Education Information Management
and
Decision Support Systems

Bsc. Hons in Artificial Intelligence
University of Moratuwa
Group 10

Table of Contents

1. Scope of the Project

Objective

To develop an advanced Education Information System integrated with a Decision Support System that streamlines the management of education-related information while empowering institutions with data-driven insights. The project aims to enhance decision-making processes in both academic and non-academic contexts by providing in-depth analyses of student growth, identifying areas for improvement, and uncovering behavioral patterns. By bridging the gap in existing systems, the solution will add substantial value to the education sector, fostering holistic development and informed strategies for student success.

Key Stakeholders

Students: For accessing academic resources, tracking performance, and engaging in non-academic activities.
Teachers: For monitoring and managing student progress, assignments, and attendance.
Administrators: Overseeing the system's functionalities and ensuring data security.

Deliverables

1. A comprehensive web application for centralized information management.
2. AI-based analytics for performance, behavioral patterns, and predictive insights.
3. Role-specific dashboards with interactive visualizations.
4. An FAQ chatbot for user support across all modules.
5. Integrated calendar for general, academic and non-academic scheduling.

Boundaries

- In Scope:
    1. Role-based user management.
    2. Academic content and behavioral analytics.
    3. Real-time dashboards and predictive analytics.
    4. AI-driven support and recommendations.

- Out of Scope:
    1. Physical infrastructure management.
    2. Development of hardware-specific applications.

Constraints

- Time-bound implementation with strict deadlines.
- Time to learn the specific tools and technologies to be used in developing the system.
- Resource allocation for data security and scalability.
- Budgetary limits on additional tools or integrations.

Assumptions

- All stakeholders have internet access to use web and mobile applications.
- Users will receive the necessary training to use the system efficiently.
- The system will integrate with pre-existing educational software for data migration.

2. Modules of the Project

	Module Name	Description
1	User Management & Authentication	Ensures secure access by verifying user identities, assigning roles, and controlling permissions, thus protecting sensitive data while enabling role-specific functionalities for effective decision-making.
2	Academic Management	This module facilitates curriculum and content management by enabling the creation and modification of curricula, subjects, and learning resources, including virtual labs and assignments with deadlines and late submission handling. It incorporates AI for auto-grading assignments and also supports manual grading.
3	Non-Academic Management	Records sports and clubs within the school detailing types, levels, achievements, and key activities to promote student engagement.
4	Academic and Non-Academic Attendance Management	Tracks and analyzes student attendance in both academic and extracurricular.
5	Behavioral Analysis System	This module tracks student engagement by monitoring the platform's average daily, weekly, and monthly activity. It records access to learning materials and generates insights on time spent, helping educators identify usage patterns and potential areas of disengagement.
6	Analysis Dashboard	Offers students progress tracking, attendance insights, and performance analysis. Teachers monitor student performance and attendance. Admins access comprehensive student and teacher data.
7	Calendar & Events	Highlights upcoming academic activities, such as exams, assignments, holidays, and important deadlines.
8	Intelligent Support System - On hold	Answer on general FAQs

3. Features of Each Module

Module 1: User Management & Authentication

1. **Role-based access control**: The system includes 3 different user roles, each with different levels of control and features within the system.
   - **Admin**
   - **Teacher**
   - **Student**
2. **Profile management**
   - Managing a distinct profile for each unique user.
   - Allow view, and update of the user profile
   - Dynamic profile updating
3. **Authentication system**
   - Robust signup for new users
   - Secure login and logout for every user.
4. **Access pattern tracking:** The users' log-in and log-out patterns will be tracked, recorded, later analyzed with Machine Learning, and used in further predictions and behavioral analysis.
5. **Multi-agent system to simulate and analyze interactions among roles:** Agent behaves according to predefined rules, objectives, and constraint
   - **Admin Agent**:
     - Monitors the activity logs of all users by retrieving the logs periodically.
     - Flags suspicious patterns, such as multiple failed login attempts or unusual login times
     - Alerts are generated for the system administrator.

Module 2: Academic Management

1. **Curriculum management**:
   - Create and modify the curriculum
   - Add/modify subjects
   - Add/show marks of the student
2. **Content Management (Learning resources)**:
   - Upload and organize teaching and studying materials
   - Upload virtual laboratories/mini video clips
3. **Assignment management:**
   - Set due dates and deadlines for the assignment submissions
   - Assignment upload.
   - Late submission handling mechanism.
   - Manage the file format of the submissions
4. **Store student final exam marks**
5. **Grading system:**
   - Facilities to define the grading criteria for each assignment once they are uploaded.
   - AI-based Automatic grade calculations
   - Handling manual gradings

Module 3: Non-Academic Management

1. **Sports activities management**
   - Maintain a list of major sports available within the school with details
     - Type (Indoor/ Outdoor)
     - Categories (individual/team)
   - A brief history of achievements gained by the sports at inter-school and national levels.

2. **Clubs & Societies**
   - Maintain a list of major clubs and societies available within the school, with descriptions of their purposes and major activities.

