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# Student Academic Mentoring System

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**Abstract:**
In the current educational landscape, institutions are increasingly generating vast amounts of academic data, yet much of this data remains underutilized in improving student outcomes. Traditional methods of student evaluation rely heavily on manual observation by faculty members, typically conducted after examination results are released. This reactive approach often delays the identification of academically at-risk students, reducing the effectiveness of mentoring interventions. To address this challenge, this research proposes a Student Academic Mentoring System that leverages data analytics to monitor, analyse, and predict student performance trends. The system collects and processes structured academic data such as internal and external marks, subject-wise grades, and pass or fail status across multiple semesters. By applying analytical techniques, the system identifies patterns in student performance and classifies students into different risk categories. This enables faculty members to take timely and informed mentoring actions. The proposed system not only reduces manual workload but also enhances the accuracy and efficiency of academic monitoring. Experimental evaluation indicates that the system significantly improves early detection of at-risk students and supports data-driven decision-making. Overall, this research highlights the importance of integrating data analytics into academic mentoring systems to foster proactive intervention and improved educational outcomes.

## I.INTRODUCTION

Educational institutions play a crucial role in shaping student success, yet one of the persistent challenges they face is effectively monitoring academic performance and providing timely support to students who are struggling [1] [2]. In most institutions, faculty members manually review student results after each semester, analysing marks, grades, and pass or fail status to assess performance. While this approach provides a general understanding of student progress, it lacks the ability to detect early warning signs or predict future performance trends. Consequently, many students do not receive the necessary guidance at the right time, which may negatively impact their academic journey.

With the rapid advancement of technology and the increasing availability of educational data, there is a growing need to shift from traditional monitoring methods to more intelligent and data-driven approaches [10] [3] Academic data, including semester results, subject-wise scores, and historical performance records, can provide valuable insights when analysed effectively. By leveraging such data, institutions can move towards predictive mentoring systems that identify potential risks before they become critical issues [5] [12].

The proposed Student Academic Mentoring System aims to bridge this gap by introducing an automated platform that continuously analyses student data and provides actionable insights. The system processes academic records to identify patterns such as consistent low performance, sudden decline in grades, or repeated subject failures. Based on these patterns, students are categorized into different risk levels, enabling faculty members to focus their mentoring efforts where they are needed most. This approach not

only enhances the efficiency of academic monitoring but also promotes a proactive learning environment where students receive timely support and guidance[5] [12].

## II.RELATED WORK

In recent years, researchers have come up with mechanisms to try and understand how students perform in the classroom to improve learning outcomes. Platforms like Moodle or Blackboard assist in recording attendance, homework, and scores but have limited capabilities [9]. Instead of finding patterns and providing recommendations, the majority only stores and presents information. Against this background, identifying learners who are likely to fail becomes difficult. Teachers also have no directions when early interventions are necessary.

Despite increasing interest, tools developed using Educational Data Mining rarely escape the laboratory. Clustering or classification-based prediction models appear regularly in journals [3] [10]. They, however, do not find their way into actual classrooms. Others are exclusively based on regression, while still, others combine several statistical routes. The results could provide student performance predictions. When the systems monitor the learning processes over a period, and patterns can be deduced. However, most of the findings remain in the simulated environment. Real schools have different conditions from the research ones. Practical difficulties impede progress at campuses. Rarely does any particular method fit easily outside the best tested scenarios [6] [7].

A fresh approach is seen when data gathering is combined with interpretation and accompanied by directed help, all in one place. The data interpretation component dynamically forms insights and creates suggested actions for multiple associated contexts, which gives it a fresh spin compared to other approaches that only present figures. The prominent considerations include accuracy combined with user-friendliness in the developed tools that suit the modern mentoring environments/circumstances.

## III.PROPOSED SYSTEM

### A. Overview of the Proposed System

The proposed Student Academic Mentoring System is to be delivered as a comprehensive system of data-derived insights for monitoring and improving student performance [3] Data is obtained from different sources, such as the semester results and the institution's student academic performance records and are fed into appropriate processing mechanisms to determine performance trends. Information such as mark lists per subject, overall grades, and pass or fail considerations are analyzed against the given academic period to establish a student's performance trend over time.

Again, based on such a detailed analysis, students are categorized into different risk categories, including low risk, medium risk, and high-risk categories. This enables them to prioritize mentoring and focusing on students with immediate needs. Moreover, the system offers comprehensive reports and graphical representations, facilitating an in-depth understanding of the underlying factors influencing student performance for faculty members. The proposed system, in general, changes the output of the data into meaningful and useful information for successful and timely mentoring.

