

**Student Records and Incident Management System with Analytics for the  
Guidance Office of Anselmo A. Sandoval Memorial National High School**

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with Specialization Track in Business Analytics

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## **APPROVAL SHEET**

This capstone project entitled: “Student Records and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School”, prepared and submitted by Bisa, John Rashid B., Diokno, Mark Justine J., and Maranan Mechaela Allysa B., in partial fulfillment of the requirements for the degree Bachelor of Science in Information Technology with the specialization track in Business Analytics, has been examined and is recommended for acceptance and approval for oral examination.

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## **DEDICATION**

This work is wholly and sincerely committed to everyone. Who assisted  
and directed us in shaping our future.

First and foremost, to the creator, ALMIGHTY GOD, the creator of all things and  
the source of life and love,

To our Parents, who have given us their limitless moral and financial support for  
the study's development,

To our friends, with whom we share our experiences of daily laughter and  
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**JRBB**

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**MABM**

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## **ABSTRACT**

Effective student guidance and behavioral monitoring are essential to fostering a safe and supportive learning environment at Anselmo A. Sandoval Memorial National High School. With over 3,000 students enrolled and more than 1,000 reported violations in a single academic year, the school's Guidance Office faces challenges in managing growing volumes of student records using outdated, paper-based methods. These manual processes lead to data loss, difficulty in tracking behavioral trends, and limited capacity for timely interventions. To address these issues, this study introduces the Student Records and Incident Management System with Analytics—a web-based platform designed to streamline recordkeeping and enhance student support services. The system features secure user access, centralized student profiling, automated incident logging, and analytics dashboards. It enables guidance counselors to categorize violations, develop individualized intervention plans, and generate descriptive reports that inform data-driven decision-making. Administrators benefit from timely summaries and behavioral insights that aid policy formulation and system oversight. Through improved data accessibility, analytics integration, and digitized processes, the system reduces redundancy, enhances information security, and empowers the Guidance Office to respond proactively to student needs. This transition from manual to digital

management achieves the general objective of the study: to develop an efficient, secure, and data-informed solution that strengthens the delivery of guidance services in the school.

## **1 INTRODUCTION**

### **1.1 Background of the Study**

The Guidance Office plays a significant role in nurturing students' personal growth, academic progress, and emotional well-being. Through various counseling programs, students are guided to develop better attitudes, enhance their personalities, and strengthen their social and psychological awareness. It serves as a safe space where students can openly express their thoughts and emotions, helping them address academic and personal challenges in a healthy and constructive way. In shaping a safe, supportive, and inclusive learning environment, guidance and counseling services also assist students in coping with stress, interpersonal conflicts, family issues, and mental health concerns. Counselors work hand in hand with teachers, parents, and the school administration to monitor student behavior, address concerns early, and implement timely, personalized interventions. By offering individual and group counseling, career guidance, and values education, the Guidance Office promotes self-awareness, emotional intelligence, resilience, and responsible decision-making. Additionally, career development programs help students discover their strengths, set realistic goals, and make informed choices about their future. As an essential component of the educational system, the

Guidance Office remains committed to delivering services that support students in reaching their full potential both inside and outside the classroom.

Despite their importance, many schools in the Philippines face significant challenges in effectively managing student-related issues. One common concern is the lack of an efficient system for handling and maintaining student records. Most public schools still rely on manual or paper-based processes, which are prone to loss, damage, and inaccuracies. This makes it difficult to track student records, behavior, and counseling history over time. Schools also encounter difficulties in documenting and addressing behavioral concerns, particularly in the absence of a centralized incident reporting and monitoring system. For instance, Furthermore, the limited availability of trained guidance personnel and the high student-to-counselor ratio hamper the timely and effective delivery of counseling services (Department of Education, 2020). Schools also encounter difficulties in documenting and addressing behavioral concerns, particularly in the absence of a centralized incident reporting and monitoring system. These limitations reduce the capacity of guidance offices to provide data-driven interventions and personalized support for students.

Anselmo A. Sandoval Memorial National High School is one of the biggest schools in the municipality of Mabini, Batangas. As of school year 2024-2025, it has 1,817 junior high school students and 1,204 senior high school students with a

total of 3,021 students. A total of 1,189 violation cases were reported by the guidance counselor as of this school year. According to Brown et al. (2019), the service of guidance and counseling schools provide a good opportunity for the students to cope with the demands of learning and personal development. Confronted by increasing incidents of violent behavior in schools, educators are being asked to make schools safer. The Guidance Office has been using the manual processing of collecting individual inventory of students for so many years now. With the increased number of students enrolled in the school, the Guidance Office must perform more efforts to maintain accurate and reliable data. The Guidance Office gathers students' data in the beginning of the school year, resulting in a large number of files. They also have a difficult time retrieving student information for academic purposes.

The proposed system of the Guidance Office of Anselmo A. Sandoval Memorial National High School will manage student records and offer fast and easy access to their personal information. The Student Records and Incident Management System with Analytics will assist guidance counselors in categorizing offenses based on severity and frequency through several effective features. The system can include an automated categorization function that assigns incidents to predefined categories such as minor and major based on the details entered. To enhance flexibility, counselors will also have the ability to customize criteria for these

categories, ensuring offenses are classified according to the school's guidelines. Additionally, the system will track the frequency of recorded incidents, allowing it to flag repeated infractions for closer monitoring. This data will be further supported by comprehensive analytics and reporting tools, which will help counselors identify behavioral patterns, track trends, and make informed decisions regarding student interventions. Through these features, the system will streamline the process of managing student behavior records and improve the counselor's ability to address concerns effectively. It saves money and big spaces for offices from files of paper records. In addition to categorizing offenses, the system can support counselors in implementing effective intervention strategies. The system can include a dedicated feature where counselors can record intervention plans tailored to individual students. According to Paolini (2019) the school counselors can utilize guidance and counseling techniques to enhance academic achievement and emotional wellness of the students. These plans may outline steps such as counseling sessions, behavior contracts, peer mediation, or referrals to specialized support services. It also makes student record administration much easier, more efficient, less time consuming and more reliable without losing quality.

Implementing Student Records and Incident Management System with Analytics in the Guidance Office of Anselmo A. Sandoval Memorial National High School aligns with several United Nations Sustainable Development Goals (SDGs),

particularly SDG:4 Quality Education. This goal emphasizes ensuring inclusive and equitable quality education while promoting lifelong learning opportunities for all. A well-designed record management system supports this by enhancing educational planning and decision-making, enabling educators and counselors to track student progress, tailor interventions and provide necessary support services. Comprehensive records help identify and support students with diverse needs, promoting within the educational system. Beyond SDG 4, Student Records and Incident Management System with Analytics also contributes to SDG 16: Peace, Justice and Strong Institutions by promoting accountability, transparency and integrity within educational institutions. Efficient record management reduces data loss, improves student confidentiality and ensures ethical handling of sensitive information.

Student Records and Incident Management System with Analytics will be designed to provide effectiveness through safe recordkeeping and reduces the use of paper for recording. The system begins with a secure login process that assigns users specific roles, ensuring that each individual has appropriate access to the information they need. Students and teachers will provide incident information to the guidance counselor in the guidance office, who will then enter it into the designated system. Counselors and administrators can create and manage student profiles, which include essential details such as personal information, guidance

records and behavioral history. This centralized system allows authorized users to easily input and update data, reducing the time spent on manual recordkeeping. When an incident or deficiency occurs, guidance counselor or staff can log the details directly into the system by selecting the student's profile and entering relevant information such as the date, nature of the offense, and any actions taken. This information is automatically linked to the student's profile for future reference. Additionally, the system features advanced data analytics that generate detailed reports to help counselors identify trends, common offenses, and behavioral patterns. This analytical feature enables school staff to make informed decisions, create targeted interventions, and track the effectiveness of their strategies. This system helps the counselor to find the information of the students in the shortest time possible. The user can easily input the data to the student's profile thus will lessen the time of work being consumed.

## **1.2 Purpose and Description**

The implementation of Record Management System for the Guidance Office of Anselmo A. Sandoval Memorial National High School will be beneficial to various stakeholders:

### **Guidance Counselor and Staff**

Guidance counselors play an essential role in supporting students' personal, academic, and emotional well-being, offering counseling services, career advice, and guidance for personal or behavioral challenges. However, the process of managing student records manually can be time-consuming and prone to errors, often making it difficult for counselors to quickly access important information needed for timely interventions. The proposed system resolves these issues by automating the collection, storage, and retrieval of student records, providing a streamlined, organized platform for counselors. This automation reduces manual workload, allowing counselors to focus more on providing personalized support and less on administrative tasks, ultimately enhancing the efficiency and effectiveness of their interventions.

### **School Administrator**

Another key stakeholder is the School Administrator, whose role is to oversee the overall operation and performance of the guidance system, ensuring coordination between departments and compliance with school policies. The administrator faces challenges such as the lack of real-time access to student data and reports, which makes it difficult to monitor trends or make timely and informed decisions regarding student discipline and support. The system addresses this by

offering built-in analytics and summary reports that give the administrator a clear overview of behavioral trends and other key indicators.

## **Students**

Additionally, another key stakeholder is the student, although students interact with the system indirectly, they are the subject of records and recipients of counseling and intervention services. The current issues they face include delays in processing counseling requests, limited follow-up, and concerns over the privacy of their personal information. The system resolves these problems by enabling quicker access to support, maintaining secure and confidential student data, and better tracking of behavioral progress.

### **1.3 Objectives of the Study**

The main objectives of the study is to design and develop the Student Records and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School.

Specifically, this study aims to:

1. To design and implement a centralized database system that efficiently stores and manages student information; including behavioral and disciplinary records, for easy access by the guidance office.
2. To develop functional modules for recording, managing, and tracking student violations and disciplinary incidents, with secured access for authorized personnel such as guidance counselors.
3. To provide analytics and visual reporting tools that support the identification of behavioral patterns and trends, enabling data-driven decision-making and timely intervention strategies.

#### **1.4 Scope and Limitations**

This capstone project focuses on the design and development of a Student Records and Incident Management System with Analytics, specifically tailored for the Guidance Office of Anselmo A. Sandoval Memorial National High School. The primary goal of the system is to streamline the process of storing, managing, and accessing student. The system will allow authorized personnel, such as guidance counselors, to securely log student information, track violations, categorize incidents based on severity, and manage intervention plans. Additionally, the administrator will manage user accounts, set access permissions, monitor system

activity, ensure data security, oversee the system's overall functionality, and use analytics to support decision-making and track student trends. A key feature is its integration of both descriptive and prescriptive analytics: descriptive analytics will help summarize past incidents and identify behavioral trends, while prescriptive analytics will provide data-driven recommendations to improve counseling strategies and proactively address student issues. The system will be developed using an Agile methodology to ensure continuous improvements based on user feedback and real-time needs.

However, the system does have its limitations. Its functionality is confined solely to the operations of the Guidance Office and does not extend to other school departments such as academic grading, enrollment, or library services. At this stage, the platform will be web-based and will require a stable internet connection for access; a mobile application version and offline features are not part of the initial development. Additionally, while it offers structured offense categorization and reporting, it does not yet include advanced features such as automated behavior predictions or real-time communication like chat or SMS alerts. The system also depends on user training and familiarity with digital tools, which may pose a challenge for some staff during the transition period. Lastly, while efforts will be made to import historical data from existing manual records, there may be

limitations in fully integrating older, incomplete, or inconsistent files into the new system.

