LIPA GRACE ACADEMY STUDENT PERFORMANCE MONITORING WITH ANALYTICS

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In Partial Fulfillment
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Major in Business Analytics

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APPROVAL SHEET

This capstone project entitled **LIPA GRACE ACADEMY STUDENT PERFORMANCE MONITORING SYSTEM WITH ANALYTICS** prepared and submitted by Thea Clarisse P. Delos Santos, Jussel Elejorde, Keanne E. Lopez in partial fulfillment of the requirements for the degree **Bachelor of Science in Information Technology Major in Business Analytics**, has been examined and is recommended for acceptance and approval for oral examination.

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ABSTRACT

With the profound impact of digital technologies, the monitoring of student performance emerged as a key challenge. Lipa Grace Academy, serving 1,253 students and 57 faculty members in Lipa City, Batangas, faced challenges in its growing educational environment. The traditional method of generating weekly reports using macro spreadsheets and emailing them individually proved time-consuming and error-prone. Moreover, students lacked access to their grades online, with reports accessible only to teachers. To address these issues, developers proposed a Student Performance Monitoring System. This system includes online grading, progress tracking which includes completed and missing activities, and analytics to determine academic honors eligibility, enhancing the overall learning experience. Lipa Grace Academy's goal is to ensure inclusive, high-quality education, contributing to the achievement of Sustainable Development Goal 4. The results of this endeavor have been profound. The successful implementation of the system expedited the creation and dissemination of weekly reports, reducing the time and errors associated with manual methods. Moreover, the system's analytics capabilities have offered insights into students' academic performance, enabling educators to make data-driven decisions. This, in turn, allows students to track their progress and understand the specific requirements for academic honors. It has fulfilled the primary objective of enhancing educational processes through digital technology, revolutionizing the traditional administrative methods and paving the way for more efficient, error-reducing, and data-driven educational practices.

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T.C.P.D.S

J.E

K.E.L

DEDICATION

This work is sincerely and completely 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,

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who have given us their limitless moral and financial support

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K.E.L

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CHAPTER I

INTRODUCTION

Background of the Study

The introduction of digital technologies profoundly affected many facets of human existence, including education. Recent technological advancements have presented novel opportunities for enhancing student performance monitoring. Incorporating technology into educational institutions has brought about a revolutionary shift in the collection, analysis, and dissemination of educational data. By leveraging digital platforms, software applications, and analytics tools, schools can streamline and automate the monitoring of student performance.

Monitoring student performance is an essential component of educational institutions because it enables educators to assess and track students' academic progress, identify areas for development, and provide timely feedback. Monitoring performance among students has traditionally relied on manual techniques, such as record-keeping and paper-based reports. However, these methods are time-consuming, error-prone, and lack the efficacy necessary to meet the demands of the current educational environment.

The United Nations recognizes the significance of quality education as a fundamental human right and a catalyst for sustainable development. Hence, it has established Sustainable Development Goal 4 (SDG 4) to ensure inclusive and

equitable education and promote opportunities for lifelong learning for all. Through developing a Student Performance Monitoring that meets the requirements of both teachers and students, Lipa Grace Academy seeks to contribute to the achievement of SDG 4 and provide its students with a quality education.

Lipa Grace Academy is a private school located at 28 B. Morada Ave. 4217 Lipa City, Batangas, has been providing education to its students for 52 years, catering to more than 1,000 students from elementary to junior high school. It was founded on July 5, 1970, and has provided quality education to students for over five decades. The school is committed to equipping students with knowledge, skills, and values to make them responsible and productive citizens.

Many educational institutions continue to encounter difficulties in administering and monitoring student performance. The Lipa Grace Academy uses a macro spreadsheet to generate weekly student reports emailed to each student individually. The weekly progress reports include their missing/completed/incomplete assignments and assessments. In addition, students cannot view their grades online, as only teachers can access the reports in the macro spreadsheet. Although this report generation method is well-intended, it is time-consuming, inefficient, and does not provide students instant access to their grades. In addition, the lack of an online platform for students to access their grades and monitor their progress hinders their ability to make informed academic decisions towards enhancing their learning outcomes.

