IntelliLearn AI: An Intelligent Personalized Learning and Performance Prediction Platform

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Abstract— IntelliLearn AI is an intelligent student development platform designed to connect academic performance monitoring, personalized learning, skill development, and career preparation within a unified web-based environment. Students in higher education often face difficulties in monitoring their academic progress, identifying weak subjects, understanding their skill gaps, and preparing for future career opportunities. Conventional educational platforms generally focus on individual activities and may not provide continuous support based on a student's academic history and development requirements.

The proposed IntelliLearn AI platform addresses these challenges by combining machine learning, educational data analysis, recommendation techniques, and generative artificial intelligence. Its major functional areas include student profile management, academic performance prediction, weak-area detection, personalized learning support, skill-gap analysis, career guidance, and student growth tracking. The platform is designed around 17 functional modules that collectively support academic and professional development.

The system follows a modular web-based architecture using Next.js, React.js, Tailwind CSS, Next.js API Routes, Supabase, and PostgreSQL. Python libraries such as pandas and scikit-learn are considered for academic data processing and machine learning operations. Google Gemini API is identified as the proposed integration for conversational academic assistance. Supabase Authentication and PostgreSQL Row Level Security provide the foundation for role-based access across five user categories: Student, Teacher, Placement Officer, Recruiter, and Administrator.

The current implementation includes five modules: Authentication and User Management, Student Academic Profile, Student Performance Prediction, Weak Area Detection, and Role-Based Dashboards. The remaining modules represent planned extensions to the platform. IntelliLearn AI aims to establish a continuous student development environment by connecting academic information with future learning and career-related guidance.

Keywords— Artificial Intelligence, Machine Learning, Personalized Learning, Student Performance Prediction, Educational Data Mining, Generative AI.

1. Introduction

The increasing use of digital technologies in higher education has created opportunities to improve academic monitoring, student learning, and career preparation through intelligent software systems. Educational institutions generate a large amount of student-related information, including semester marks, subject-wise performance, attendance records, assessment results, technical skills, projects, certifications, and career interests. Proper analysis of this information can help students and teachers understand academic progress and identify areas that require improvement.

However, many existing educational platforms mainly focus on individual functions such as online learning, academic assessment, student information management, or career guidance. These separate systems may not provide a complete view of a student's academic development. Students may find it difficult to understand their weak subjects, select suitable learning resources, track their academic progress, and prepare for future employment opportunities using different platforms.

Artificial Intelligence (AI) and Machine Learning (ML) provide useful approaches for analyzing educational data. Machine learning models can examine historical academic records to estimate student performance and identify possible academic risks. Educational data mining can help discover patterns in student performance, while recommendation techniques can support the selection of learning resources and skill development activities.

Generative AI also provides opportunities to improve the learning experience through conversational interactions. It can support explanations of academic concepts, preparation of study notes, generation of practice questions, and subject-related assistance. However, generated information must be checked for accuracy and should be used as a support mechanism rather than a replacement for teachers or verified educational material.

To address these requirements, IntelliLearn AI is proposed as an integrated platform that connects academic performance monitoring,

personalized learning, intelligent tutoring, skill-gap analysis, and career preparation. The system supports five categories of users: Students, Teachers, Placement Officers, Recruiters, and Administrators. Each user category is provided with relevant functionality according to its responsibilities and access permissions.

The platform consists of 17 functional modules. These modules cover authentication and user management, student academic profiles, semester progression, personalized learning, performance prediction, weak-area detection, AI tutoring, skill-gap analysis, career guidance, project recommendations, hackathon recommendations, internship guidance, placement recommendations, company knowledge management, student growth tracking, role-based dashboards, and AI Student Journey Memory.

A key design concept of IntelliLearn AI is AI Student Journey Memory. It is intended to maintain a continuous record of a student's academic and professional development across multiple academic years. This includes academic performance, completed projects, acquired skills, certifications, and career interests. The objective is to use this historical information to support more relevant future recommendations.

The current implementation establishes the foundation through authentication, academic profile management, performance prediction, weak-area detection, and role-based dashboards. The remaining modules are planned for progressive development and integration.

