PAMANTASAN NG LUNGSOD NG MUNTINLUPA

A WEB-BASED SMART STUDENT MONITORING SYSTEM WITH AI-POWERED PERFORMANCE ANALYTICS AND EARLY INTERVENTION ALERTS FOR ST. IGNATIUS ACADEMY

A Capstone Project Presented to the Faculty of the

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Pamantasan ng Lungsod ng Muntinlupa

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

PROJECT CONTEXT

In today's educational landscape, the integration of advanced technologies plays a big role in improving the efficiency, accuracy, and transparency of academic processes. However, many schools still use old-fashioned ways to monitor student performance, which often leads to mistakes and delays. These manual systems take too much time and effort, especially for teachers who are already managing multiple responsibilities. This makes it harder to track students progress accurately and give the right support at the right time. Because of this, there is a need for a system that can help schools manage academic records more efficiently and effectively.

This research will be conducted at St. Ignatius Academy, located in Bayanan, Muntinlupa City, with a focus on the Senior High School department. The researchers conducted an interview, and according to the school's administrators and teachers, their current process often causes delays and makes it difficult to manage student records properly. Despite using a computerized system, there are still problems with recording and organizing students' academic information. As a result, the school administrator struggles to monitor and process all student records efficiently. The current approach is also time-consuming for both administrators and teachers. These challenges not only increase the teachers' workload but also slow down the decision-making process when students need support or are at risk of failing.

The main problem this study aims to solve is the delay and user-friendly system to monitor student performance. The current manual process makes it difficult for teachers to keep up, especially when they need to check or update records regularly. This can result in late interventions for students who are struggling and may even affect their academic success. By addressing this issue, the school can prevent long-term setbacks and improve student achievement. It also allows teachers to focus more on teaching, rather than spending too much time on paperwork or constantly reminding students about their academic performance status.

Addressing this problem is important because it will make the academic monitoring process smoother, faster, and more accurate. It will also lessen the stress and workload of teachers by reducing manual tasks. More importantly, it will help students improve because teachers can easily identify those students who need to be reminded about their academic performance. When schools use better systems, it benefits everyone—teachers, students, and even parents who want to stay informed about their child's performance.

This study proposes a smart education monitoring system that will track student performance and send early warning alerts when needed. The system will be web-based and easy for teachers to use. They will be able to log in, manage records, and view academic data anytime through a secure website. This solution will help St. Ignatius Academy manage student records better, reduce errors, and boost productivity. It will also improve communication between teachers and students, making the learning experience more effective and meaningful.

PURPOSE AND DESCRIPTION

The purpose of this project is to help teachers and school administrators monitor student academic performance more efficiently. The system will be a web-based academic monitoring tool designed for the Senior High School teachers of St. Ignatius Academy. It will allow them to track, analyze, and manage students' grades and performance in using the system. The system aims to reduce the difficulties that teachers face in recording and checking student progress every grading period.

This system will serve as an easy-to-use website that will lessen the workload of teachers by providing a centralized space where all student data can be stored and updated. Teachers will also be able to assess the different areas of student performance, helping them give better support and guidance. This will help identify students who are struggling and need help.

With the help of this system, teachers can complete their tasks faster and with fewer mistakes compared to the current manual method. The system will also turn data into simple graphs and reports, making it easier for teachers to understand and explain student progress. This will allow them to make better decisions when giving feedback or recommendations for students who are not performing well.

Overall, this project will not only benefit the administrators but also the teachers and students of St. Ignatius Academy. Teachers will save time and effort, while students will better understand the areas where they need to improve. The system is built to be user-friendly so that it can be used easily. By using this system, the school can improve how it manages academic records and support better learning outcomes.

Below are the following beneficiaries who will benefited the system:

Administrator, the system will help the administrator to manage and perform tasks more easily compared to the current method of monitoring students. The system will assist administrators in managing data more effectively by graphically illustrating student performance.

Teachers, the system aims to help teachers by automatically computing grades and sending early intervention alerts to students who are at risk of failing. This reduces the need for teachers to spend extra time repeatedly notifying students about their academic status.

Students, the students will benefit from the system by receiving notifications if they are at risk of failing. This allows them to reach out to their teachers immediately to address any concerns. They can also make up for missed work or requirements by discussing with their teachers what actions they need to take to avoid failing grades.

Researchers, the researchers will benefit from the system as it helps them visualize and understand problems during the development process. It also supports logical thinking when dealing with system errors or issues, helping them improve their analytical and problem-solving skills.

Future Researchers, this system can serve as a guide or reference for future researchers. It can be used as a basis for their own research studies, especially if the topic is related. It may also provide helpful data and additional information to support their work.

OBJECTIVE OF THE STUDY

General Objective

The main objective of this study is to develop a smart student monitoring system integrated with AI-powered performance analytics and early intervention alerts to enhance academic performance tracking and provide timely support for students at St. Ignatius Academy.

Specific Objectives

1. To design the Web-Based Smart Student Monitoring System with AI-Powered Performance Analytics and Early Intervention Alerts for St. Ignatius Academy with the following features:

    a. Capable of collecting student academic activities and performance data through teacher inputs and records.

    b. Capable of presenting summarized student performance using dashboards and visual reports for easier monitoring by the school administrator.

    c. Capable of analyzing students' academic data and identifying those who are at risk of academic failure.

    d. Capable of delivering early intervention alerts to inform students of possible academic risks.

2. To develop the web-based Smart Student Monitoring System with AI-Powered Performance Analytics and Early Intervention Alerts for St. Ignatius Academy using HTML, CSS, and JavaScript for the front end, and MySQL for the database.
3. To test and improve the system using Alpha and Beta Testing.

4. To evaluate the system using ISO/IEC 25010:2011 Software Evaluation for IT experts and actual users.
5. To implement the proposal system to St. Ignatius Academy.

SCOPE AND LIMITATION

The scope of the study is to develop and implement a Smart Student Monitoring System equipped with AI-powered performance analytics and early intervention alerts developed for the needs of St. Ignatius Academy. The system is designed to collect and analyze student academic data and performance in order to identify learning trends and predict potential academic risks. Through AI-driven algorithms, the system will generate alerts when students show signs of poor academic performance, enabling early intervention and timely support. Data privacy and user authentication will be prioritized to protect students and teachers information throughout the monitoring process.