### B. Overall System Architecture

The system architecture is designed using a layered approach to ensure scalability, flexibility, and efficient data management. The primary elements include the frontend, backend, and database. The first layer is the frontend, which acts as a user interface for faculty and administrators, generating reports and displaying student information. It is designed to be intuitive and user-friendly to promote ease of use among all users and stakeholders.

Its main tasks include processing information, performing analytical functions, and operating as a communication channel between the frontend and the database. The backend also includes algorithms for performance analysis and risk classification, plus APIs that can retrieve and update data. The structured data in the database includes academic information such as student, student records, subjects, and performance data. Note that this architecture provides information flow and supports real-time analysis and reporting.

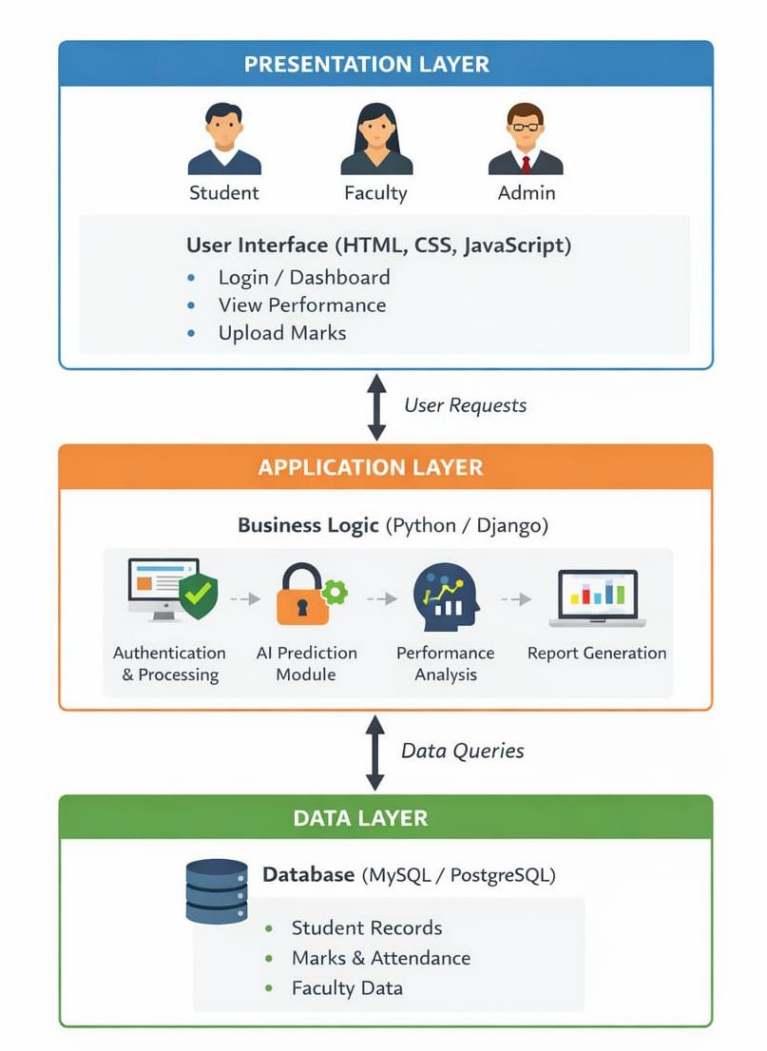



**Fig: 1 System Architecture**

### C. Data Collection Modules

The data collection module is a critical part of the system because it makes sure data used for analysis is accurate and reliable [3] The system collects data from several sources, such as university results portals, Excel sheets, and manual inputs from faculty members. This data consists of student names, their subject-wise marks, grades, and pass or fail status over different semesters.

Before analysis, the data is subjected to preprocessing to eliminate inconsistencies, fill in missing data, and ensure a standardized format. Without this step, it is possible to analyze inconsistent data, which threatens the accuracy of the results. The resulting structured data format allows storing and accessing data when required by various system modules.

### D. Frontend Design and User Interface

The frontend design is about having a clear but appealing user experience. The interface includes dashboards and specific indicators showing the average marks achieved, performance in individual subjects, risk levels, etc. The result needs to be interpreted in a less complex manner so the best option appears to the users, which is why data is shown in the form of a chart or graph [4].

