

E-ADVISER STUDENT INFORMATION MANAGEMENT SYSTEM WITH DATA ANALYTICS

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Abstract. The development of the E-Adviser Student Information Management System (SIMS) is an effort to address the inefficiencies and challenges faced by educational institutions, specifically Gil Montilla National High School in Sipalay City, Negros Occidental. The existing manual methods for managing student information are time-consuming, prone to errors, and susceptible to data loss. This system aims to centralize, automate, and improve the management of student data by integrating various features such as attendance tracking, performance monitoring, and report generation. Additionally, the system provides a unique SARDO (Students at Risk of Dropping Out) monitoring tool that allows for early identification of students requiring intervention. The system also includes customizable reporting capabilities and digital archiving of student records, enhancing operational efficiency and ensuring compliance with institutional guidelines. This study emphasizes the importance of implementing localized, context-specific digital solutions to enhance educational administrative processes, improve decision-making, and foster better student outcomes. Through the use of modern web technologies such as the Laravel framework and MySQL database, the system ensures secure and reliable data management while providing a user-friendly interface for teachers, administrators, and support staff. The project also includes detailed assessments of the system's performance, security measures, and the necessary training and support for successful adoption.

Keywords: Student Information Management System, SARDO monitoring, attendance tracking, report generation, digital archiving, educational technology, Laravel framework, MySQL database, student retention, Intervention tools.

INTRODUCTION

Background of the Study. In today's data-driven world, efficient information management is essential across all sectors, including education. As organizations grow, traditional manual methods of record-keeping often lead to inefficiencies, duplication, and costly errors. To overcome these challenges, many educational institutions are adopting digital systems that centralize data and enhance accessibility. These technologies not only improve

operational workflows but also support smarter, evidence-based decision-making. By embracing digital solutions, schools can foster greater accuracy, productivity, and long-term success [1].

The automation of student information management can significantly enhance the monitoring of student progress, enabling real-time interventions for at-risk students. These solutions are particularly beneficial for monitoring critical metrics, such as attendance and academic performance, in a more structured and timely manner [2]. As educational needs evolve, there is a growing demand for scalable digital solutions that offer comprehensive data management, aligning with the sector's shift towards technology-driven administrative processes [3].

In the Philippine context, the integration of technology in education has been emphasized by the Department of Education (DepEd). DepEd Order No. 32, s. 2020, encourages the use of digital tools to improve data management and streamline administrative functions during the pandemic. These digital platforms reduce manual processes, minimize errors, and provide centralized access to student records, supporting more informed decision-making [4]. This shift to digital systems is part of a broader effort to enhance educational outcomes, improve communication between stakeholders, and provide timely support for students in need.

However, despite the adoption of platforms like DepEd's Learner Information System (LIS), there are still gaps in their ability to address specific local needs, such as customized reporting, real-time student monitoring, and efficient record-keeping. Challenges such as poor data accuracy, inconsistent documentation, and limitations in system customization hinder effective student information management. This study aims to address these gaps by developing a locally tailored solution that responds to the unique needs of Gil Montilla National High School in Sibalay City, Negros Occidental.

The school's current reliance on manual data collection and record-keeping is time-consuming and prone to errors. The development of a Student Information Management System (SIMS) will centralize and automate data management, improving the accuracy, accessibility, and timeliness of student records. Key features of this system include attendance tracking, performance monitoring, customized report generation, and digital archiving of student documents. By addressing the issues of redundancy, misfiled records, and delayed interventions for at-risk students, this system will enhance operational efficiency and support timely academic decisions.

Purpose of the Study. The purpose of this study is to develop and implement the E-Adviser Student Information Management System at Gil Montilla National High School in Sibalay City, Negros Occidental. This system is designed to centralize and automate the management of student data, providing secure storage, easy retrieval, and accurate updates to student records. The system aims to enhance operational efficiency by offering key features such as attendance tracking, monitoring of students at risk of dropping out (SARDO), and customized report generation. Additionally, it will facilitate the digital archiving of important student documents, reducing reliance on paper records and ensuring quick access when needed. By streamlining administrative tasks and minimizing manual errors, the system will support data-driven decision-making, allowing teachers, administrators, and parents to monitor student progress in real-time. The overall goal is to improve student retention, provide timely interventions for at-risk students, and contribute to better educational outcomes at the school. Ultimately, the E-Adviser SIMS will support the school's mission to modernize its

administrative processes, foster a supportive learning environment, and enhance student success.

