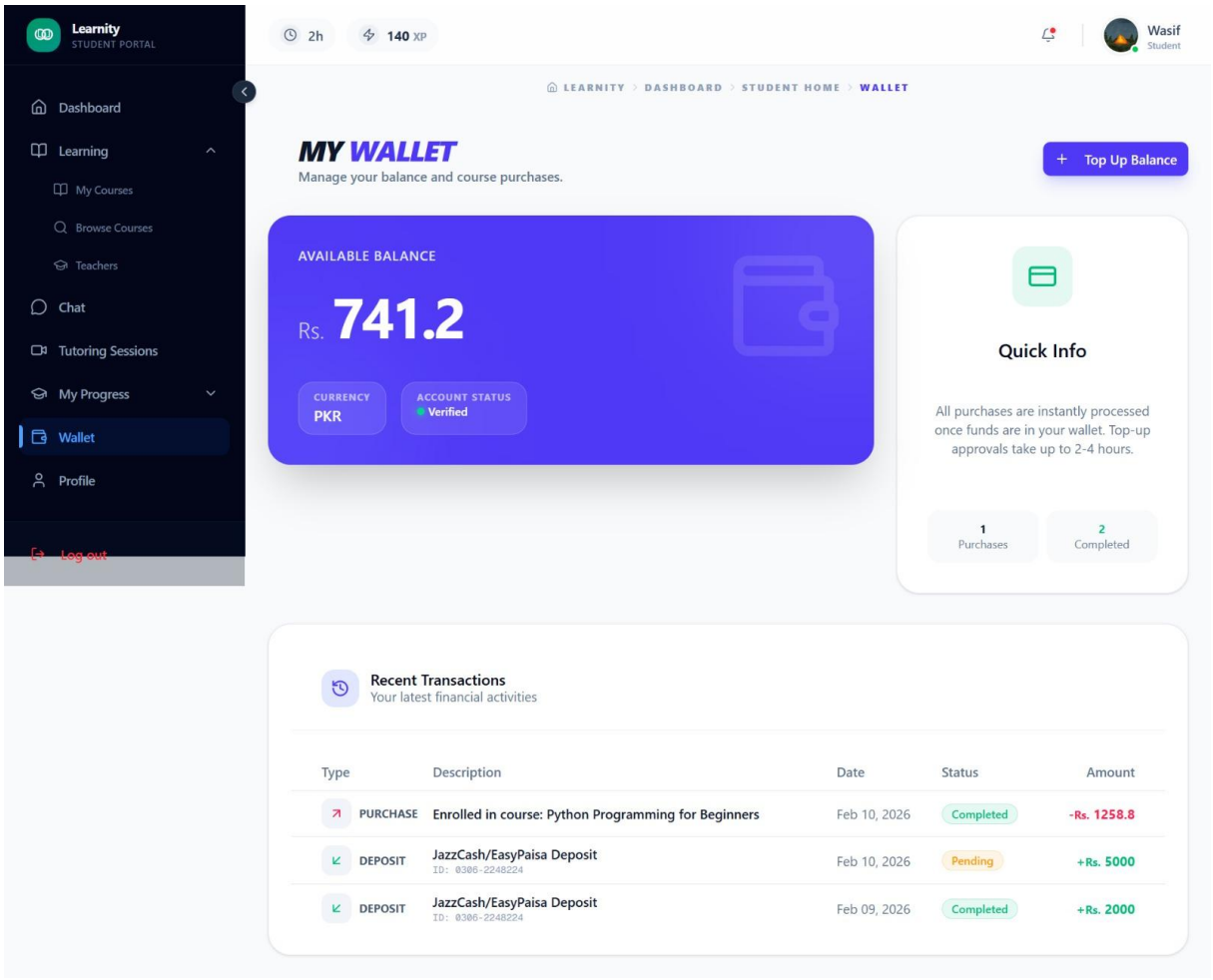

Figure 5-10: Student Wallet

5.4.5 LEARNING INTERFACE (VIDEO PLAYER)

Figure **5-11** shows how users will experience the core learning experience.

- **Video Player:** Custom player with adaptive quality (100ms/Stream).
- **Lesson Navigation:** Sidebar to switch between lessons.
- **Completion Button:** Marking a lesson as "Done" to earn XP.

Figure 5-11:Video Player

5.4.6 GAMIFIED PROGRESS TRACKER

Figure **5-12** shows the Learnity Progress Tracker, which monitors the overall progress of learners through daily rankings similar to gaming leaderboards. It displays XP, completed lessons, quiz scores, and learning streaks to encourage healthy competition and consistent engagement.