### **1.5        Definition of Terms**

To help understand and explain the terms used in this study, the following are hereby defined:

**Centralized Database System:** It is a centralized database system is an integrated platform where data is stored and managed in one location, allowing for improved consistency and data control (Adebayo & Oyekunle, 2020). In the context of our system, the centralized database serves as the core storage for all student records, incident reports, counseling session logs, and analytics data. It ensures that guidance counselors, school administrators, and authorized personnel have real-time, secure, and unified access to critical information, eliminating the risks of data duplication, fragmentation, and unauthorized alterations.

**Data-Driven Decision Making:** It involves the systematic collection, analysis, and interpretation of data to inform educational practices, policies, and strategies, aiming to enhance student outcomes and institutional effectiveness (Fernandes, 2023). In this study, it refers to how the system's integrated analytics tools will assist guidance counselors and school administrators in making informed decisions

regarding student behavior, academic performance, and counseling needs. By providing clear visualizations and trends based on recorded data, the system enables more accurate and timely interventions that support student development and overall school improvement.

**Guidance Counselor:** A certified professional who supports students' academic, career, personal, and social development in school settings (American School Counselor Association, 2021). In this study, the guidance counselor account will serve as the primary user interface for managing student concerns, including viewing and updating student records, documenting incidents, scheduling counseling sessions, and monitoring behavioral progress.

**Intervention Plan:** It involves a systematic process that includes assessing needs, setting objectives, selecting appropriate methods, implementing actions, and evaluating outcomes Armitage (2020). In the context of this study, the intervention plan refers to a systematic process integrated into the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School. This structured approach allows guidance counselors to create individualized plans that are data-informed, timely, and aligned with the student's developmental needs.

## **2 REVIEW OF RELATED SYSTEMS/STUDIES**

This chapter primarily discusses the various studies, concepts, and related systems used to create the project and significantly impact the studied variables. Material enabled the proponents to understand the project better.

### **2.1 Technical Background**

To meet the project's requirements for handling data, developing basic web applications, and creating dynamic web pages, studies conducted in an office in Mabini, Batangas, utilized a range of tools and computer languages in the development of the record management system for Guidance Office. HTML was used to establish the page's structure, providing a strong foundation for content organization (W3Schools, 2021). JavaScript was employed to ensure responsiveness by enabling dynamic updates and interactive elements (Mozilla Developer Network, 2021). CSS, together with Bootstrap, was utilized to format fonts, colors, layouts, and spacing, allowing for a consistent and visually appealing design (Mozilla Developer Network, 2021).

Python Django served as the primary web framework, allowing rapid development and clean, pragmatic design, while managing backend operations effectively (Django Software Foundation, 2021). PostgreSQL was selected as the

database management system because of its robustness, scalability, and open-source nature (PostgreSQL Global Development Group, 2021). Figma was employed to design and test the user interface to ensure usability and accessibility for the target users (Figma, 2021). Visual Studio was chosen as the development environment, providing powerful tools for code editing, debugging, and version control integration (Microsoft, 2021).

## **2.2 Related Studies**

Effective management of student records plays a critical role in ensuring efficient administrative operations in educational institutions. Numerous studies have explored the challenges of manual record-keeping systems and the potential benefits of transitioning to digital platforms.

Duruin and Siddayao (2024) examined the challenges faced by Magalalag National High School, identifying the growing volume of paper records and the lack of document storage as major issues. Their findings emphasized the urgent need for efficient, up-to-date record management solutions. Similarly, Amaefule and Eshiet (2022) highlighted the impact of record management on teaching and learning in secondary schools, stressing the necessity of adopting computerized systems to promote data accuracy and informed decision-making.

In addressing these challenges, several researchers have proposed the development of digital systems. Olipas (2020) successfully designed and developed a Student Information and Violation Management System (SIVMS), demonstrating that automated systems can significantly enhance the efficiency and effectiveness of managing student records and violations. Supporting this, Uka and Ekwonwune (2019) proposed a web-based student record management system to solve issues like improper course registration and result delays, ultimately aiming to enhance the accuracy and accessibility of academic records.

The importance of real-time data access and notification systems has also been underscored. Krisfianto and Indahyanti (2024) pointed out the gap in many schools' adoption of real-time, web-based systems for managing student violations, suggesting a need for further exploration. Livamianti and Saputra (2024) proposed SIMPONIS, a web-based violation management system that features real-time updates and early warning mechanisms, thereby improving responsiveness and transparency in behavior monitoring.

To further enhance monitoring and analysis, Devega et al. (2024) developed a decision support system integrating the Simple Multi-Attribute Rating Technique (SMART) with graphical dashboards. Their system uses visual tools such as scatter

plots and heatmaps to provide clearer insights into student conduct, assisting educational institutions in decision-making processes.

The role of information and communication technology (ICT) in modernizing record-keeping practices is crucial. Nwachukwu and Asogwa (2020) reviewed how ICT tools improve the accuracy, effectiveness, and efficiency of maintaining and accessing records. This perspective is echoed by Kalpana et al. (2023), who proposed integrating student performance analysis systems into academic platforms to promote data-driven educational practices.

In terms of practical implementation, several studies have detailed the transition from manual to digital systems. For example, Falolo et al. (2022) explored the challenges of traditional paper-based systems and advocated for digitized student registration and record management. Likewise, Uy, Cabrera, Pinero, and Vizcarra (2023) developed a computer-based record management system for Baggao North Central School, improving efficiency, accuracy, and data security.

In higher education, the importance of structured and computerized record systems is further supported by Reyes et al. (2024), who stressed maintaining the integrity of record-keeping in Philippine Higher Education Institutions (HEIs). Similarly, Adra et al. (2024) created a digital records management system for

Veritas College's Registrar's Office, integrating features like email verification to enhance communication.

Several studies focus specifically on discipline and incident management. The work of Habagat (2020) at Jose Rizal Memorial State University digitized counseling and behavioral records, addressing inefficiencies of manual systems. Meanwhile, Dela Cruz and Dela Cruz (2024) developed a Student Discipline Monitoring System that includes real-time incident reporting and behavior analytics to aid proactive intervention. González and Garcia (2024) also contributed to this area by designing a Safety Incident Report System that improved incident tracking and promoted a culture of safety in universities.

Moreover, the integration of advanced technologies like IoT into student record management has been explored by Mustafa and Mustafa (2025). Their study showed that IoT-enabled systems significantly enhanced the security, retrieval speed, and accessibility of student data.

International studies also underscore the global relevance of digitizing student records. Assaf et al. (2022) highlighted the difficulties faced by conflict-affected universities in Syria, where manual record-keeping limited student mobility and access to opportunities. This situation emphasizes the critical importance of standardized and digitized record systems.

From an administrative standpoint, the importance of efficient data management was highlighted by Walden University's article "The Benefits of Properly Managing Your School's Student Records," which noted the ease of accessing important student information through well-designed digital systems. Complementing this, the Managed Outsource Solutions (2021) article outlined best practices for digitizing paper records, including scanning, OCR application, and systematic indexing for easy retrieval.

The ECM Consultant (2025) emphasized that effective data management — which includes collecting, storing, organizing, and protecting data — is fundamental to maintaining reliable and secure student record systems. By applying sound data management principles, schools can prevent data loss, duplication, and security breaches, ensuring long-term success in record management initiatives.

These studies demonstrate the growing need for educational institutions to transition from manual to digital record-keeping systems. They underscore the advantages of automation, real-time access, data security, and integrated analytics in improving administrative efficiency, student behavior monitoring, and overall educational outcomes. The proposed Student Record and Incident Management System with Analytics draws from these findings, aiming to modernize traditional

practices by introducing a centralized, secure, and data-driven platform for school guidance offices.

### **2.3 Related Systems**

The development of record management systems (RMS) and their integration with advanced technologies has been extensively explored across various sectors, emphasizing the importance of secure, efficient, and accessible data handling.

Agustin and Babaran (2021) introduced the Guidance Records Management System with SMS Notification, designed for student behavior tracking. It integrates Information and Communications Technology (ICT) to record and monitor student attendance and incident reports while immediately notifying parents via SMS about academic or behavioral issues. This system was evaluated using the ISO/IEC 25010 standard, ensuring a high degree of functionality, usability, security, and reliability. Similarly addressing incident tracking, Gil-Hernández et al. (2024) developed a Safety Incident Report System for healthcare students, allowing real-time, structured reporting of clinical incidents, which in turn improved safety and educational quality through enhanced risk assessment and follow-up actions.

As security and data integrity become increasingly critical, several studies propose blockchain-based solutions for records management. Kong (2024) explored blockchain's application for student records, ensuring tamper-proof, decentralized

data storage, enhanced by smart contracts to control access rights. This approach parallels the findings of Chitikela (2024), who introduced a Secure and Transparent Medical Record Management System using blockchain and Python to manage healthcare data securely through decentralized storage and automated access control. Reinforcing this trend, Al-Khasawneh et al. (2023) proposed a comprehensive blockchain-based framework, integrating smart contracts, encryption, and privacy key management to address vulnerabilities in traditional record systems.

The integration of innovative technologies was also observed in Huang and Li's (2024) development of an advanced student management system. By using programmable device programming and evaluating it through a BP neural network, they achieved remarkable system stability and throughput, demonstrating how next-generation computation can dramatically improve educational management platforms' performance.

Records management improvements are not only driven by technology but also by the need for administrative efficiency. Uy et al. (2023) highlighted how a computer-based student record management system improved operations at Baggao North Central School by minimizing human errors and transitioning from manual to digital processes. Similarly, Pagayonan (2023) developed a Record Management

System with Document Control, emphasizing secure and efficient handling of sensitive documents.

Expanding the focus to higher education institutions, Thilakavalli et al. (2023) created an RMS that integrated academic and non-academic operations, guided by the Technology-Organization-Environment (TOE) framework and the Unified Theory of Acceptance and Use of Technology (UTAUT). This dual framework ensured that the system met organizational needs while promoting user adoption. A comparable approach was presented by Mukred et al. (2019), who reviewed key factors influencing Electronic Records Management Systems (ERMS) adoption in higher education, further supporting the need for context-sensitive system development.

Administrative efficiency was also underscored by Adeyanju (2020) at the University of Lagos, where moving from manual to electronic records accelerated tasks and reduced paperwork. Gesmundo et al. (2022) emphasized that organized, secure, and accessible records not only enhance efficiency but also professional growth among administrative staff.

Focusing on the private sector, Guijo (2024) identified common record-keeping challenges faced by SMEs in Pasig City and proposed a tailored guide to improve records management practices. Similarly, Savinov (2021) emphasized the need for

a unified approach in Systems of Records Management, contrasting Western and post-Soviet systems and advocating for global integration of records management practices.

In terms of regional implementations, Clemence et al. (2023) reported on the inconsistent adoption of ERMS across Tanzanian universities due to infrastructural and training limitations, issues also encountered by Abaya et al. (2023) at Niger Delta University Teaching Hospital in Nigeria. These findings highlight the critical need for comprehensive infrastructure and training support when implementing electronic systems.

Water utilities and government units have also benefited from digitized records. Butt et al. (2021) discussed how ERMS implementation at Pakistan's Water and Power Development Authority improved transparency and accountability. Locally, Romero (2021) called for standardized electronic RMS across Laguna's LGUs to address inconsistencies, while Manun-og and Flores developed a Municipal Consolidation System to centralize and streamline resident information management across government offices.

The healthcare sector has particularly leveraged electronic systems for better service delivery. Delosa and Delosa (2020) designed a records management system for a regional medical center to organize and secure health records efficiently.

Meanwhile, Agbeyangi et al. (2024) utilized Hyperledger Fabric blockchain to manage electronic health records at Frere Provincial Hospital, ensuring better data integrity and access control.