This study is limited to the internal academic monitoring of the students enrolled at St. Ignatius Academy and does not cover external student activities or personal matters outside the school environment. The AI model used in the system relies on the accuracy and completeness of the data stored in the database; therefore, any inaccurate or missing data may reduce the effectiveness of the analytics and alerts. Additionally, real-time classroom behavior monitoring and psychological evaluations are outside the scope of this system. The initial implementation will be limited to select grade levels and subjects, and full deployment will depend on further testing and training of school personnel.

CHAPTER 2

REVIEW OF RELATED LITERATURES & STUDIES

This chapter presents the review of related literature and studies underlying the development of a smart student monitoring system with integrated AI analytics and early intervention alerts. It explores existing systems and research efforts related to academic performance tracking, automated monitoring tools, data analytics in education, and alert-based intervention strategies.

TECHNICAL BACKGROUND

The front-end of the system will be developed using HTML, CSS, and JavaScript. HTML will be used to structure the content of the web pages, CSS will define the layout and appearance of elements, and JavaScript will make the system interactive, such as checking if a form is filled out correctly in real time. Visual Studio Code (VS Code) will be the integrated development environment (IDE) for writing, testing, and fixing the source code. It is chosen because it supports web development and offers helpful extensions.

The back-end of the system will be developed using XAMPP, which includes Apache to run the local server, PHP to handle the system's logic and user actions, and MySQL to store and manage student records such as grades, attendance, and performance data. The system will include a rule-based AI feature that automatically checks student academic data, such as quiz scores, activities, major exam results, and attendance. If a student's average grade falls below the passing mark, the system will send an alert to both the student and the teacher. This helps teachers give support early when a student is at risk of failing.

To improve the system's appearance and usability, the developers will use Canva to design icons, banners, and other visual elements. These designs will help make the system easier to understand and more attractive for both students and teachers. The team will also use Draw.io to create system diagrams, including Functional Decomposition Diagram (FDD) and database designs. These diagrams will help explain how the system works and support the documentation process.

During testing and deployment, the system will be installed on computers or laptops with average hardware specifications. A common setup may include an Intel Core i5 processor, 8GB of RAM, and a solid-state drive (SSD) to keep the system running smoothly. Local hosting will use XAMPP within a local area network (LAN) during testing. If the system needs to be accessed outside the school, it can be uploaded to an online web hosting service. Basic networking tools like Wi-Fi routers or network switches may be used to connect multiple devices within the school.

RELATED LITERATURE

Schools are now turning to data-driven strategies to improve decision-making in the classroom. With the help of student data, teachers can quickly spot learners who are struggling academically. This allows for earlier interventions, which can make the teaching process more effective. When educational institutions use data responsibly, student learning outcomes improve. Systems like the proposed web-based smart student monitoring platform are built to support such data-driven approaches that empower teachers to meet students' unique needs [1].

Learning dashboards that gather and display academic data in one platform are essential in modern education. These tools give teachers a clearer understanding of student performance by providing real-time insights. Through visualized analytics, instructors can make timely adjustments to their teaching strategies to better match students' learning styles. As a result, lessons can be tailored to improve individual progress. A smart student monitoring system integrates these dashboards to promote more personalized and efficient learning environments [2].

Artificial Intelligence tools that offer predictive analytics have shown promise in identifying students at risk of failing or dropping out. By analyzing patterns in attendance, performance, and engagement, these systems provide early alerts for intervention. Educators can use these alerts to take proactive steps, such as offering extra help or counseling. This kind of technology plays an important role in student monitoring systems, particularly when early support can make a meaningful difference. Implementing this into platforms like the proposed system can support student retention and success [3].

Understanding student performance requires looking beyond test scores. Participation in class, behavior during school activities, and general attitude all contribute to academic development. Smart systems that combine these data points provide a more complete view of each student. They allow for better tracking of student engagement and classroom behavior. These insights are valuable for schools aiming to support the holistic growth of their students [4].

The rise of distance learning has made it more difficult for educators to monitor student progress. Tools that offer real-time tracking and performance reports have become essential in remote and hybrid settings. Teachers can provide timely feedback and adjust lesson delivery to ensure students are keeping up. This is especially important when in-person observation is limited. Web-based smart monitoring systems fill this gap by providing structure and oversight in all learning formats [5].

Educational institutions can also use data mining techniques to discover hidden patterns in student records. These patterns help identify learners who may require additional academic support. Through targeted interventions, teachers can address these needs more effectively. Smart systems that include data mining features enable faster, more informed responses to student challenges. This promotes better outcomes across the school [6].

Systems that are accessible through the web make student monitoring more efficient and convenient. Teachers and school leaders can access student data anytime, allowing for quick decisions about academic support. These platforms provide up-to-date information that helps track both progress and challenges. With a well-designed interface, web-based systems improve school organization. They are an essential component in modernizing academic monitoring [7].

Student performance systems that present academic data in clear, structured formats help improve decision-making in schools. Teachers can easily interpret progress reports and adjust their strategies accordingly. These systems also assist in planning lessons and managing classes more effectively. The ability to quickly identify trends in student performance supports a more responsive approach to education. Such features are vital in systems like the one proposed for St. Ignatius Academy [8].

AI-powered tools that analyze student learning behavior offer new opportunities for academic support. By detecting patterns of underperformance early, these tools help teachers intervene before problems worsen. Quick responses lead to better learning outcomes and more positive academic experiences. Integrating these tools into student monitoring platforms enhances their value. They promote smarter systems capable of adapting to each student's needs [9].

When real-time data is available, teachers can make instant changes during lessons. This allows for more dynamic classroom management and better engagement. Students benefit from adjustments that match their pace and understanding. A responsive teaching approach helps maintain focus and improves lesson effectiveness. Real-time feedback systems are vital in any smart student monitoring solution [10].

AI-supported platforms can centralize various aspects of student monitoring such as test results, attendance, and behavioral data. Having this information in one place simplifies the task of tracking student progress. It helps both educators and parents stay informed about a learner's academic journey. These features keep students accountable and focused on their goals. They are particularly useful in developing more organized, intelligent school environments [11].

