SRS Report

SMART CAMPUS

By

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Abstract

The Advanced eLMS (Learning Management System) is designed to enhance the traditional online learning experience by providing students and faculty with a unified platform for accessing course materials, engaging with interactive tools, and tracking academic progress. Key features include secure login, access to resources and question banks, an AI-powered chatbot for instant guidance, and a student reward system to encourage academic participation and achievement. This system streamlines learning workflows, promotes active engagement, and integrates modern technology to support both teaching and learning in a flexible, efficient, and user-friendly manner.

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Chapter 1

Introduction

Education today is no longer confined to classrooms or rigid schedules— it thrives on flexibility, accessibility, and engagement. The purpose of our project is to design and develop an Advanced e-Learning Management System (eLMS) that overcomes the shortcomings of traditional LMS platforms. While many existing systems provide basic course delivery and assessment tools, they often fail to address usability, personalization, and seamless integration with modern educational needs.

1.1 Project Overview

Smart Campus aims to modernize online education by addressing the limitations of conventional LMS platforms. Traditional systems often struggle with usability, personalization, and integration with emerging technologies, leaving students and instructors frustrated. Our system will develop a more engaging, adaptive, user-friendly and intelligent learning environment; benefiting students, instructors, and administrators alike.

1.2 Motivation

Conventional LMS platforms, though widely adopted, often leave both learners and educators frustrated. Some common issues include:

- Complicated user interfaces that make navigation difficult.
- Limited features/ personalization for different types of learners.
- Poor integration with modern tools (e.g., AI-based recommendations, analytics, mobile-first accessibility).
- Lack of real-time support for interactive learning and collaboration.
- Administrative overhead for managing users, resources, and performance tracking.

These limitations reduce efficiency and student engagement, rather making using learning tools feel like a extra hassle rather than an empowering experience.

1.3 Project Outcome

- Providing an intuitive interface for all user roles (students, instructors, admins).
- Supporting personalized learning paths powered by analytics.
- Enabling real-time interaction and collaboration between users.
- Offering comprehensive performance tracking and reporting.
- Ensuring cross-platform accessibility.
- Reducing administrative workload through automation and streamlined workflows.
- Integrating an AI-powered chatbot to provide real-time academic support, answer FAQs, and guide users through learning activities.

Chapter 2

System Study

This chapter presents an analysis of existing Learning Management Systems and the feedback collected from users. It outlines key findings from studied journals and survey data to inform the design and improvement of our eLMS.

2.1 Information Gathering

To build an effective Learning Management System (eLMS), it is important to first look at how similar systems have been studied and improved in the past. This section highlights key research papers and journals that we've studied to explore performance, usability, and adaptability in LMS platforms. And a survey was conducted targeting both students and administrators to gather feedback on the usability, effectiveness, and challenges of existing Learning Management Systems. By analyzing responses from these key stakeholders, we aim to identify areas for further improvement and inform the design of a more user-friendly and adaptive eLMS.

2.1.1 Related research papers & Journals

- Improving Learning Management System Performance: A Comprehensive Approach to Engagement, Trust, and Adaptive Learning[1]
- Creating an LMS ePortfolio Building System That Enhances the Quality of College Life from One That Supports Self-Regulated Learning[2]
- Assessing the Usability of University of Tehran's Learning Management System[3]

2.1.2 Survey

In the pursuit of continuous improvement and user-centric project development, we conducted a User Satisfaction Survey to gauge the sentiment and feedback of our potential consumers regarding our latest product.

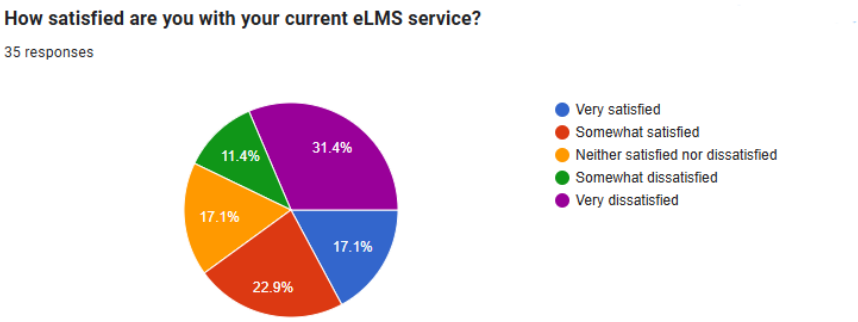
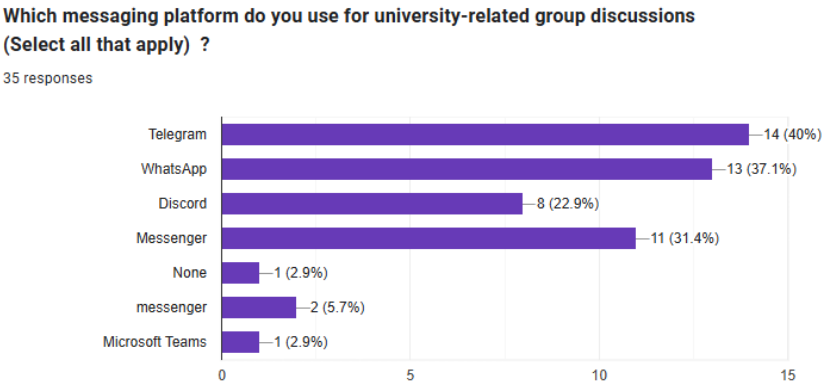


Figure 2.1: Usage of Existing Systems



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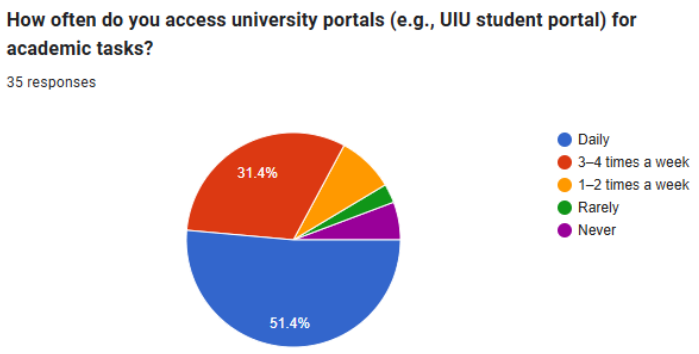

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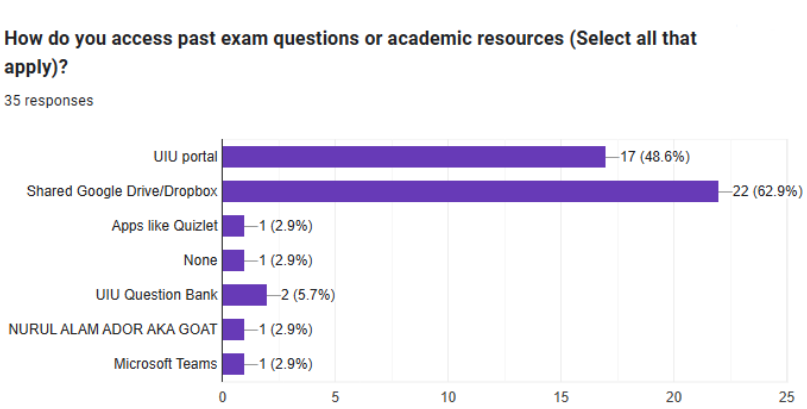