The main contribution of this work is the design of a unified student development platform that connects academic intelligence with personalized learning and career preparation.

The remainder of this paper is organized as follows: Section 2 presents the problem statement and objectives. Section 3 discusses the related literature. Section 4 describes the proposed methodology and system architecture. Section 5 explains the functional modules. Section 6 discusses implementation, technology stack, testing, and limitations. Section 7 concludes the paper and identifies future development directions.

2. Problem Statement and Objectives

2.1 Problem Statement

Students in higher education institutions generate academic information throughout their educational journey. This information includes subject-wise marks, semester results, attendance, assessment performance, projects, certifications, and technical skills. However, this information is often maintained in different records or systems, making it difficult to obtain a unified understanding of a student's academic progress.

One of the major challenges faced by students is identifying subjects in which they are performing below expectations. Without proper analysis of academic records, students may not recognize their weak areas at an early stage. Similarly, teachers may require an organized method to review student performance and identify students who need additional academic support.

Another challenge is the lack of personalized learning guidance. Students have different levels of understanding, learning requirements, and academic goals. General learning resources may not always address their individual difficulties. A system that analyzes academic performance and

identifies weak subjects can provide a foundation for more focused learning support.

Students also need to understand the relationship between academic knowledge, technical skills, projects, and career requirements. Academic records alone may not provide a complete representation of professional readiness. Connecting academic information with skill development and career guidance can help students plan their future development more effectively.

Existing educational applications often address these activities separately. Academic management systems maintain student records, learning platforms provide educational content, and career platforms focus on professional opportunities. The absence of a connected student development process can make it difficult to track progress across academic semesters and career preparation activities.

Therefore, an integrated intelligent platform is required to organize student information, analyze academic performance, identify weak areas, and provide a foundation for personalized learning and career guidance.

IntelliLearn AI addresses this requirement through a modular architecture that combines student profile management, machine learning-based performance analysis, weak-area detection, and role-based information access. Additional learning and career-related capabilities are included in the proposed system roadmap.

2.2 Objectives

The main objectives of IntelliLearn AI are:

1. To develop an integrated web-based platform for student academic monitoring and development.
2. To provide centralized management of student academic profiles and related information.
3. To analyze student academic records and support performance prediction using machine learning techniques.
4. To identify weak subjects and potential academic difficulties using available performance indicators.
5. To provide role-based dashboards for Students, Teachers, Placement Officers, Recruiters, and Administrators.
6. To establish a foundation for personalized learning recommendations and AI-assisted academic support.
7. To connect academic progress with future skill development and career guidance.

3. Literature Review

Artificial Intelligence and Machine Learning have increasingly been explored in education to improve personalized learning, student performance analysis, academic prediction, and educational recommendations. Educational data mining helps identify patterns in academic records, while generative AI provides new possibilities for interactive learning support.

3.1 Personalized and Adaptive E-Learning

Personalized e-learning systems adapt educational content, learning activities, assessments, and feedback according to individual learner characteristics. Murtaza et al. [1] reviewed AI-based personalized e-learning systems and discussed learner profiling, recommendation mechanisms,

adaptive content delivery, and implementation challenges.

Research on personalized adaptive learning in higher education also highlights the potential of adapting learning activities according to student requirements [6]. Such systems can help learners access relevant educational resources and improve engagement.

For IntelliLearn AI, personalized learning represents an important future direction. Academic performance and weak-area information can provide a foundation for identifying suitable learning activities for individual students.

3.2 Educational Data Mining and Student Performance Prediction

Educational data mining applies statistical methods and machine learning techniques to educational records to discover patterns and estimate student outcomes. Historical marks, attendance records, assessment results, and other academic indicators can be used to analyze student performance [2], [5].

Performance prediction can be treated as either a classification or regression problem. Classification models can identify categories such as students who are academically at risk, while regression models can estimate numerical outcomes such as expected academic scores.

Chakrapani and Chitradevi [2] discussed student academic performance prediction using machine learning techniques. Arizmendi et al. [5] reviewed the prediction of student outcomes using digital learning behavior data and discussed standards and directions for future research.

These studies provide a research foundation for the Student Performance Prediction module of IntelliLearn AI. The system uses academic information as the basis for performance analysis and potential early identification of students who may require additional support.