Artificial Intelligence (AI) is becoming an essential tool in improving student success by enabling early identification of academic struggles and providing tailored interventions.

AI systems can analyze large volumes of student data, such as attendance records, grades, and behavioral patterns, to recognize signs of declining performance before they become critical. These technologies not only support educators in making informed decisions but also help institutions create more inclusive and responsive learning environments. By integrating AI into student monitoring platforms, schools can enhance their ability to support learners more effectively and promote better academic outcomes [12].

Early warning systems are helpful in spotting students who might fall behind. They are especially important in virtual learning setups where student activity is harder to track. These tools notify educators of concerning trends so they can act quickly. Timely interventions help prevent long-term academic problems. Schools like St. Ignatius Academy can enhance student support using this approach [13].

While AI systems offer useful insights, they may also affect how students feel about being monitored. Continuous observation could make some learners uncomfortable. It's important to implement such technologies with clear communication and a focus on support. A well-balanced system ensures students feel safe and respected. With the right approach, smart monitoring can lead to both improved performance and student well-being [14].

RELATED STUDIES

A school-based web system was developed to improve how student records are handled. It made administrative tasks faster and allowed better tracking of academic performance. By organizing student data in a central platform, the school could make more accurate plans and provide targeted interventions. This not only improved efficiency but also raised overall school performance. Systems like these show the value of web-based tools in educational settings [15].

Tracking systems that deliver updates in real time allow teachers to adjust their methods without delay. When students need support, they can get help right away instead of waiting for formal assessments. This kind of flexibility improves teaching quality and student outcomes. It also reduces time spent on repetitive tasks. Schools using such systems report better classroom engagement [16].

Progress tracking tools help educators measure student development over time. These systems offer consistent updates that teachers can use to shape instruction. With regular reports, it becomes easier to guide each learner on a personalized path. These systems also make classroom organization more manageable. They play a key role in performance-based education [17].

An online attendance monitoring system was adopted by a school in the Philippines, leading to better discipline and record accuracy. Teachers were able to access attendance logs with ease, reducing paperwork and improving accountability. This system encouraged students to be more consistent in their attendance. The tool also made daily routines simpler for faculty. Such improvements support smoother school operations [18].

AI in education brings many benefits, but it also raises some concerns. While it improves learning tracking and offers new insights, some students feel uncomfortable being monitored closely. Data privacy and emotional impact must be considered when implementing AI tools. Schools must develop clear policies to ensure responsible use. A thoughtful balance protects student welfare while using technology for growth [19].

A smart AI system was designed to watch over student progress and generate alerts for those at risk. This helped schools step in before problems worsened, improving academic success rates. Teachers could prioritize support where it was needed most. The system proved useful in maintaining high standards. Early alerts are now essential in effective student monitoring [20].

AI models were used to predict future grades and behavioral trends in students. This predictive capability helped schools intervene before academic or behavioral issues became serious. Teachers could develop better instructional plans tailored to students' needs. Such features are powerful tools in ensuring continuous improvement. These applications form the backbone of AI-powered education systems [21].

Tools that identify struggling students before issues become severe are changing classroom management. Teachers are no longer limited to reacting after failure happens. Instead, they can prevent it. These systems allow for more focused instruction and better academic support. Smart tools like these are essential for schools seeking to modernize learning [22].

A study developed a data mining-based model that accurately predicted student performance. This system provided a deeper understanding of learning patterns and needs. Teachers were able to build better learning experiences based on those insights. Classroom performance improved across multiple subjects. These innovations demonstrate how analytics contribute to student growth [23].

Effective tracking tools have a direct effect on academic achievement and classroom discipline. They offer clear and consistent records that help both teachers and administrators make decisions. These systems reduce delays in support and increase student accountability. The classroom environment becomes more productive. Smart systems help in creating structured and responsive educational spaces [24].

A school deployed an AI-powered attendance tracking system that streamlined teacher workloads. The system minimized manual errors and offered accurate daily logs. Teachers saved time and focused more on lesson planning. It enhanced reliability and consistency in school records. These types of tools improve institutional efficiency [25].

An IoT-based smart school system was designed to monitor various student activities automatically. It helped teachers maintain order and improve oversight during lessons. This real-time visibility led to better student conduct. Schools using such systems reported stronger classroom management. These features are essential in preparing for tech-integrated education [26].

AI-based tools for monitoring academic performance were tested in a school setting. They helped teachers quickly spot students who needed additional help. This allowed for more timely and personalized learning plans. As a result, students received the support they needed without delay. These systems represent the future of student-centered education [27].

DEFINITION OF TERMS

OPERATIONAL TERMS

User Role - The different levels of system access such as student, teacher, administrator, and parent, each with specific functionalities.

Attendance Monitoring - The method used to track student presence in class, possibly using QR codes or biometric scans.

Student Profile - A personalized data record containing the student's information, academic history, and performance tracking.

System Dashboard - The main interface where users (admin, teacher, student) can view summaries of relevant data and access features.

Real-time Feedback - Immediate responses provided by the system to students or teachers, such as performance metrics or system alerts.

Performance Evaluation - A feature in the system for assessing student progress using grades, quizzes, or activity tracking.

TECHNICAL TERMS

Smart Education System - A technology-based learning platform that integrates devices, internet, and software to enhance teaching and learning experiences.

Database - A structured collection of data stored digitally to manage information such as student records, attendance, or grades.

Web-based Application - An online software tool accessed through a browser, used by students, teachers, and admins for various education-related tasks.

Artificial Intelligence (AI) - Machine-based logic integrated into the system to provide intelligent features such as personalized learning suggestions.

Learning Management System (LMS) - A platform that enables the administration, documentation, tracking, and delivery of educational courses or training programs.

Performance Analytics - The process of collecting, analyzing, and interpreting academic data to evaluate students' strengths, weaknesses, and overall learning progress.

Early Intervention Alerts - Automated notifications triggered by the system when a student shows signs of academic decline or irregular behavior, allowing school staff to take timely corrective action.

Student Monitoring System - An integrated platform designed to track, record, and analyze various student-related data including grades, attendance, behavior, and participation.