Module 4: Academic and Non-Academic Attendance Management

1. **Maintain attendance records**
   - Flexible and easy class-wise attendance entry for the teachers on manual attendance marking
   - Attendance of extra-curricular activities
     - Manually recording student attendance for sports activities.
     - Manually recording student attendance for club and society activities
2. **Allowing the user to filter and view attendance details**
3. **Attendance pattern analysis**
   - Analyze attendance ratios on school days within a calendar month.
   - Attendance records of a particular year class-wise and individual student-wise.
   - Identify attendance patterns, such as clusters of students frequently absent on specific days.
4. **Early warning if frequent or consecutive absences detected**
5. **Absence-related document management**
   - Allow students to upload medical and other leave-related documents

Module 5: Behavioral Analysis System

1. **Track student engagement with the system.**
   - Monitor and record the average time students spend active on the system daily, weekly, and monthly.
2. **Student Views and Access Analysis**
   a. **Use ML models to analyze engagement patterns:**
      - Time spent on resources.
      - Frequency of resource access.

Module 6: Analysis Dashboard

- ❖ **For Student users**
  1. **Progress tracking**
     - Display the progress of each subject
  2. **Assignments Timeline**
     - Overdue deadlines
     - Assignments due in the future
     - Sort the timeline by date or courses
  3. **Display and visualize tracked and analyzed attendance details**
     - Visualize attendance and absence on school days on a calendar month, year
     - Attendance history records
     - Attendance patterns of extracurricular activities
  4. **Display identified behavioral patterns**
     - Visualize students' overall engagement with the system.
     - Display resource access and usage tracking
  5. **Easy navigation**
     - Site page
     - Non-academic activity details
     - Course pages
  6. **Display of calendar module**
  7. **Compare exam marks:** Compare your exam marks with previous terms via graphs/ charts
  8. **Predictive analysis**
     - Calculate risks based on the performance and assignment grading and final marks

- ❖ **For Teachers**
  1. **Track and monitor student progress and performance class-wise and individually as necessary,**
     - Term/ Subject/ Yearly wise academic performance
     - Progress in the course materials
     - Analysis of the attendance
     - Low attendance risks

- ❖ **For Admins**
  1. **Access to details of teachers and students**
  2. **Track and monitor student activities:** Access comprehensive data on student activities, including academic and non-academic aspects.

Module 7: Calendar & Events

1. **Facility to add, modify, and delete events and schedules to the calendar**
2. **Academic Schedule**: Display key dates like
   - Exams
   - Assignments
   - Public and special school holidays.
3. **Attendance Integration**: Link calendar events with attendance tracking for better monitoring.
4. **Non-academic schedule**
   - Sports schedules and events
   - Clubs & Societies schedules and events

Module 8: Intelligent Support System

Developing a general FAQ chatbot for your site with key modules like **User Management & Authentication**, **Academic Management**, and others can be done effectively by structuring the chatbot to address common user queries related to each module.

1. **User Management & Authentication -**

   Sample FAQs:

   - "How do I reset my password?"
   - "Why can't I log in to my account?"
   - "How do I update my profile information?"

   Chatbot Actions: Provide step-by-step instructions or direct users to the relevant settings page. Suggest contacting support.

2. **Academic Management -**

   Sample FAQs:

   - "How do I access my course materials?"
   - "How can I check my grades?"
   - "Where can I find assignment deadlines?"

   Chatbot Actions: Provide links to course pages or grade dashboards, Academic and Non-Academic.

3. **Calendar & Events**

   Sample FAQs:

- "When is my next exam?"
- "What events are happening this month?"
- "How do I set reminders for assignments?"

Chatbot Actions: Offer to add reminders to the user's calendar.

4. Dependencies Between Modules

Source Module	Depends on Modules	Nature of Dependency
User Management & Authentication	None	It is a foundational module and does not rely on other modules.
Academic Management	User Management & Authentication	Requires user authentication and role-based access to manage academic content securely.
Non-Academic Management	None	It is a foundational module and does not rely on other modules.
Academic and Non-Academic Attendance Management	User Management & Authentication	It requires authentication for teachers to record student attendance and for students to view their attendance.
	Academic Management	Marking attendance in terms of participation in classes or courses
	Non-Academic Management	Marking attendance in terms of participation in extracurricular events
Behavioral Analysis System	User Management & Authentication, Academic management,	Requires user authentication and academic management to manage the behavioral analysis part.
Analysis Dashboard	User Management & Authentication	Requires user-specific role-based access to ensure personalized dashboard content and secure retrieval of user profile data.
	Academic Management	Currently following subjects/ courses and their progress data Assignment grades records
	Academic and Non-Academic Attendance Management	Attendance records to display analytics and metrics on the student dashboard.
	Behavioral Analysis System	Behavioral metrics for presenting engagement analytics.
Calendar & Events	Academic Management	Depends on academic schedules, assignment deadlines, and curriculum-related events.

	Non-Academic Management	Depends on non-academic schedule and events
	Academic and Non-Academic Attendance Management	Relies on attendance records and extracurricular activity schedules for calendar events.
Intelligent Support System	User Management & Authentication	User authentication and access control data are required to provide tailored responses based on user roles (Admin, Teacher, Student) and profile-specific information.
	Academic Management	Chatbot relies on this module to effectively access course materials, grades, and assignment-related information to answer academic queries.
	Calendar and event	Chatbot needs event scheduling and academic calendar data to answer questions about upcoming exams, assignments, and events, and to set reminders.

5. References

- Akura: [About Akura | Learn More About School Management Systems | Aspitio](#)
- Blackboard LMS: [Blackboard: The most modern and innovative LMS available | Anthology](#)