Rather than relying on traditional physical report cards, the school prefers the value of providing students with a digital platform to access and review their grades seamlessly. The current system, characterized by its inefficiencies and limited transparency, presents significant obstacles for instructors in their efforts to effectively monitor and manage student performance. Instructors are burdened with the time-consuming task of manually generating and distributing reports, often resulting in delays and potential errors. Moreover, the lack of transparency within the existing system means that instructors may struggle to gain a comprehensive overview of student progress, hindering their ability to identify struggling students and provide timely support. The inability of students to access their weekly progress within the system may impact their motivation and interest in learning. Therefore, the developers propose a Student Performance Monitoring System with Analytics that has comprehensive monitoring and tracking capabilities.

To address the issues, the researchers propose developing a Student Performance Monitoring System for elementary to junior high school pupils at Lipa Grace Academy. The system will enable instructors to input students' raw scores for various activities and assessments in which the grade will be automatically computed. In contrast, the system will provide students with a dashboard to view their grades and monitor their weekly progress regarding incomplete, missing, or completed activities and quizzes.

The proposed system will also integrate analytics, enabling the system to provide valuable insights into students' performance, such as tracking analytics for

determining the required percentage for academic honors. The proposed system will provide the institution with a valuable tool for managing and monitoring student performance, improving communication between teachers and students, and enhancing the student's overall learning experience.

Objectives of the Study

The main objective of the study is to design and develop a Student Performance Monitoring System with Analytics for Lipa Grace Academy and contribute to the achievement of Sustainable Development Goal (SDG) 4.

Specifically, this study aims to:

1. enable teachers to:
    1.1. input raw scores for tracking of weekly progress of students
    1.2. view class records
2. provide students with
    2.1. weekly progress data
    2.2. overview of grades
3. integrate tracking analytics to analyze student performance and identify improvement areas to determine the percentage required for students to qualify for academic honors.

Significance of the Study

The challenges faced by Lipa Grace Academy have an impact on the academic performance of its students. These challenges include using macro spreadsheets to generate weekly reports and allowing students to view their grades

online. The proposed study will design and develop a Student Performance Monitoring System for the Lipa Grace Academy that utilizes analytics to monitor the student's performance to address these issues.

One of the main goals of the proposed study is to contribute to achieving Sustainable Development Goal 4. SDG 4 seeks to ensure inclusive and equitable education and promote opportunities for lifelong learning for all. By developing a Student Performance Monitoring System, the Lipa Grace Academy will be able to provide a more comprehensive platform that meets the specific requirements of its students and teachers.

Additionally, the students will benefit significantly from implementing the proposed system. They will have access to a platform that enables them to view their grades and monitor their weekly progress. This level of transparency and self-monitoring empowers students to assume responsibility for their education, set objectives, and make informed decisions regarding their academic journey. In addition, integrating analytics will provide students with valuable insights into their performance.

The teaching faculty of Lipa Grace Academy will also experience significant advantages from the adoption of this system. The tracking of student performance will reduce their administrative burden. With the availability of comprehensive student performance data, teachers will be able to identify individual student strengths and weaknesses, tailor their teaching approaches accordingly, and provide targeted support to maximize student potential.

In addition to the benefits at the school level, the findings and outcomes of this study are relevant to the educational community as a whole. The proposed system works as a model for other educational institutions facing similar challenges in monitoring student performance. The insights gained from the development and implementation process can serve as a valuable reference for future research and development endeavors in educational technology and analytics. The study's success has the potential to encourage other institutions to implement innovative solutions that leverage technology and analytics for enhanced monitoring of student performance.

Additionally, the study is significant because it contributes to the growing body of knowledge regarding the use of technology in education. The study will provide insights into the challenges educational institutions face in administering and monitoring their students' performance, as well as how technology can assist in overcoming these obstacles. This study's findings can be helpful for educational institutions intending to implement a Student Performance Monitoring System or are currently facing similar obstacles.

In conclusion, the proposed study will address the challenges faced by the school through developing a Student Performance Monitoring System and utilizing analytics. The features of the system will provide a platform that teachers and students can use to monitor and improve academic performance. The significance of the study lies in its contribution to the attainment of SDG 4, which is to ensure

inclusive and equitable quality education and promote lifelong learning opportunities for all.

Scope and Limitations of the Study

This research intends to design, develop, and implement a Student Performance Monitoring System with Analytics for Lipa Grace Academy. The Student Performance Monitoring system will provide instructors and students with various features and functions.