Web-based platforms also feature prominently. Libadia et al. (2025) developed a web-based ERMS for the Office of Senior Citizens Affairs (OSCA) in the Philippines, enhancing information retrieval and processing through centralized digital records. This is in line with the trend observed by Malekani and Alphonse (2022) at Sokoine University of Agriculture, where an Electronic Document Management System (EDMS) improved administrative workflows and accessibility to critical documents.

Danlog et al. (2017) focused on high schools in the Philippines, where a computerized record management system improved the organization and retrieval of student records, significantly easing staff workloads and improving data security.

## **2.4      Synthesis**

Effective management of student records has become increasingly vital to improving administrative operations, promoting data-driven decisions, and enhancing overall educational outcomes. Both local and international studies paint a clear picture: traditional, paper-based record-keeping systems are no longer

sufficient to meet the growing demands for accuracy, security, and accessibility in educational institutions.

Several researchers, such as Duruin and Siddayao (2024) and Amaefule and Eshiet (2022), identified the limitations of manual systems, including issues related to storage, data loss, and inefficiency. These challenges underscore the urgent need to shift towards digital platforms that offer more reliable, efficient, and user-friendly management of student information. Studies by Olipas (2020) and Uka and Ekwonwune (2019) support this need by demonstrating how automated systems can improve the accuracy of academic records and streamline administrative processes.

Beyond simply digitizing records, recent developments show a move toward more intelligent, real-time, and analytics-driven systems. Innovations such as the Student Information and Violation Management System (Olipas, 2020) and the web-based violation monitoring platforms proposed by Livamianti and Saputra (2024) introduce features like real-time updates and early-warning notifications that enable schools to respond proactively to student behavior and academic concerns.

Looking deeper into related systems, technological advancements are increasingly shaping the future of records management. Systems that integrate SMS notifications (Agustin and Babaran, 2021) and blockchain technology (Kong, 2024; Chitikela, 2024) highlight a growing emphasis on security, transparency, and

immediate communication. In particular, blockchain applications offer promising solutions for securing records against tampering while ensuring that only authorized users have access.

Another critical insight emerging from the literature is the importance of integrating analytics and visualization tools. Devega et al. (2024), for example, demonstrated how graphical dashboards and decision-support tools help institutions not just to store information but to interpret it meaningfully, aiding in proactive interventions and better policy-making. Similarly, the application of artificial intelligence techniques, such as neural networks by Huang and Li (2024), points toward a future where educational management systems can predict trends and support more strategic decisions.

Despite the many advantages, the transition to digital systems is not without challenges. Studies from Clemence et al. (2023) and Abaya et al. (2023) illustrate the reality that without sufficient infrastructure, training, and user buy-in, even the most advanced systems may fail to deliver their intended benefits. These findings highlight the importance of adopting a comprehensive approach that considers not only technological capacity but also organizational culture and user readiness.

Moreover, the collected studies suggest that an effective Student Record and Incident Management System should be more than a digital filing cabinet. It must

be designed as a dynamic, secure, and intelligent platform that offers real-time access to information, ensures data privacy, supports communication with stakeholders, and provides meaningful insights through analytics. Such systems are essential for creating educational environments that are not only more efficient but also more responsive to the needs of students, teachers, and administrators alike.

In light of these insights, the proposed Student Record and Incident Management System with Analytics stands as a timely and necessary response to the evolving demands of modern education. It aims to bridge the gap between traditional administrative practices and the emerging need for data-driven, secure, and user-centered solutions.

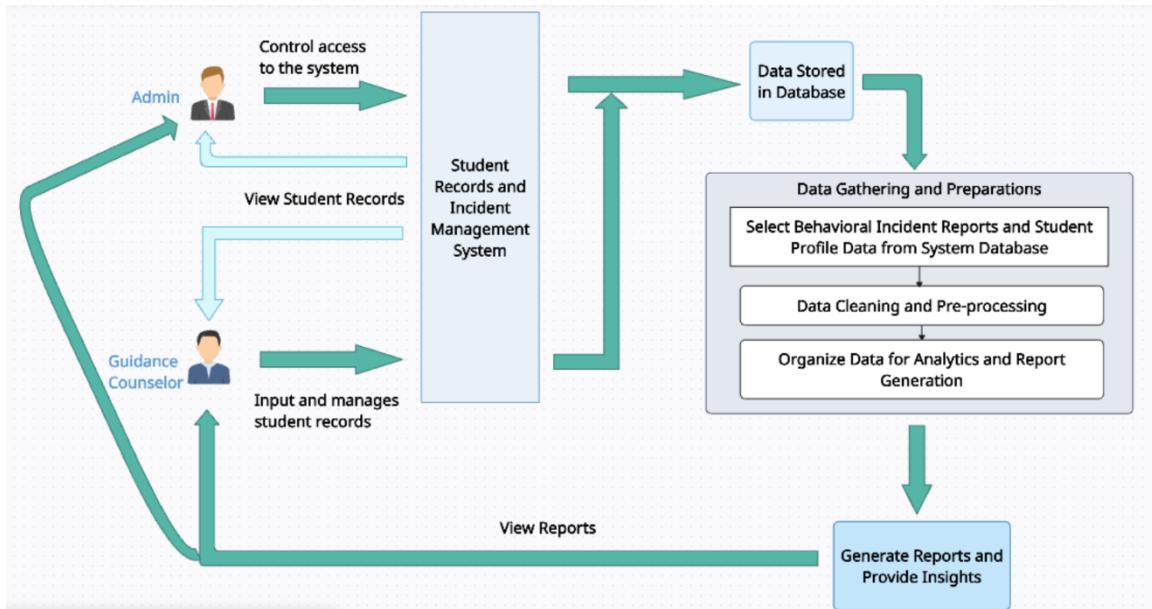
## **2.5      Conceptual Framework**

Figure 2-1 illustrates the study's conceptual framework, incorporating the essential components for developing a record management system. The process begins with identifying key users, including the students, guidance staff, and system administrator of Anselmo A. Sandoval Memorial National High School.

The students provide personal details and incident records in the Guidance Office, while guidance staff is responsible for inputting and managing student information. System administrators oversee user access levels and data integrity.

The development phase utilizes various tools, including JavaScript for interactivity, HTML and CSS for web page structure and styling, Bootstrap for responsive and consistent design, Python Django for backend development, PostgreSQL for database management, Figma for interface design and prototyping, and Visual Studio for coding and development.

**Figure 2-1. Conceptual Framework**



### **3 DESIGN AND METHODOLOGY**

This chapter details how the system was designed and analyzed using the study's overall plan. The chapter addresses the central concepts behind the project, the process of development, requirements, design approaches, the tools employed, and the base for testing and deployment.

#### **3.1 Project Concepts**

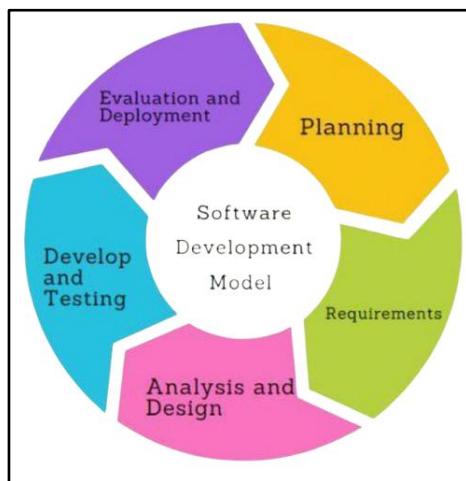
The project addresses the gap in maintaining and organizing student records and incident reports at Anselmo A. Sandoval Memorial National High School, where documentation is traditionally managed through manual processes. A centralized web-based system will be developed to digitally store student information, including behavioral and disciplinary records, making data easier to access, manage, and analyze. The system enables secure, role-based access for guidance counselors and administrators, improving workflow and ensuring confidentiality. It includes features such as incident tracking, counseling session logs, real-time notifications, and analytics dashboards for identifying behavioral trends and supporting data-driven decisions. The system aims to streamline the management of student records and incident reports, reduce manual workload, provide real-time access to student data, and generate analytical reports for informed decision-making. By digitizing records and integrating analytics, the system

enhances the guidance office's capacity for timely intervention, accurate reporting, and comprehensive student support management.

### **3.2 Development Model**

This study adopts the Agile Software Development Life Cycle (SDLC) to design and implement the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School. The Agile approach allows for iterative development, frequent stakeholder collaboration, and adaptability throughout the project. It consists of five major phases: Requirements Gathering, Planning, Design and Development, Testing, and Deployment, each contributing to the creation of a system tailored to the specific needs of the guidance office.

**Figure 3-1. Agile Development Methodology**



The planning phase involved setting a structured roadmap for development, defining responsibilities, timelines, and deliverables. The researchers conducted regular meetings with stakeholders to align the technical direction of the system with institutional goals. The team identified risks and outlined project milestones while allowing flexibility for evolving requirements. Comprehensive documentation was prepared to ensure mutual understanding and consistent communication among team members and stakeholders.

In the requirements gathering phase, the researchers worked closely with school stakeholders such as guidance counselors, teachers, and administrative personnel to determine the core needs of the system. Information was collected through interviews, surveys, and observations to understand the existing challenges in managing student records and incidents manually. Based on the data, the system's objectives were outlined, focusing on centralized digital storage, efficient incident reporting, behavior monitoring through analytics, and secure, role-based access.

During the analysis and design phase, the user interface was designed using Figma to create intuitive wireframes and mockups, ensuring a user-friendly experience for all system users. The front-end of the system was developed using HTML, CSS (with Bootstrap), and JavaScript to ensure responsiveness and accessibility across devices. The back-end was built with Python Django, enabling

efficient backend processes and database interactions. PostgreSQL was selected as the database system for its robustness, scalability, and ability to manage structured student data and incident logs effectively. Key features such as student profiling, incident tracking, analytics dashboards, and notification systems were implemented in this phase.

In the development and testing phase, the system will undergo a series of evaluations including unit testing, integration testing, and user acceptance testing (UAT). These tests will ensure that all modules function correctly and cohesively. Real users from the guidance office will participate in UAT to validate that the system meets their expectations and provide relevant feedback. Adjustments will be made to enhance usability, fix bugs, and address any issues identified during testing. Special attention will also be given to validating the security of sensitive student data.

Finally, in the evaluation and deployment phase, the system will be launched online through a cloud-based hosting service to guarantee accessibility, scalability, and secure operation. The web-based platform will allow authorized users to access student records, log incidents, generate reports, and view analytics from any internet-connected device. Supporting documentation and user manuals will also be provided to ensure proper system usage and maintenance.

By following the Agile Software Development Life Cycle (SDLC) model, the development of the system remained flexible, user-centered, and responsive to the school's evolving needs. Continuous stakeholder engagement and iterative development cycles contributed to the creation of a robust and reliable platform that enhances the efficiency of student record management and incident tracking in the guidance office.

### **3.3 Requirements Analysis**

The current process at the Guidance Office of Anselmo A. Sandoval Memorial National High School is largely manual and paper-based. Student records, including personal information, guidance logs, offense reports, and intervention notes, are physically filed in folders stored within the office. At the start of every school year, the office collects data through printed individual inventory forms, which are then sorted and stored manually. This practice leads to a significant accumulation of paperwork over time, with thousands of student records being handled and maintained by a small team of guidance personnel.

When counselors or school administrators need to access a student's disciplinary history, they must sift through numerous folders to locate the relevant information. This method is not only time-consuming but also prone to errors,

misfiling, and delays in decision-making. Retrieving historical data or identifying behavior patterns across multiple students becomes particularly difficult, especially with the growing student population now exceeding 3,000.