3.3 Generative AI and Conversational Tutoring

Generative AI introduces new possibilities for interactive learning support, including concept explanations, question answering, study assistance, feedback, and educational content generation.

Research on ChatGPT in education identifies opportunities for accessible academic assistance while also highlighting concerns involving factual accuracy, privacy, academic integrity, and excessive dependence on automated responses [3], [4].

Large language models can help students understand complex topics by generating explanations and examples. They can also support the preparation of study notes, summaries, and practice questions.

IntelliLearn AI identifies Google Gemini API as a proposed integration for conversational academic assistance. The planned AI Tutor module is intended to support subject-related questions, programming explanations, study notes, and practice questions. Generated information should be checked for accuracy and should not replace verified academic resources.

3.4 Educational Recommender Systems

Educational recommendation systems help students discover suitable courses, learning resources, practice exercises, and skill

development opportunities. Recommendation methods may consider learner interests, previous academic performance, existing skills, and educational objectives [7].

An effective educational recommendation system should consider whether a learning resource matches the student's current proficiency and contributes to a particular academic objective. Recommendation quality can be examined through relevance, ranking performance, diversity, coverage, user feedback, and response time.

The proposed IntelliLearn AI platform can use academic profiles and weak-area information as a foundation for future learning recommendations.

3.5 Longitudinal Student Modeling and Growth Tracking

Longitudinal student modeling involves maintaining information about a learner's development over an extended period. Instead of examining each semester independently, this approach considers previous academic results, acquired skills, completed projects, certifications, learning activities, and career interests.

A student's previous academic difficulties may influence future learning recommendations. Similarly, completed projects and certifications may provide useful information for future skill-gap analysis and career guidance.

The AI Student Journey Memory module of IntelliLearn AI is designed around this concept. It aims to maintain student development information from the first academic year through the final year and provide continuity for future recommendations.

3.6 Synthesis and Identified Research Gap

Existing research supports the usefulness of personalized learning, academic performance prediction, conversational tutoring, educational recommendation systems, and longitudinal student modeling. However, these capabilities are frequently studied or implemented as separate functions.

A continuing challenge is connecting academic records, performance analysis, learning requirements, and career development through a unified student profile.

IntelliLearn AI addresses this design challenge by proposing a common student development platform. It combines academic profile management, performance prediction, weak-area detection, role-based access, and planned learning and career guidance capabilities.

The current implementation establishes the foundation through five completed modules. The remaining modules are intended to extend the system into a broader academic and career development environment.

4. Proposed Methodology

4.1 System Architecture

IntelliLearn AI is designed as a modular web-based system that combines student information management, academic data processing, machine learning, generative AI integration, and career guidance.

The architecture separates the presentation layer, application services, persistent data storage, and intelligence-related processing. This separation supports maintainability and

allows individual modules to be developed and integrated progressively.

The frontend provides an interface through which different user categories interact with the platform. The application layer manages requests, business logic, and communication between the frontend and database. The data layer maintains student profiles and academic information. The intelligence layer supports performance analysis and the planned integration of additional AI-based features.

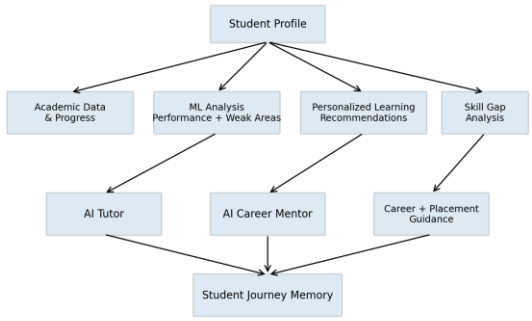

Fig. 1. Overall architecture of the proposed IntelliLearn AI platform.

The proposed student development process begins with user authentication and student profile creation. Academic information is maintained in the student profile and processed for performance analysis. The system uses available academic records to support performance prediction and weak-area identification.

In future development, these results can be connected with personalized learning, skill development, and career guidance modules. As students complete new academic semesters and development activities, their information can be updated to support longitudinal tracking.