For the teachers, the system will offer various features that streamline their administrative tasks and enhance their ability to monitor student performance effectively. Teachers can input raw scores for various activities, assignments, and assessments directly into the system in which the grade will be automatically computed. Additionally, the system will provide a dashboard for teachers to record and update grades, eliminating manual record-keeping efficiently. This feature will simplify the grading process and provide teachers with a comprehensive overview of student performance.

On the other hand, students will have access to a dashboard to view their grades and performance in real time. They can track their progress over time, identifying areas where they excel and areas that require improvement. This will enable students to clearly understand their academic standing and take proactive measures to enhance their learning outcomes. Additionally, the system will provide students with their weekly progress reports. These reports can be based on their

assignments, quizzes, and other assessments within the week, helping them identify and track school activities.

Despite this study's comprehensive approach, researchers considered certain limitations. This study will not include other features beyond the scope of the system, such as a forum for parent-teacher communication. The system will not provide online classes or synchronous communication channels between the teachers and students or generate automated reports or analyses without the users' input. The proposed system will only be implemented and tested in Lipa Grace Academy, and the results may not apply to other schools with different needs and situations. Lastly, it is worth mentioning that the system will be web-based, and the development of a mobile app is not within the scope of this study.

Definition of Terms

To facilitate the understanding of this study, different terms are defined herein.

Advent. As used in this study, it refers to a coming into place, view or being; arrival.

Analytics. Analytics refers to the application of mathematical, statistical, and computational methods to large volumes of data in order to discover patterns, extract insights, and derive actionable information. In the context of this study, analytics refers to the systematic process of collecting, organizing, analyzing, and interpreting data related to student performance.

Honor Roll. A list containing the students at a given school who have excelled academically.

Macro Spreadsheet. A macro spreadsheet refers to a large-scale spreadsheet document created using spreadsheet software, such as Microsoft Excel or Google Sheets. It is a tool commonly used at Lipa Grace Academy for generating weekly reports of student performance.

Predictive Analytics. Involves applying advanced statistical algorithms and machine learning models to analyze historical data, identify patterns, and generate predictions or forecasts based on the identified trends. In the context of the study, predictive analytics will be used in determining the percentage required for students to qualify for academic honors.

Visualization Charts. Visual representations, such as graphs, charts, or diagrams, used to present data and information in a clear and easily understandable

format. In the context of this study, graphical representations generated by the system that display relevant data, performance metrics, and trends using various types of charts or visual elements, enabling students and teachers to comprehend and interpret the information more effectively.

Self-Monitoring. The practice of students actively tracking and assessing their own academic performance and progress. The integration of features within the Student Performance Monitoring System that allow students to view their grades, completed activities, and performance metrics, enabling them to monitor their own progress and take ownership of their learning journey.

Transparency. Transparency is the openness and accessibility of information. In the context of this study, the availability of comprehensive and up-to-date performance data, including grades, and assessment results.

CHAPTER II
REVIEW OF RELATED SYSTEMS AND STUDIES

This chapter presents the Technical Background, Related Studies, and Related Systems, which helped in familiarizing information relevant and similar to the present study.

Technical Background

This section aims to provide an in-depth discussion of the essential technical aspects of developing the Lipa Grace Academy Student Performance Monitoring System with Analytics. The technical background aligns with attaining the project objectives.

The researchers will use different programming languages in developing the system. These include Angular and Bootstrap for the front end and Python and SQL for the back end. Python serves as the primary programming language for the back end, where it will play a pivotal role in data processing and management within the system. SQL, on the other hand, will be the query language used for the system's database management.

In addition to these programming languages, the researchers will use various frameworks and libraries to build the system. Django, a Python-based web framework, will be used for the system's back end. Angular, a powerful JavaScript framework, will serve as the cornerstone of the front-end development, facilitating the creation of a smooth and interactive user experience. To ensure a responsive and

mobile-friendly interface, Bootstrap, a CSS framework, will also be incorporated into the front-end development.

In this study, the researchers will use tracking statistics to analyze student performance and identify improvement areas using Python libraries mainly NumPy and pandas. Descriptive statistics is a branch of statistics that deals with the collection, analysis, interpretation, and presentation of data. It involves summarizing and presenting data meaningfully, which will help provide insights into student performance. NumPy and pandas will play essential roles in this process. NumPy, a powerful numerical computing library, will enable the efficient handling and manipulation of data, making it easier to perform statistical calculations and computations. On the other hand, pandas, a data analysis library, will streamline data management, allowing for the organization and exploration of student performance data. By analyzing the data, teachers can provide targeted interventions to help struggling students, thus contributing to achieving the Sustainable Development Goal (SDG) 4 and the project's objectives.