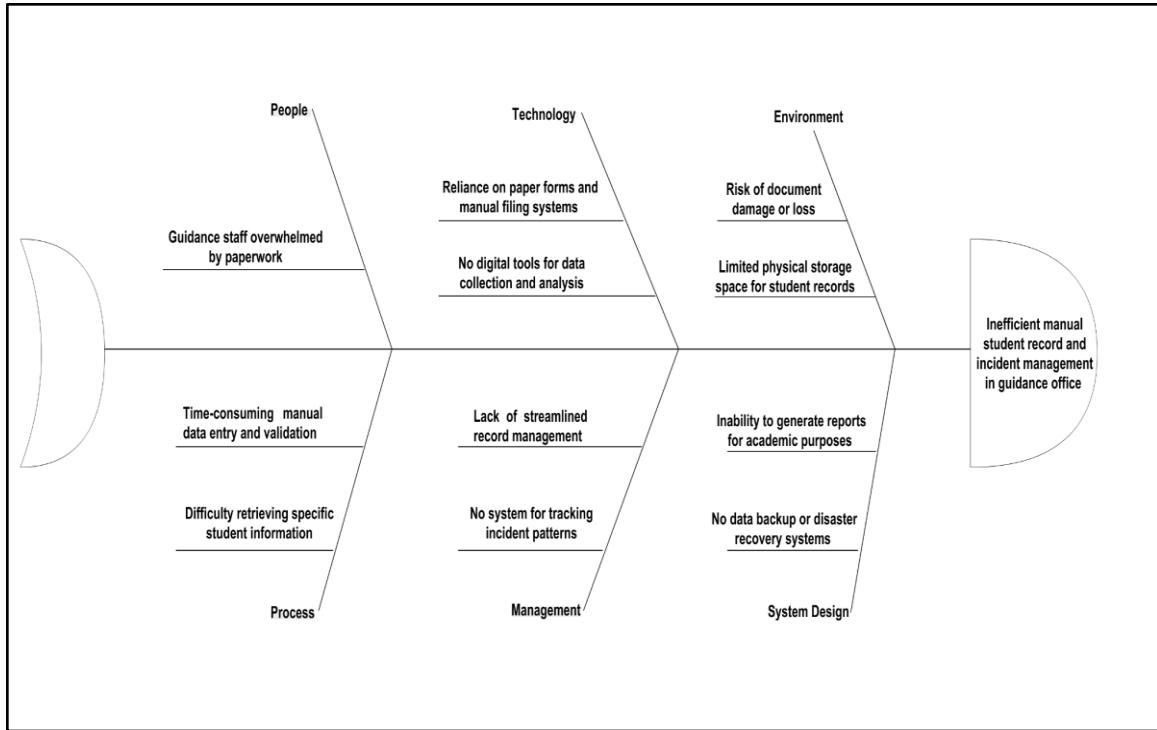
Facilities supporting the current system include filing cabinets, printed forms, logbooks, and one or two shared computers that are mainly used for encoding documents or creating manual reports. There is no centralized student database, and analytics are performed manually using spreadsheets, which makes behavioral trend analysis nearly impossible.

As the school continues to grow and behavioral cases increase, the limitations of this traditional system—including difficulty in record retrieval, lack of data accuracy, and inefficient use of time and space—highlight the need for a centralized, digital solution such as the proposed Student Record and Incident Management System with Analytics.

### **Fishbone Diagram**

Figure No. 3-2 illustrates the inefficiencies in managing student records and incidents within the guidance office stem from a combination of six key areas: People, Process, Technology, Environment, Management, and System Design.

**Figure 3-2. Fishbone Diagram**



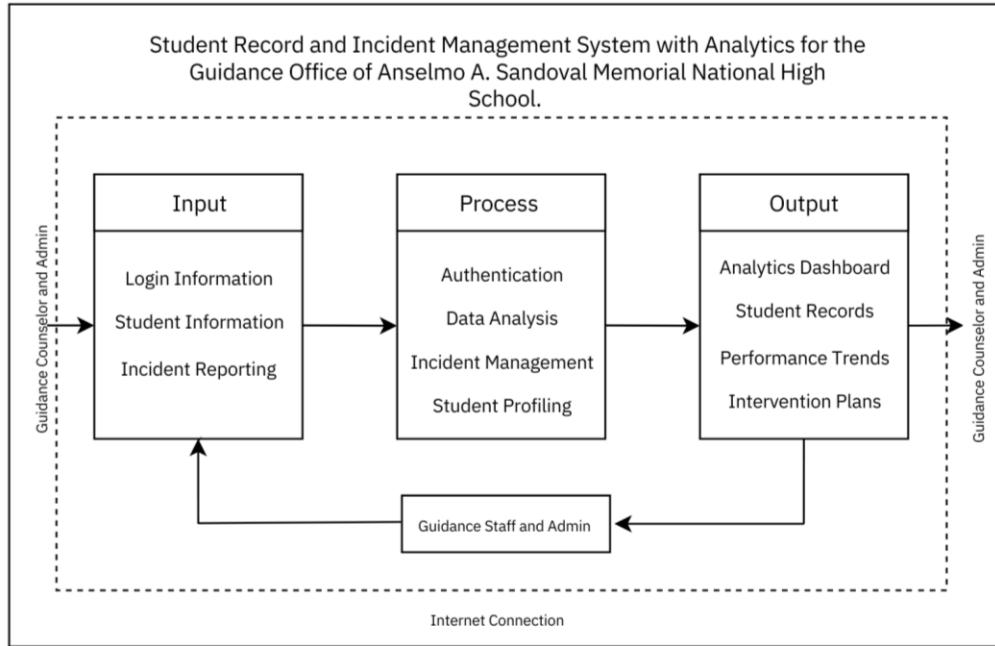
Guidance staff are often overwhelmed by the volume of paperwork, leading to delays in accessing important information and difficulties in keeping up with daily responsibilities. Manual data entry and outdated filing systems slow down operations and make it hard to retrieve specific student details when needed most. The heavy reliance on physical documents not only consumes valuable space but also increases the risk of records being lost or damaged. Without a streamlined system for tracking student incidents or generating academic reports, important patterns can go unnoticed, reducing opportunities for early support or intervention. Furthermore, the lack of digital tools, automated processes, and reliable data backup makes the current setup fragile and inefficient. These challenges point to the need

for a modern, digital solution that can help staff work more effectively while ensuring that students receive timely and well-informed support.

### System Boundary

The system boundary diagram illustrates how guidance counselors and admin interact with the Student Record and Incident Management System with Analytics through three core components: Input, Process, and Output.

**Figure 3-3. System Boundary**



Users provide inputs such as login information, student details, and incident reports, which are then handled internally through processes like authentication,

data analysis, incident management, and student profiling. These processes ensure that the system can securely and efficiently interpret and manage sensitive student data. The outputs delivered by the system include an analytics dashboard, updated student records, performance trend insights, and intervention plans—all designed to support timely and informed decision-making by the guidance office. These outputs help create a comprehensive view of student behavior and progress.

The system emphasizes the importance of a structured digital environment in addressing the challenges faced by traditional school guidance operations, such as fragmented data handling, lack of timely reporting, and limited data-driven decision-making. It aims to overcome these inefficiencies by leveraging technology to streamline operations, enhance analytics, and improve student support outcomes.

### **Use Case**

A Use Case Diagram is a highly valuable tool in system development, providing a clear and visual overview of how different users, known as actors, interact with the system. It identifies the key functionalities, or use cases, that the system must deliver, helping to clarify the project's scope and requirements from the outset. By illustrating the connections between users and system operations, the diagram ensures that development efforts are focused on meeting real user needs. It also serves as a shared reference for developers, stakeholders, and

analysts, supporting effective communication during the design and analysis phases.

**Figure 3-4. Use Case Diagram**

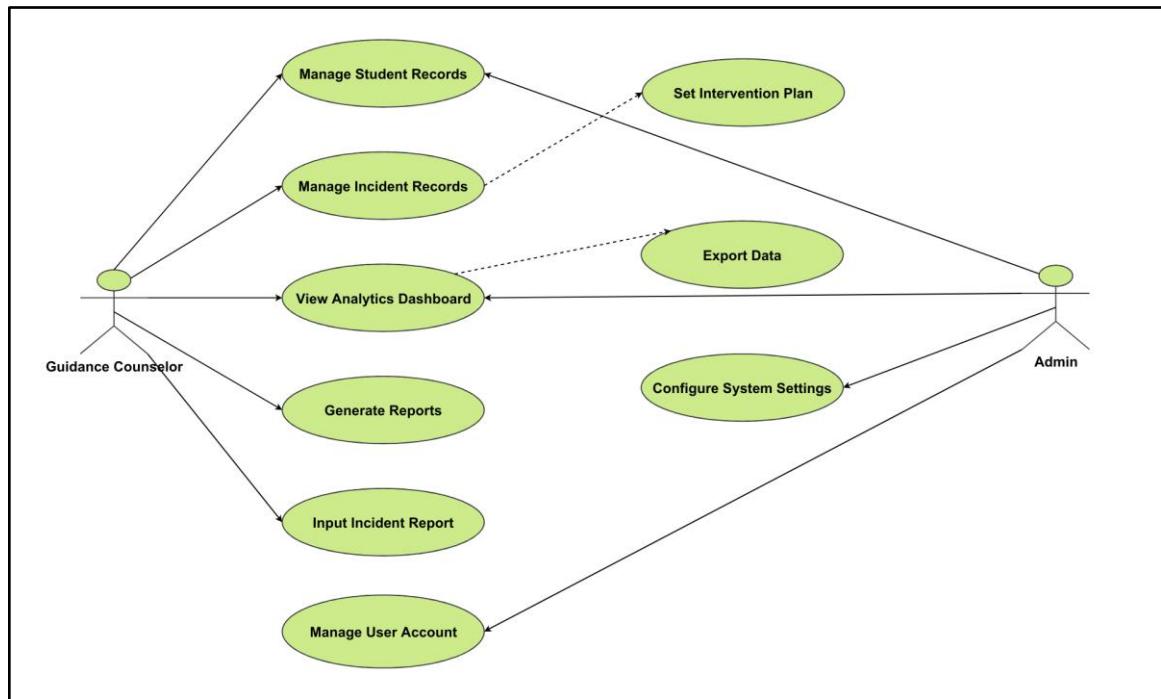


Figure 3-4 illustrates the core interactions between the system and its two primary users: the Guidance Counselor and the Administrator. This system is designed to support and streamline key functions within the Guidance Office, particularly focusing on the management of student records, incident reports, and data-driven analytics.

The Guidance Counselor interacts with the system through a variety of essential tasks. These include managing student records, reporting and managing

behavioral incidents, generating detailed reports, and viewing analytical dashboards for informed decision-making. Additionally, the counselor has the capability to input incident reports directly and to develop intervention plans such as counseling sessions and written agreement when necessary, a functionality that extends from student record management.

On the other hand, the Administrator has broader control over the system. Beyond sharing some responsibilities with the counselor, such as managing student records and accessing analytics, the admin is also tasked with more technical and oversight functions. These include managing user accounts and configuring system settings to ensure that the platform operates smoothly and securely. The administrator can also export data, an extended function of viewing analytics, to support further reporting or data archiving needs.