4.2 Use Case Diagram

The use case diagram represents the interaction between the IntelliLearn AI platform and its five primary user categories: Students, Teachers, Placement Officers, Recruiters, and Administrators. Each user category is associated with a distinct set of responsibilities and system functionalities. Role-based access control helps organize the platform's operations and ensures that users can access only the information and functions permitted according to their assigned roles.

Students are the primary users of the IntelliLearn AI platform. They can access and manage their academic profiles, view semester-wise academic information, and review their performance-related details. The Student Performance Prediction module is designed to provide insights into their expected academic performance, while the Weak Area Detection module identifies subjects that may require additional attention. Through the role-based dashboard, students can access relevant academic information and monitor their progress.

Teachers interact with the platform to access relevant student academic information and review performance-related details according to their assigned permissions. They can use available academic information to understand student progress and identify subjects in which students may require additional academic support. The system is designed to provide teachers with an organized view of student academic performance.

Placement Officers are intended to use the platform to access relevant student profiles and academic information for placement-related activities. The proposed career guidance, skill-gap analysis, internship guidance, and placement recommendation modules can provide additional support for

placement preparation as these features are developed.

Recruiters represent organizations that may use the platform to access relevant student profiles and recruitment-related information according to the permissions provided by the system. The proposed placement recommendation and company knowledge base modules are intended to support future interactions between student profiles and industry requirements.

Administrators are responsible for managing platform users and overseeing system-level operations. Their responsibilities include user management, role assignment, and maintaining appropriate access permissions. Authentication and authorization mechanisms help ensure that administrative operations are restricted to authorized users.

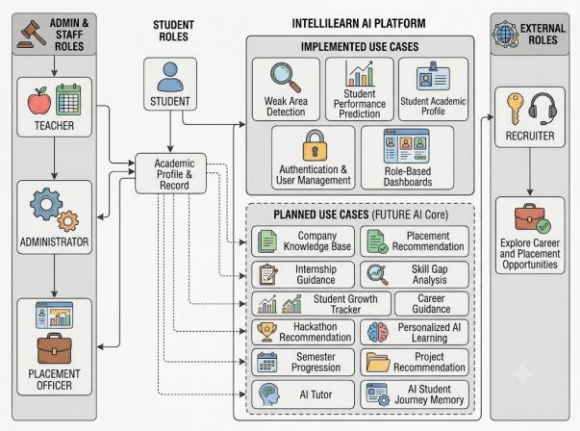

Fig. 2. Use case diagram of the IntelliLearn AI.

As shown in Fig. 2, the use case diagram provides a high-level representation of the relationship between the five user categories and the major functions of IntelliLearn AI. It identifies the responsibilities of each user without describing every internal processing step. The five implemented modules form the current operational foundation, while the remaining modules represent planned system extensions. Therefore, the final system diagram distinguishes implemented functionalities from proposed functionalities.

4.3 AI Student Journey Memory and Intelligent Module Coordination

The AI Student Journey Memory is proposed as a central component of IntelliLearn AI that maintains a longitudinal representation of each student's academic and professional development. Instead of considering every semester or student activity independently, this component is designed to connect information collected throughout the student's academic journey.

The memory component is intended to maintain relevant information such as academic performance, semester marks, completed projects, acquired technical skills, certifications, learning progress, career interests, and placement-related milestones. This information can help the platform understand the student's current capabilities as well as their development over multiple semesters.

The Academic Profile Module provides the basic student information and academic records required by the system. The Student Performance Prediction Module analyzes available academic data to estimate future performance, while the Weak Area Detection Module identifies subjects or concepts where students may require additional support. These implemented modules establish the foundation for future intelligent coordination.

The AI Student Journey Memory is designed to use information from these components to maintain a broader view of student progress. For example, if a student repeatedly performs poorly in a particular subject, the system can preserve this information as part of the

student's academic history. In future development, this information can help generate personalized learning recommendations and suggest suitable improvement activities.

The proposed Personalized Learning Module can use academic performance and identified weak areas to recommend relevant learning resources. Similarly, the Skill Gap Analysis and Career Guidance Modules can use the student's academic background, technical skills, completed projects, and career interests to suggest suitable skill-development pathways and career opportunities.

