

The Islamia University Of Bahawalpur, Pakistan

Final year Project (FYP) proposal Form (for 7th semester)

Department of Information Technology (DIT)

Integrating Explainable AI for Transparent Educational Decision Support

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Objective & Scope of the Project

Integrating Explainable AI for Transparent Educational Decision Support aims to transform how institutions analyze, interpret, and act upon academic, behavioral, and engagement-related data. Traditionally, organizations rely on manual observations, delayed reporting, and subjective evaluations—methods that are often inconsistent, reactive, and prone to bias.

By integrating predictive analytics with explainability and real-time monitoring, institutions can intervene **before issues escalate**, ensuring fairness, accountability, and improved outcomes. The model shifts from a **reactive system to a transparent, intelligent, and proactive decision-support ecosystem**.

Objectives

To develop an Explainable AI-powered early-warning platform that collects academic, behavioral, attendance, and engagement data to identify at-risk individuals using transparent predictive algorithms that clearly explain how risk levels are determined.

To automate risk categorization and scoring using machine learning models ensuring every risk alert is accompanied by understandable factor contributions such as declining performance, absenteeism, disciplinary issues.

To promote proactive intervention by sending real-time notifications to counselors, teachers, administrators, or guardians when early signs of risk are detected, supported by interpretable insights that justify why an intervention is needed.

To ensure accountability and continuous monitoring through automated alerts, evidence-based recommendations, follow-up reminders, and escalation workflows, especially when risk trends increase or remain unresolved.

Scope

The scope of the Explainable AI-Based Educational Decision Support System covers the complete lifecycle of risk identification, explanation, intervention, monitoring, and institutional reporting. The system integrates both predictive analysis and explainability mechanisms to ensure every decision is transparent, fair, and accountable.

1. User / Student Monitoring Module

Collects academic records, attendance, behavioral logs, social-emotional indicators, and engagement metrics.

Allows students, mentors, or teachers to self-report concerns or upload supporting evidence such as documents, screenshots, or observations.

Current risk level

Explainable AI insights (e.g., “Low attendance contributed 32% to risk score”)

Performance trends and improvement recommendations

Ensures transparency by showing students or users how their data influences their risk categorization.

2. Admin / Management Module

Centralized control panel for managing risk categories, predictive model configurations, and explainability parameters.

Enables administrators to monitor risk distribution across departments, programs, or age groups with clear visual explanations.

Provides access to **active, resolved, and escalated cases**, including the AI's reasoning behind each risk level.

System Features

Feature	Description
Risk Data Collection & Registration	The system supports both automatic and manual collection of risk-related data, including attendance patterns, academic performance, behavioral indicators, engagement logs, and counselor observations. Each entry can include details such as category of concern, notes, and supporting documents. Collected data is processed through Explainable AI models to ensure transparent interpretation.
Real-Time Risk Tracking, Explanations & Status Updates	Students, mentors, counselors, and parents can view real-time updates about risk levels along with explainability insights (e.g., which factors contributed most to the risk score). Automated alerts notify stakeholders when risk increases, new concerns are detected, or intervention milestones are reached.
Explainable Predictive Analytics Dashboard	A transparent, interpretable dashboard offers visual insights into risk distributions, key contributing features, SHAP/LIME factor explanations, trend analysis, and root-cause indicators. These analytics help institutions identify high-risk groups, recurring issues, and areas needing strategic policy intervention.
Feedback & Intervention Evaluation System	After interventions, students and counselors can provide feedback on the effectiveness of the actions taken. This feedback loop helps evaluate outcomes, retrain models, reduce bias, and continuously improve the decision-support system's reliability, fairness, and transparency.

Software Requirements

Category	Tools / Technologies
Frontend	Angular / React, HTML5, CSS3, TypeScript, JavaScript
Backend	Java (Spring Boot) / Python (Flask or Django for AI & XAI Services)
Predictive Analysis, Explainable AI & Machine Learning	Python, Pandas, NumPy, Scikit-Learn, TensorFlow / PyTorch, SHAP, LIME, Jupyter Notebook
Database	MySQL / PostgreSQL
Data Storage & Integration	REST APIs, JSON, Cloud Storage (AWS / Firebase) – optional
IDE / Development Environment	Eclipse, Visual Studio Code, PyCharm, Jupyter Notebook
Visualization & Dashboards	Angular Charts, Chart.js, Power BI, Python Matplotlib / Seaborn, SHAP Visualizer
Documentation & Modeling Tools	MS Word, PowerPoint, Draw.io, StarUML, CASE Tools

System Design (Concept Overview)

[User Interface (Web/Mobile: Angular/React)]



[Self-Report & Data Intake Forms
(attendance, grades, behavior, surveys, uploads)]



[API Gateway & Application Server
(Java Spring Boot / Python Flask)]



[Data Ingestion & ETL Layer
(cleaning, validation, feature extraction, anonymization)]



[Machine Learning & Explainable AI Engine
(Risk prediction, SHAP/LIME explanations)]



[Risk Scoring & Transparent Rules Engine
(severity levels, thresholds, escalation policies, SLA timers)]



[Intervention Management & Notification System
(alerts to counselors, teachers, admins, parents)]



[Database Server
(MySQL/PostgreSQL – cases, risk scores, XAI outputs, logs)]



[Decision Support Dashboard
(explainable insights, risk trends, factor contributions, reports)]

Conclusion

The **Explainable AI-Based Educational Decision Support System** transforms traditional, reactive monitoring into a proactive, transparent, and data-driven intervention framework. Conventional approaches—such as delayed observations, subjective judgments, and inconsistent follow-up—often overlook early warning signs and can result in unnecessary escalation or unfair decisions.

By introducing a **centralized, predictive, and interpretable platform**, this system continuously gathers key indicators such as attendance, academic performance, behavioral patterns, and engagement levels. These signals are processed using machine learning enhanced with **Explainable AI (XAI)**, ensuring that every risk prediction is accompanied by clear, understandable reasoning.

Automated workflows ensure that at-risk individuals are identified early, routed to the correct counselor or department, and supported through structured, trackable interventions. Escalation rules, SLAs, and follow-up reminders ensure accountability at every stage.