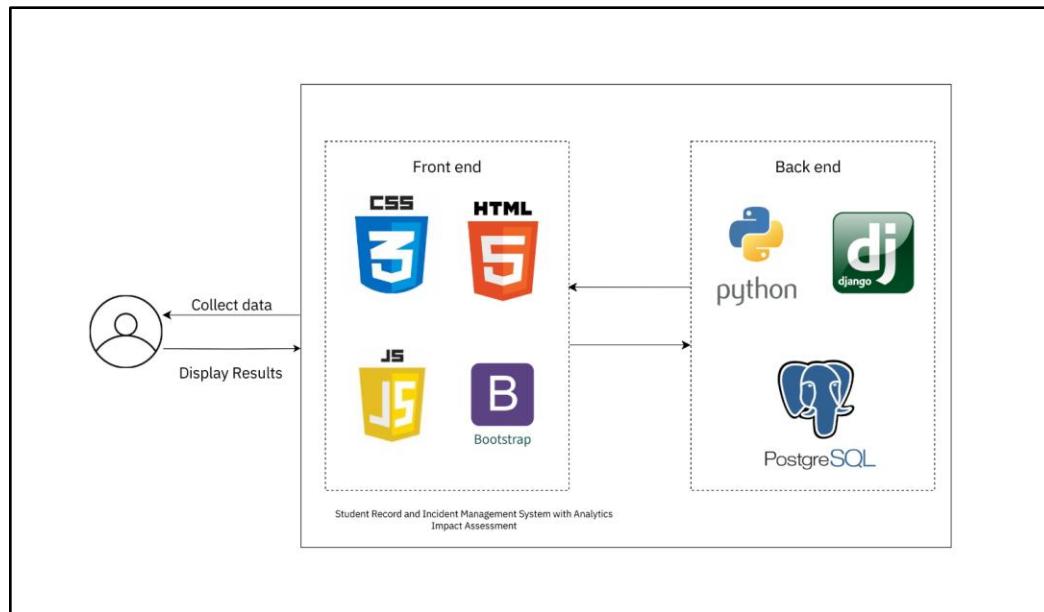
Each user must authenticate through the system before accessing their respective features. The diagram outlines how each role accesses and utilizes the system according to their responsibilities, reinforcing a role-based access structure. Moreover, the diagram captures the comprehensive functionality of the system and clearly represents how the platform supports the guidance office's operations in a structured, efficient, and user-oriented manner.

### **3.4 System Design**

The system design was explained during this interval. Diagrams such as a use case diagram, a sequence diagram, and a data flow diagram were created to make the system more understandable.

## System Architecture

**Figure 3-5. System Architecture**



In the design phase of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School, comprehensive research and stakeholder consultation are undertaken to identify specific needs and system requirements. The system is developed to address key challenges in the current manual process, such as inefficient tracking of

student records, delayed incident reporting, and the lack of centralized analytics for behavioral trends.

The core functionalities include digitizing student record management, streamlining incident reporting, enabling real-time access to student profiles, and integrating analytics to support data-driven decision-making. A web-based application is designed to ensure easy accessibility for guidance counselors and administrative staff.

User interface mock-ups and wireframes are developed to illustrate the system's layout, ensuring intuitive navigation and usability. The system architecture is meticulously planned, defining database schemas, application layers, and integration modules that support data accuracy, scalability, and efficient retrieval.

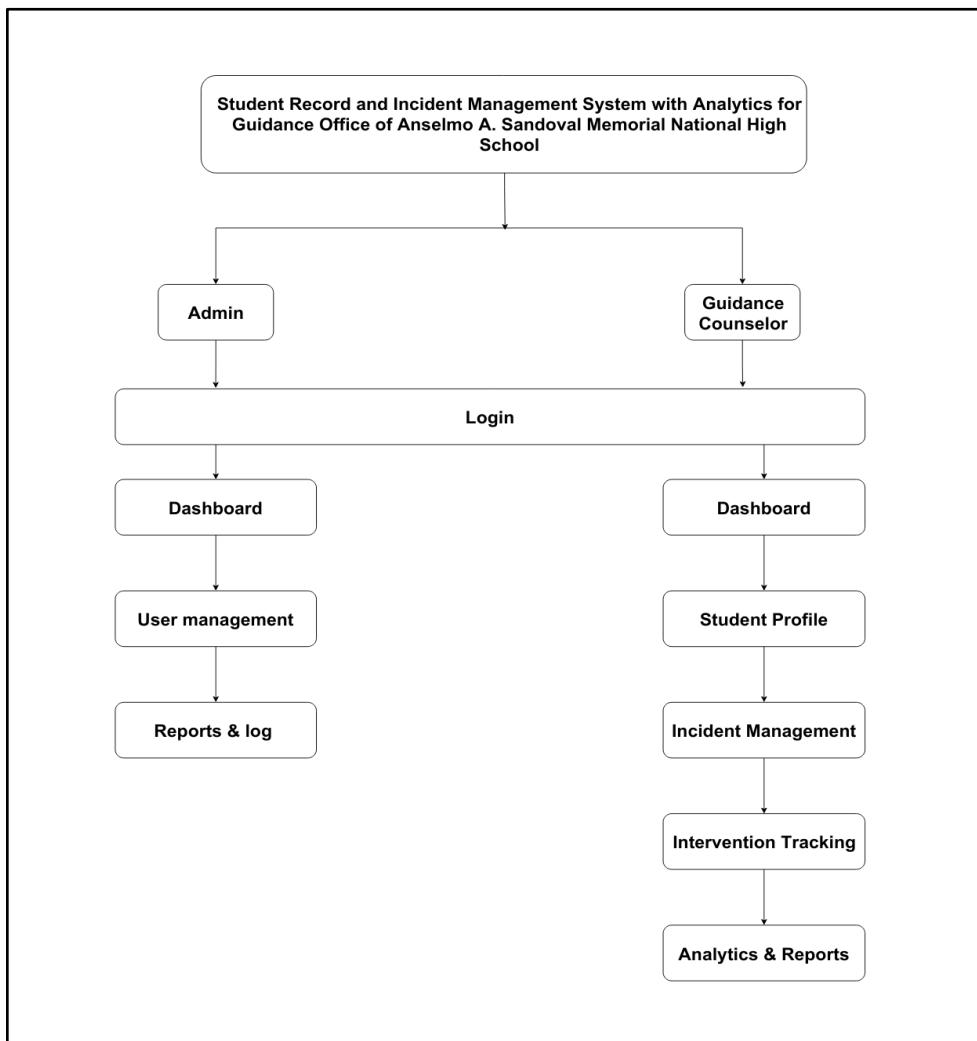
Advanced security protocols are integrated to safeguard student data, maintain confidentiality, and comply with data privacy regulations. Throughout the design phase, continuous engagement with end-users and iterative feedback loops help refine the system to align with the operational needs and strategic goals of the Guidance Office.

## **Link Architecture**

Figure 3-6 represents the structure of the Student Record and Incident Management System with Analytics used by the Guidance Office of Anselmo A.

Sandoval Memorial National High School. The system supports two primary user roles: Admin and Guidance Counselor. Both user roles begin with a login process that leads them to their respective dashboards.

**Figure 3-6. Link Architecture Diagram**



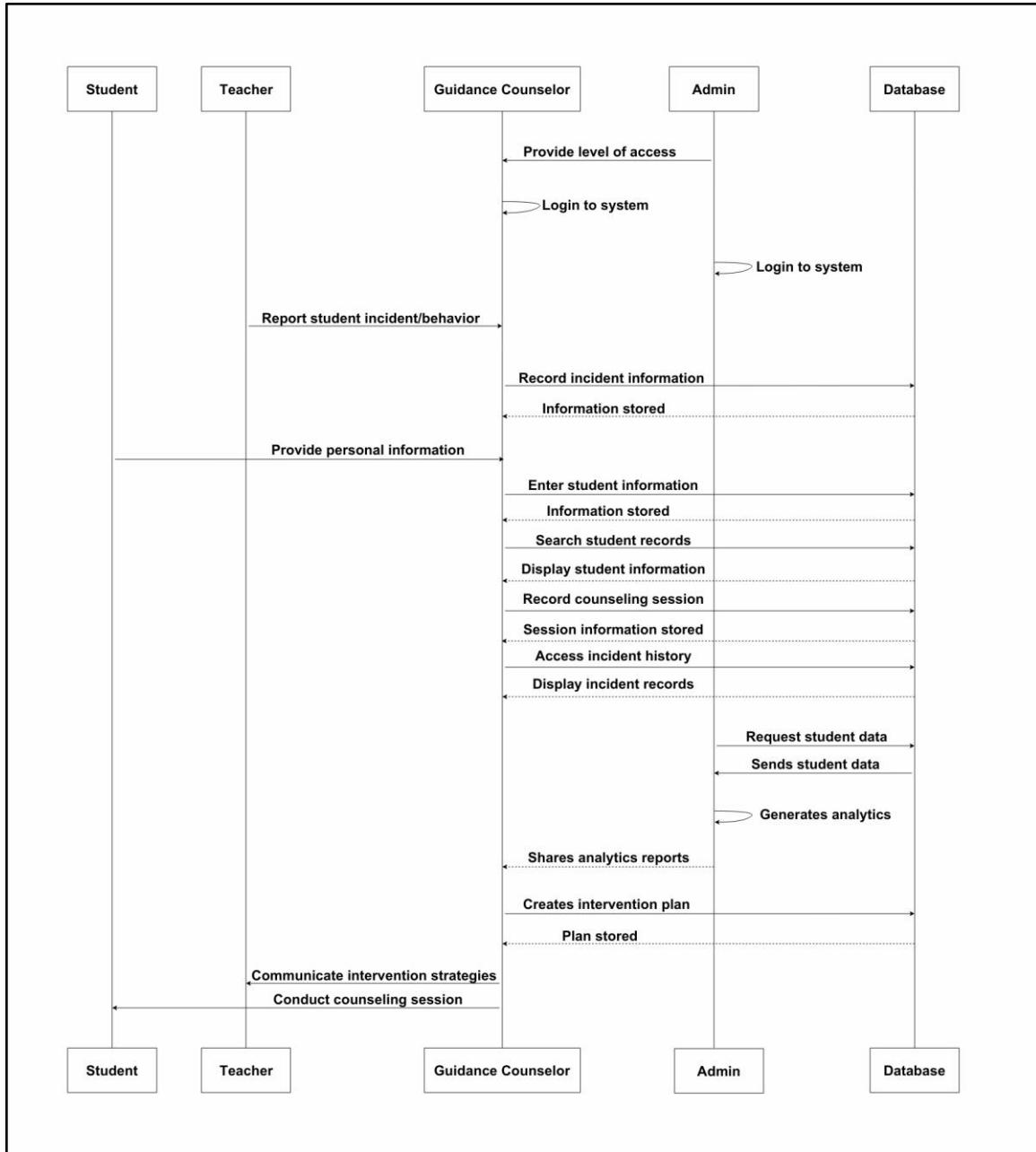
From the Admin dashboard, users can access user management functionalities, allowing them to handle account-related tasks. They also have

access to the reports and log section, which is used for monitoring system activity and maintaining records. For the Guidance Counselor, the dashboard is designed to manage student-related tasks. It includes access to student profiles, which serve as the foundation for understanding individual student backgrounds. Counselors can then proceed to incident management, where they record and address disciplinary or behavioral issues. Following this, the intervention tracking module helps them monitor the measures taken to support students. Finally, the system provides analytics and reporting features, enabling data-driven insights and decision-making regarding student behavior and outcomes.

### **Sequence Diagram**

Figure 3-7 illustrates the operational flow of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School, showcasing interactions between key users: Student, Teacher, Guidance Counselor, Admin, and the Database. Each user is represented by a vertical lifeline, while arrows indicate the direction and sequence of actions.