The proposed Generative AI integration using the Google Gemini API can further support this process by providing conversational explanations, study assistance, practice questions, and personalized educational guidance. Its responses should be based on relevant student context and should be treated as assistance rather than verified academic results.

The overall coordination process is designed to connect student information, academic analysis, historical progress, and future recommendations. The AI Student Journey Memory and several advanced modules are still planned or under development. Therefore, this architecture represents the proposed functionality and should not be interpreted as a fully implemented multi-agent system.

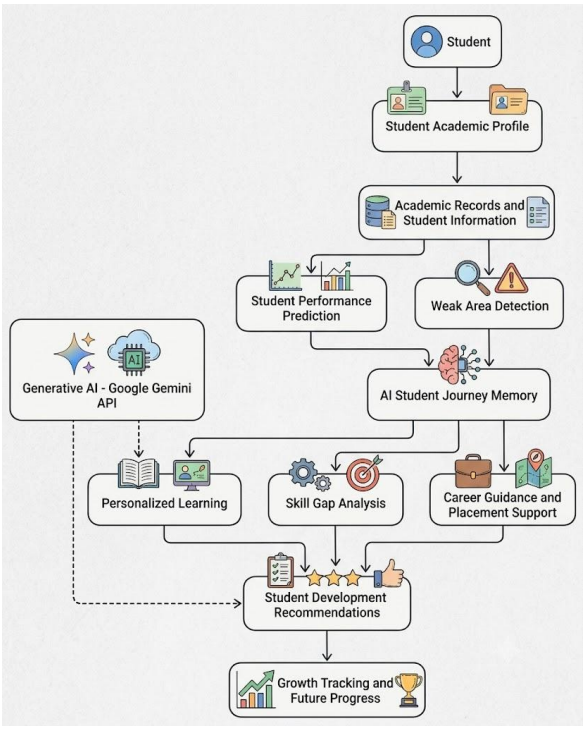

Fig. 3. AI Student Journey Memory and Module Coordination.

As represented in Fig. 3, the AI Student Journey Memory connects the student's academic information with performance analysis and future development activities. The implemented academic profile, performance prediction, and weak-area detection modules provide the foundation for this process. The remaining capabilities are intended to extend the platform into a continuous student-development environment.

The main objective of this coordination approach is to reduce the separation between academic monitoring, personalized learning, and career preparation. By maintaining relevant student history, IntelliLearn AI aims to provide recommendations that consider both current performance and long-term development.

4.4 Student Performance Prediction and Weak-Area Detection

Student performance prediction and weak-area detection are important components of IntelliLearn AI. These modules are designed to analyze academic information and help identify students who may require additional academic support. Traditional academic monitoring mainly focuses on semester results, whereas IntelliLearn AI aims to use available student data to provide a more structured understanding of academic performance.

The Student Performance Prediction Module analyzes relevant academic information, such as subject-wise marks, previous semester results, CGPA, and other available academic indicators. Machine learning techniques are used to analyze these records and estimate student performance. The prediction can help students and teachers understand academic progress and identify possible areas requiring attention.

The Weak-Area Detection Module focuses on identifying subjects or academic areas where a student may be facing difficulties. It uses available academic indicators, including subject-wise marks and assessment performance, to identify potential weaknesses. This information can help students understand which subjects require more attention and support academic improvement.

Both modules work with the Student Academic Profile Repository, which maintains the academic information required for analysis. Their outputs can also support future modules such as Personalized AI Learning, AI Tutor, and AI Student Journey Memory. These planned modules can use performance information and identified weak areas to provide more personalized academic assistance.

The combination of performance prediction and weak-area detection helps IntelliLearn AI move beyond basic academic record management. It establishes an analytical foundation for monitoring student progress and supporting data-driven academic decisions.