To ensure reliable and secure hosting, the project will utilize the capabilities of Amazon Web Services (AWS), a leading cloud computing platform. This strategic choice offers several advantages, including scalability, high availability, and user-friendly accessibility to the system. AWS's cloud infrastructure will enable efficient storage and retrieval of data, ensuring seamless user interactions and robust support for data analytics, thereby enhancing the overall system performance.

The researchers will utilize an agile methodology to ensure the project is completed efficiently. This method is an iterative approach that involves collaboration between cross-functional teams to deliver a product that meets the client's needs. This methodology will allow the project to be completed promptly and efficiently, ensuring that the final product meets the objectives set.

Furthermore, the researchers will implement a testing plan to ensure the system's quality. International Organization for Standardization/International Electrotechnical Commission 9126 will be used as the testing standard, which is a comprehensive testing plan that focuses on quality characteristics such as functionality, reliability, usability, efficiency, maintainability, and portability.

RELATED STUDIES

Famorca and Elivera (2020) state that technology, specifically learning analytics, can disrupt traditional teacher-centered learning environments. Learning analytics generates learning patterns based on learner interactions and is used in a metacognitive adaptive blended learning environment. By recording and analyzing learners' log files, activity status, progress indicators, scores, and visibility indicators, rule-based algorithms can be generated to control, regulate, and direct learners' progression in a blended learning environment. This research seeks to provide educational technologists with the necessary mechanisms and indicators for generating learning analytics and enhancing student-centered learning and teacher

effectiveness. The study also identifies topics requiring additional research attention.

In a similar study conducted by Amazona and Hernandez (2019), academic performance monitoring is defined as the degree to which a student meets the course or program's established requirements. The mentioned study seeks to ascertain the acceptance level of users towards an information system that predicts students' academic performance Using the technology acceptance model and a survey conducted in a Philippine higher education institution. The results indicate that perceived usability substantially affects its perceived usefulness. Additionally, there is no correlation between perceived usefulness and attitude toward technology adoption. The technology acceptance model clarifies the adoption determinants of predictive analytics in student academic performance, and the study discusses their practical and theoretical implications.

According to Raga et al.'s (2018) research, web-based learning environments in Philippine higher education institutions (HEIs) have enabled the accumulation of vast quantities of data on students' online activity. The difficulty resides in analyzing this vast quantity of data. This study proposes a data-driven method for analyzing student action records captured by the Learning Management System Moodle to generate graphical representations that instructors can use to monitor student activities throughout the course. The log data analysis from several blended courses using the Moodle platform at a university revealed variations in student behavior, such as patterns in resource access, assessment assignments, and engagement level.

According to the study, data analytics enhances student engagement and performance.

A study conducted by Revano and Garcia (2021) states that higher education institutions are implementing new methods of assessing and monitoring student progress to improve student learning outcomes. Learning analytics, made possible by advanced analytics tools that utilize real-time data, has the potential to help attain these goals. However, the use of learning analytics tools is frequently hampered by their design, which only occasionally considers users' requirements and preferences. To address this issue, a participatory design (PD) approach was used in this study to construct a human-centered learning analytics dashboard for higher education. The study gathered feedback and observations from students and instructors during multiple PD sessions. Four key factors were identified as essential for the development of the dashboard: data accessibility, time considerations, assisting students in their transition to university life, and discipline-specificity. The findings of this study emphasize the significance of human-centered design in the development of learning analytics tools and provide insight into how such tools can be optimized for use in an academic setting.

According to a study by Panadero et al. (2018), the proliferation of digital learning environments has made it more essential for students to monitor their learning, evaluate their progress, and determine their next course of action. Supporting self-regulated learning is difficult for instructors, particularly when students learn independently online. The authors propose utilizing learning analytics

to address this issue to improve self-directed learning. They contend that it is crucial to comprehend what trace data from digital environments reveals about student progress to develop effective data-driven interventions. In addition, they suggest that the most effective interventions encourage students to reconsider their strategies, evaluate their progress, and make better decisions as they are learning instead of directly attempting to develop student capacity through feedback.