2. PRODUCT DESCRIPTIONS

The E-Adviser Student Information Management System (SIMS) is a comprehensive digital solution designed to address the inefficiencies in managing student information at Gil Montilla National High School. The system centralizes student data, automates administrative tasks, and streamlines reporting and monitoring. It includes key features such as real-time attendance tracking, performance monitoring, SARDO (Students At Risk of Dropping Out) tracking, digital archiving of documents, and the ability to generate customized reports. By integrating these functionalities, the system aims to improve operational efficiency, reduce manual errors, and provide timely insights into student progress. The system is tailored to the specific needs of the school, providing a solution that is not only user-friendly but also adaptable to the growing demands of the institution.

Operating Environment

The E-Adviser SIMS will operate in a web-based environment, ensuring accessibility and flexibility across different devices. It is built using modern web technologies such as the Laravel framework and MySQL database, which provide a scalable, reliable, and secure environment for data storage and retrieval. The system is designed to function efficiently with the school's existing infrastructure, including standard computers and network configurations. While the system requires an internet connection for real-time data updates and remote access, it also supports offline functionality for areas with limited connectivity. This hybrid approach ensures that the system remains operational in a variety of settings, whether the school is fully online or operating with intermittent internet access.

The system's hardware requirements are designed to align with the available resources at the school. It will operate on devices with a minimum of 8 GB RAM, 1 TB SSD storage, and Intel Core i5 or higher processors. The system will also be compatible with commonly used web browsers such as Google Chrome, Mozilla Firefox, and Microsoft Edge, ensuring that it can be accessed by a variety of users, including teachers, administrators, and support staff. The platform's flexible deployment ensures that the system can scale with the growth of the school and handle an increasing amount of student data over time.

Design and Implementation Constraints

The design and implementation of the E-Adviser SIMS are subject to several constraints that must be effectively managed to ensure the system's success. One of the primary constraints is the school's existing hardware and infrastructure. Although the system is designed to work with standard hardware configurations, the school's current technology may limit some of the system's more resource-intensive features. In particular, older computers with limited processing power and storage may face challenges in handling large datasets or performing complex operations. Future upgrades to the school's hardware infrastructure may be necessary to optimize the system's performance, particularly as the school continues to grow and more data is generated.

Another constraint is the budget allocated for the system's development and maintenance. While the school has allocated sufficient resources for the initial deployment, the budget may limit the inclusion of advanced features or additional software tools that could enhance the system's functionality. To address this, the system has been designed with

scalability in mind, allowing future expansions and upgrades as additional funds become available.

Table 1.

Recommended Hardware Requirements

Hardware Environment	Minimum Requirements
Processor	Core i5 or higher
Memory (RAM)	8 GB RAM or higher
Storage Space	1 TB
Computer Monitor	LED 1280 x 800 minimum screen resolution.

The user experience is also a critical consideration. Given that teachers, administrators, and staff have varying levels of technical expertise, the system must be user-friendly and intuitive to minimize the learning curve. Comprehensive training will be required to ensure that all users are comfortable with the system's features. This constraint requires the system to be designed with a focus on simplicity and accessibility, which may limit some of the more complex functionalities in favor of ease of use.

Table 2.

Recommended Software Requirements

Software Environment	Minimum Requirements
Operating System	Windows
Web Server	Apache
Database	MySQL 5.7 or higher
PHP Framework	Laravel 8. x
Browser Compatibility	Latest Chrome, Firefox, Safari
Documentation	Microsoft Word 2019
Collaboration	Google Hand Outs

The system's implementation is dependent on the availability of technical support personnel who can handle maintenance and troubleshooting tasks. As the system is integrated into the school's operations, the availability of IT staff with the necessary expertise will be crucial to maintaining the system's performance and addressing any issues that arise.

There are security and data privacy concerns to consider. Given the sensitive nature of student information, the system must comply with local and international data privacy regulations, such as the Data Privacy Act of 2012 (Republic Act No. 10173). This includes ensuring that student records are securely stored, encrypted, and only accessible to authorized personnel. Robust security protocols must be implemented to protect against data breaches, unauthorized access, and data loss. While there are several constraints that must be managed during the system's design and implementation, the E-Adviser SIMS has been developed with flexibility and scalability in mind. With proper planning, training, and support, these constraints can be addressed, ensuring that the system will significantly improve student information management at Gil Montilla National High School.

3. SYSTEM FEATURES

System Decomposition.

The E-Adviser Student Information Management System is divided into several key components that work together to ensure the system's efficiency and functionality. The system is organized into modules for student data management, attendance tracking, academic performance monitoring, and report generation. The modular design ensures each aspect of student management is handled separately, with each module interacting seamlessly to support overall system performance. For example, the Student Management Module handles student record creation and updates, while the Attendance Module tracks daily student presence. The SARDO Monitoring component identifies at-risk students, and the Report Generation Module creates customized reports for administrators and educators. The system is also designed with role-based access control, allowing users to interact only with the modules relevant to their responsibilities.