This is presented in the form of an individual student's record, which also includes data indicating problematic areas. The risk levels are also denoted using a color code, further enhancing the system's usability. From the users' perspective, the complexity is removed, and simple information is relayed using the frontend infrastructure.

### E. Backend Architecture and Processing

The backend of the system is a vital part of data processing and analysis, It accomplishes this by using specific algorithms that assess student performance on several predetermined factors and criteria, including calculating the average marks of all students, determining the number of students that fail, and taking into account the grade trends in the class. These algorithms can either be rule-based or use machine learning algorithms associated with more advanced prediction.

Also, the backend is responsible for data communication using the APIs to ensure that the frontend speaks to the backend database seamlessly. It performs data retrieval, updating, and report generation functions, ensuring efficiency and reliability of the system. The backend ensures consistency and accuracy in performance evaluation by centralizing the analytical logic.

### F. Modular System Design

The system follows a modular design approach, dividing functionality into discrete components for maintainability and scalability [4]. The Data Input Module handles collecting and preprocessing student data, while the Processing Module analyses the data and produces insights. The Risk prediction module classifies the students based on the results, and the visualization module's role is presenting the output through visuals such as dashboards and reports.

Finally, the Mentoring Module assists faculty members in making informed decisions by providing recommendations and notifying them of critical cases. That way, each module can be developed and tested separately, enhancing the system's flexibility and making future upgrades easier.

## IV. IMPLEMENTATION DETAILS

The implementation of the system is done with the help of modern web technologies as well as programming frameworks. The frontend is implemented via HTML, CSS, and JavaScript with responsiveness and user-friendly interaction. Its backend is implemented using programming languages such as Python or Node.js, which are well-equipped for data processing and API development. The database is handled using database management systems like MySQL or MongoDB, which can store and retrieve structured data efficiently [5] [6]

Performance metrics such as averages, subject-wise performance, and failures are calculated during student data processing. These are further used to classify students in different risk categories. In this regard, accuracy, efficiency, and scalability are paramount to ensure the system works reliably under heavy workload.

### A. Navigation and User Interaction

There are also navigation features provided by the system which gives the users access to various functionalities easily. Faculty members can upload data, view dashboards, and analyse student performance through a well-structured interface. Filters, select boxes, and search fields allow the user to analyse the results of a particular student or subject, making the system more usable and intelligent [4].

**B. Styling and Design Elements**

The system has been designed with a focus on clarity and professionalism. A consistent colour scheme and well-organized content, paired with a clean layout, guarantee readability, and ease of use. Charts and graphs are used to display data accurately without overwhelming the user [9].

**C. Testing and Final Output**

System testing is a critical process that verifies that a system will work as intended, with the required accuracy and performance. This includes the unit testing of individual modules, integration testing to ensure the proper interaction of the system, and user testing to assess usability. The final output is in the form of dashboards and reports that give a holistic view of the student's performance and risk status [3] [10].

## IV.MODULE SPLITUP

The system is divided into different modules so that each module can efficiently do a particular task. This helps in understanding, developing and maintaining the system easily. The user module enables faculty members to see the performance, analyze results and predict the students who might fail or need to be encouraged. The admin module manages and updates student data.

The server module is responsible for the entire system's core performance in terms of processing requests, performing necessary computations, and producing relevant output based on the provided information. It integrates the frontend and the database seamlessly. All information connected to the student, such as marks, grades, performance histories, and other related data is stored in the database in a structured manner. On a high-level, the academic mentoring system is an infrastructural solution brought about by the interaction of its three modules – frontend, backend, and database – working seamlessly together to fulfill their professional roles in promoting academic mentoring, managing student information, and system intelligence in manipulating data.