Figure 2.4: Usage of Existing Systems

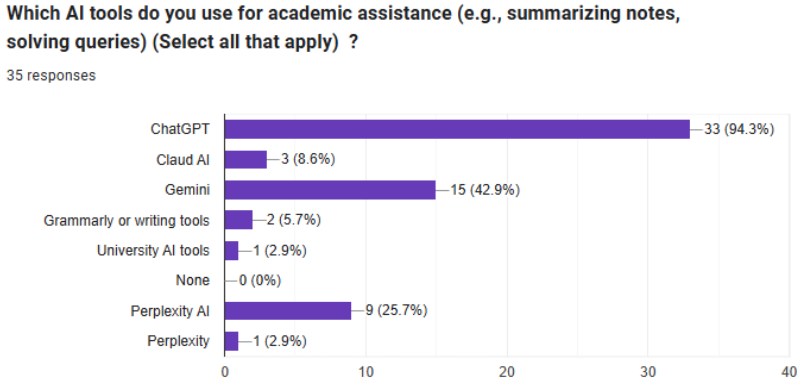

Figure 2.5: Usage of Existing Systems

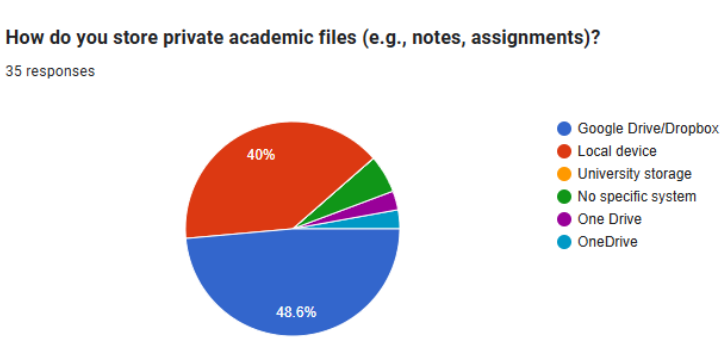

Figure 2.6: Usage of Existing Systems

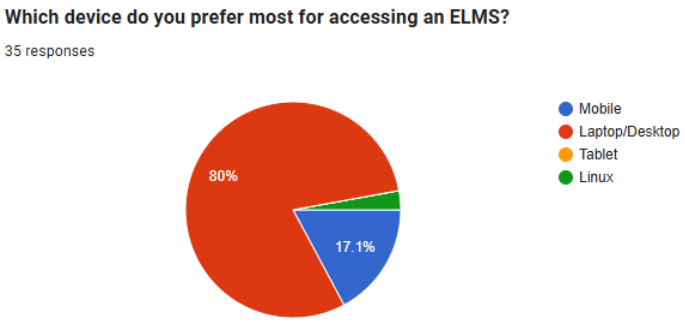

Figure 2.7: Usage of Existing Systems

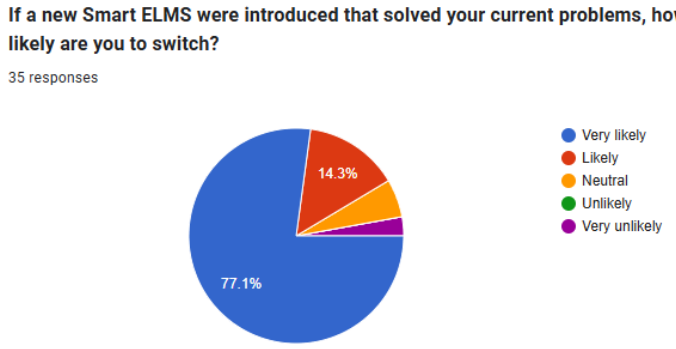

Figure 2.8: Usage of Existing Systems

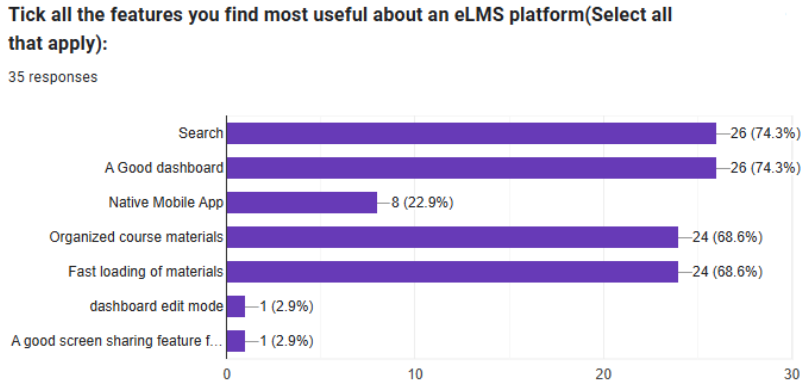

Figure 2.9: Interest in Proposed Features

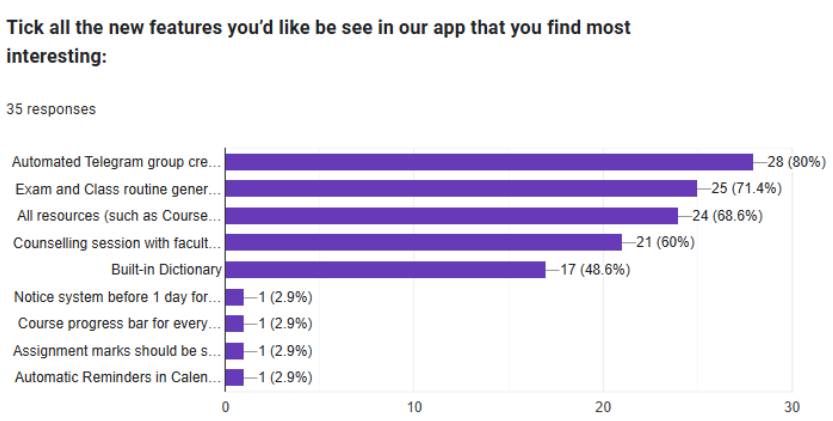

Figure 2.10: Interest in Proposed Features

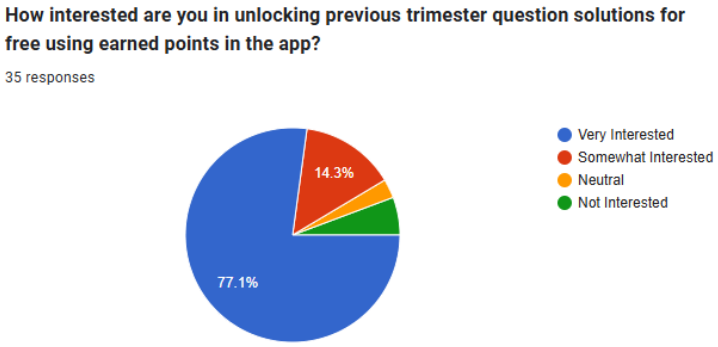

Figure 2.11: Interest in Proposed Features

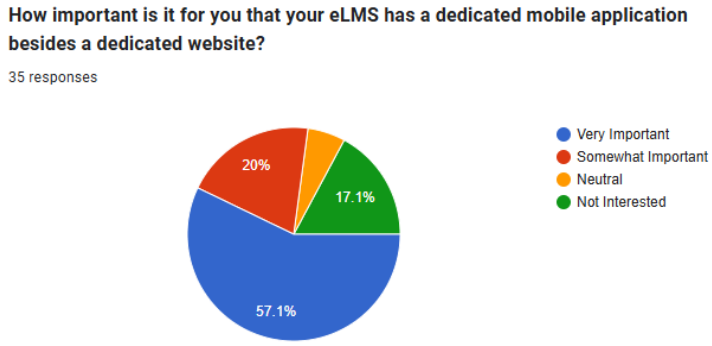

Figure 2.12: Interest in Proposed Features

2.2 Core Features

- AI powered ChatBot

- Automatic Group Creation
- Routine & Exam Scheduler
- Sophisticated build-in dictionary
- Attachment of Question Bank with Solution
- Personalized dashboards showing courses, progress, notifications, and important stats

2.3 Feature List Fixation

After analyzing the existing system and identifying the needs of students, faculty, and administrators, the final list of features for **Smart Campus** has been fixed. Each feature is associated with both functional and non-functional requirements to define what the system will do and how it should perform.

1. User Authentication (Login/Signup and Verification)

Functional Requirements:

- The system will allow users to register as Student, Faculty.
- It should verify user credentials before granting access into system.
- The system should validate inputs such as email format and password strength.
- Duplicate user accounts should not be allowed.

Non-Functional Requirements:

- The system should support multiple users logging in simultaneously.
- The login interface must be responsive on all devices.
- Passwords must be stored in an encrypted format.

2. Dashboard Management

Functional Requirements:

- After login, users should be redirected to their respective dashboards.
- Students should be able to view schedules, resources, rewards, and chatbot history.
- Faculty should be able to upload schedules and resources.

Non-Functional Requirements:

- The design will be consistent across all pages concurrently.
- The system should handle at least 100 active sessions smoothly.

3. Routine and Exam Scheduler

Functional Requirements:

- Faculty should be able to upload and update class routines and exam schedules.
- Students should be able to view and download them easily.

Non-Functional Requirements:

- File upload size should not exceed 10 MB.
- Updates should reflect on student dashboards instantly.
- The system should support PDF, image other necessary file formats.

4. Resources and Question Bank

Functional Requirements:

- Faculty should be able to upload lecture notes, assignments, and previous question papers with solve.
- Students should be able to view and download uploaded materials.
- The system should categorize contents by course, faculty, and trimester.

Non-Functional Requirements:

- Upload and download operations should complete within 5 seconds.
- Files should be scanned to prevent virus infections.
- Backup copies should be maintained to avoid data loss.

5. Reward/Gamification System

Functional Requirements:

- The system should track student participation in events and assign points.
- Leaderboards and badges should be displayed based on earned points.
- Faculty can view and assign (particular) student performance and achievements.

Non-Functional Requirements:

- The leaderboard should update automatically in real time.
- The point system should be accurate and tamper-proof.

6. AI Chatbot Integration

Functional Requirements:

- The chatbot should answer frequently asked questions and guide users.
- It should respond appropriately based on user input.
- Complex queries should be redirected to faculty or admin.

Non-Functional Requirements:

- It should handle multiple users at the same time.
- It must maintain/remember context for at least five interactions.

7. User Management (Administrator Panel)

Functional Requirements:

- Administrators can view, edit, or delete user accounts.
- They can assign roles and reset passwords when needed.
- The admin panel should generate user activity reports.
- The admin panel should monitor blog section.

Non-Functional Requirements:

- Only authorized administrators can access this panel.
- All activities must be logged for security purposes.
- The system should remain stable for large datasets.

Chapter 3

System Analysis

In this section, we'll try to take a closer look at the current landscape and needs of e-learning systems. Through benchmarking, gap analysis, and feasibility studies, we identify the system requirements, shortcomings, and the practical considerations for implementing our Smart Campus system.