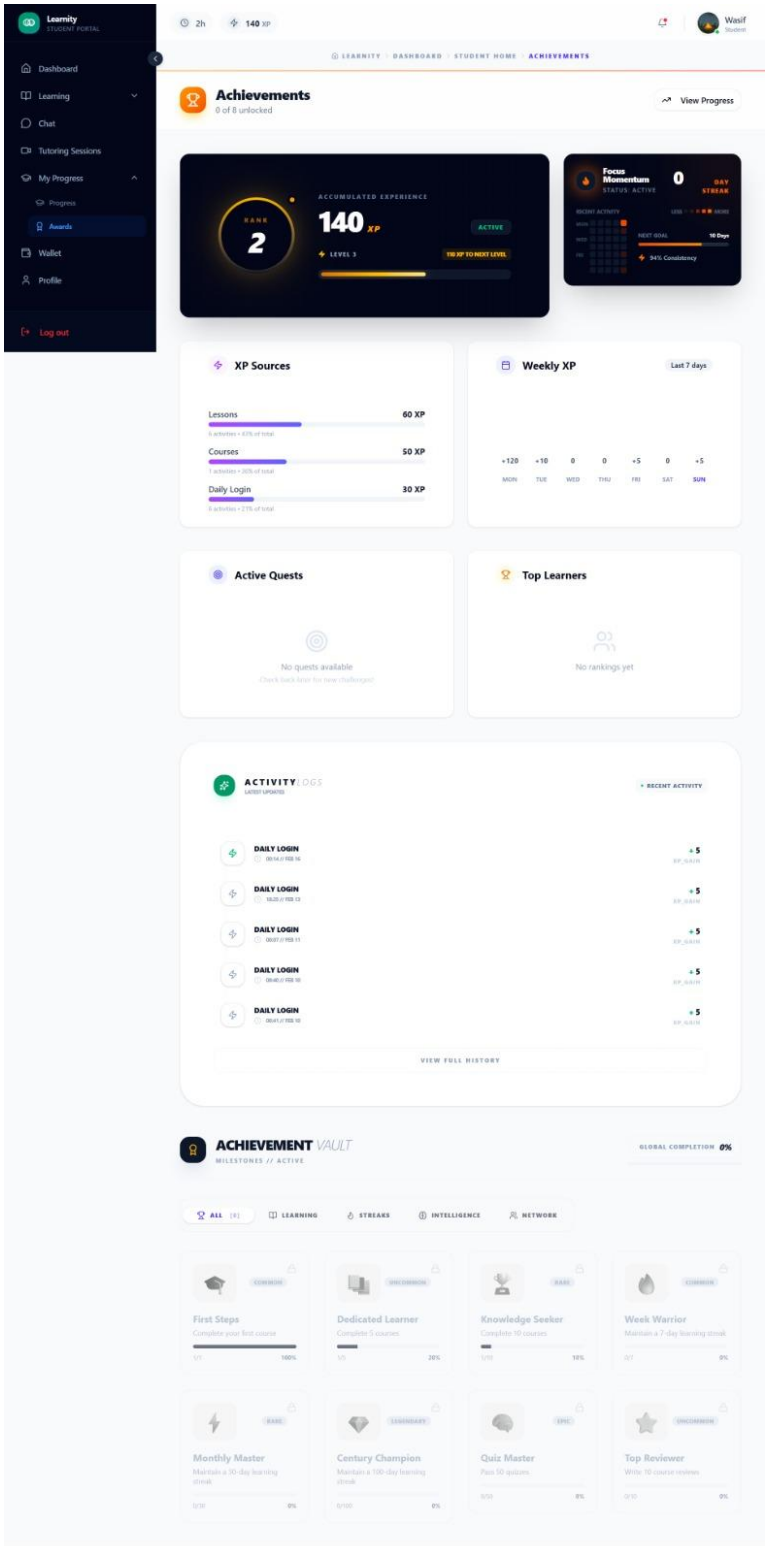

Figure 5-12: Progress Tracker

5.5 TEACHER PORTAL

The teacher portal focuses on content creation and management.

5.5.1 TEACHER DASHBOARD (ANALYTICS)

In Figure **5-13** the command center for educators is shown

- **Revenue Stats:** Total earnings from courses.
- **Enrollment Stats:** Number of active students.
- **Engagement:** Average watch time.