According to the study conducted by Duldulao et al. The online student academic performance monitoring and evaluation system at Quirino State University is an automated platform that optimizes difficult, time-consuming, and repetitious data processing tasks such as exam scores, grade computation, and student record maintenance. Only one data entry is permitted into the system, and processing instructions for data manipulation are provided automatically. It was suggested that parents of students should be accommodated, that grades should be secured, and that it should be possible to evaluate student performance during midterm and final grading.

Predicting students' academic performance in education can enhance the teaching and learning process for both educators and students. According to Estrera et al. (2017), the researchers sought to create a system that integrates a dynamic web-based grade book with predictive analytics to evaluate student performance. Through a series of experiments, they determined that factors such as GPA, gender, study behavior, interest in studies, and study time significantly impacted prediction accuracy. Utilizing the Decision Tree Algorithm for forecasting purposes was

determined by the study to be effective. Overall, the findings indicate that this system can facilitate systematic monitoring of student performance, allowing teachers and students to take the necessary steps to enhance academic outcomes. The researchers suggest that entrance exam scores and extracurricular activities be used to predict students' academic performance, thereby providing educators with additional insight.

According to Dayupay et al. (2022), students and teachers can use data mining techniques to uncover hidden knowledge and patterns that can improve the educational system's decision-making processes. In e-learning systems or web-based education, student behavioral characteristics play an essential role, as they indicate the student's interactivity with the e-learning system. The authors aimed to demonstrate the significance of student behavioral features by gathering educational data from a learning management system (LMS). Feature analysis was performed on the dataset, followed by data preprocessing, a crucial step in knowledge discovery. To predict student academic performance, the researchers used different analytics or algorithms such as Naive Bayes (NB), Decision Tree (ID3), Support vector machines (SVM), and K-Nearest Neighbor (KNN). The results demonstrated that the proposed model using ensemble techniques achieved better accuracy, indicating its reliability for monitoring student performance.

According to the study by Borbon et al. (2021), the purpose of this study was to evaluate the online learning approach using MyLPU in terms of technology, coursework, course, instructor, communication, learning, satisfaction and

preference, performance monitoring, and identifying the problems encountered in online education, as well as proposing an action plan to improve the online learning environment of the students and teaching strategies using MyLPU. The authors used descriptive and quantitative analysis to evaluate the online learning approach utilizing MyLPU among tourism and hospitality students in the College of International Tourism and Hospitality Management. Various statistical tools were used to collect and present the data, and the findings revealed that technology and coursework were integral components of online learning. Students responded favorably to technology, coursework, and preferences. The teacher will support the student's initiative to be motivated to learn.

Several studies have investigated the impact of implementing learning management systems (LMS) in online learning environments on monitoring student performance. According to the research conducted by Tus et al. (2021), the use of Learning Management Systems (LMS) significantly correlates with the academic performance of Filipino students participating in online learning. Students who utilize LMS platforms frequently perform better academically than those who do not. In addition, the study discovered that students who often use LMS platforms have superior time management skills and are more self-directed learners. The study also revealed that using LMS platforms positively impacts student motivation and online learning engagement. The authors concluded that integrating LMS platforms with performance monitoring into online learning can enhance Filipino students' academic performance and learning outcomes.

Technological advancements have made innovative and interactive methods for conveying online courses possible; however, educators continue to face challenges associated with poor student performance and low success rates in these courses. Raza et al. (2021) state that monitoring and documenting online students' academic progress and experiences is arduous, especially when students are not physically present in the classroom and access course materials remotely. Therefore, automated student performance monitoring is essential to prevent underachieving students from slipping behind and leaving unnoticed.

The expansion of technology has paved the way for novel educational approaches, such as e-learning management systems (LMS). Learning management systems offer numerous advantages to academic institutions, including enhanced student engagement, academic progress monitoring, and personalized learning. According to Avci & Ergün (2022) study, the LMS participation rate was significant for student engagement and academic performance but not for information literacy. Closely monitoring student participation and performance within the LMS can assist instructors in determining their students' requirements and providing support accordingly. High participation rates enhance students' interest in online courses. Consequently, students can avoid learning difficulties in online environments. These discoveries influence how students learn online and how classes are taught to increase student success in online learning environments.