3.1 Benchmark Analysis

Features	**UIU eLMS**	**Moodle**	**G. Classroom**	**Coursera**	**Edmodo**	**Smart Campus**
AI Assistant	×	×	×	✓	×	✓
Native Mobile App	×	✓	✓	-	✓	×
Routine & Exam Scheduler	×	×	×	×	×	✓
Resource & Question Bank	!	✓	×	✓	!	✓
Counselling Booking	×	×	×	×	×	✓
Integration with Telegram, Google Drive	×	!	!	!	!	✓
Gamification / Points System	×	!	✓	✓	!	✓
Offline Access	×	!	×	✓	!	×
Analytics Dashboard	!	!	×	✓	!	✓
Pricing Policy	Free	Free + Open src	Free	Paid	Free	Free + Open src

Table 3.1: Benchmark Analysis of different platforms

3.2 Gap Analysis

The study of existing LMS platforms such as UIU ELMS, Moodle, Google Classroom, Coursera, Edmodo, and Smart Campus reveals that while these systems perform the basic functions of delivering courses and managing assessments, several important gaps remain unaddressed. The key gaps identified are as follows:

- **Personalization Gap:** Current platforms lack adaptive learning paths and data-driven recommendations. Smart Campus introduces AI-powered personalization to create a tailored learning experience for each student.
- **Support Gap:** Existing systems do not provide instant human-like assistance. Smart Campus integrates an AI chatbot to deliver real-time academic and administrative support.
- **Scheduling Gap:** Traditional LMS solutions often require external tools for routine and exam scheduling. Our system includes a built-in smart scheduler to ensure clarity and reduce missed deadlines.
- **Resource Gap:** Resource sharing and question banks are either absent or fragmented. Smart Campus offers a centralized repository with robust search and tagging features.

3.3 Feasibility Analysis

A Feasibility study evaluates whether the proposed project can be successfully developed and deployed within the given constraints. For the Smart Campus project, several dimensions of feasibility were considered:

3.3.1 Technical Feasibility

The technologies required for building the Smart Campus—such as PHP/JavaScript for the backend, MySQL for database management, and mobile app frameworks—are widely available, well-documented, and already familiar to our team. The development team possesses the necessary technical expertise to implement features such as an AI assistant, exam scheduler, and mobile application.

3.3.2 Economic Feasibility

This is the most critical consideration. Compared to commercial LMS platforms that often require costly subscriptions, the proposed eLMS is economically viable because developing an eLMS from scratch might seem costly at first glance, but careful analysis shows it is sustainable and cost-effective in the long run:

Initial Investment: The primary expenses include hosting servers, development tools, and third-party APIs for AI chatbot integration. Since many open-source frameworks will be leveraged, licensing costs remain minimal.

Operational Costs: Ongoing costs such as server maintenance, database hosting, and system updates are predictable and scalable depending on user load.

Cost-Benefit Analysis: The system's ability to reduce administrative overhead, streamline academic scheduling, and automate support through the AI assistant saves both time and manpower.

Return on Investment (ROI): With proper deployment, the platform can cut down recurring expenses and potentially generate value by offering subscription-based features in future expansions.

Here's our Cash Flow Method to measure economic feasibility:

Table 3.2: Cash Flow (NPV @ 10%) for Smart Campus

Item	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Initial Investment / Cost (BDT)	500,000	–	–	–	–	–
Operating Cost (BDT)	–	100,000	120,000	130,000	140,000	150,000
Expected Revenue (BDT)	–	250,000	300,000	350,000	400,000	450,000
Net Cash Flow (BDT)	**-500,000**	**150,000**	**180,000**	**220,000**	**260,000**	**300,000**
Discount Factor ($\frac{1}{(1+0.10)^t}$)	1.0000	0.9091	0.8264	0.7513	0.6830	0.6209
Discounted Cash Flow (BDT)	**-500,000.00**	**136,363.64**	**148,760.33**	**165,289.26**	**177,583.50**	**186,276.40**
					Net Present Value (BDT)	**+314,273.12**

$$\text{NPV} = \sum_{t=0}^{5} \frac{CF_t}{(1+0.10)^t} = -500{,}000 + \frac{150{,}000}{1.1} + \frac{180{,}000}{1.1^2} + \frac{220{,}000}{1.1^3} + \frac{260{,}000}{1.1^4} + \frac{300{,}000}{1.1^5} = \mathbf{314{,}273.12}\ \text{BDT}$$

3.3.3 Legal Feasibility

The project does not violate any legal or copyright restrictions, as it relies on open-source technologies and original design. However, standard data privacy and security practices (such as GDPR compliance, data encryption, and user consent) will be observed to protect usaer information.

3.3.4 Behavioral Feasibility

Behavioral feasibility focuses on how well the proposed eLMS aligns with the needs, expectations, and habits of its users. Our analysis indicates that students and faculty are already accustomed to using digital tools for learning and teaching, making the transition smooth. The inclusion of features like AI chatbot support, resource access, and a reward system encourages engagement and motivates users to adopt the platform. Since the system minimizes manual effort and provides a user-friendly interface, user acceptance is expected to be high.

3.4 SWOT Analysis

Strength	Weakness
1. **Integrated Platform:** • Combines multiple academic tools in a single, cohesive system. 2. **Tailored for UIU Students:** • Designed specifically to meet the needs of UIU's student community. 3. **AI Integration:** • Uses AI to enhance learning, automate tasks, and provide insights. 4. **User-Friendly Interfaces:** • Intuitive design ensures easy navigation and usage.	1. **Technical Risks:** • Potential for bugs, downtime, or system failures. 2. **Dependency on Third-Party Services:** • Relies on external tools which might affect stability. 3. **Security & Privacy Concerns:** • Risk of data breaches or misuse of student information. 4. **Limited Development Resources:** • Smaller team might slow down feature updates or support.

Strengths & Weaknesses of Smart Campus

Opportunities	Threats
1. **Growing Demand for Digital Academic Support:** • Rising need for online learning tools. 2. **Potential UIU Collaboration:** • Chance to work closely with the university for better adoption. 3. **Premium/ Advanced Features:** • Opportunity to offer extra-value services. 4. **AI Evolution:** • Ability to leverage advancing AI technologies for smarter solutions.	1. **Competition:** • Existing LMS platforms may capture the target audience. 2. **Infrastructure Limitations:** • Server or network constraints could affect performance. 3. **Stronger Competitors:** • Well-funded platforms may overshadow our system. 4. **University Competition:** • Internal university initiatives could reduce adoption.

Table 3.3: Opportunities & Threats of Smart Campus

Chapter 4

System Design

This section outlines how our advanced eLMS is structured and how it works behind the scenes. We start with the Context Diagram to show the system's interactions with users and external entities. The Data Flow Diagram (DFD) maps how information moves through the system. Use Case Diagrams highlight what students, faculty, and admins can do, while the Activity Diagram captures the step-by-step flow of key processes. Finally, the Swimlane Diagram shows who does what and when.

Together, these diagrams give a clear, practical picture of the eLMS's structure and operations, bridging the gap between requirements and implementation.