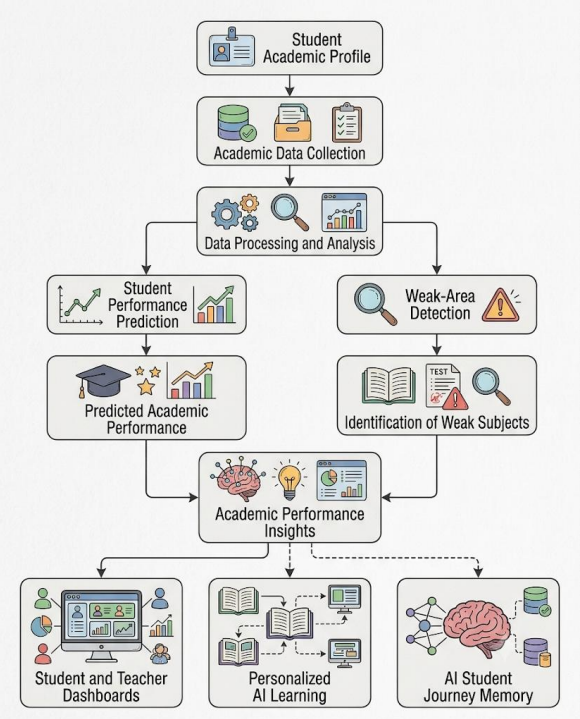

Fig. 4. Student Performance Prediction and Weak-Area Detection process.

As illustrated in Fig. 4, the process begins with the collection of academic information from the Student Academic Profile Repository. The collected data is processed and analyzed by the performance prediction and weak-area detection components. The resulting insights are presented through role-based dashboards to support academic monitoring. These outputs can also serve as inputs for future personalized learning and student journey tracking capabilities.

4.5 Career Guidance and Placement Recommendation

The Career Guidance and Placement Recommendation component of IntelliLearn AI is designed to help students identify suitable career paths, explore internship opportunities, and prepare for future placement opportunities. Students may find it difficult to understand which career options match their academic performance, technical skills, interests, and learning progress. The proposed component aims to provide guidance by considering the information available in the student's academic profile and development history.

The Career Guidance module is intended to help students explore possible career paths based on their academic background, areas of interest, and technical development. It can provide information about relevant career domains and the knowledge or skills generally required for those roles. This guidance can help students understand the relationship between their current academic progress and their future career objectives.

The Internship Guidance module is proposed to help students identify internship opportunities related to their academic background and career interests. It may provide information about relevant internship domains, expected skills, and preparation requirements. This can help students understand the practical experience they may need to gain before applying for employment opportunities.

The Placement Recommendation module aims to connect student profiles with potentially relevant placement opportunities. The recommendation process may consider available academic information, technical skills, career interests, and other relevant profile details. The system can present suitable opportunities and the requirements associated with them so that students can understand why a particular opportunity may be relevant to their profile.

The Company Knowledge Base module is intended to maintain useful information about companies, their technology domains, job roles, and general recruitment requirements. This information can support students in understanding different organizations and preparing for opportunities that match their interests. The usefulness of recommendations depends on the availability, accuracy, and regular updating of company and opportunity information.

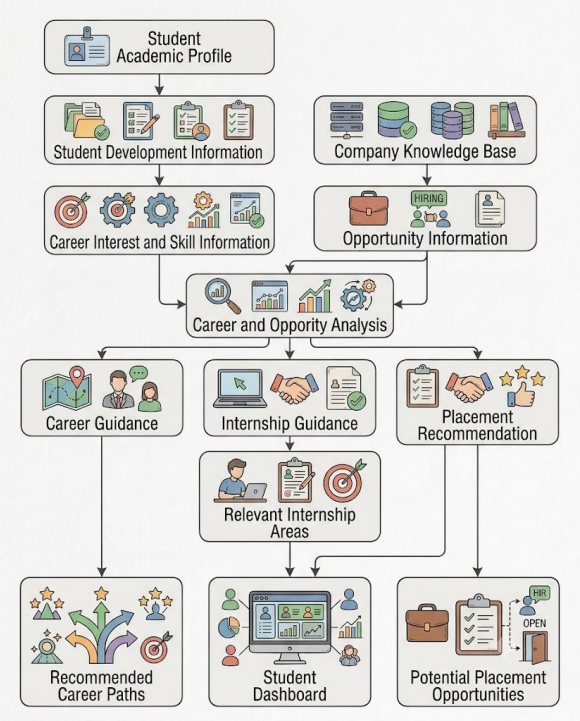

Fig. 5. Proposed Career Guidance and Placement Recommendation Workflow.