Providing a high-quality education is essential, but accurately predicting student academic performance is important for enhancing educational outcomes and

assisting students in achieving success. According to the study of Asiah et al. (2019), the lack of accurate and efficient prediction models is a significant obstacle. Predictive analytics can improve institutional decision-making and contribute to improved outcomes. The purpose of this paper is to review current research on academic analytics, with a particular emphasis on predicting student academic performance. Previous researchers have proposed various methods for developing performance models utilizing multiple categories of student data, techniques, algorithms, and tools. Techniques for predictive modeling include classification, regression, and clustering tasks. Numerous variables have been investigated to determine the most influential characteristics for accurate prediction. The ability to precisely predict performance is valuable for guiding the learning process and assisting students in avoiding low grades. In addition, predictive models can help instructors predict course completion and final grades, which are directly related to student performance. It is essential to have high-quality input data, appropriate predictive methods, and robust prediction models to construct effective predictive models.

The study of Qazdar et al. (2022) investigated learning analytics for monitoring and enhancing students' progress in LMS to identify key performance indicators (KPIs) that instructors can use to track student progress and identify struggling students. The student's progress in a learning experience indicates how they interact with courses and learning materials, which instructors can use to

identify underachievers, predict students' progress, and identify those who are at risk and require intervention.

In a similar study, Murad et al. (2022) propose a learning analytics dashboard called DashLearn that includes a predictive analytic component to monitor and predict students' academic performance based on their learning activities. The study results indicate that DashLearn enables students to monitor their academic performance, attendance, and assignment submission status and predict their grades in advance, resulting in enhanced learning outcomes.

Learning analytics is a dynamic research field that uses data analysis to improve student's learning experience and environment (Ismail, Ismail, & Ismail, 2021). The research conducted by S. Nizam Ismail et al. (2021) examines the level of student engagement with the Learning Management System (LMS) using learning analytics. Using a learning analytics tool, the study analyzes student engagement with the LMS, investigates the approaches students use to manage their studies, and examines various learning analytic techniques for analyzing student data. The authors conclude that learning analytics can boost student engagement and optimize the LMS, improving learning outcomes.

Predicting students' performance is essential for the success of the education industry. Nonetheless, this endeavor is complicated by the vast amounts of data stored in educational databases, and some institutions need systems capable of analyzing and monitoring student performance. According to Lynn & Emanuel (2021), insufficient research on performance prediction methods and a lack of

awareness regarding the significance of predicting student performance contribute to this issue. To address this issue, the review concentrates on examining commonly employed data mining techniques for predicting students' performance in previous studies to identify the most accurate prediction technology. The findings indicate that the decision tree algorithm is the most reliable classification method for predicting pupil performance, yielding accurate and trustworthy results. Predicting students' performance facilitates monitoring their progress, identifies both successful and struggling students and enables educators to make timely interventions and well-informed decisions. This opportunity contributes significantly to the development of the education sector by improving academic standards in educational institutions.

According to Park et al. (2021) study, "Change of Paradigm on LMS for Online Education: LMS Implementing Learning Analytics and Online," LMS should be designed based on learning analytics that indicates students' learning progress and predict their achievement. The LMS should also incorporate an online assessment that measures students' learning in online education on the move. Based on these LMS characteristics, the authors developed CLASS, an LMS.

Modern education is fundamentally focused on ensuring academic success for all students. To accomplish this, educators require effective tools to identify students who may be academically at risk and adapt instructional strategies to meet their specific requirements. Monitoring student progress is a valuable practice that enables instructors to utilize student performance data to continuously evaluate the

efficacy of their teaching methods and make educated decisions about instruction. According to Vilanova et al. (2019), the main outcome of the SPEET project was the creation of an IT tool that incorporated specialized algorithms to address the project's most pressing challenges, including classification, clustering, and dropout prediction. This tool seeks to provide educators with a data-driven method for monitoring student performance and guiding decision-making regarding instructional interventions.

According to Warnars et al.'s (2020) study, students play an essential role as psychologically prepared individuals to receive instruction and guidance from their school. However, each student demonstrates outstanding performance and growth, highlighting the significance of tracking their development to ensure continual improvement of student quality. In addition, evaluating students' educational accomplishments includes the provision of rewards, words of encouragement, and motivation, all of which contribute to improving their learning outcomes and participation in school activities. When selecting students based on their performance or evaluating their developmental trajectory, schools should employ multiple criteria to arrive at widely accepted decisions. It is imperative that colleges and other relevant parties continuously monitor student performance.