4.1 Context diagram

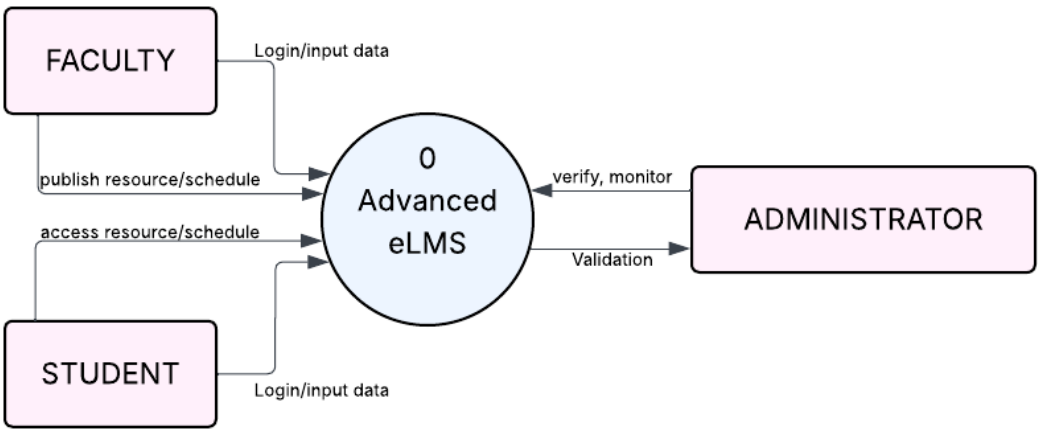

Figure 4.1: Context diagram

4.2 Data Flow Diagram

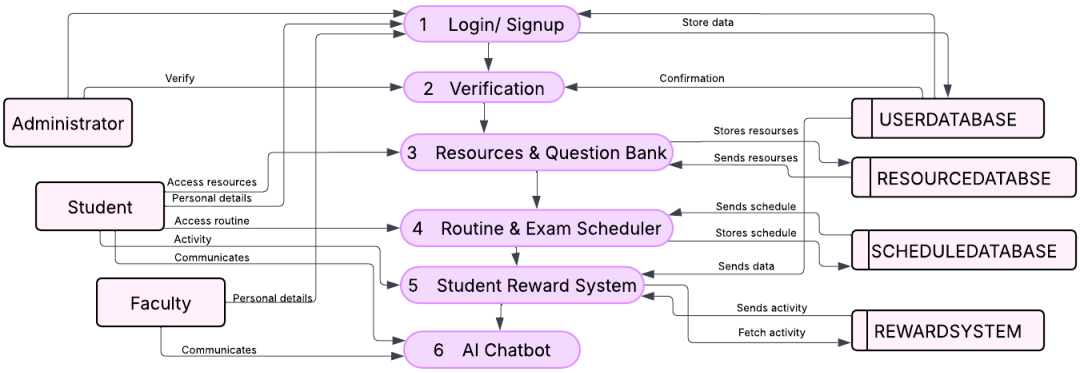

Figure 4.2: Data Flow diagram

4.3 Use Case Diagram

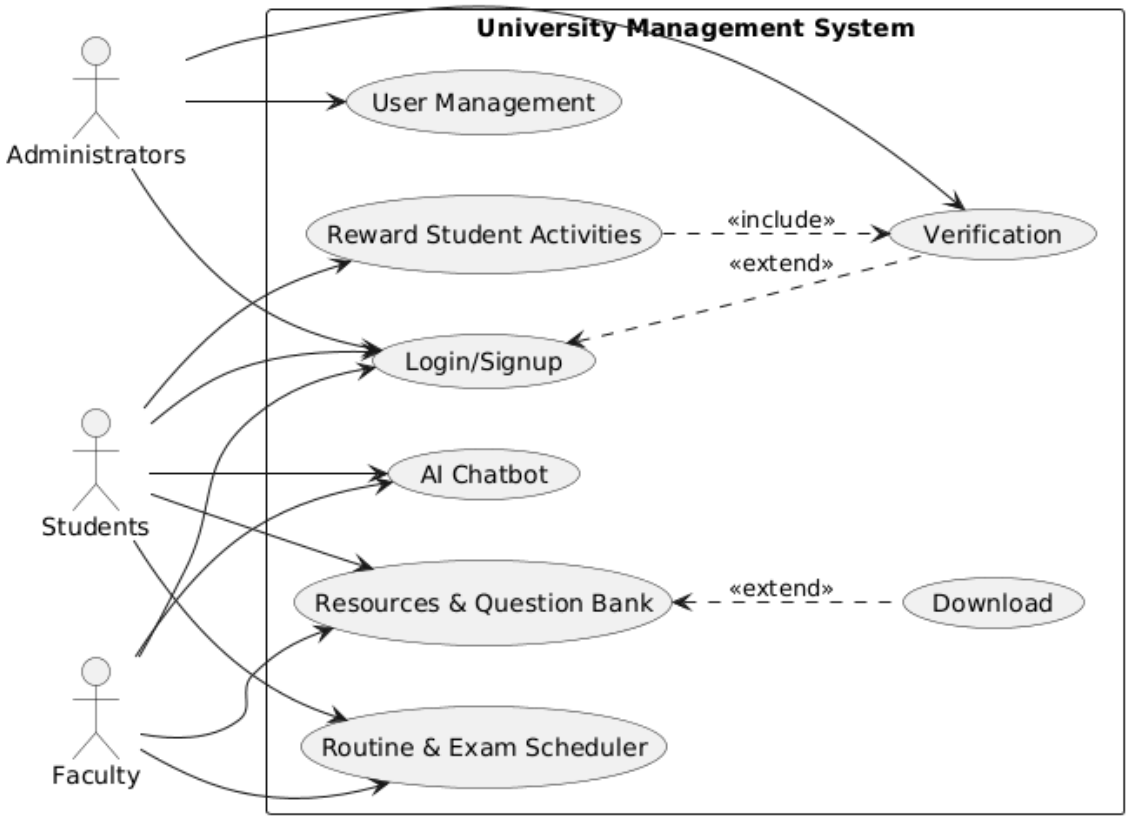

Figure 4.3: Usecase diagram

4.4 Use Case Descriptions

4.4.1 Use Case 1: Access Resources and Question Bank

- **Use Case Number:** UC-001
- **Use Case Name:** Access Resources and Question Bank
- **Stakeholders/Actors:** Student, Faculty
- **Description:** This use case allows students to view and download learning materials and question banks provided by faculty for their courses.
- **Pre-condition:** The student must be logged in and enrolled in the course.
- **Main Flow of Events:**
  1. Student logs into the eLMS.
  2. Student navigates to the course dashboard.
  3. Student selects "Resources" or "Question Bank" section.
  4. System displays available resources and question banks.
  5. Student views or downloads desired material.
- **Alternative Scenario:**
  - If no resources are uploaded by faculty, the system displays a message indicating that no files are available.
  - If the download fails due to network issues, the system prompts the student to retry.
- **Post-condition:** Student has accessed or downloaded the requested resources/question bank successfully.

4.4.2 Use Case 2: Usage of AI Chatbot

- **Use Case Number:** UC-002
- **Use Case Name:** Usage of AI Chatbot
- **Stakeholders/Actors:** Student, Faculty
- **Description:** This use case allows users to interact with the AI-powered chatbot for guidance, queries, and support within the eLMS.
- **Pre-condition:** User must be logged into the system.
- **Main Flow of Events:**

1. User accesses the AI chatbot interface from the dashboard.
2. User types a query or selects a predefined question.
3. System processes the query using AI algorithms.
4. Chatbot displays the response to the user.
5. User can ask follow-up questions or end the session.

- **Alternative Scenario:**
  - If the chatbot fails to understand the query, it requests clarification or provides related suggestions.
  - If the system is down, an error message is displayed, and users are redirected to support resources.
- **Post-condition:** User receives a relevant answer or guidance from the AI chatbot.

4.4.3 Use Case 3: Student Reward Activity

- **Use Case Number:** UC-003
- **Use Case Name:** Student Reward Activity
- **Stakeholders/Actors:** Student, Faculty, Admin
- **Description:** This use case tracks student achievements and rewards them for completing activities, assignments, quizzes, or other engagement tasks.
- **Pre-condition:** Student must be logged in and have completed an activity eligible for rewards.
- **Main Flow of Events:**
  1. Student completes a course-related activity (completing voluntary quiz).
  2. System evaluates the activity performance.
  3. System awards points, badges, or certificates as applicable.
  4. Student views the reward in their profile dashboard.
- **Alternative Scenario:**
  - If the activity is not completed entirely, the system does not award the reward and notifies the student.
  - If there is a system error, reward is queued and updated later.
- **Post-condition:** Student's profile is updated with the earned rewards successfully.