**Figure 3-7. Sequence Diagram**



The process begins with the Guidance Counselor logging into the system with access provided by the Admin. Teachers report student incidents to the guidance counselor in the guidance office, which can record and stored in the database. The counselor gathers personal information from the student, enters it into

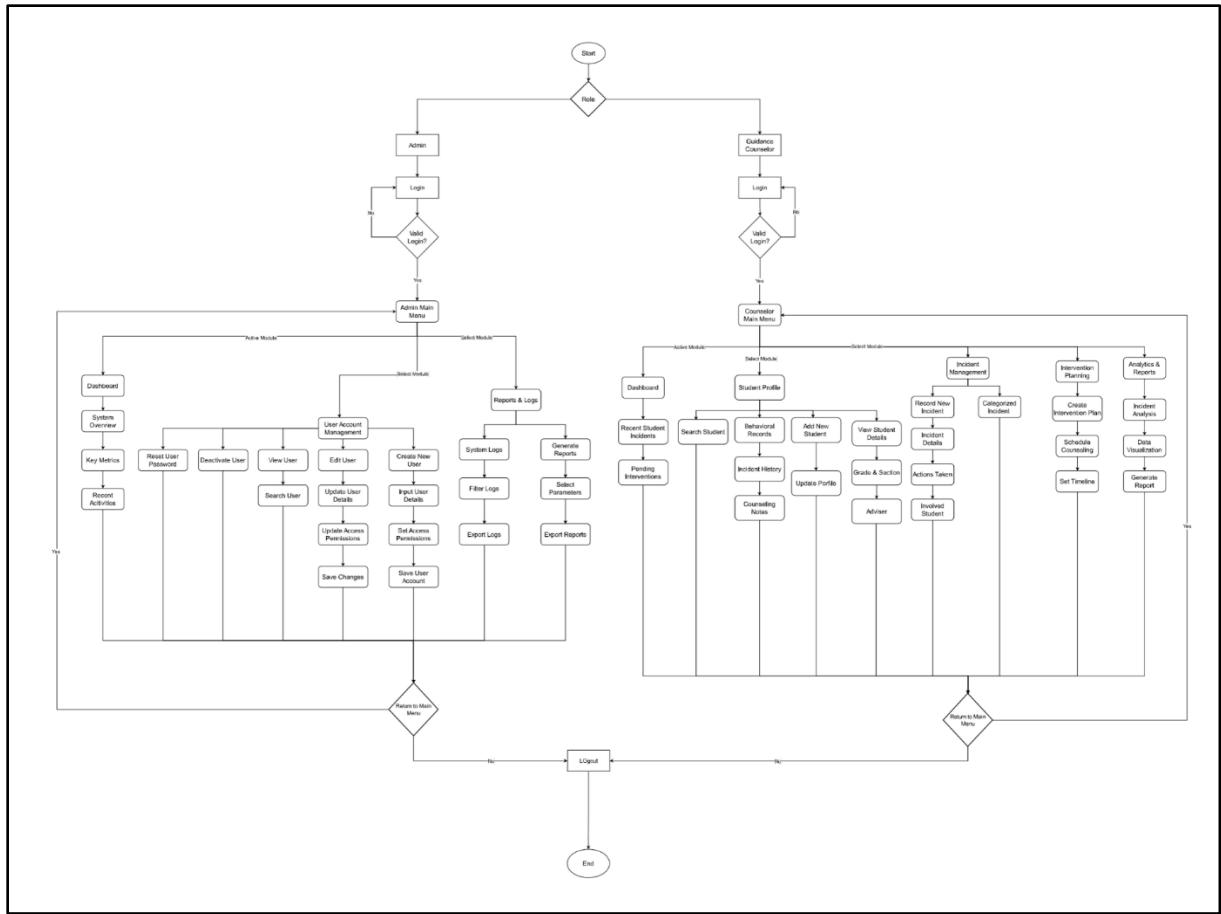
the system, and accesses student records and incident history as needed. Counseling sessions are logged, and all relevant information is continuously stored in the database for reference.

The admin can request student data and generate analytics, which are shared with the Guidance Counselor to inform decision-making. Based on the gathered data and reports, the counselor creates a personalized intervention plan, which is stored and communicated to both the student and teacher. The process concludes with the implementation of intervention strategies through a counseling session. Throughout this workflow, the database acts as the central hub, ensuring consistency, data accuracy, and seamless coordination across all users, ultimately supporting a responsive and effective student support system.

## **Flow Chart**

Figure 3-8 illustrates the overall system flow of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School. The process begins at the login stage, where users are categorized as either Admin or Guidance Counselor. After logging in, the system verifies their credentials to direct them to their respective dashboards.

**Figure 3-8.** *Flowchart for Admin and User*



For the Admin, the dashboard provides access to system management features, including managing user accounts, viewing and updating key metrics, and performing administrative tasks. The Admin can place, deactivate, or search users, view approval requests, and manage system logs. Additionally, the Admin can generate reports, filter logs, and export analytics data to monitor system performance and track user activity.

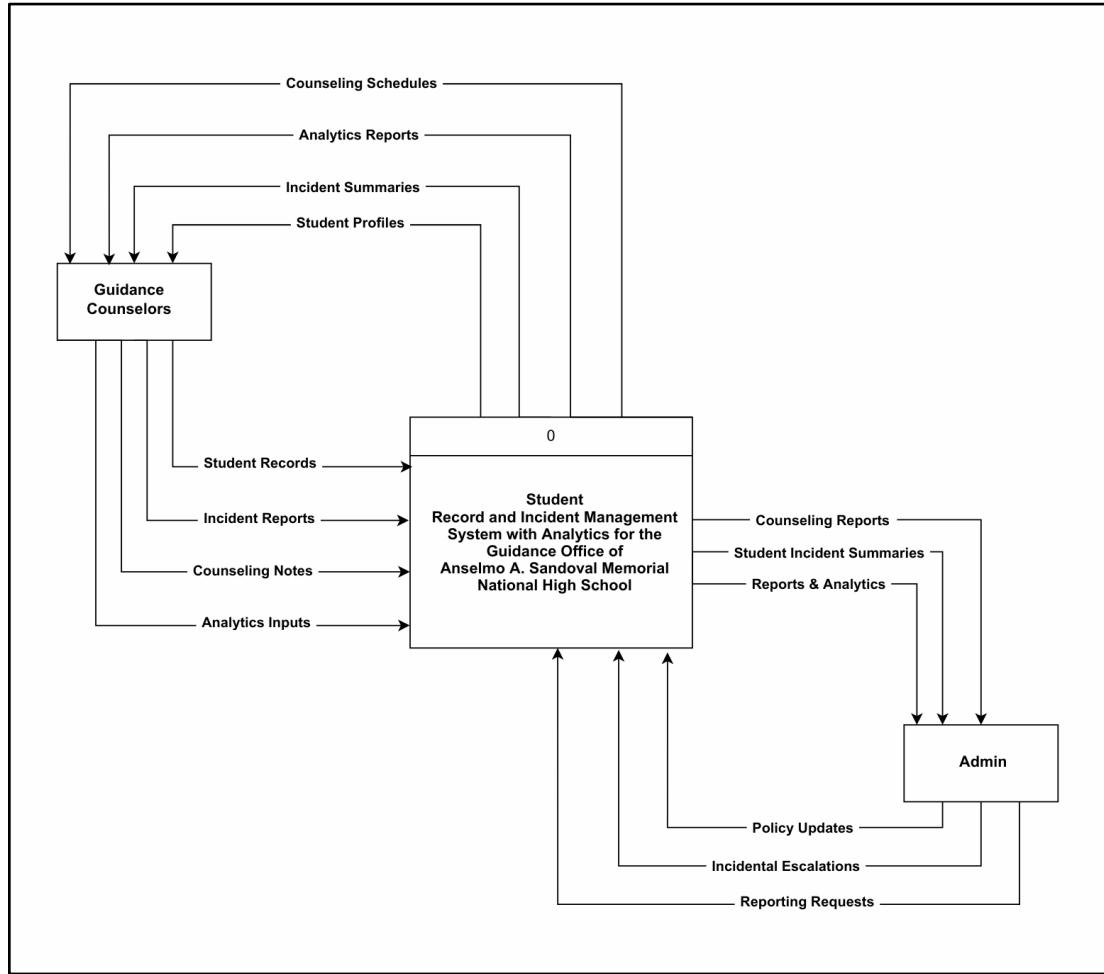
On the other hand, the Guidance Counselor is given access to modules tailored to student support and behavioral tracking. Upon successful login, they can

view their dashboard, which includes real-time updates, recent incidents, and overall behavior summaries. Counselors can manage student profiles by adding new records, updating existing ones, and viewing student history and attachments. They can also access modules for recording incident details, categorizing the severity, setting interventions, and generating counseling logs. Furthermore, they can evaluate behavioral trends through the analytics panel and generate printable reports for documentation.

### **Context Diagram**

This diagram illustrates how the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School functions as a central platform that facilitates the exchange of information between guidance counselors and administrative staff.

**Figure 3-9. Context Diagram**



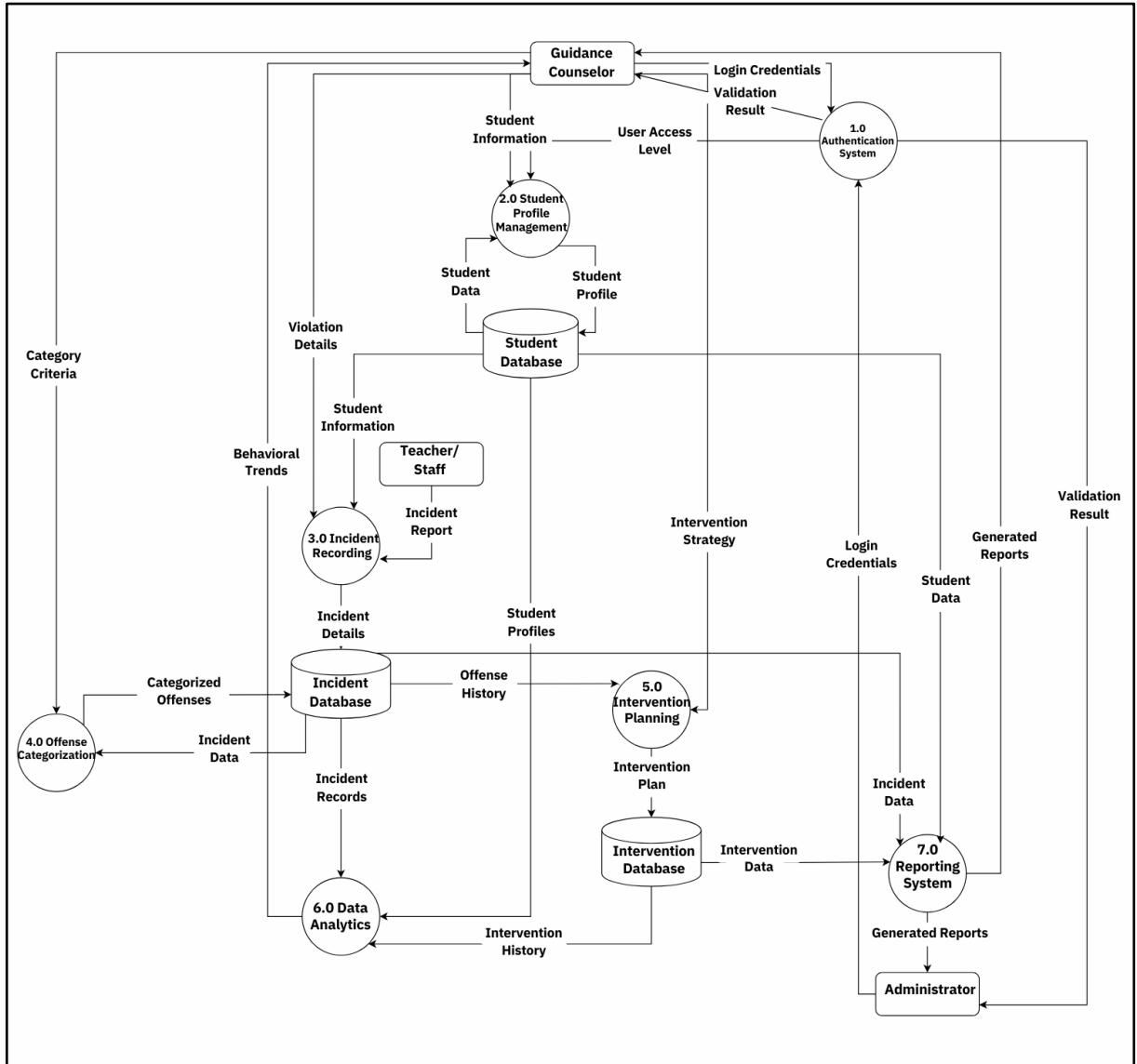
In Figure 3-9, guidance counselors input key data into the system such as student records, incident reports, counseling notes, and analytics inputs. In return, they receive important outputs like counseling schedules, analytics reports, incident summaries, and student profiles. These outputs help them monitor, assess, and plan appropriate interventions for students more effectively.