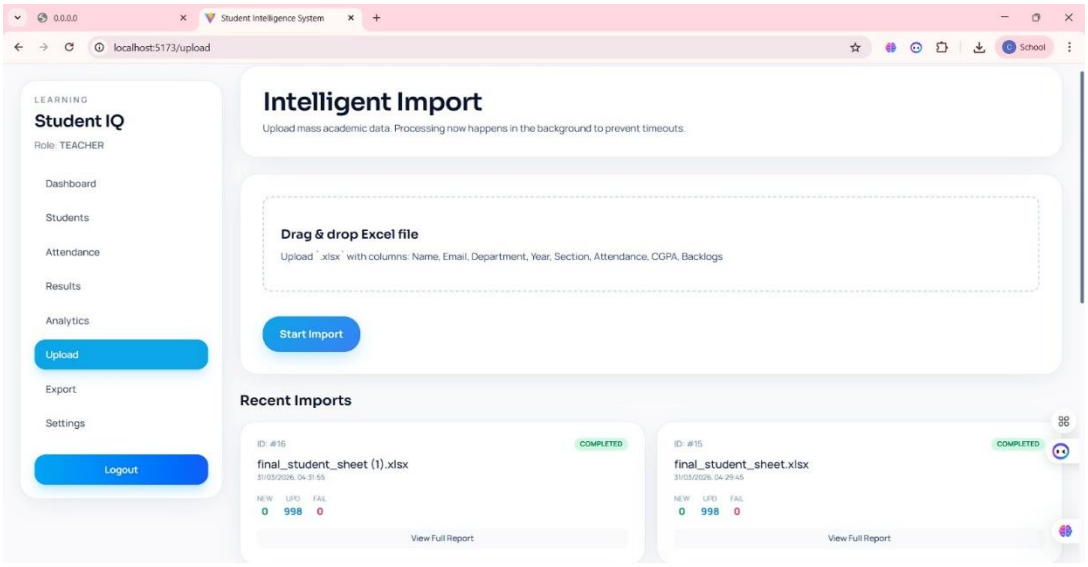
## V.RESULTS

However, the results of the proposed system are effective analyses of student academic performance and those at risk. By using structured data such as marks and grades, the system is able to classify the students into different categories of student-at-risk based on their academic performance. This gives faculty members a clear picture of the students who are excelling and those who need special attention in their academic pursuits [10].

Reduction in manual effort is one of the major outcome of the system. The system gives a holistic and streamlined view of the data instead of reading out individual student record books. The system also enables easier detection of students struggling significantly due to very low scores or repeatedly failing a particular subject. In general, decision-making during academic mentoring is fast and correct when aided by the system.