4.5 Activity diagram

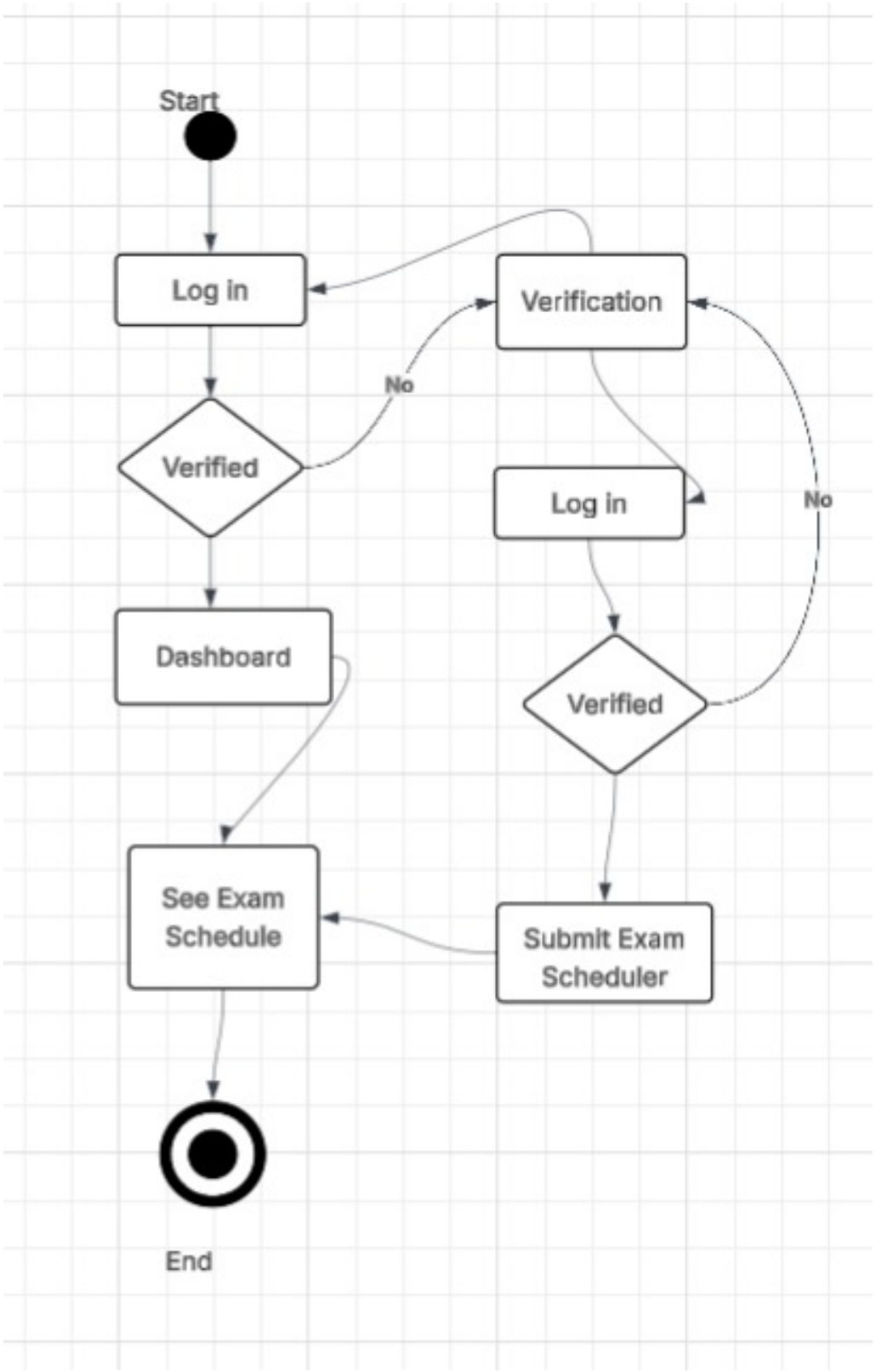

Figure 4.4: Activity diagram

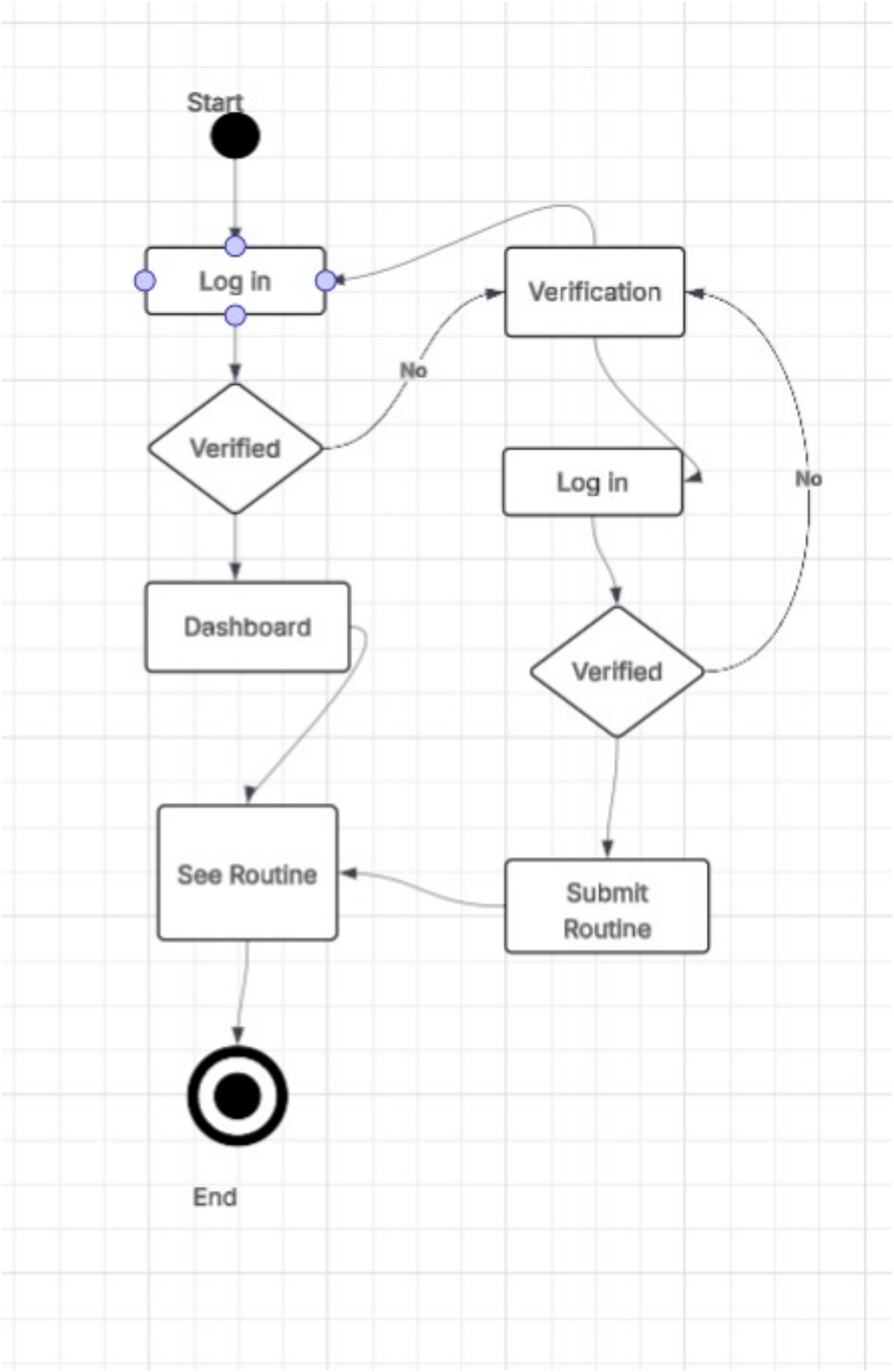

Figure 4.5: Activity diagram

4.6 Swimlane Diagram

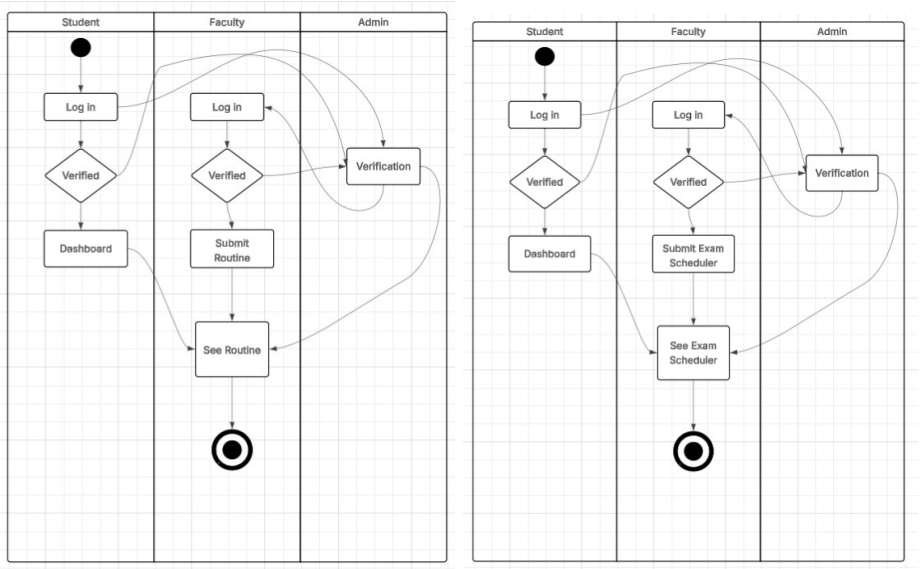

Figure 4.6: Swimlane diagram

4.7 Class Diagram

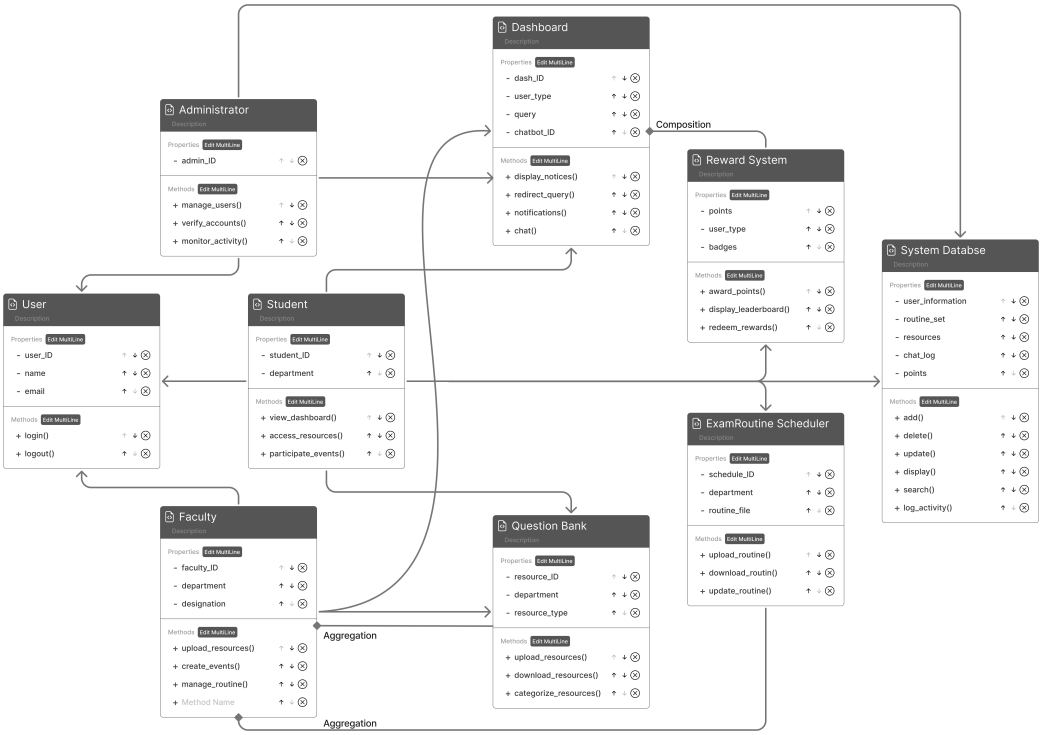

Figure 4.7: Class diagram

4.8 State Diagram