Real-Time Data Processing - The system's ability to process and respond to data inputs immediately as they are collected, enabling instant performance feedback and alert generation.

Data Visualization - The graphical representation of data through charts, graphs, and dashboards to help users easily interpret student performance and trends.

Access Control - A security mechanism that restricts system access to authorized users only, protecting sensitive student data from unauthorized use.

CHAPTER 3

METHODOLOGY

In this chapter, the methodologies used throughout the study are described together with the diagram presentation. Here are the following sections that will be discussed in this chapter: Requirements Analysis, Requirement Documentation, Design of Software, System Product and/or Process, Development and Testing and Implementation Plan.

REQUIREMENTS ANALYSIS

In this section, the focus is on the current process and specific needs of the organization, specifically in monitoring student performance. By conducting interviews with key stakeholders and reviewing the existing systems and procedures, the proponents aim to gain a complete understanding of the school's operations and objectives.

The key individuals involved in this study include teachers and school administrators, as each plays an important role in the academic monitoring process. Teachers are responsible for recording student grades, managing class records, and submitting final grades. School administrators review and monitor these records to assess the academic standing of students.

The main activity being monitored is student academic performance. This includes tracking grades in quizzes, written works, performance tasks, final exams, and attendance. The goal is to ensure that all student data is up to date, accurate, and accessible for both teaching and administrative purposes. The process also helps in identifying students who may be at risk or require academic support.

The process takes place within St. Ignatius Academy, a private educational institution located at Navs Building, National Road, Brgy. Bayanan, City of Muntinlupa. Student performance records are updated by teachers on a regular basis, typically after each assessment such as quizzes, written works, or performance tasks. Grade summaries are usually compiled weekly or at the end of each grading period. Once the grades are finalized, the reports are submitted to the school administrators.

The current process combines both manual and digital methods. Teachers use physical class record books to write down student performance and attendance. Some also use Microsoft Excel to compute and summarize grades. Once finalized, the results are manually submitted to the school administrator. Below is an overview of the current system.

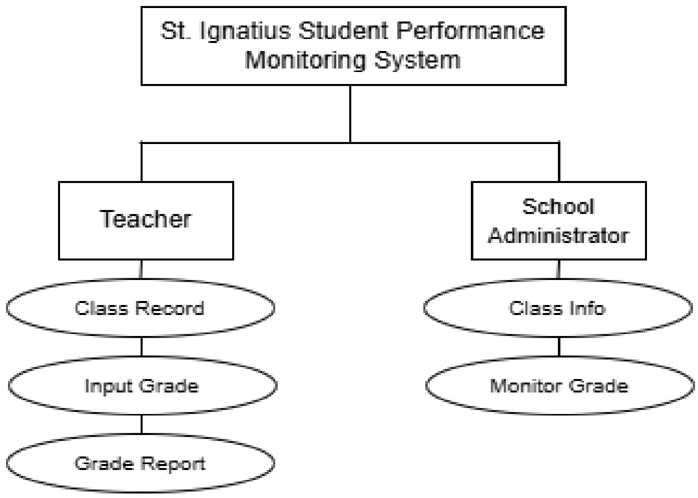

Figure 1. Functional Decomposition Diagram of the Existing Student Performance Monitoring Process at St. Ignatius Academy, Muntinlupa Branch

The functional decomposition diagram of the existing student performance monitoring process at St. Ignatius Academy Branch illustrates the division of tasks between teachers and school administrators. The process begins with the teacher, who is responsible for managing class records, entering student grades, and generating grade reports. Once the grades are calculated, the reports are submitted to the school administrator. The administrator manages class information and monitors the overall performance of students. This includes reviewing academic data to ensure it is accurate and consistent across all classes. Based on the grade reports, the administrator identifies areas that need improvement, whether related to student performance or the academic subject itself.

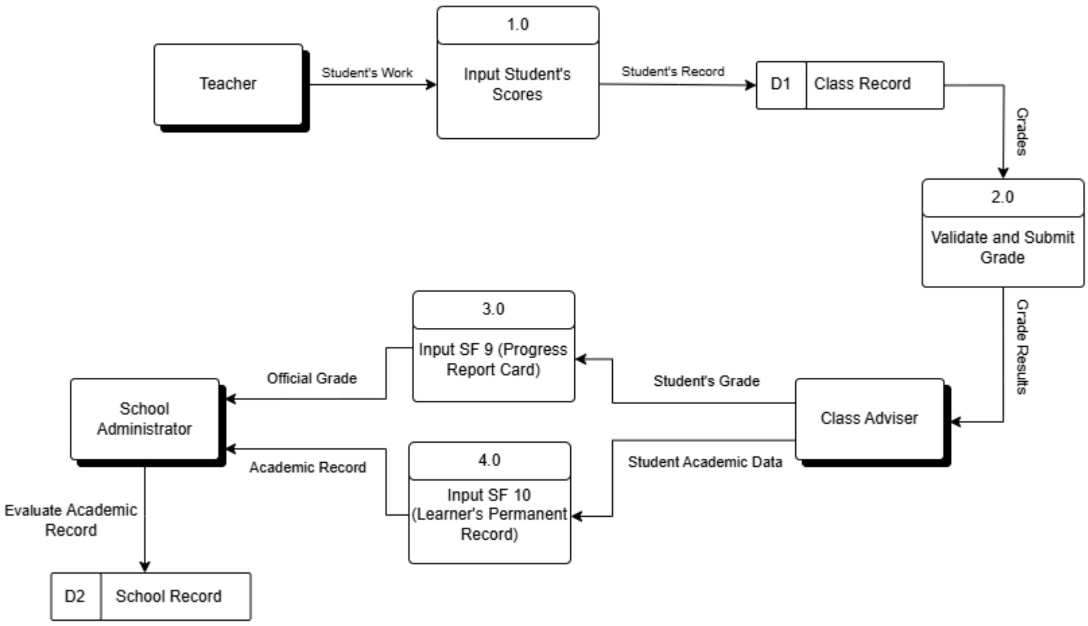

Figure 2. Diagram of the Existing Manual Student Performance Monitoring Process at St. Ignatius Academy, Muntinlupa Branch

Figure 2 clearly illustrates the Diagram of the Existing Manual Process at St. Ignatius Academy, Muntinlupa Branch. Initially, teachers encode the submitted work of their students and store the results in a class record. Once the total scores for written work and performance tasks are calculated, the teachers generate the quarterly grades. These grades are then submitted to the class adviser, who is responsible for inputting the students' grades into SF 9

(Progress Report Card) and SF 10 (Learner's Permanent Record). After completing the input, both SF 9 and SF 10 are forwarded to the school administrator. The student grades are then reviewed, evaluated, and stored in the School Record. Students will be able to view their grades when the advisers distribute the report cards.