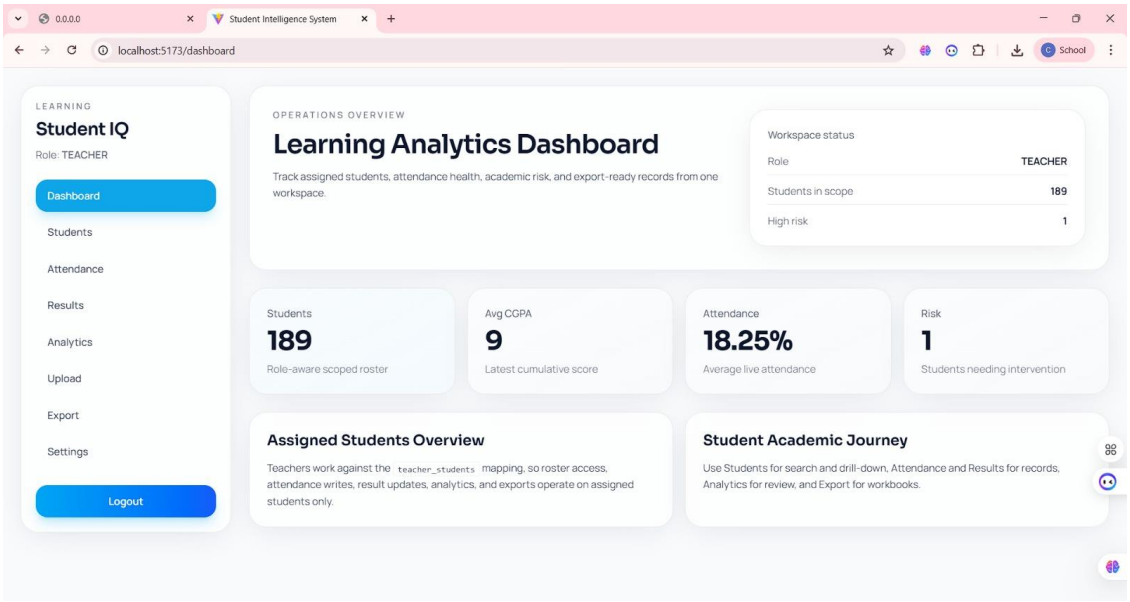
**Data Upload & Processing Result**

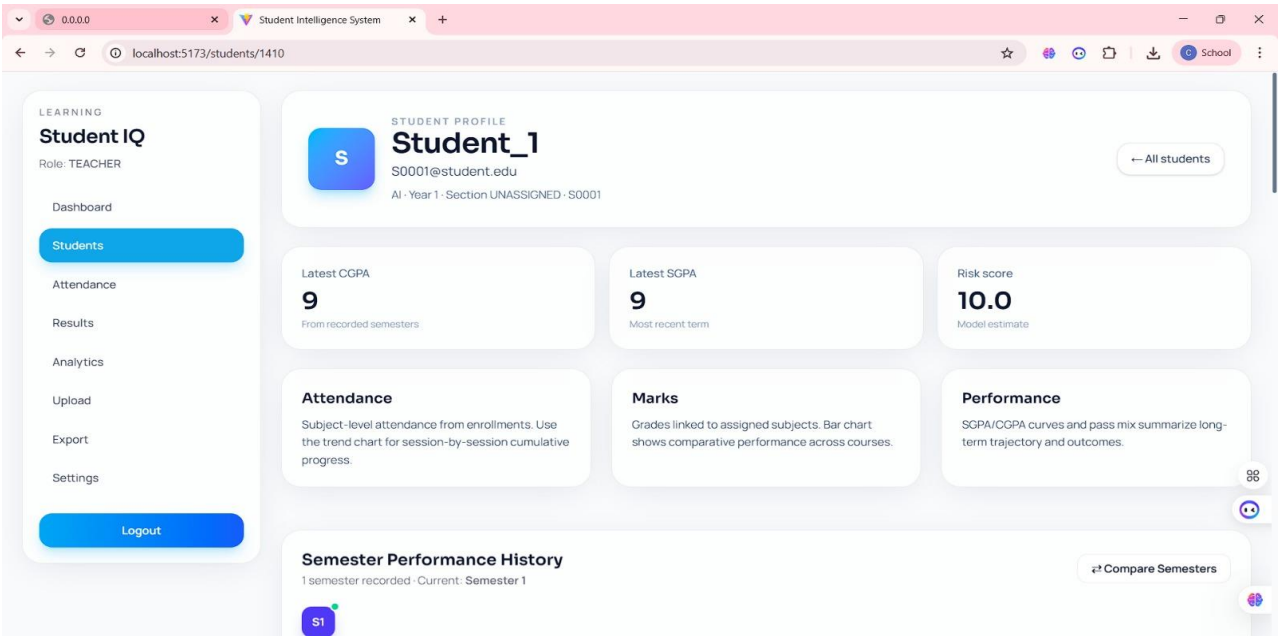
The system successfully processes uploaded academic data and converts it into structured information for analysis.




**Student Performance Dashboard**

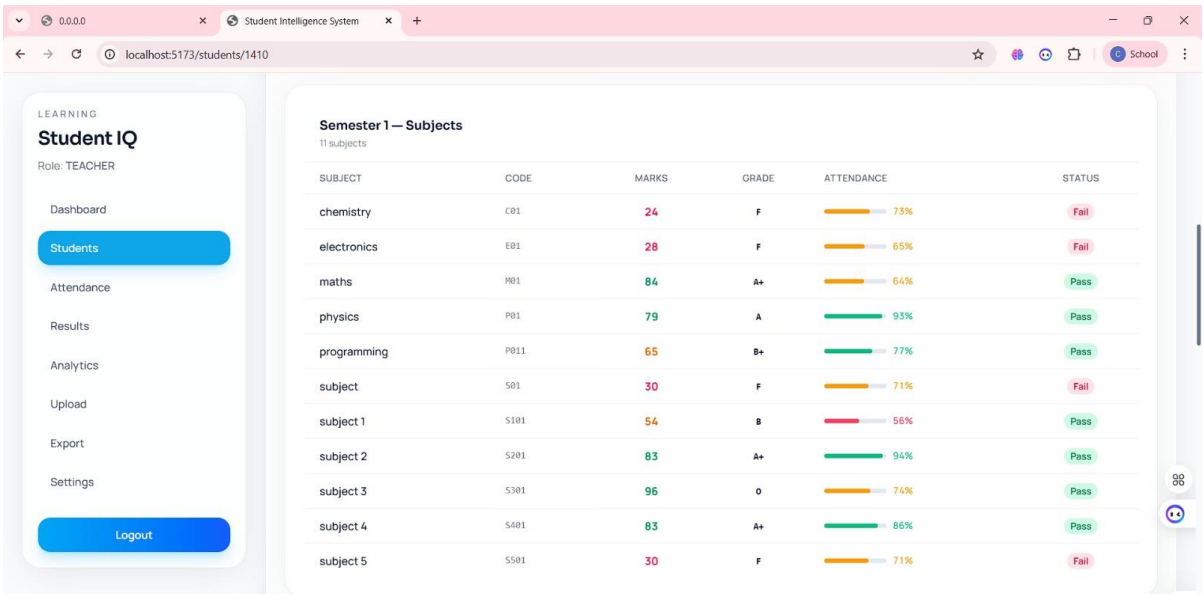
This dashboard shows the overall academic performance of students, including marks, grades, and average scores in a simple visual format.