In a similar study, Costa et al. (2019) found that tracking students' progress and performance in modern educational systems can be beneficial for instructors and researchers. The authors investigate the use of learning objectives and student interactions in Learning Management Systems to track student performance, with

the intent of implementing a software architecture known as Student Academic Performance Evaluation System (SapeS). The author created SapeS based on Learning Analytics and Learning Objectives to aid the instructor in the evaluation procedure. It is anticipated that the system will assist educators in promoting and enhancing learning by supplying student performance and progress data.

Implementing an Education Management Information System (EMIS) is widely acknowledged as a crucial instrument for enhancing education quality and attaining sustainable development. According to Nkata & Dida (2019), in developing nations like Tanzania, many secondary institutions manually collect, store, and disseminate education data. This manual system hinders the accurate, timely, and reliable dissemination of educational information, making it difficult for parents to track their child's academic progress. Frequently, parents must physically visit schools or wait until the end of the term or academic year to receive their child's academic report. Social and economic factors limit parental involvement in monitoring and tracking academic progress, resulting in poor student performance. To address this issue, the study used structured interviews and questionnaires to obtain data from education stakeholders in secondary schools. According to the study's findings, poor parental involvement contributes to the academic underachievement of secondary school pupils in Tanzania. The study developed and implemented a centralized EMIS to facilitate better monitoring and tracking of student progress to increase parental involvement and academic achievement.

According to a study by Bajracharya (2019), learning analytics analyzes, monitors, and reports educational data displayed on the educators' and students' applications called the learning analytics dashboard, which measures the learners' activities and visualizes the overall results at a glance. Blended learning systems, which combine classroom-based instruction with online learning, have gained popularity and rely on LMS for content delivery.

According to Kew and Tasir (2022), the education industry has benefited from learning analytics because it can be used to analyze student factual data to identify problems with e-learning and provide interventions to assist students. However, the development of Learning Analytics interventions to provide students with personalized learning materials to suit their needs and improve their learning performance is not yet fully understood. Consequently, the author intends to implement Learning Analytics in e-learning in order to enhance student performance. The findings demonstrated that Learning Analytics assisted the majority of students in improving their motivation, academic achievement, cognitive engagement, and cognitive retention in e-learning.

According to Toktarova and Popova (2022), educational data analysis is a rapidly developing field that enhances the quality and effectiveness of student learning in e-learning systems and environments. Visual analytics techniques are regarded as the most effective method for reviewing and presenting educational data in a format that is both accessible and informative. The authors conclude that visualization makes it possible to present data in a visual and informative format for

perception and can aid in analyzing a student's digital footprint and constructing their digital profile.

The study of Şahin and Yurdugül (2022) found that learners desire more entertaining and self-monitoring learning environments and want the LMS to have reporting and predictive capabilities on student achievement. The researchers suggest that the needs and expectations of learners align with third-generation learning management systems, which can be developed through learning analytics. The study discusses the learner expectations and needs in the context of third-generation learning management systems, interventions, and types of intervention.

In a similar study of Bystrova et al. (2018), learning analytics in massive open online courses (MOOCs) can help predict learner performance, mainly as higher education adopts adaptive learning approaches. The authors employ interdisciplinary methods to analyze qualitative data on performance in various categories of course assignments to predict and improve learner performance while enhancing the overall quality of MOOCs. Learning analytics can provide valuable insights regarding learners' engagement with information and their entry-level skill levels. The study describes the outcomes of implementing the proposed learning analytics algorithm to evaluate learner performance in specific MOOCs.

According to Koh and Kan's (2021) study, despite continuous enhancements, students utilize the administrative functions of learning management systems (LMS) more frequently than learning applications. As learning management systems (LMS) evolve into next-generation digital learning environments that can

support user accessibility, content creation and curation, performance monitoring, interoperability, personalized adaptive learning, collaborative learning, and analytics-driven performance management, it is essential to consider students' readiness to engage with these features. Results indicate that students who frequently use LMS for content learning and discussion are also interested in engaging in student-centered e-learning activities and operating systems that support content curation, performance monitoring, remote group administration, and mobile interoperability.

Information systems play a crucial role in the dissemination of academic and non-academic information in the field of education. According to Trison and Suryawinata (2021), there is a lack of an information system that facilitates mobile device access to student development updates. In response to this absence, the purpose of the mentioned study was to develop a student monitoring information system that enables teachers and guidance counselors to provide parents with information regarding grades, attendance, achievements, and disciplinary actions efficiently and on time. As a result, the Android-based Student Monitoring Information System proved to be a helpful tool, simplifying the process of providing student progress updates to parents for the development of their children.