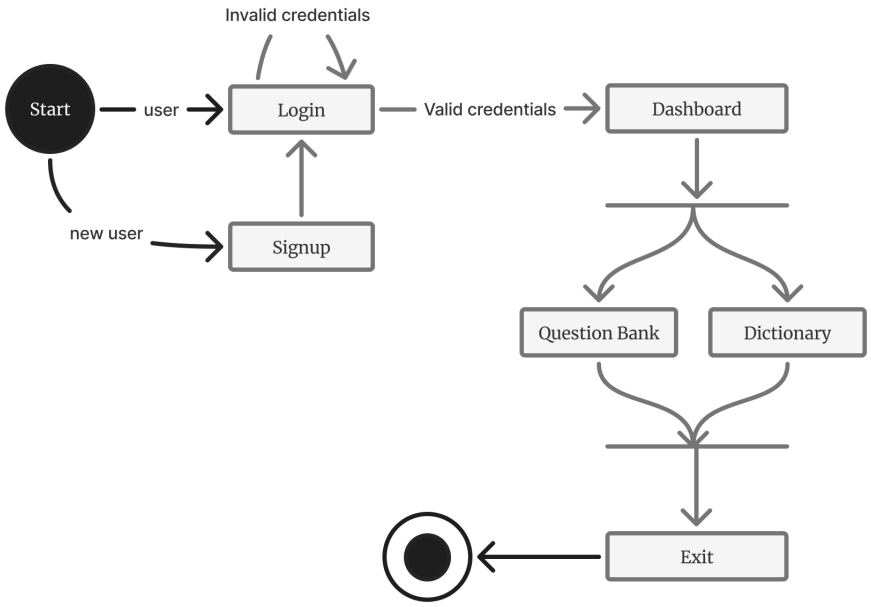

Figure 4.8: State diagram

4.9 Deployment Diagram

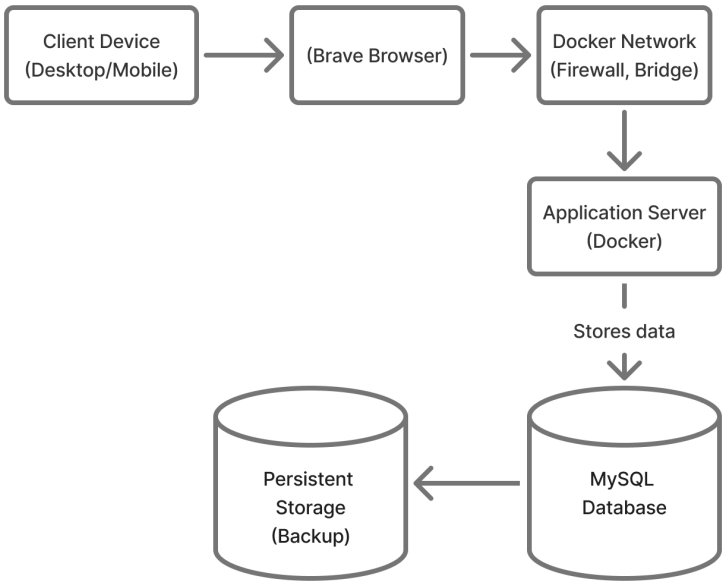

Figure 4.9: Deployment diagram

4.10 Sequence Diagram

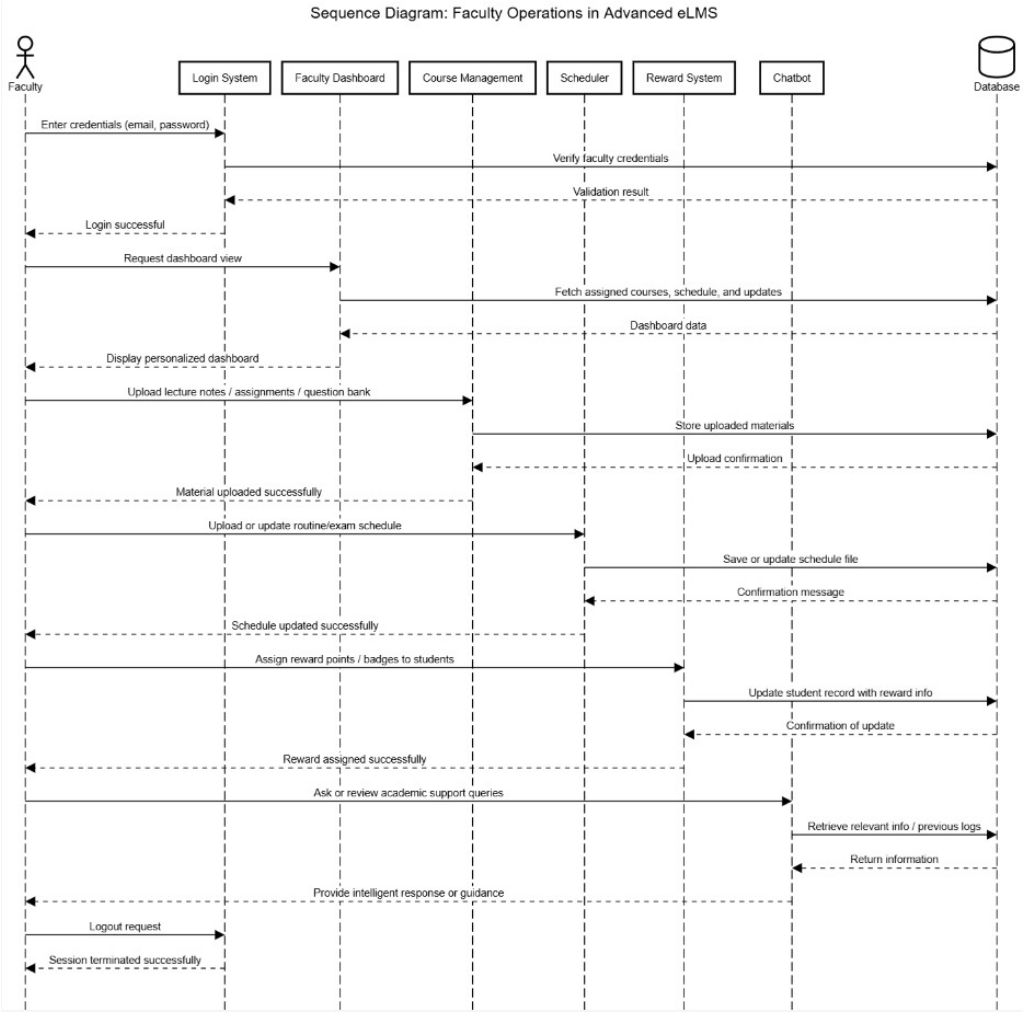

Figure 4.10: Sequence diagram (Faculty)

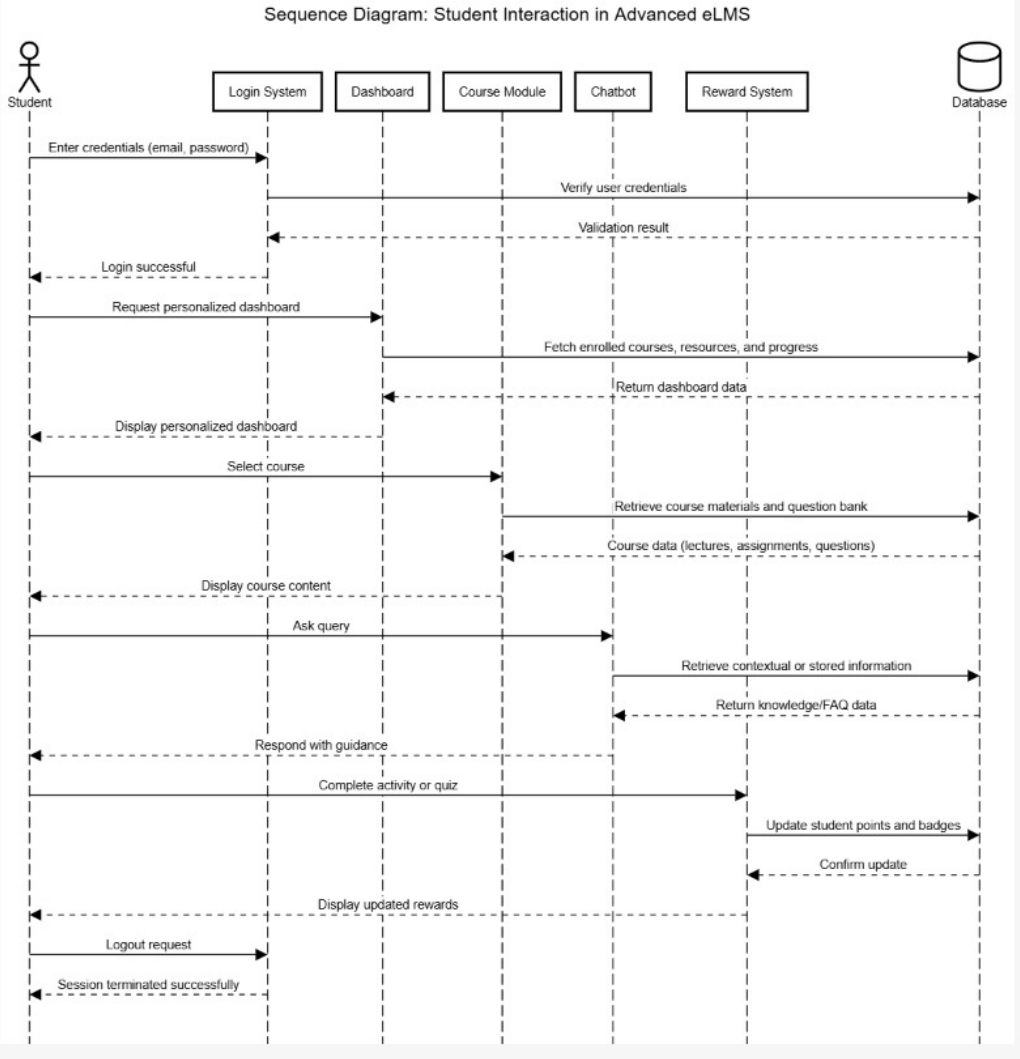

Figure 4.11: Sequence diagram (Student)