On the other hand, the admin side provides inputs like policy updates, incidental escalations, and reporting requests. The system processes this data and generates outputs such as counseling reports, student incident summaries, and comprehensive reports and analytics. By serving as an intermediary between counselors and administrators, the system ensures streamlined communication, accurate documentation, and timely reporting. Overall, it promotes an organized and data-driven environment for managing student welfare and behavior, enhancing the overall efficiency and effectiveness of the school's guidance services.

### **Data Flow Diagram**

The flow of information between each end user is illustrated in Figure 3-10 Data Flow Diagram (DFD) using De Marco and Yourdon method. This diagram provides a high-level overview of how the student behavior monitoring and intervention system operates, showing the movement of data between users and internal processes. It outlines how key stakeholders such as guidance counselors and administrators interact with the system to manage student profiles, record incidents, categorize offenses, plan interventions, and generate reports.

**Figure 3-10. Data Flow Diagram**



The system begins with user authentication, which validates login credentials before granting access to the system's various functions. Once authenticated, users can retrieve or update student data through the Student Profile Management module, which is stored in the Student Database.

Guidance counselors report behavioral incidents via the Incident Recording module, storing detailed reports in the Incident Database. These reports are then categorized through the Offense Categorization module based on predefined criteria. This categorized data supports the Intervention Planning process, which uses both student profiles and offense histories to develop tailored intervention strategies stored in the Intervention Database. The Reporting System compiles data from multiple modules to generate comprehensive reports for administrators, while the Data Analytics module identifies trends and patterns in student behavior. Overall, the DFD illustrates how the system ensures efficient data flow and supports informed decision-making for student behavior management and intervention planning.

### **3.4.1 Software Requirements Specifications**

Student Record and Incident Management System with Analytics is a web-based platform designed for the Guidance Office of Anselmo A. Sandoval Memorial National High School. It digitizes the entire process of managing student records, behavioral incidents, and counseling interventions. The system incorporates data analytics to help guidance counselors identify behavioral trends, monitor recurring violations, and make evidence-based decisions. In essence, the system aims to eliminate manual filing errors, reduce processing time, enhance data accuracy, and

support more responsive and personalized student interventions for a safer and more efficient school environment.

#### *3.4.1.1 Functional Requirements*

These requirements outline the core features and capabilities that the system must deliver to effectively support the needs of the guidance counselors and school administrators.

##### **1. User Authentication and Authorization**

1.1 The system must allow secure login for guidance counselors and administrators.

1.2 Access levels must vary depending on user roles to maintain data security and confidentiality.

##### **2. Student Profile Management**

2.1 The system must allow authorized users to create, view, and update student records.

2.2 Student profiles must include personal details, academic year, counseling history, and behavioral records.

##### **3. Incident and Violation Recording**

3.1 The system must enable staff to report and categorize behavioral incidents or deficiencies.

3.2 Repeated offenses should be tracked and flagged for counselor intervention.

#### 4. Intervention and Counseling Documentation

4.1 Counselors must be able to create and manage personalized intervention plans tied to each student profile.

4.2 The system should allow tracking of counseling session frequency, outcomes, and follow-ups.

#### 5. Reports and Analytics

5.1 Real-time analytics must be generated to show trends such as the most common violations, at-risk students, and intervention success rates.

5.2 These analytics must support data-driven decisions by the guidance office and school administration.

#### 6. . Data Privacy and Protection

6.1 All sensitive student data must be encrypted and securely stored in compliance with data privacy laws (e.g., Data Privacy Act of 2012).

6.2 Access control mechanisms must ensure that only authorized users can view or modify specific data.

*3.4.1.2 Non-Functional Requirements*

1. Accessibility

1.1 Authorized guidance staff and administrators must be able to securely access the system via a web-based interface.

1.2. The system should be accessible through desktop or laptop computers (PCs) with a stable internet connection and supported web browser.

1.3. A user-friendly, responsive interface is required to ensure ease of use for staff with varying technical skills.

2. Accuracy

2.1 The system must maintain current and precise data on student records, incidents, and counseling activities.

2.2 All updates like counseling notes and incident reports should be reflected in real-time to ensure data reliability.

3. Compatibility

3.1 The system must support major web browsers including Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

3.2. It should provide seamless usability across different screen sizes and devices, including desktops, tablets, and mobile phones.

Specifies how the system should behave and that it is a constraint upon the behavior of the system. It is the quality attributes of a system.

#### 4. Security

4.1 . Role-based access control and authentication are required to restrict data access to authorized personnel only.

4.2. Sensitive student data must be encrypted during storage and transmission to uphold data privacy standards.

4.3. The system must implement automated backups and secure storage to prevent data loss and support recovery.

#### 5. Performance

5.1 The system should process user requests, such as record retrieval and report generation, within a few seconds.

5.2. It must support concurrent access by multiple users (guidance counselors and admin) without degradation in performance.

## 6. Maintainability

6.1 The software code should be modular and well-documented to simplify maintenance and future enhancements.

6.2. Administrative configurations such as role settings and reporting criteria should be editable through the interface without requiring technical intervention.

## 7. Reliability

7.1 The system should ensure high uptime with minimal downtime for maintenance.

7.2. In the event of system failure, backup and recovery procedures must allow for rapid restoration of services.

### **3.4.2 Hardware and Software Requirements**

#### **Hardware Requirements**

To guarantee the smooth and efficient operation of the Student Record and Incident Management System with Analytics, it is essential for guidance counselors

and school administrators to use hardware that meets or exceeds the system's requirements. These users are responsible for inputting, updating, analyzing, and retrieving sensitive student data. Therefore, their hardware must be capable of handling data processing, secure access, and system analytics functions without delays or system interruptions.

The evaluation of hardware requirements takes into consideration essential components such as the processor, memory (RAM), storage capacity, display resolution, network interface, input devices, and the operating system. These specifications are designed to maintain consistent system reliability and responsiveness, especially in handling high volumes of student data and behavioral records.

For administrative and guidance counselor access, desktops or laptops with stable internet connections are recommended. A modern desktop or laptop setup with stable internet connectivity and sufficient processing power is vital for daily operations such as encoding records, generating reports, and reviewing behavioral analytics. This flexibility ensures the system is accessible across a range of hardware platforms without compromising functionality.

**Table 3-1.** Minimum Hardware & Network Requirements

| <b>Hardware Component</b> | <b>Minimum Requirements</b> | <b>Recommendation Requirements</b>            |
|---------------------------|-----------------------------|---|
| Processor                 | Intel Core i3 or equivalent | Intel Core i7 or Higher                       |
| Hard Disk Drive           | At least 500 GB HDD         | 800 GB SSD or Higher                          |
| Memory (RAM)              | At least 4GB                | 8GB or Higher                                 |
| Graphics Card             | Integrated Graphics         | Dedicated Graphics Card                       |
| Network Interface         | Ethernet Port or Wi-Fi      | Gigabit Ethernet or Dual-Band Wi-Fi           |
| Display                   | 1366x768 resolution         | 1920x1080 Full HD resolution                  |
| Operating System          | Windows 7 or later          | Windows 10 Pro / macOS / Linux                |
| Cooling System            | Standard Fan Cooling        | Advanced Air Cooling or Liquid Cooling System |

### **Software Requirements**

The Student Record and Incident Management System with Analytics was developed using a robust combination of modern technologies to deliver a secure, efficient, and intuitive platform tailored for counselors and administrators. The front end of the system was crafted using HTML, CSS, JavaScript, and Bootstrap to ensure a responsive and user-friendly interface that adapts seamlessly across various devices. On the backend, Python and the Django web framework were utilized to

manage secure workflows, role-based access control, and complex data structures efficiently.

To support reliable data management, PostgreSQL was selected as the database solution for its stability and capacity to handle extensive student and incident records. Development was carried out using Visual Studio Code (VS Code), a lightweight and versatile code editor that enhances productivity through its powerful extension support, debugging features, and Git integration. This combination of tools and frameworks ensures that the system is both scalable and maintainable, capable of supporting the evolving needs of the Guidance Office.

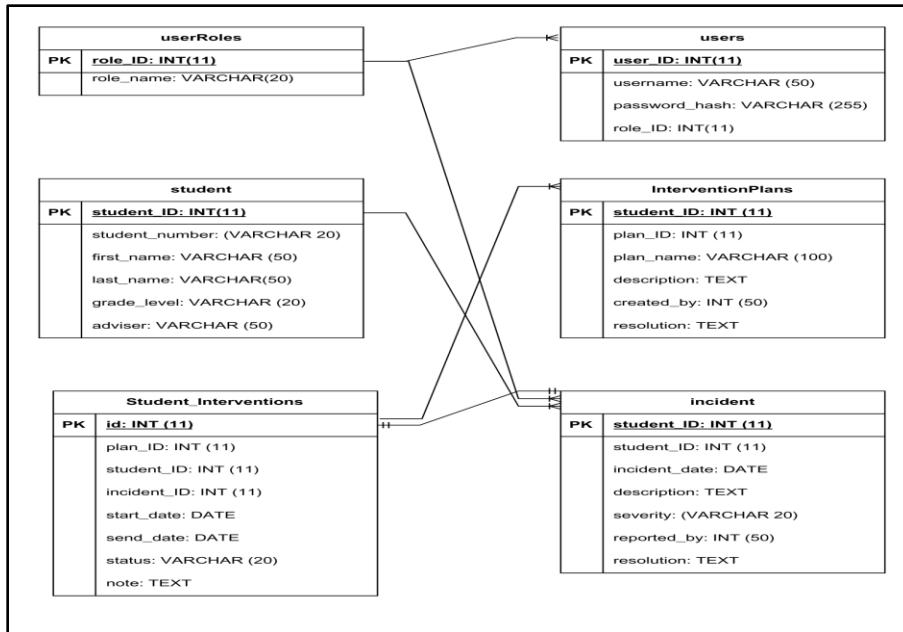
**Table 3-2. Software Requirements & Specification**

| <b>Programming Language</b> | <b>Programming Tools</b> | <b>Database</b> | <b>Operating System</b>                     | <b>Others</b>                               |
|-----------------------------|--------------------------|-----------------|---|---|
| HTML                        | Visual Studio Code       | PostgreSQL      | Windows 7 or Newer                          | AI-Powered Analytics                        |
| CSS                         | Visual Studio Code       | PostgreSQL      | macOS, Linux, Android, iOS                  | Mobile and Cloud Compatibility              |
| JavaScript                  | Visual Studio Code       | PostgreSQL      | Web Browser (Chrome, Firefox, Safari, Edge) | Web Browser (Chrome, Firefox, Safari, Edge) |
| Django                      | Visual Studio Code       | PostgreSQL      | Cross-Platform                              |   |

### 3.4.3 Database Design

Database design was used to make sure the data stayed consistent, efficient, and scalable. A data model was created to define how the data would be structured, stored, and accessed. Tables were used to represent entities, and their relationships were set up based on what was needed. The design process included normalizing the data to cut down on redundancy and keep the data accurate and reliable. Indexing was also used to speed up queries and make data retrieval faster. Constraints like primary keys, foreign keys, and unique constraints were added to make sure the data stayed accurate and consistent. Security was also considered, with things like user authentication, role-based access control, and encryption added to protect the data.