System Functionalities.

The core functionalities of the E-Adviser Student Information Management System focus on automating and enhancing administrative processes. Student Data Management is a primary functionality, where administrators and teacher-advisers can easily enter, update, and view student records. Attendance Tracking is streamlined, with teachers able to mark attendance quickly and accurately, while SARDO Monitoring allows for the identification and tracking of students at risk of dropping out. The system supports real-time monitoring, sending alerts to teachers and administrators when students show signs of academic or attendance concerns. The Report Generation feature is another essential functionality, allowing users to generate customized reports on student performance, attendance, and SARDO lists. These reports can be used to make data-driven decisions and identify areas where interventions are needed. All of these functionalities are designed to work together to simplify and automate school management tasks, improving efficiency and reducing manual workloads.

System Features.

The system incorporates a variety of features to address the unique needs of the school. One key feature is the centralized database, which ensures all student records, including personal information, academic history, and attendance records, are stored in a single location. This centralization reduces redundancy and makes it easier for administrators and faculty to access and manage student data. Real-time dashboards are another important feature, providing visual data representations of key metrics such as attendance patterns, academic performance, and SARDO monitoring. These dashboards are designed to be interactive, allowing users to drill down into data and identify trends or issues that require immediate attention. Role-based access control ensures the security of sensitive student data by limiting access to authorized users only, with permissions set based on roles such as administrator, teacher, and support staff. Finally, the system supports customized reporting, enabling administrators to generate specific reports tailored to the school's needs, such as promotion lists, SARDO lists, and student health records. These features work together to create an intuitive and efficient system that supports school administration, faculty, and student success.

4. EXTERNAL INTERFACE REQUIREMENTS

User Interfaces.

The system will have a user-friendly interface designed to provide seamless navigation and data entry for different user roles, such as students, administrators, and faculty. This interface is intuitive and optimized for use across devices such as desktops, tablets, and smartphones, ensuring accessibility for all users. Users will interact with dynamic dashboards that display real-time data analytics, attendance statistics, student performance, and critical alerts for Students At Risk of Dropping Out (SARDO). Furthermore, the system will include detailed reporting features, enabling administrators to generate customized reports based on the school's specific needs, such as SARDO lists and promotion reports

Hardware Interfaces.

The system is designed to be hardware-agnostic, functioning optimally across various device types. The minimum hardware requirements for smooth operation include:

Table 2.

Hardware Requirements

Category	Specification
Processor	2.7 GHz CPU minimum
RAM	16 GB
Storage	2 TB SSD
Motherboard	Compatible with Intel Processors
Computer Monitor	LED 1280 x 800 minimum screen resolution

The system is web-based, requiring only internet connectivity and a modern browser (Chrome, Firefox, Safari). For offline functionalities, particularly in environments with limited internet access, local servers may be used to store exam data temporarily until synchronization with the central system is possible

Software Interfaces. The system integrates with existing Student Information Systems (SIS) and Learning Management Systems (LMS) through Application Programming Interfaces (APIs). This ensures the seamless exchange of data, such as student academic records and attendance logs, across platforms. The system also supports integration with cloud platforms for storage, providing scalable data management. Security measures, such as SSL encryption, are implemented for secure data transfer between systems

Communication Interfaces. The system uses secure web communication protocols (HTTP/HTTPS) to ensure safe transmission of sensitive data. Email notifications will be employed to notify students about exam schedules, results, and personalized course recommendations. Administrators will receive real-time alerts about system activity, such as the completion of student evaluations or any security breaches. For offline synchronization, data will be securely transmitted using protocols like TCP/IP, ensuring that student data remains intact during system synchronization

External System Requirements. For optimal performance, the system will require integration with several external systems: Student Information System (SIS) for

accessing student demographic data, Cloud storage platforms for data backups, Third-party payment gateways for managing transaction fees related to exams or student services, Data privacy compliance with national standards such as the Data Privacy Act of 2012 to ensure that all user data is securely handled and processed.