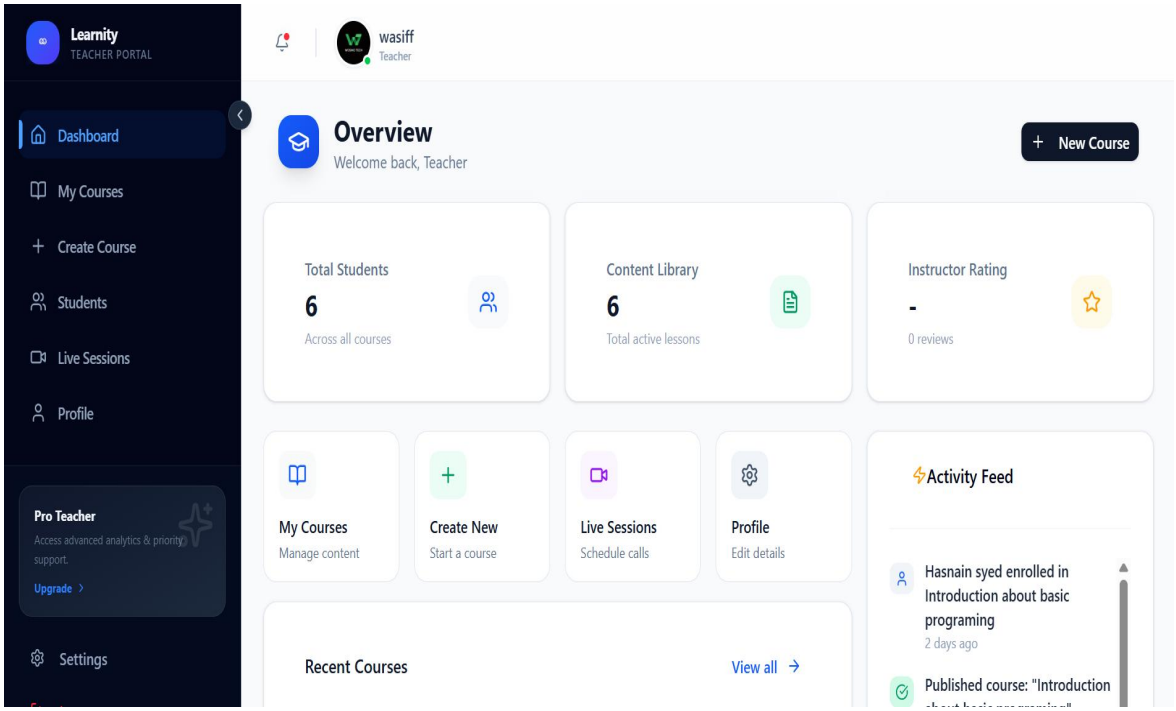

Figure 5-13: Teacher Dashboard

5.5.2 COURSE CREATION WIZARD

Figure **5-14** shows the Pricing & Publishing.

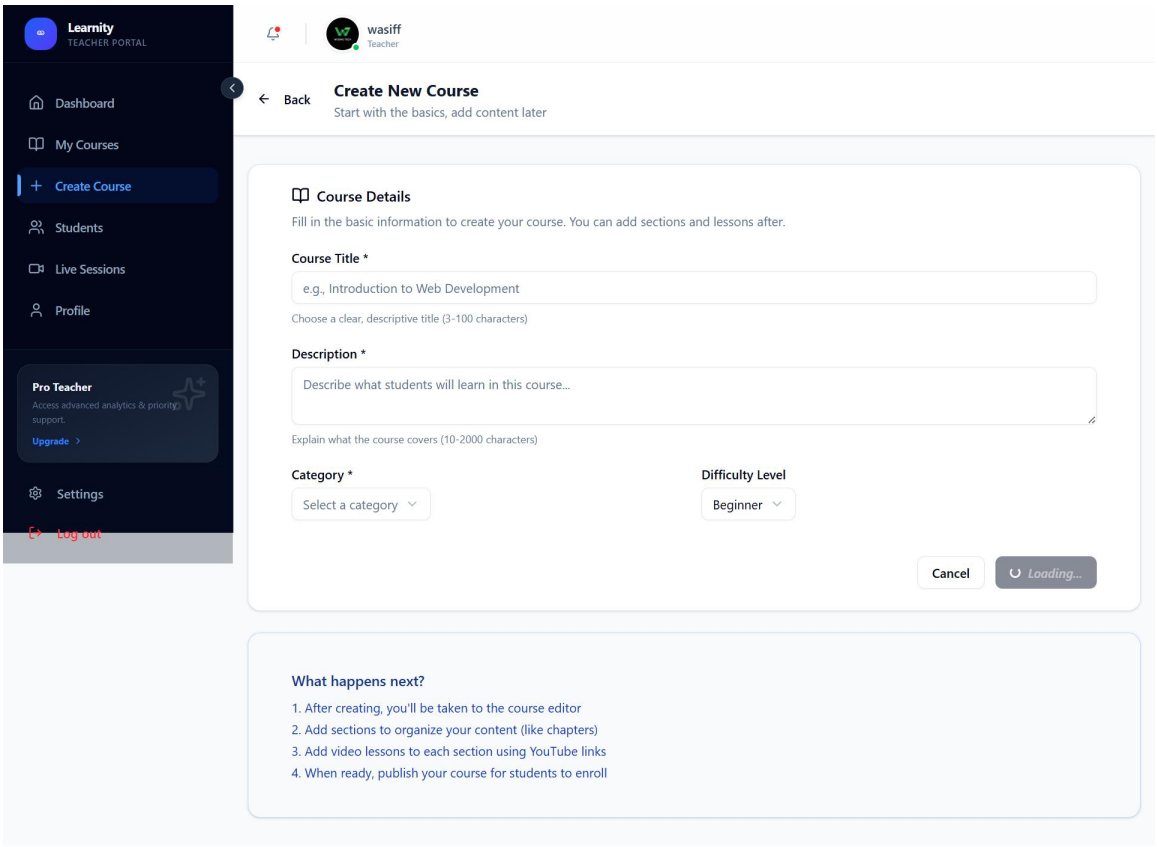

Figure 5-14: Course Creation Page

5.5.3 TEACHER WALLET

Figure **5-15** shows that teachers automatically receive earnings in their wallet whenever a student purchases their course