REQUIREMENT DOCUMENTATION

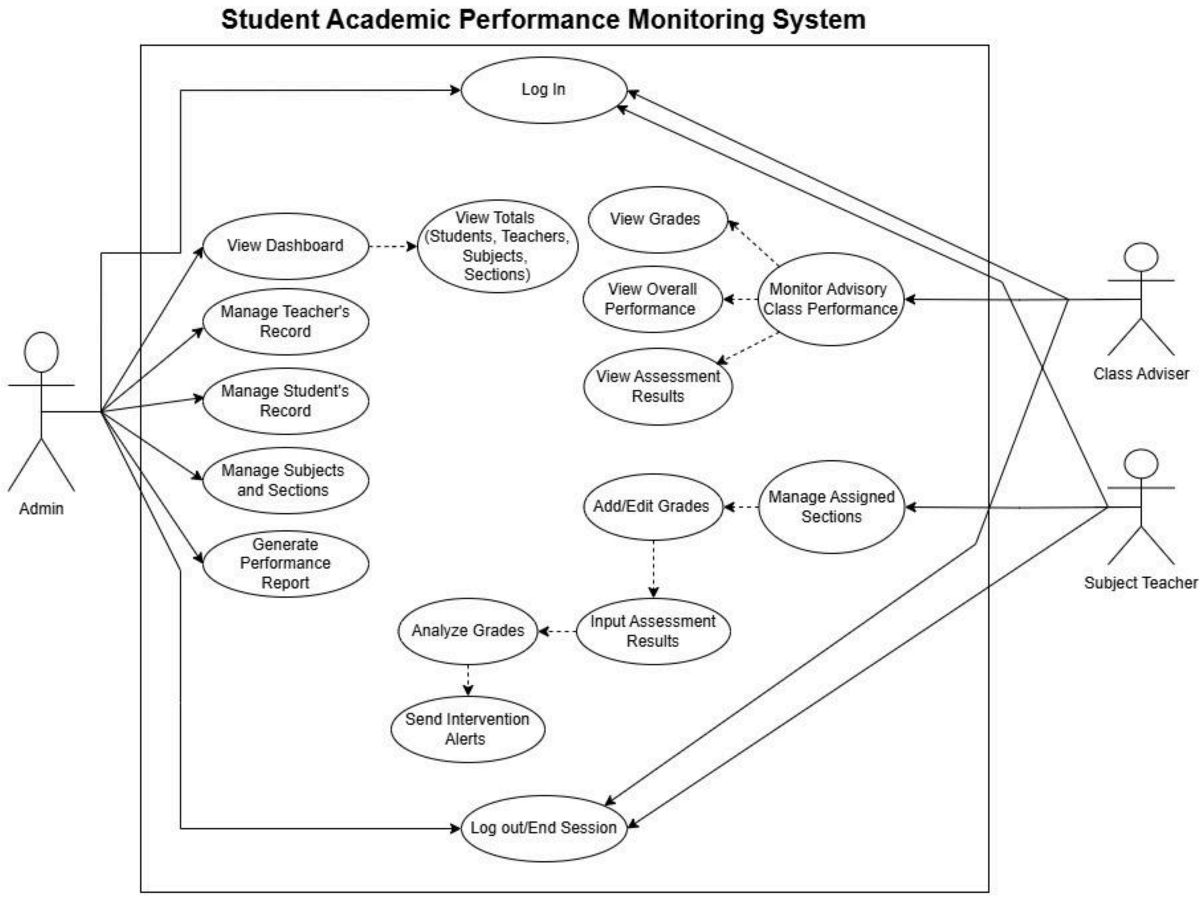

Figure 3. Use Case Diagram of the Proposed System

The use case diagram illustrates how different users interact with the Student Academic Performance Monitoring System. It includes three main users: the Admin, the Subject Teacher, and the Class Adviser.

The Admin is responsible for managing and organizing important school data. They can add or update information about teachers and students, assign subjects to grade levels, create class sections, appoint advisers, and assign subject teachers to those sections. The admin can also access the dashboard to view the total number of students, teachers, subjects, and sections. Additionally, they can generate academic performance reports.

The Subject Teacher uses the system to handle their assigned classes. They can add or edit student grades, input assessment results, analyze student performance, and send intervention alerts when needed. They can also view the sections assigned to them.

The Class Adviser can monitor the performance of their advisory class. They can view student grades and check assessment results to better understand each student's progress. The Logout/End Session use case is available to all authenticated users, providing a secure exit from the system.