Chapter 5

User Interface (UI) Design

The user interface of the **Advanced eLMS** has been designed to ensure an intuitive and smooth experience for students, faculty, and administrators. The design process focused on creating clean layouts, easy to navigate, and full-on responsive components that work effectively across all devices.

5.1 UI Design of Feature Pages

The primary feature interfaces include:

- **Login and Signup Pages:** Provide secure access and user verification with clear input fields and role selection.

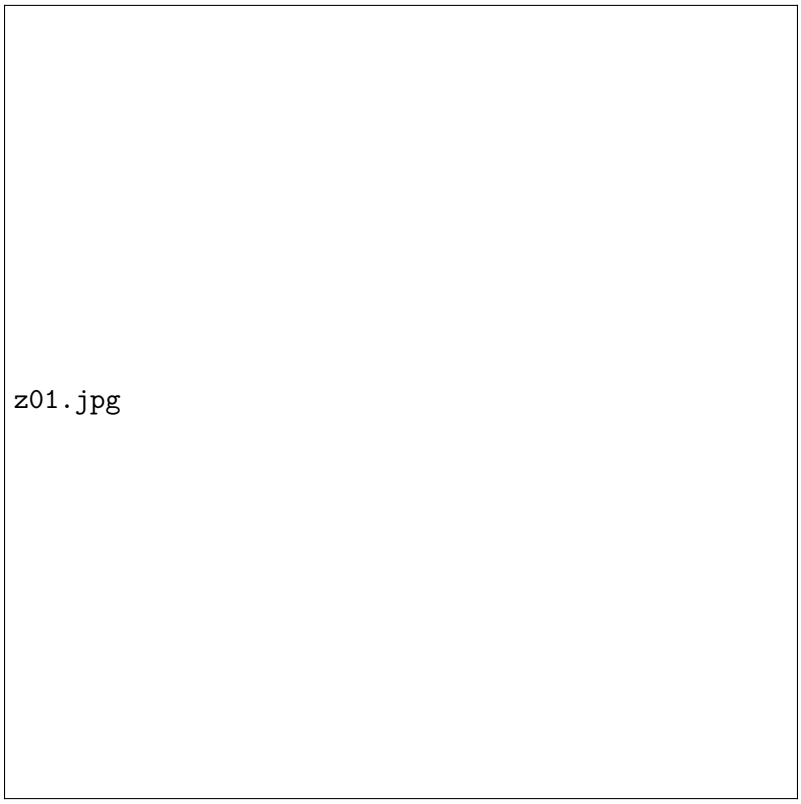

Figure 5.1: Login page for Faculty & Student

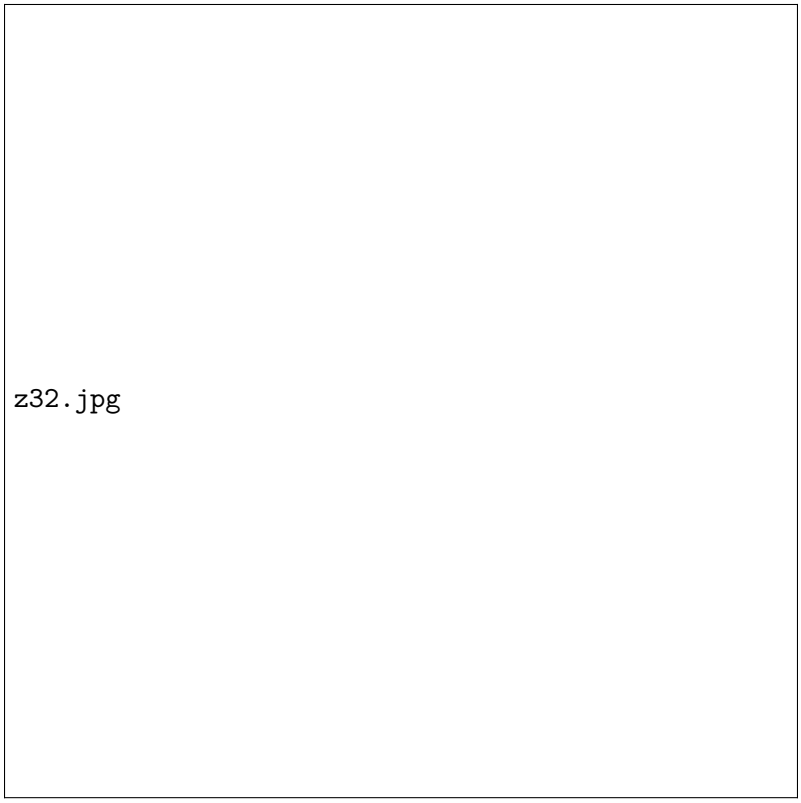

Figure 5.2: Login page for Admin

- **Dashboard:** Acts as a central control panel displaying personalized features for students and faculty.