- Earnings are credited instantly at the time of enrollment with no delay
- Teachers can request a withdrawal to transfer their earnings to a bank account
- Withdrawal requests remain pending until an admin reviews and approves them
- Teachers can track their available balance, total earnings, pending amounts, and withdrawal history on their dashboard

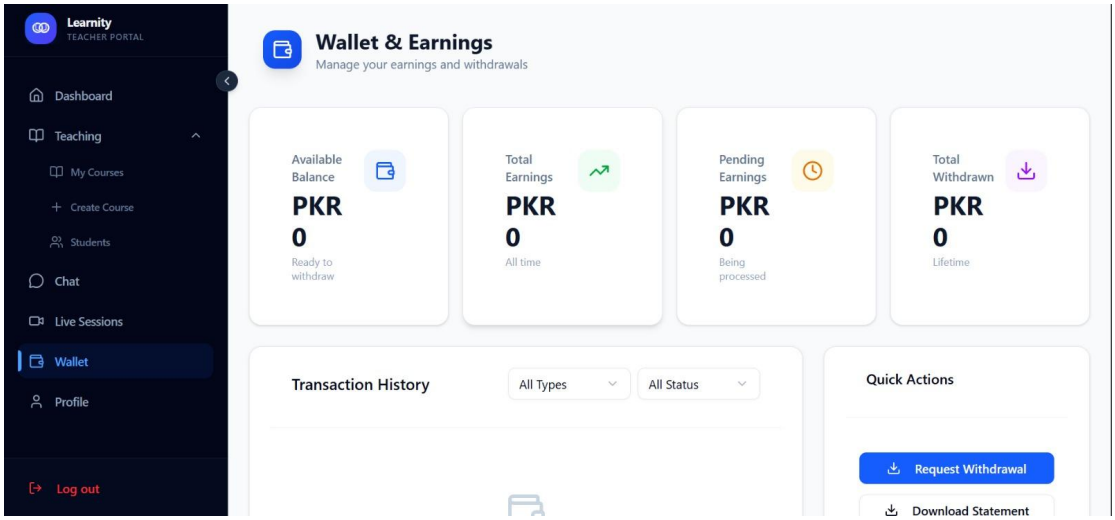

Figure 5-15:Teacher Wallet

5.5.4 TEACHER PROFILE SETTINGS

Figure **5-16** shows a public-facing profile page where teachers can upload a bio, profile picture, and social links to build their personal brand.

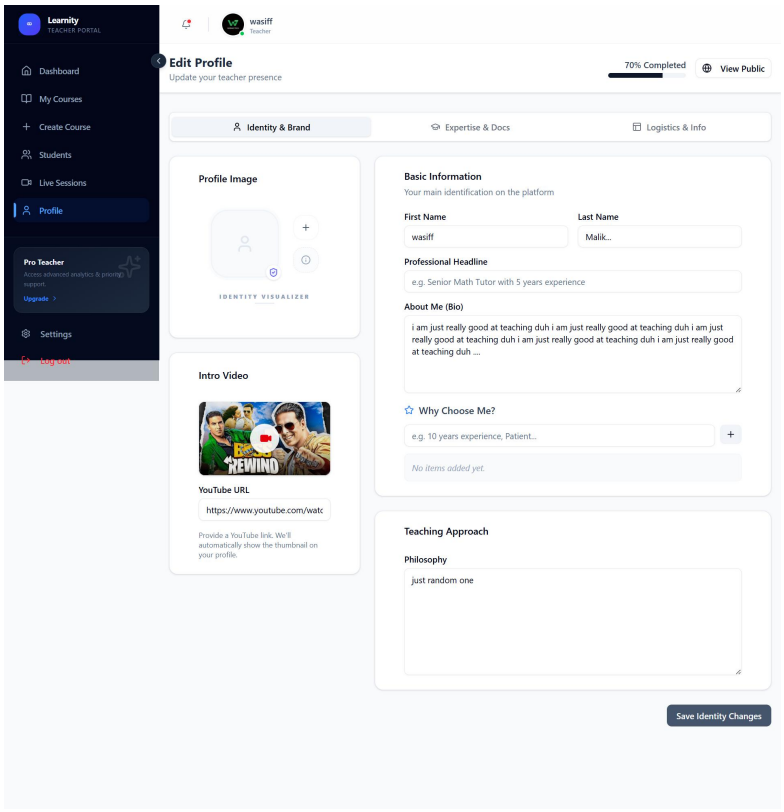

Figure 5-16: Teacher Profile Settings

5.6 ADMIN PORTAL

The governance layer for platform management.