As shown in Fig. 5, the proposed workflow begins with the student's academic profile and development information. The system uses this information along with available company and opportunity details to support career guidance, internship guidance, and

placement recommendations. The resulting information can be presented through the role-based dashboard to help students plan their next steps.

These capabilities are part of the proposed development of IntelliLearn AI and are not claimed as fully implemented or experimentally validated. Their future effectiveness will depend on the quality of student data, the availability of reliable opportunity information, and the relevance of the recommendation approach.

4.6 Personalized Learning and AI-Based Academic Assistance

The Personalized Learning and AI-Based Academic Assistance component of IntelliLearn AI is designed to support students in improving their academic knowledge and developing the skills required for their future goals. Students may have different learning requirements depending on their academic performance, understanding of subjects, and individual learning progress. A common learning approach may not address the specific difficulties faced by every student. The proposed component aims to provide learning support based on individual student information.

The Personalized AI Learning module is intended to provide learning recommendations according to the student's academic performance, identified weak areas, and learning requirements. Based on the available information, the system may suggest relevant subjects, topics, and learning activities. For example, if a student requires improvement in a particular subject, the platform may recommend studying related concepts and practising relevant topics.

The AI Tutor module is proposed to provide interactive academic assistance using Generative AI technology. It is intended to help students understand difficult concepts, ask subject-related questions, and receive explanations in a simple manner. The planned integration of the Google Gemini API SDK can support this functionality. The AI Tutor is expected to act as an additional learning support system and not as a replacement for teachers or classroom learning.

The Skill Gap Analysis module is designed to identify differences between a student's existing skills and the skills required for a selected learning or career goal. It may use available student profile information, academic progress, and skill-related records to identify areas that require further development. Based on the identified gaps, the system can suggest relevant learning topics and activities.

4.7 Data Management and Security

Data management and security are important components of IntelliLearn AI because the platform handles student academic records, performance information, skills, learning progress, and career-related details. The system requires a structured database to store and manage this information efficiently while ensuring that users can access only the data permitted by their assigned roles.

IntelliLearn AI uses PostgreSQL as its primary relational database, hosted through Supabase. The database is designed to manage information related to student profiles, academic records, semester performance, subject details, user accounts, and other platform activities. The structured database supports relationships between students, teachers, academic departments, divisions, and subjects.

Authentication is managed using Supabase Auth, which supports secure user sign-in and

identity management. The platform supports five user roles: Student, Teacher, Placement Officer, Recruiter, and Administrator. Role-Based Access Control (RBAC) is used to organize access according to the responsibilities of each user category.

PostgreSQL Row Level Security (RLS) provides an additional mechanism for restricting access to database records. RLS policies can be configured to ensure that users can access only the information permitted by their roles. For example, students should access their own academic information, while teachers should access relevant academic information according to their assigned responsibilities. Placement officers, recruiters, and administrators should receive access according to their defined permissions.

The platform uses Next.js and React.js for the frontend, while Next.js API Routes support application-specific server-side operations. Supabase provides backend services and database connectivity. Python libraries such as pandas and scikit-learn support machine learning and academic data processing. The proposed Google Gemini API integration is intended for future AI-assisted learning capabilities.

Since IntelliLearn AI maintains personal and academic information, appropriate access policies and data-handling practices are important. Database access should be restricted through properly configured authentication and authorization mechanisms. The system should also ensure that sensitive student information is not exposed to unauthorized users.

The current implementation establishes the foundation through authentication and user management, student academic profiles, and role-based dashboards. Additional security validation, complete role-specific access testing, and end-to-end testing of the integrated platform remain important activities as further modules are developed.

5. Implementation and Evaluation

IntelliLearn AI is being developed as an integrated web-based platform to support student academic monitoring, performance analysis, and future career development. The current Stage-I implementation focuses on establishing the core functionality required to manage student information, analyze academic performance, identify weak areas, and provide role-specific access. The remaining advanced capabilities are part of the proposed framework and require further development and integration.