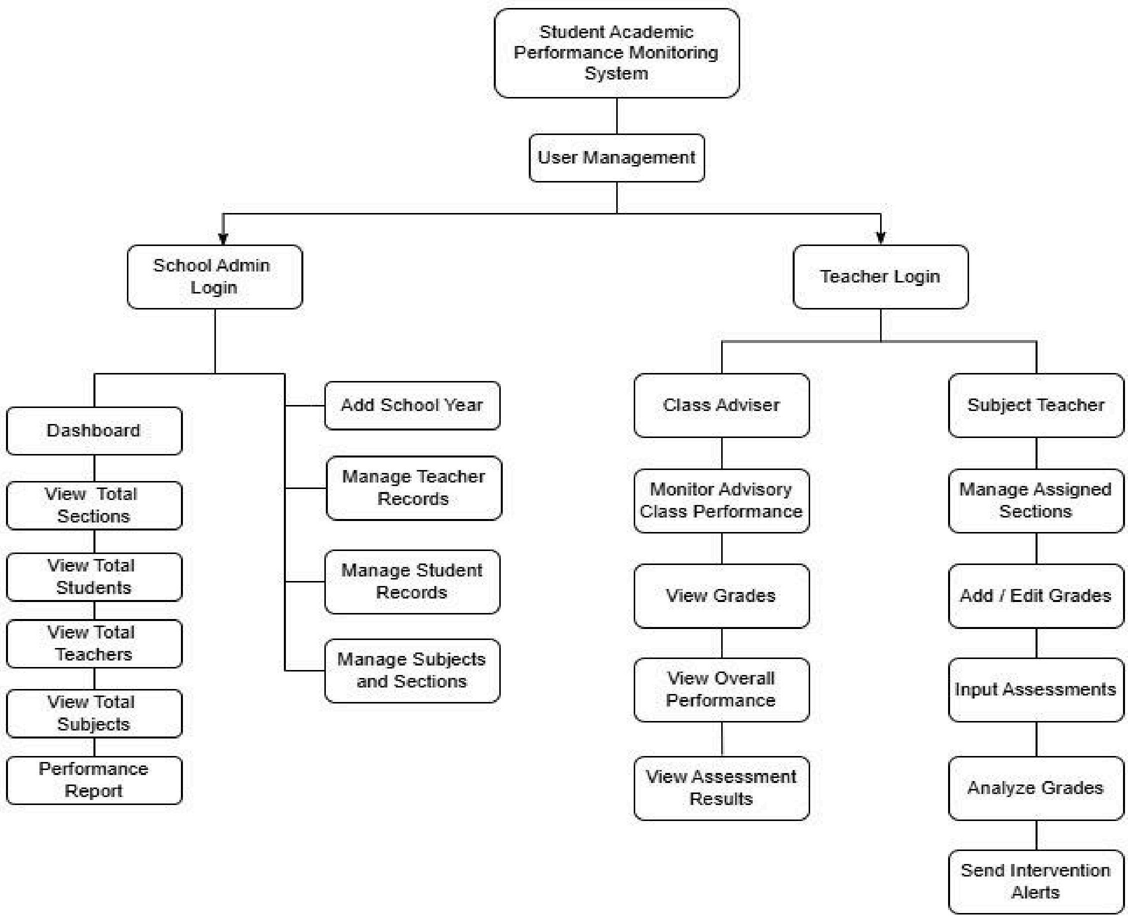

Figure 4. Functional Decomposition Diagram of the Proposed System

In Figure 3, it illustrates the two main parts of the system: the School Admin Module and the Teacher Module.

School Administrator's Module

This module handles the main functions of the system. The school administrator is responsible for managing and organizing important data such as teacher and student information. The admin can set up the school year, assign subjects per grade level, add student and teacher records, create class sections, appoint advisers, and assign subject teachers to specific sections. The dashboard allows the admin to view the total number of sections, students, teachers, and subjects. It also provides access to the academic performance report.

Teacher's Module

The Teacher Module is designed for teachers to manage and monitor student performance. Subject teachers can add or edit grades, input assessment results, view their assigned sections, and track grade trends through visual tools. Class advisers can monitor the overall performance of their advisory class, including grades and assessment results. This helps them keep track of their students' academic progress and provide support when needed.