5.6.1 ADMIN DASHBOARD

Figure **5-17** shows a high-level overview of platform health.

- **Total Users:** Count of Students vs. Teachers.
- **System Alerts:** Pending verifications or reports.

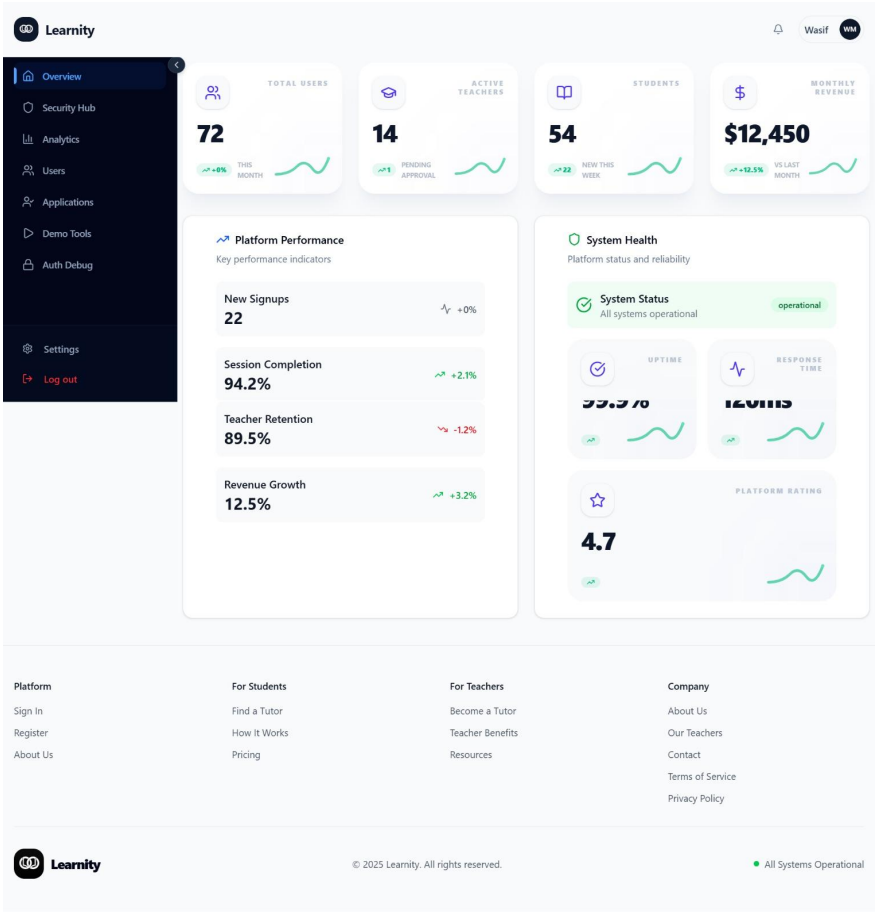

Figure 5-17: Admin Overview Dasboard

5.6.2 USER MANAGEMENT (TEACHERS)

Figure **5-18** shows a list of all registered teachers. Admins can:

- **View Details:** Inspect uploaded documents.
- **Action:** Approve (Verified badge) or Reject applications.