5. OTHER NONFUNCTIONAL REQUIREMENTS

The E-Adviser Student Information Management System is designed to meet high-performance standards, ensuring a smooth and responsive user experience even under demanding conditions. The system is expected to provide quick response times for core functions such as user login, data entry, and report generation, with task completion times not exceeding 5 seconds under typical usage. To support continuous operations, the system must be capable of handling at least 50 concurrent users without performance degradation. Additionally, it must accommodate up to 2,000 student records and execute queries and report generation efficiently, even during peak usage times. Scalability is an essential consideration, as the system must adapt to increasing data volumes and user traffic without compromising speed or functionality, ensuring smooth operation as the institution grows. In terms of security, the system incorporates multiple layers to ensure the integrity and confidentiality of sensitive data. It utilizes role-based access control (RBAC), granting users access only to the data relevant to their roles, and requires two-factor authentication (2FA) for administrative logins, preventing unauthorized access. Data encryption is applied both to stored data and data in transit, ensuring that sensitive student information remains secure throughout the system. The system also features automated backups and disaster recovery protocols, ensuring data can be restored quickly within 30 minutes in the event of a failure. Regular security audits and penetration testing are conducted to proactively identify and address vulnerabilities, keeping the system safe from potential threats. The system is built with software quality attributes that ensure its reliability and usability. Usability is prioritized, with a user-friendly interface designed to minimize the learning curve for all users, from administrators to faculty and students. The system scored highly for user-friendliness, with a rating of 4.8/5, indicating that it is accessible and easy to operate even for those with minimal technical expertise. Reliability is also a key feature, with the system guaranteed to operate with 99.9% uptime annually. It is designed to handle high data loads and perform accurately, ensuring the system's stability and consistency, which is critical for managing sensitive student records. The system's interactivity is enhanced through real-time dashboards and data visualization tools that display key metrics, such as attendance trends and performance indicators, in an easily digestible format. These features not only improve engagement but also enable administrators to make informed, data-driven decisions promptly. The system is designed to be scalable, allowing for smooth growth and evolution. It will adapt to new technological advancements and institutional needs, supporting the addition of features without performance degradation. Furthermore, the system is flexible, enabling seamless integration with other educational tools and platforms. This ensures that the system can evolve alongside the institution's needs, keeping it relevant and effective for the long term. To ensure comprehensive quality, the system will undergo rigorous testing throughout its development. Unit testing will ensure that individual modules function correctly, while integration testing will verify that all components work seamlessly together. The system will also undergo user acceptance testing (UAT) to ensure it meets the needs of stakeholders and to gather feedback for further refinement. During the testing phases, performance will be assessed under various conditions to ensure that the system can handle peak loads and provide accurate data without delays.

6. PROJECT MANAGEMENT

The successful development and implementation of the E-Adviser Student Information Management System are critical for improving student data management and streamlining administrative processes at Gil Montilla National High School. The project follows a phased approach to ensure that each step is completed efficiently and effectively, with continuous feedback and improvement. The project is divided into several key phases: initiation, planning, design, development, testing, and deployment. During the initiation phase, the project scope is defined, and the key stakeholders—administrators, faculty, and IT personnel—are identified. This phase also involves gathering requirements, understanding the school’s needs, and setting realistic expectations for system functionality. In the planning phase, detailed project plans are created, outlining timelines, resource allocation, and budget estimates. Risk management strategies are developed to address potential challenges, such as user resistance or technical difficulties, ensuring the project stays on track. The design phase focuses on system architecture, user interface design, and the development of key features. This phase includes creating wireframes, database schemas, and prototypes, ensuring that the design meets the needs of the school’s administrative processes. In the development phase, the system is built using the Laravel framework, MySQL database, and other modern web technologies, ensuring scalability, reliability, and security. The development process is iterative, with regular check-ins and adjustments based on feedback from stakeholders. Once the system is developed, it enters the testing phase, where rigorous testing is conducted to ensure that the system meets all functional and nonfunctional requirements. Unit testing, integration testing, and user acceptance testing (UAT) are all carried out to validate the system’s performance, security, and usability. The testing phase is crucial for identifying any bugs or issues that could affect the user experience, and adjustments are made before the system is deployed. The deployment phase involves the final implementation of the system at Gil Montilla National High School. This phase includes data migration, user training, and the setup of any necessary infrastructure. Administrators, teachers, and support staff are trained on how to use the system effectively, ensuring smooth adoption and minimizing disruptions. A post-deployment support plan is put in place to address any issues that may arise after the system is live, ensuring that the system remains operational and user-friendly over time.

7. SUMMARY

The E-Adviser Student Information Management System modernizes student data management at Gil Montilla National High School by centralizing records, automating tasks, and providing real-time insights for data-driven decisions. Key features include real-time dashboards, automated report generation, and SARDO monitoring, which help identify at-risk students and ensure timely interventions. The system incorporates robust security protocols, including role-based access control and data encryption, ensuring compliance with data privacy laws. Designed for scalability and performance, the system efficiently handles large data volumes and supports multiple concurrent users. Developed through a phased approach with active stakeholder involvement, it addresses specific challenges such as report generation, student retention, and document archiving. Overall, the system improves administrative efficiency and enhances student success, supporting the school’s goals of continuous improvement and academic excellence.

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