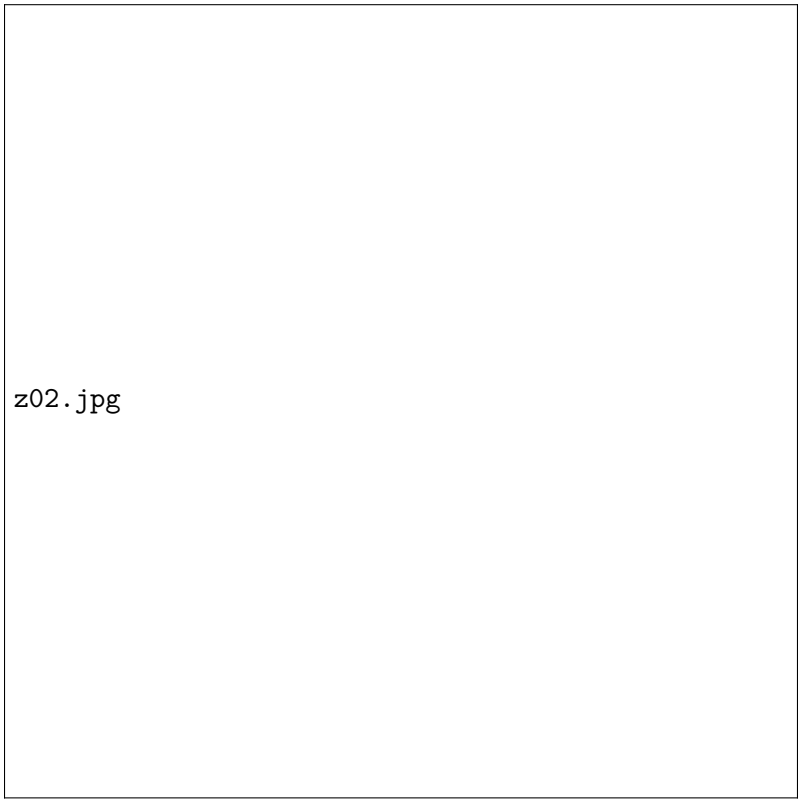

Figure 5.3: Home page for Faculty

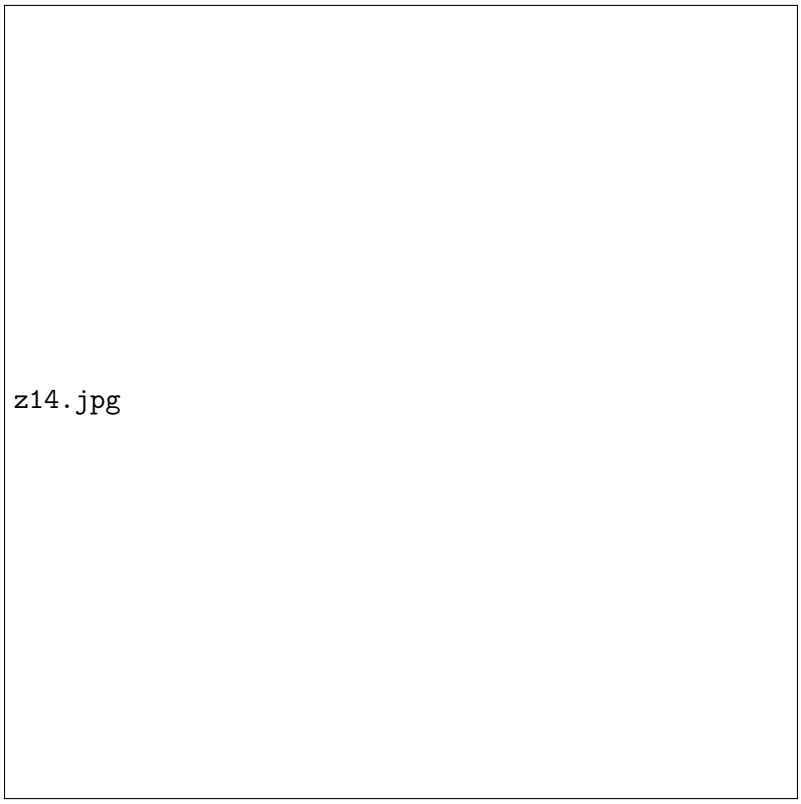

Figure 5.4: Home page for Students

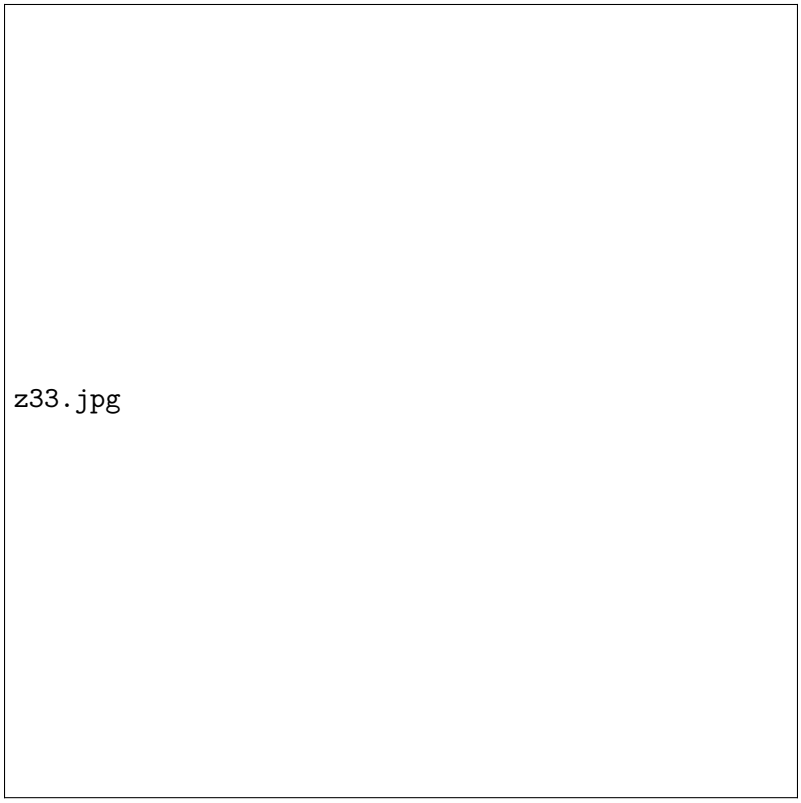

Figure 5.5: Home page for Admin

- **Advanced dictionary:** Allows students to learn and enlist their vocabulary, it also offers intelligent word lookup with contextual suggestions and pronunciation support.

Figure 5.6: Glossary feature usage

- **Automated Group creation:** Let faculty form group for students based on enrolled courses with utmost efficiently and hassle.

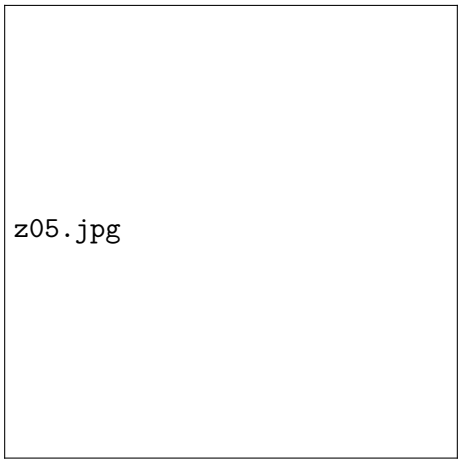

Figure 5.7: Automated group creation

- **Reward System:** Displays leaderboard and points earned by students for active participation.

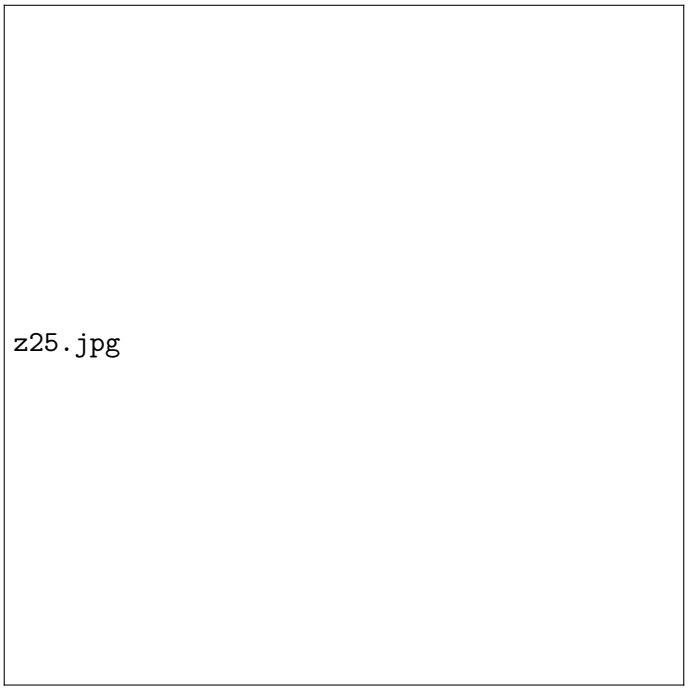

Figure 5.8: Brainstorming games with reward system

- **AI Chatbot Interface:** Provides instant query responses and academic guidance through an integrated chat system.

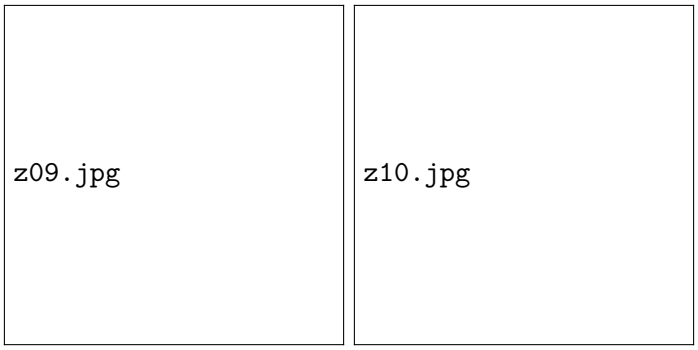

Figure 5.9: Chat system gateway

Each page was structured to maintain visual uniformity and to ensure that important actions remain accessible without visual clutter. The goal was to keep the interface minimal yet functional, following familiar patterns to reduce the learning curve for new users.

5.2 UI Design Principle

There are quite a few set of rules created by different people that address the best practices and requirements of UI Design, such as Three Golden Rules, Shneiderman's Eight Golden Rules, Norman's Design Principles, etc. In designing the Advanced eLMS (Enhanced Learning Management System), the user interface strictly adheres to **Mandel's Golden Rules of Interface Design**. These rules emphasize consistency, efficient use of shortcuts, and informative feedback—ensuring that the system remains user-centric, intuitive, and responsive across both student and faculty interfaces.

Dr. Theo Mandel's golden rules are divided into three main principals where each of these groups contains a number of specific rules, as follows:

5.2.1 Place Users in Control

- Use modes judiciously (mode-less)
- Allow users to use either the keyboard or mouse (flexible)
- Allow users to change focus (interruptible)
- Display descriptive messages and text(Helpful)
- Provide immediate and reversible actions, and feedback (forgiving)
- Provide meaningful paths and exits (navigable)
- Accommodate users with different skill levels (accessible)
- Make the user interface transparent (facilitative)

- Allow users to customize the interface (preferences)
- Allow users to directly manipulate interface objects (interactive)

5.2.2 Reduce Users' Memory Load

- Relieve short-term memory (remember)
- Rely on recognition, not recall (recognition)
- Provide visual cues (inform)
- Provide defaults, undo, and redo (forgiving)
- Provide interface shortcuts (frequency)
- Promote an object-action syntax (intuitive)
- Use real-world metaphors (transfer)
- User progressive disclosure (context)
- Promote visual clarity (organize)

5.2.3 Make the Interface Consistent

- Sustain the context of users' tasks (continuity)
- Maintain consistency within and across products (experience)
- Keep interaction results the same (expectations)
- Provide aesthetic appeal and integrity (attitude)
- Encourage exploration (predictable)

References

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[2] Masayuki Miyoshi, Masaru Ueki, Kenichi Ohno, and Motoyuki Ohmori. Creating an LMS eportfolio building system that enhances the quality of college life from one that supports self-regulated learning. *Yonago Acta Medica*, 64(4):324–329, 2021.

[3] Mahdieh Nazari. Assessing the usability of university of tehran's learning management system. *Informology*, 2025. Available online via Academia.edu.