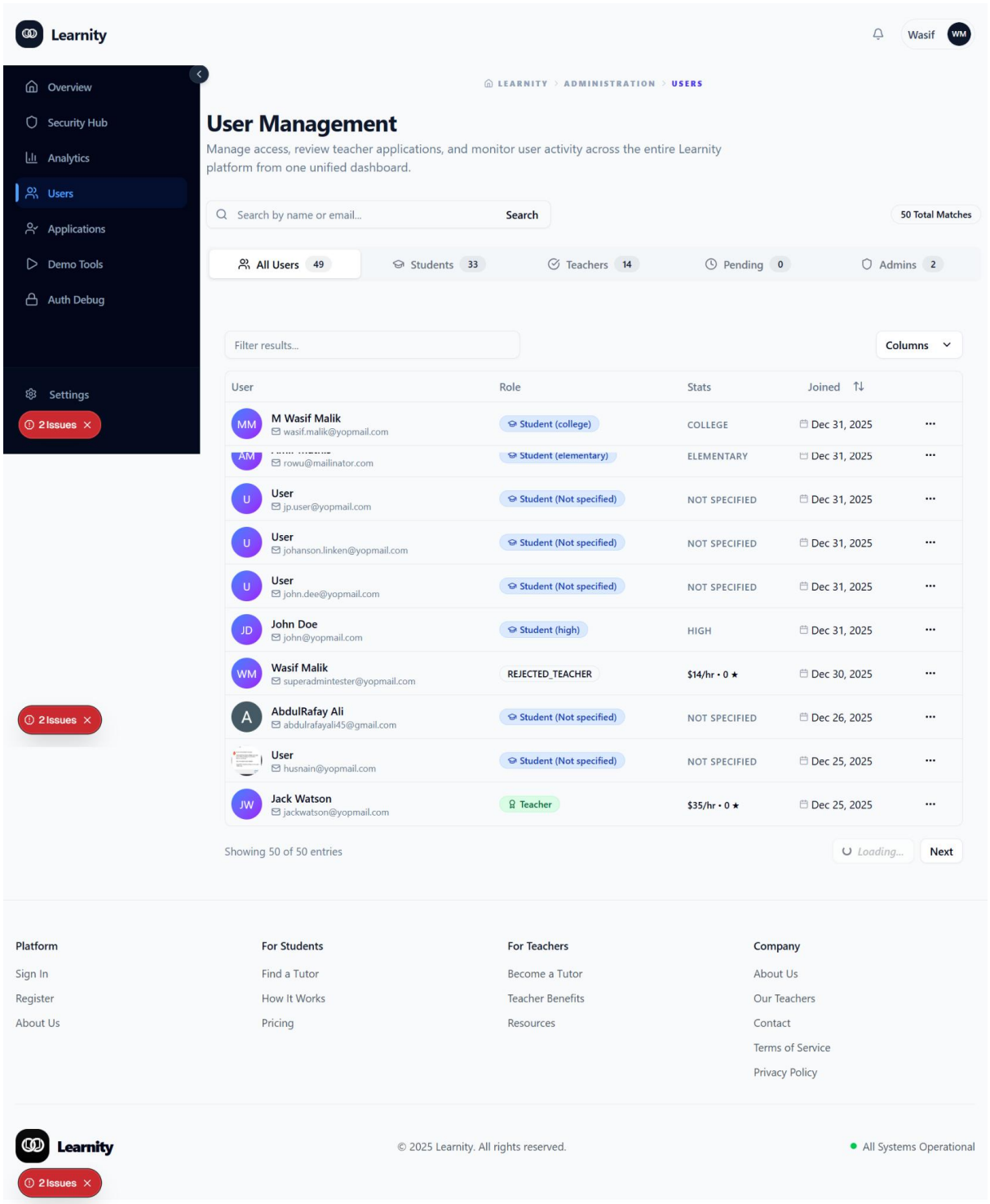

Figure 5-18: User Managemnt (Teachers)

5.6.3 WALLET MANAGED BY ADMIN

Figure **5-19** shows the wallet system managed by admin.

- Admins review and approve or reject all student deposit requests after verifying payment receipts
- Admins review and approve or reject all teacher withdrawal requests before funds are released
- Only approved deposits add money to a student's wallet and only approved withdrawals deduct from a teacher's wallet
- Admins can filter transactions by status (Pending, Completed, Failed) for efficient processing
- All admin financial decisions are recorded in the audit trail for accountability and transparency