DESIGN OF SOFTWARE, SYSTEMS, PRODUCT AND/OR PROCESS

Conceptual Frameworks

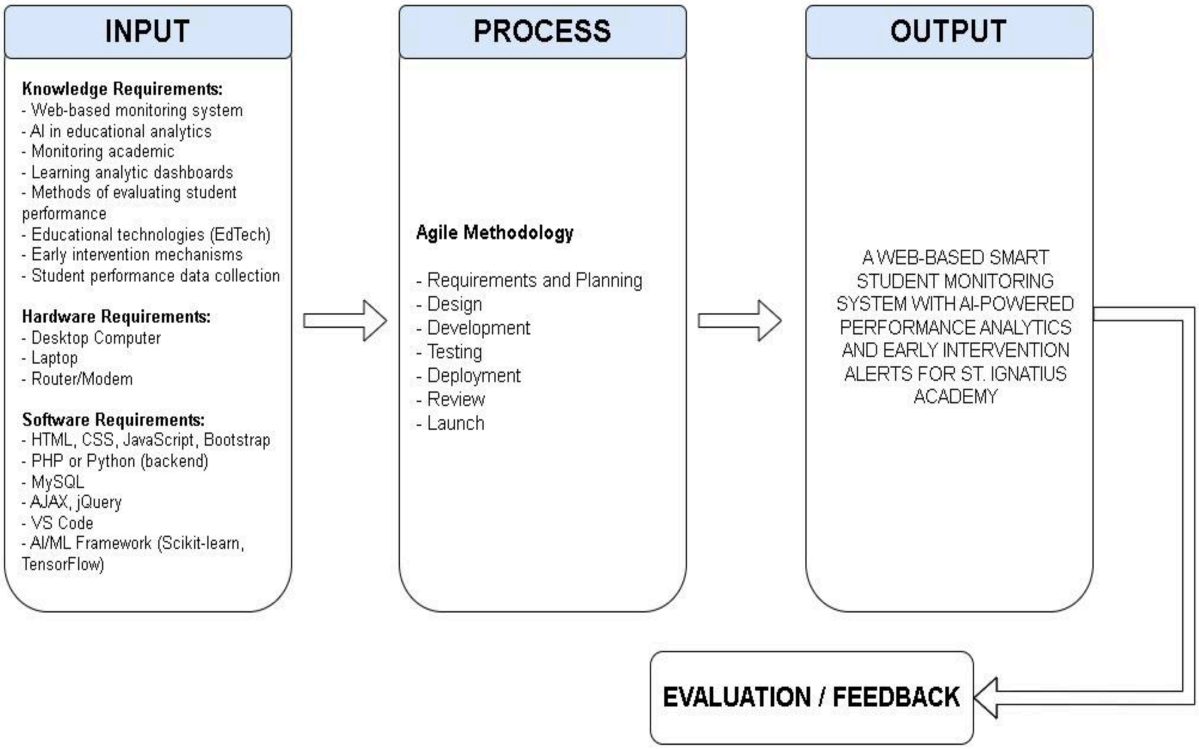

Figure 5. Conceptual Framework Diagram of the Proposed Title

Figure 4 illustrates the conceptual framework of the proposed system. It presents the different stages and processes involved in achieving the objectives of the study. The Input phase consists of knowledge, software, and hardware requirements. The knowledge requirements include web-based monitoring systems, the use of AI in educational analytics, tracking academic, behavioral, and social performance metrics, learning analytics dashboards, student performance evaluation methods, educational technologies (EdTech), early intervention strategies, and student data collection techniques. The hardware requirements include desktop computers, laptops, and internet connectivity through a router or modem. The software requirements consist of development tools and technologies such as HTML, CSS, JavaScript, Bootstrap, PHP or Python for the backend, MySQL for the database, AJAX, jQuery, code editors like Sublime Text or Visual Studio Code, and AI/ML frameworks such as Scikit-learn or TensorFlow. The Process follows the Agile methodology, which includes the phases of requirements gathering and planning, system design, development, testing, deployment, review, and final launch. The Output of this framework is a fully functional web-based smart student monitoring system that features AI-powered performance analytics and early intervention alerts. This system is designed to support and improve student monitoring and academic performance at St. Ignatius Academy. Additionally, an evaluation loop is incorporated into the framework to ensure continuous improvement. It involves collecting user feedback from the deployed system and applying necessary updates and adjustments. This helps maintain the system's functionality, user-friendliness, and adaptability to changing needs. Overall, this conceptual framework provides a structured and effective guide for the successful development of the proposed information management system.

System Architecture

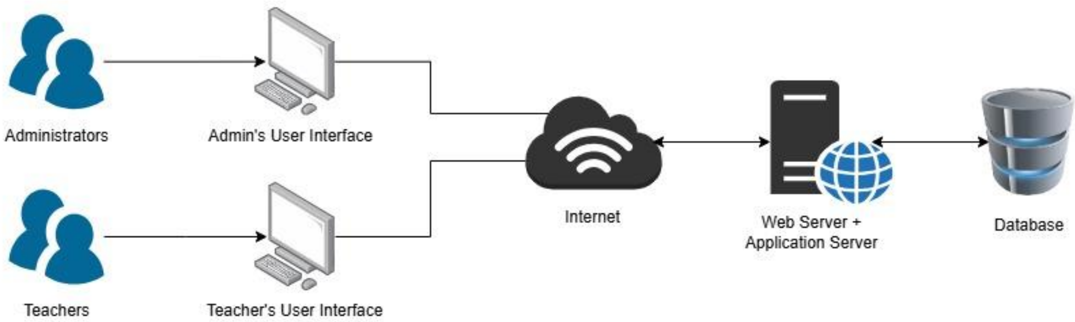

Figure 6. System Architecture of the Proposed Title

Figure 5 illustrates the system structure of the Web-Based Smart Student Monitoring System with AI-Powered Performance Analytics and Early Intervention Alerts for St. Ignatius Academy. At the user level, both administrators and teachers use the system through their own web-based user interfaces on their computers. These interfaces are easy to use and are the main way to enter and view information. They connect to the system over the internet, which links the users' devices to the main system. The main system runs on a combined web server and application server. This server handles the user interfaces, runs the system's features, and most importantly, uses AI to analyze student data. It identifies patterns or signs of poor performance and sends early warning alerts when needed. All student records, performance data, attendance, and system settings are stored in the database. This database keeps all the information organized and available for both users and the AI system to use. The overall design makes sure that data flows smoothly from input to storage, analysis, and action. This makes the system a helpful tool for supporting students at St. Ignatius Academy.

DEVELOPMENT AND TESTING

Development Procedure

The researchers decided to use the Agile methodology to build the student performance monitoring system in phases. Agile allows for iterative planning, implementation, testing, and development, which aligns well with the dynamic and user-centered nature of educational app development.

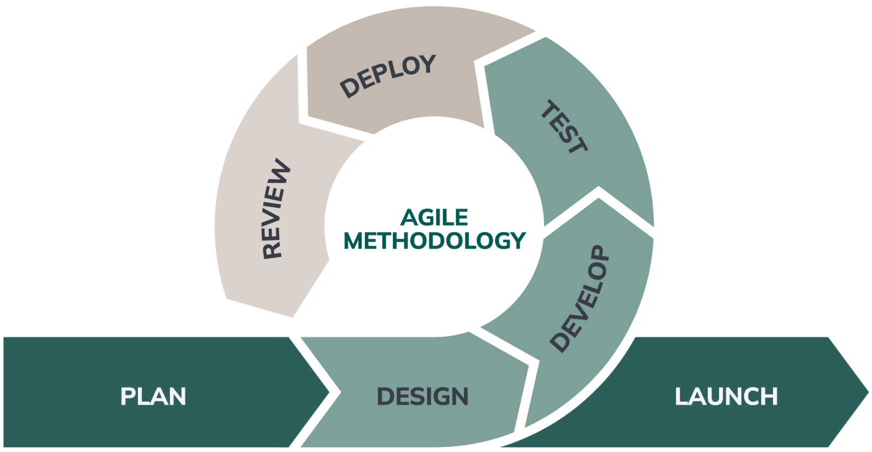

Figure 7. Agile Methodology

Phase 1: Requirements and Planning

In the initial phase, the researchers conducted interviews with key stakeholders, including teachers and school administrators, to gather the system requirements. These discussions focused on understanding the users' needs and desired features for the system. The researchers then outlined the core functionalities based on the collected input and created a step-by-step plan for the development process. This phase ensured that the system would be aligned with the actual needs of its intended users.

Phase 2: Design

Once the requirements were established, the researchers began designing the system's user interface and overall layout. The design aimed to be simple, intuitive, and user-friendly, especially for individuals who may not be highly familiar with technology. Wireframes and mockups were created to visualize the structure and flow of the system. This phase focused on ensuring that the design would support a smooth user experience.

Phase 3: Development

During the development phase, the system was built gradually, following the planned features from the previous phases. Key modules such as student information entry, AI-powered performance analysis, real-time alerts, and administrative dashboards were developed and implemented.

Phase 4: Testing

In this phase, each part of the system was tested to ensure it functioned correctly and met the expected requirements. The team performed functionality checks, fixed identified errors, and ensured that the system was easy to use. Feedback from sample users, including teachers, was also gathered to identify usability issues and areas for improvement. This phase helped ensure the system's quality and reliability before deployment.