5.1 Implementation Details

The platform follows a modular web-based architecture. The frontend is developed using Next.js, React.js, and Tailwind CSS to provide an interactive interface for different user roles. Node.js and Next.js API Routes support backend operations and communication between application components.

Supabase is used as the Backend-as-a-Service platform, with PostgreSQL serving as the primary relational database. Supabase Authentication manages user authentication, while PostgreSQL Row Level Security (RLS) is used to control access to stored information according to configured user permissions.

5.2 Functional Testing

Functional testing is required to verify that the implemented modules perform their intended operations. The current testing scope focuses on the core Stage-I functionality, including authentication, academic profile management, performance-related

operations, weak-area identification, and role-specific dashboard access. Integration testing is also required to examine communication between the frontend, backend API routes, Supabase services, PostgreSQL database, and machine-learning components. RLS policies should be tested with different user roles to identify unauthorized data access

5.3 Results and Discussion

The current Stage-I implementation establishes the basic operational foundation of IntelliLearn AI. Authentication and User Management provide controlled access to the platform, while the Student Academic Profile module maintains information required for academic analysis. Student Performance Prediction and Weak-Area Detection introduce academic intelligence into the system, and Role-Based Dashboards organize platform information according to user roles.

The integration of these modules provides a foundation for connecting academic monitoring with future personalized learning and career-development capabilities. For example, performance-related insights and identified weak areas can serve as inputs to the proposed Personalized AI Learning and AI Tutor modules. Similarly, academic and developmental information can contribute to the planned Student Journey Memory.

TABLE 1. Functional Testing of Implemented IntelliLearn AI Modules

Test case	Expected result	Actual result
User login	Authorized login	Actual observed result
Student profile	Profile information displayed	Actual observed result
Performance prediction	Prediction generated	Actual observed result
Weak-area detection	Weak subjects identified	Actual observed result
Role-based dashboard	Correct dashboard displayed	Actual observed result

However, the current implementation should not be considered a fully integrated intelligent student-support platform because several advanced modules remain under development or are planned for future stages. The practical effectiveness of the implemented machine-learning functionality must also be established through experiments using a defined dataset and suitable evaluation metrics.

No numerical accuracy, learning improvement, or placement-success claims are made without corresponding experimental results. Functional completion of individual modules should also be distinguished from complete end-to-end validation of the platform.

6. Conclusion

This paper presented IntelliLearn AI, an intelligent student-centred framework designed to connect personalized learning, academic performance prediction, weak-area detection, skill development, and career guidance within a unified platform. The framework aims to support students throughout their academic journey by connecting their current academic progress with their future learning and career goals.

The reviewed literature highlights the potential of artificial intelligence, machine learning, adaptive learning, educational chatbots, and recommendation systems in

improving student support. However, these capabilities are often developed as separate functions. IntelliLearn AI addresses this integration challenge through a common student profile and a proposed Student Journey Memory that can maintain relevant academic progress, learning activities, skills, and career-related information over time.

The current Stage-I implementation establishes the foundation through five core modules: Authentication and User Management, Student Academic Profile, Student Performance Prediction, Weak-Area Detection, and Role-Based Dashboards. Other advanced capabilities, including Personalized AI Learning, AI Tutor, Skill Gap Analysis, Career Guidance, and Student Journey Memory, remain part of the proposed framework and require further development and integration.

The practical effectiveness of IntelliLearn AI has not yet been established through comprehensive experimental results. Future work should therefore focus on completing the proposed modules, evaluating machine-learning models using suitable datasets and reproducible metrics, conducting functional and usability testing, and validating the reliability of AI-generated assistance and recommendations. Appropriate privacy, security, explainability, and responsible-AI measures will also be important for handling student information and supporting trustworthy system operation.

The future scope includes integrating Explainable Artificial Intelligence (XAI) to clarify the reasons behind predictions and recommendations, and Retrieval-Augmented Generation (RAG) to ground AI-generated responses in trusted educational and institutional resources. Multilingual and voice-based assistance, mobile application support, advanced career recommendations using current job-market information, and integration with institutional Learning Management Systems (LMS) can further extend the platform. Longitudinal evaluation using real student data will be necessary to assess its impact on academic progress, student engagement, skill development, and career readiness.

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