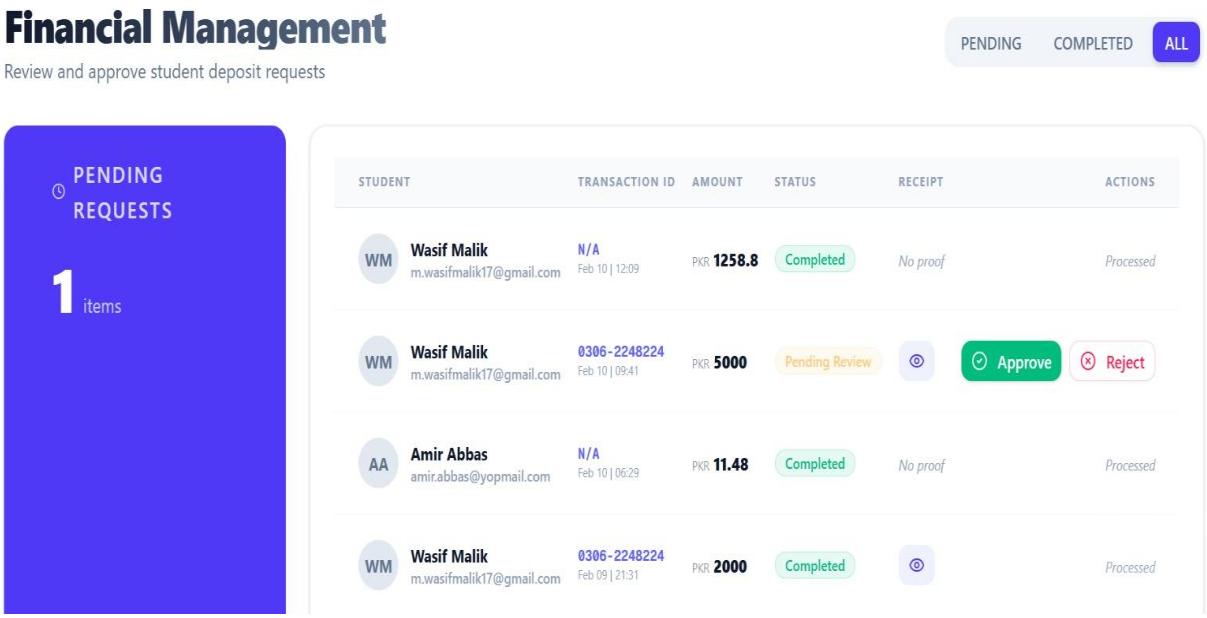

Figure 5-19: Admin Wallet Management Page

5.6.4 ANALYTICS

Figure **5-20** shows how admin would see the analytics of the website.