**Figure 3-10. Database Design**



### **3.4.4 Trade-off and Multiple Attributes**

System design for the Student Record and Incident Management System with Analytics involved navigating several critical trade-offs to meet the diverse needs of the Guidance Office, teaching staff, school administrators, and students.

During the design and development phases, essential system characteristics—including cost-efficiency, scalability, reliability, maintainability, security, performance, and usability—were thoroughly evaluated. Decisions were made to ensure a balance between providing robust features such as real-time incident tracking and analytics, while maintaining system simplicity and ease of use for non-technical users. Constraints are limiting factors that influence the tools and technologies suitable for system development. For the successful creation of the Record Management System for the Guidance Office in Mabini, Batangas, it was essential to evaluate various programming languages, frameworks, and tools to determine the most effective options.

**Table 3-3. Evaluation of Programming Languages and Tools Used in the Development**

| <b>Considered Tools</b> | <b>Structure</b> | <b>Interactivity</b> |
|-------------------------|------------------|----------------------|
| HTML                    | 5                | 3                    |
| JavaScript              | 3                | 5                    |

|               |   |   |
|---------------|---|---|
| CSS           | 4 | 3 |
| Bootstrap     | 4 | 4 |
| Python Django | 4 | 4 |

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Table 3-3 presents the programming languages and tools used during the development of the project, evaluated based on their effectiveness in building page structure and enabling interactivity—two critical factors in creating a responsive and user-friendly system. HTML received the highest score of 5 for structure due to its role as the foundational language for organizing and presenting content on the web. Python Django and CSS followed with a score of 4 each, recognized for Django’s ability to streamline backend logic and enforce clean architectural patterns, and CSS’s contribution to consistent styling and layout design. In terms of interactivity, JavaScript scored the highest with a 5, as it plays a vital role in enhancing user experience through dynamic content updates and real-time interaction. Bootstrap, which complements both structure and interactivity, scored 4 for its grid system and built-in responsive components that significantly reduce development time while maintaining a polished user interface. Meanwhile, HTML and CSS scored 3 in interactivity since they lack native scripting capabilities but still contribute indirectly through markup and styling. This comprehensive evaluation ensured that each tool aligned well with the system’s usability goals and technical requirements.

**Table 3-4.** *Evaluation of Database Tools*

| <b>Considered Database</b> | <b>Familiarization</b> | <b>Ease of Use</b> |
|----------------------------|------------------------|--------------------|
| PostgreSQL                 | 5                      | 5                  |
| MySQL                      | 3                      | 3                  |
| MariaDB                    | 3                      | 3                  |
| Oracle                     | 2                      | 2                  |

Table 3-4 presents the evaluation of four database tools considered during the development of the system—MySQL, MariaDB, Oracle, and PostgreSQL. To ensure efficient data management and seamless integration with the backend, the databases were assessed based on two main criteria: familiarization and ease of use. These were rated on a scale from 1 (lowest) to 5 (highest). PostgreSQL emerged as the primary choice due to its robustness, scalability, and prior experience of the development team, earning a score of 5 in both categories. Its ability to handle complex queries, support large datasets, and maintain reliability in production environments made it the most suitable option for the system. MySQL also performed strongly, particularly in the familiarization category, receiving a 5, as it was commonly used in earlier local development environments such as XAMPP. Additionally, it earned a 5 for ease of use due to its simplicity and broad community support. In contrast, MariaDB, Oracle, and PostgreSQL (from a broader developer familiarity standpoint) were each rated 3 for both criteria, as they either required a

steeper learning curve or were less familiar to the development team despite their capabilities. This structured evaluation helped ensure that the chosen database aligned with both the technical requirements of the system and the team's proficiency.

### **3.5 Development**

The development of the Student Record and Incident Management System with Analytics was driven by the need to deliver a reliable, secure, and user-friendly platform tailored to the operational requirements of the Guidance Office at Anselmo A. Sandoval Memorial National High School. The system was built using a combination of modern web technologies to ensure smooth performance, maintainability, and scalability.

On the front-end, developers utilized HTML, CSS, and JavaScript to create an intuitive and responsive user interface accessible across various devices. The design focused on simplicity and usability to support guidance counselors, and administrators with minimal learning curve. Interactive elements were implemented to improve the efficiency of tasks such as reporting incidents, viewing student profiles, and generating behavioral summaries.

For the back-end, the system was developed using the Python Django framework, chosen for its built-in security features, rapid development capabilities, and robust support for data modeling and role-based access control. Django's modular structure allowed for clear separation of concerns across different system modules, such as incident management, student records, and analytics reporting.

PostgreSQL was used as the primary database system due to its strong support for relational data, advanced querying capabilities, and transactional reliability. The database schema was carefully designed to handle complex relationships between students, incident reports, counseling logs, and user roles, while ensuring data integrity and scalability.

### **3.5.1 Software Development Tools**

The software development of the Student Record and Incident Management System with Analytics followed a full-stack approach, combining front-end technologies such as HTML, CSS, and JavaScript with back-end technologies like Python and the Django framework for secure and efficient server-side processing. PostgreSQL was used for managing the system's relational database, ensuring reliable data storage and access for student records, incident logs, and analytics data. Development was carried out using Visual Studio Code, which provided a streamlined coding environment with tools for syntax highlighting, real-time

debugging, and Git-based version control. Figma was utilized during the design phase to prototype user interfaces and maintain visual consistency across different modules of the platform.

### **3.5.2 Hardware Development Tools**

The Student Record and Incident Management System with Analytics was developed using a combination of hardware and software tools. The primary hardware tools included a keyboard, mouse, monitor, as well as mobile devices, laptops, and desktop computers. These were essential for testing and ensuring that the system could be accessed effectively by various types of users across different platforms. The system was designed with compatibility in mind, allowing it to function smoothly across a range of hardware configurations. This ensured accessibility for guidance counselors and administrators regardless of their device specifications.

## **3.6 Testing and Evaluation**

The testing and evaluation phase of the Student Record and Incident Management System with Analytics for the Guidance Office at Anselmo A. Sandoval Memorial National High School will focus on verifying the system's functionality, ensuring it meets user expectations, and confirming that it operates

without significant issues. The verification process will involve a series of activities including code reviews, compliance with defined requirements, and walkthroughs to check that key modules like student data management, disciplinary record tracking, and analytics features are working as designed.

Validation will be conducted through user acceptance testing (UAT) involving guidance counselors and school administrators to confirm that the system provides the necessary functionality for improving student record-keeping, incident tracking, and decision-making support. Feedback from these users will be collected to ensure the system meets their needs in practical, real-world applications.

Testing activities will include unit testing, integration testing, system testing, and security testing. Unit testing will ensure that individual modules such as the student database, behavior incident tracker, and reporting tool function as expected. Integration testing will verify that the system's components interact properly with each other. System testing will focus on evaluating the performance of the platform under various operational conditions, both typical and extreme. Security testing will check the robustness of data protection measures to ensure sensitive student information is safeguarded.

Quantitative metrics such as system uptime, error rates, and processing time for record queries will be assessed to measure technical performance. In addition,

qualitative feedback through user satisfaction surveys and interviews will be analyzed to gauge the system's usability and effectiveness from the user's perspective. This comprehensive testing and evaluation approach is designed to ensure that the Student Record and Incident Management System not only meets its technical requirements but also supports the guidance office's goal of improving student support and fostering a positive learning environment.

### **3.7 Deployment**

The deployment of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo A. Sandoval Memorial National High School will be conducted in a phased approach to minimize disruption. The process will begin with pilot testing, involving a select group of guidance counselor and administrator to validate system performance in real-world conditions. Following successful pilot testing, the system will be gradually rolled out, expanding to additional users and incorporating their feedback for continuous improvement. The system will be hosted on a cloud-based infrastructure, ensuring scalability, high availability, and secure data backups. School staff, including IT and guidance office personnel, will be actively involved in the deployment to provide feedback, address issues, and stabilize the system for full integration into daily operations.

### **3.7.1 Sustainability and Maintenance Plan**

To ensure the long-term success and operation of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo

A. Sandoval Memorial National High School, a comprehensive system demonstration will be provided for end-users, focusing on system functionality, data management, incident tracking, and best practices for maintaining confidentiality and security of student information. After deployment, a formal turnover process will transfer ownership of the system to the school's Guidance Office and school administrator. Technology transfer activities will equip local personnel with the skills needed for routine system maintenance, data backups, and user access management. A proactive maintenance plan will be established, which includes regular updates, system optimizations, bug fixes, and security checks. Quarterly reviews will also be conducted to collect feedback, assess system performance, and ensure continuous improvements to meet the evolving needs of the school.

### **3.7.2 Risk Management Plan**

Throughout the development and deployment of the Student Record and Incident Management System with Analytics for the Guidance Office of Anselmo

A. Sandoval Memorial National High School, several potential risks have been identified that may impact the success of the project. A structured risk management

approach will be followed, utilizing a Risk Assessment Matrix to evaluate and address risks related to system functionality, user adoption, data security, and integration.

**Table 3.5** Risk Assessment Matrix

|   |                   | SEVERITY          |                  |                    |                    |
|---|-------------------|-------------------|------------------|--------------------|--------------------|
|   |                   | ACCEPTABLE<br>(1) | TOLERABLE<br>(2) | UNDESIRABLE<br>(3) | INTOLERABLE<br>(4) |
| P<br>R<br>O<br>B<br>A<br>B<br>I<br>L<br>I<br>T<br>Y | IMPROBABLE<br>(1) | Low               | Medium           | Medium             | High               |
|   | POSSIBLE<br>(2)   | Low               | Medium           | High               | Extreme            |
|   | PROBABLE<br>(3)   | Medium            | High             | High               | Extreme            |

**Table 3.6** Risk Management Plan

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| Risk | P | S | RE | Mitigation |
|------|---|---|----|------------|
|------|---|---|----|------------|

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|   |   |   |        |   |
|---|---|---|--------|---|
| System Downtime or Failure              | 2 | 3 | High   | Conduct regular maintenance and real-time monitoring. Activate backup server and inform users of temporary measures. Maintain logbooks for temporary use.     |
| Internet Connectivity Issue             | 2 | 2 | Medium | Maintain manual logbooks for temporary use and sync data once the internet is restored  |
| Data Loss Due to Human Error            | 2 | 2 | Medium | Recover data from backups and limit editing permissions to trusted users  |
| Forgotten Admin or User Credentials     | 2 | 2 | Medium | In cases where automatic recovery fails, assign a system administrator to manually verify the user's identity and reset credentials through a secure protocol |
| Server Hosting Issues or Service Expiry | 2 | 3 | High   | Monitor server health and renew subscriptions in advance. Use a backup hosting plan or switch to a local server temporarily                                   |
| Data Breach or Unauthorized Access      | 2 | 3 | Medium | Implement user authentication, role-based access, and data encryption   |

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