Phase 5: Deployment

After successful testing, the system was deployed to a live server environment where it became accessible to users. The researchers ensured that all core functions were stable and that users could begin using the system for real tasks. Basic user guidance and support were also provided to help them navigate the system effectively. This phase marked the official launch and readiness of the system for day-to-day use.

Phase 6: Review

The final phase involved reviewing the entire development process and evaluating the system's performance based on user feedback. The researchers gathered comments and suggestions to determine if the system was meeting its objectives and to identify any areas that could be improved in future updates. This ongoing review supports the continuous enhancement of the system, ensuring it remains relevant and useful to its users.

Testing Procedure

Table 1 and 2 shows the testing procedures undertaken by the researchers.

Table 1

Alpha Testing Procedure

Components/Module	Tests to Be Conducted (Alpha Testing)
User Login & Access Control	1. Users are able to log in and log out properly. 2. Incorrect login attempts are blocked with proper error messages. 3. Password reset and recovery features work as expected. 4. Users only access features based on their roles.
Teacher Module	1. Teachers can input and edit grades and attendance for their assigned students. 2. Teachers can view only their assigned students' records. 3. Teachers can log behavior notes and student activities. 4. Teacher dashboards display correct and updated information.
School Administrator Module	1. Admins can create, edit, and deactivate user accounts. 2. Admins can set school year, subjects, and class settings. 3. Admins have full access to all reports and dashboards. 4. Only admins can access and change system configurations.

The testing procedure is needed by the proponents to identify bugs, test functionality, and ensure all major features are working as expected. This early testing focuses on fixing technical issues, checking role-based access, and confirming that modules such as login, grading, and user management perform correctly in a controlled environment.

Table 2

Beta Testing Procedures

Components/Module	Tests to Be Conducted (Alpha Testing)
Teacher Module	1. Teachers are able to manage class records during regular use. 2. The grading and attendance process is easy to complete. 3. Teachers can view and track student progress clearly. 4. Features are working as expected with no major errors.
School Administrator Module	1. Admins can manage settings and users in real usage. 2. Admins can generate and review accurate reports. 3. System settings updates are saved and applied properly. 4. The interface is clear and functions are easy to use.

In the Beta testing phase, the system is released to a selected group of actual end-users who use it in real-world conditions. Teachers and administrators interact with the platform, and their feedback is collected using a Likert scale. This feedback helps developers assess usability, identify overlooked problems, and refine system features based on real experiences. The Likert scale provides measurable insights that highlight which areas are working well and which need improvement before full deployment.

Table 3 shows the evaluation tool used by the researchers in evaluating the proposed system.

Table 3

ISO/IEC 25010:2011 Software Evaluation Tool for IT Experts

Indicator	Description
1. Functional Suitability	Degree to which a product of system provides functions that meet stated and implied needs when used under specified conditions.
2. Performance Efficiency	Performance relative to the amount of resources used under stated conditions.
3. Usability	Degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
4. Reliability	Degree to which a system, product or component performs specified functions under specified conditions for a specified period of time.
5. Security	Degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization.
6. Maintainability	Degree of effectiveness and efficiency with which a product or system can be modified by the intended maintainers.
7. Portability	Degree of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another.

The table shows the areas of evaluation under the ISO/IEC 25010:2011 Software Evaluation Tool for I.T. Experts. It particularly evaluated the functionality, performance, usability, reliability, security, maintainability and portability of the proposed software.

Table 4 shows the evaluation tool used by the researchers in evaluating the proposed system.

Table 4
ISO/IEC 25010:2011 Software Evaluation Tool for Actual Users

Indicator	Description
1. Functional Suitability	Degree to which a product of system provides functions that meet stated and implied needs when used under specified conditions.
2. Performance Efficiency	Performance relative to the amount of resources used under stated conditions.
3. Usability	Degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
4. Reliability	Degree to which a system, product or component performs specified functions under specified conditions for a specified period of time.

The table shows the areas of evaluation under the ISO/IEC 25010:2011 Software Evaluation Tool for Actual Users. It particularly evaluated the functionality, performance, usability, and reliability of the proposed software.

Table 5 shows the matrix for the Likert scale used by the researchers in evaluating the software.

Table 5

Matrix for the Likert Scale used in the research instrument

Scale	Range of Mean Value	Interpretation
5	4.51 - 5.00	Excellent
4	3.51 - 4.50	Very Good
3	2.51 - 3.50	Good
2	1.51 - 2.50	Fair
1	1.00 - 1.51	Poor

The Likert scale is a valuable tool that measures the satisfaction level of the beneficiaries with the proposed system, including user attitudes and perceptions. It typically ranges from "Strongly Disagree" (1.0–1.5) to "Strongly Agree" (4.51–5.0). During the alpha and beta testing phases, the scale helps identify how strongly users agree or disagree with specific features or functions of the system. This allows developers to pinpoint strengths and weaknesses by gathering detailed feedback from internal testers in the alpha phase and real-world users in the beta phase. As a result, the Likert scale supports targeted improvements and helps ensure that the final product meets user expectations and needs.

IMPLEMENTATION PLAN

An implementation plan is a process of defining the strategy for achieving specific goals or making decisions. This section represents the plan, activities, the things involved, and the time required to complete the implementation. This plan will serve as a guide to the administrator who will be assigned to maintain the system entitled *"A Web-Based Smart Student Monitoring With AI-Powered Performance Analytics and Early Intervention Alerts for St. Ignatius Academy."* The implementation overview includes deployment procedures, user training, and resource allocation necessary to support the full adoption of the system.

Table 6

Implementation Plan Table

Strategy	Activities	Persons Involved	Duration
Approval from the Institution	Send formal letters for the approval of the principal	Researchers, Principal, Administrator	1–2 days
System Installation	Install the system and check the facility (hardware and software readiness)	Researchers, School Staff, Administrator	2–3 days
Information Distribution	Distribute user manuals	Researchers, Administrator, Adviser, Subject Teachers	1 day
User Training	Conduct hands-on training, system demonstration, and lectures	Researchers, Administrator, Adviser, Subject Teachers	3 days

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