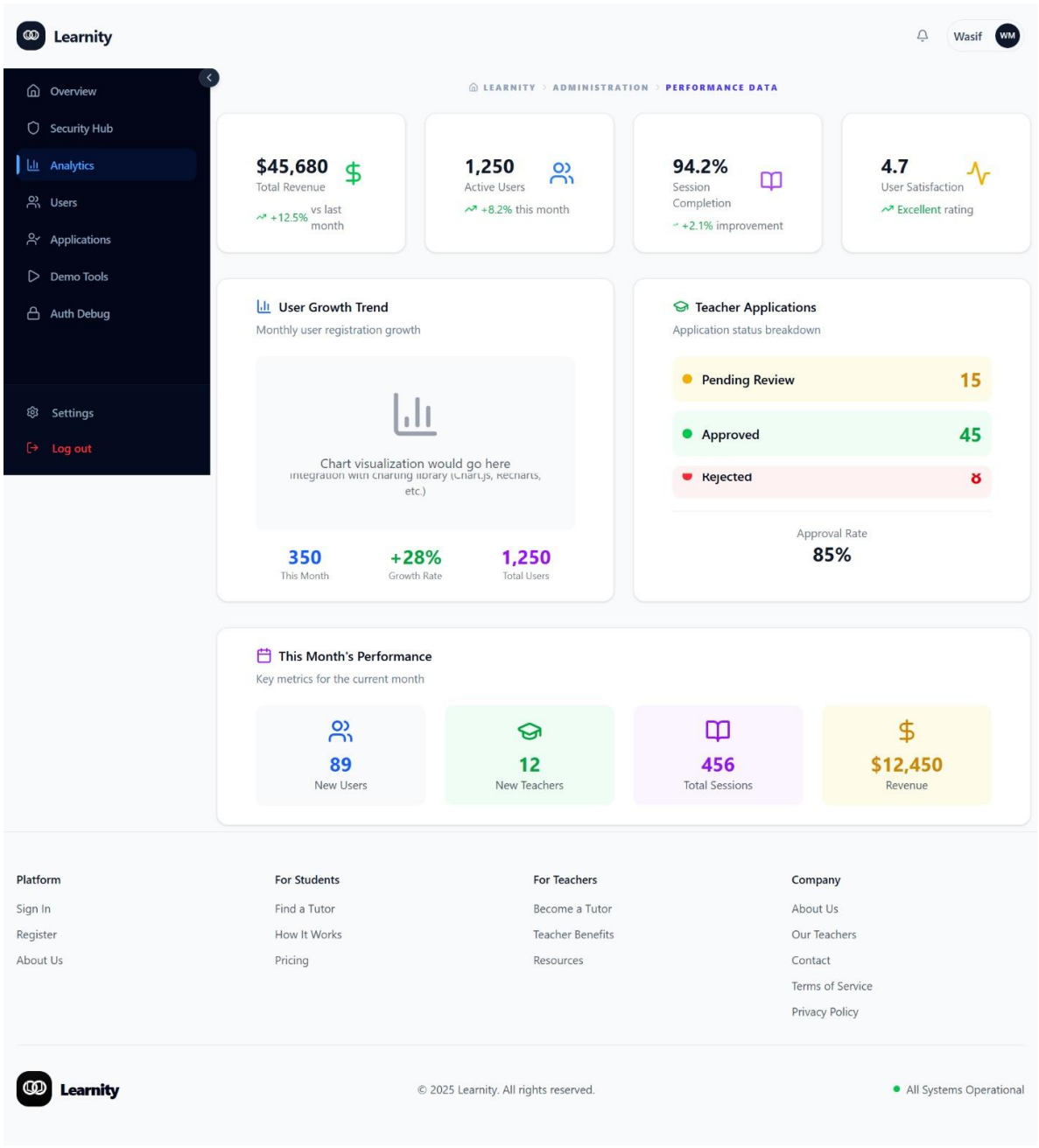

Figure 5-20: Analytics Page

5.6.5 AUDIT LOGS

Figure **5-21** shows the audit logs of the website

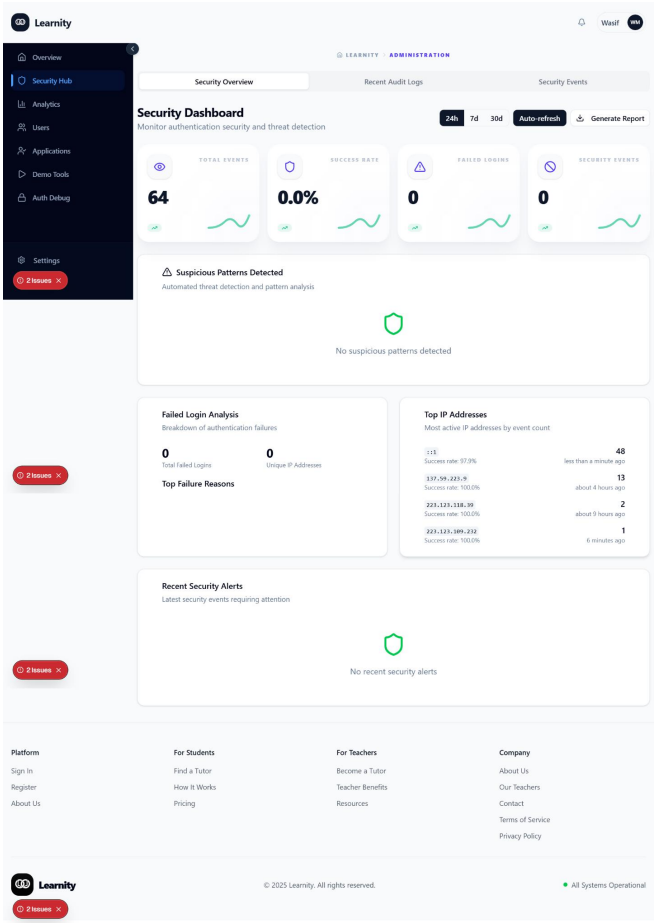

Figure 5-21: Audit Logs

5.7 SUMMARY

The implementation phase has resulted in a robust, multi-faceted platform. We have successfully built distinct yet interconnected portals for Students, Teachers, and Administrators, ensuring that the entire lifecycle of online education—from course creation to consumption and verification—is fully digitalized and user-friendly.

CHAPTER NO. 6

RESULT AND CONCLUSION

6.1 RESULT

The primary goal of this Final Year Project was to bridge the educational gap in Sindh by creating "Learnity," a localized, technology-driven learning platform. It can be confidently stated that this goal has been achieved. We successfully developed a system where:

Students can access the Sindh Board curriculum from their homes using low-bandwidth connections.

Teachers have a verified platform to monetize their skills and conduct live classes.

Engagement is driven by gamification (XP and Streaks), answering the problem of high dropout rates in online courses. Technologically, the use of Next.js and Serverless PostgreSQL proved to be robust choices capable of handling real-time interactions without crashing.

6.2 LIMITATION

Like any software project, Learnity has room for improvement. Due to the time constraints of the academic year, we encountered the following limitations:

- **Simulated Payments:** We could not integrate a live banking API (JazzCash/EasyPaisa) due to regulatory requirements for student projects. Payments currently require manual screenshot verification.
- **No Native Mobile App:** While the website is a Progressive Web App (PWA) and works well on phones, it is not a native Android (.apk) or iOS app, which limits push notification capabilities.

- **Manual Moderation:** Content moderation is currently manual. As the platform grows, relying on Admins to check every video will become a bottleneck.

6.3 FUTURE RECOMMENDATIONS

To make Learnity a commercially viable product in the future, we recommend the following enhancements:

- **AI-Powered Personalization:** Implementing an AI tutor that analyzes a student's quiz scores to recommend specific lessons they are weak in.
- **Native Mobile Applications:** Developing React Native apps for Android and iOS to support offline video downloads and better push notifications.
- **Automated Moderation:** Integrating AI/ML visual analysis tools to automatically flag inappropriate content in videos before they are published.
- **Parental Dashboard:** Adding a portal for parents to view their child's attendance and quiz performance via SMS alerts.

6.4 CONCLUSION

The "Digital Divide" in Pakistan is not just about a lack of internet; it is about a lack of relevant content. Learnity fills this void. This project has taught us that building an EdTech platform is not just about writing code; it is about understanding user psychology. By integrating real-time video (100ms) and chat (GetStream), we transformed a static website into a thriving community. The platform provides easy navigation, secure authentication, and a scalable database structure that can grow with the user base. Most importantly, Learnity demonstrates that high-quality

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