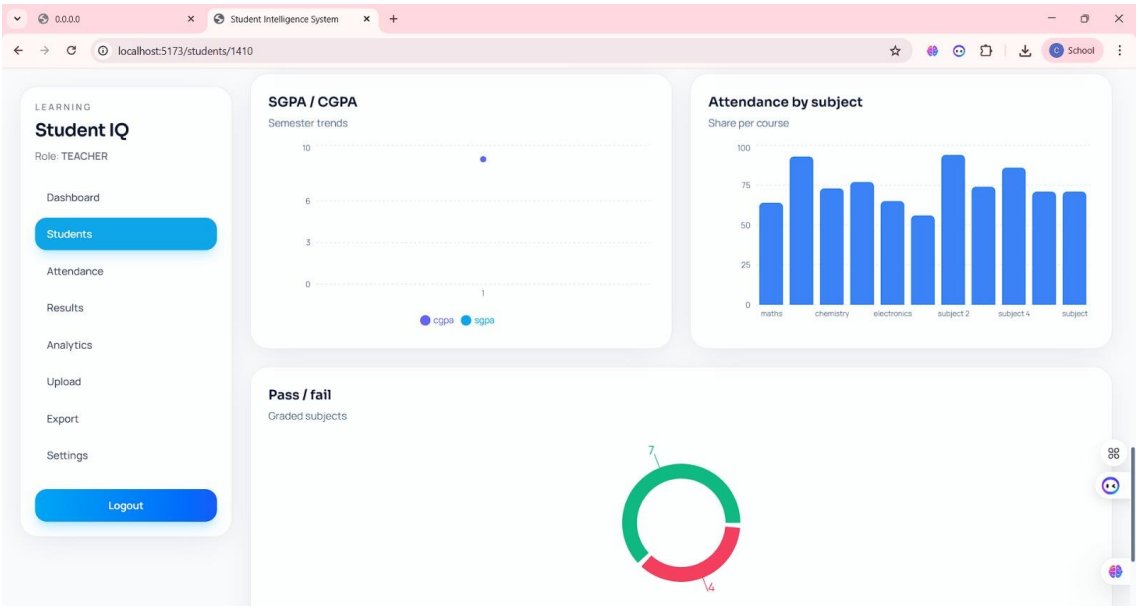

**Subject-wise Analysis Graph**

This graph presents subject-wise performance, helping to identify strengths and weak areas of students.



**Performance Trend Analysis**

This result shows how student performance changes over time, helping in tracking improvement or decline and A summarized report is generated, giving a clear view of student performance and risk levels.




## VI.DISCUSSION

### A. User Engagement and Interaction Analysis

The system is designed in a way that it does not pose any difficulty for its users; faculties in particular have to interact with the system. The interface is not complicated and can be understood in such a way that users will always have enough important information at their fingertips without any confusion. Dashboards, performance indicators, and risk categories are some of the features that provide a better understanding of the students' data to the user. The faculty member can easily browse through necessary sections and obtain detailed reports, viewing individual students when necessary. Such a level of simplicity and clarity improves the engagement of users with the system, rendering it a true rather than a hypothetical model to be used in real academic environments [1] [2].

### B. Educational Impact

Its introduction has a positive effect on the academic environment in general. Early identification of at-risk students enables timely and adequate guidance and support from the faculty. This way, they can help them to change for the better while its not yet too late. The system also promotes a data-driven form of education wherein decisions are based on actual data from performances, rather than assumptions. Such a result, in turn, ensures a more informed, data-guided approach to education. In the long run, such systems can help in increasing the pass percentages and produce better academic results along with enhanced student confidence.

## VII.CONCLUSION

To conclude, the Student Academic Mentoring System stands out to be an effective and viable way of monitoring student performance and making necessary improvements, This will also help faculty members to timely address such issues. It reduces manual work, maintains the required accuracy in analysis and mentoring, and generally enhances the mentoring process.

The system also signifies the importance of technology in education to help make better decisions and supplement success. The system can further be improved for the future to include machine learning

models, real-time data analysis, and integration with institutional platforms. These can make the system even more powerful and useful in modern education systems [3] [5].

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