In the study conducted by Nasution et al. (2022), a web-based learning system is required to facilitate instructors' online monitoring and evaluation of the learning process. The mentioned study sought to develop a monitoring and evaluation system for blended learning. The study employed a research-and-

development research design with a waterfall analysis that included requirements analysis, system design, implementation, integration and testing, and operation and maintenance. The outcome of the research is the development of an application for monitoring and evaluating learning assessments, which the monitoring and evaluation team can readily implement during the evaluation process. The system can also display a description of monitoring and learning assessment results, and it is currently used at a college for monitoring and assessing integrated learning activities.

The researchers reviewed these studies to highlight technology's importance in enhancing student engagement and monitoring academic performance. Most studies have also explored using learning analytics to monitor and improve student progress using LMS. Moreover, other related studies show that monitoring student participation, performance, activities, attendance, and grades can help instructors support learning accordingly, which will also be implemented in the proposed study. Other studies also stated that predictive analytics in predicting academic performance would help students identify at-risk courses. The researchers will incorporate those features into the proposed study by tracking student performance. Overall, the studies' findings demonstrate that the Student Performance Monitoring System, combined with analytics, can significantly improve educational institutions' teaching and student progress and performance monitoring. The mentioned studies above support the proposed study's objective of developing a comprehensive

Student Performance Monitoring platform with Analytics to monitor within the system.

RELATED SYSTEMS

E-learning or distance learning has become the most common form of education. According to Cambronero Jr. (2018), Universities must consider cost-effective and efficient operational strategies. The current Graduate Program Classroom Management System at Central Philippine University utilizes a manual class record. This record contains all necessary data regarding a specific class, including each student's attendance, test scores, and grade components. Exams are manually graded and administered, which can be difficult in large classes. Teachers submit grades to the school record system at the end of each semester, and final grades are mailed to students. Email and social sites for communication and grade submission can be unreliable and disorganized. To address these issues, researchers developed an E-Learning system that could streamline these processes and enhance the Classroom Management System's efficacy and effectiveness. A centralized E-Learning system could facilitate communication, the submission of requirements and assignments, the distribution of course materials, the administration of examinations, and the online viewing of grades and academic monitoring. It could help instructors and students save time and enhance the learning experience.

According to Domingo et al. (2021), the K-12 Basic Education program in the Philippines employs standards and a competency-based grading system, with

grades determined by the weighted raw score of students' summative written work, performance tasks, and quarterly assessments. Technology has played a crucial role in assisting instructors with various aspects of assessment, such as progress monitoring, communication, application, and grading. This study seeks to develop a computerized grading system to address teachers' difficulties and problems when recording and monitoring grades. The decision support system integrated into the developed system facilitated monitoring of academic and non-academic student grades and performance. In addition, it allowed for identifying students whose academic performance may be at risk.

Monitoring university students' attendance is essential for identifying potential problems early. According to the system developed by Bakhri et al. (2020) Students Attendance Monitoring System with SMS Notification (SAMS) was designed to address this need. The system identifies students who may exceed the permissible percentage of absences and notifies the Academic Affairs Division (AAD), parents, and students via SMS. SAMS was developed using the Waterfall Model, which included analysis, design, implementation, testing, and documentation phases. Usability testing revealed that SAMS makes it significantly easier for instructors to monitor absenteeism, thereby increasing efficiency and effectiveness. SMS notifications have proven extremely beneficial, enabling direct communication with parents regarding their children's attendance issues.

Implementing the K-12 program in the Philippines has highlighted the need for effective e-learning administration systems to support education in senior high

schools. According to Santos, Durano, and Hortillosa (2023), they have designed a learning management system (LMS) for monitoring student performance in Philippine senior high schools. The developers of the LMS designed it so that an administrator can manage, maintain, and update learning materials. At the same time, instructors can create and deliver content, monitor student engagement, and evaluate student performance. In addition, the system allows students to upload assignments, take tests, and examine their performance. The LMS is designed to operate on a distributed network, allowing for more excellent service coverage, and is developed using agile software development based on the features desired by the principals, instructors, and students.

The system developed by Duldulao (2018) seeks to design and develop a computerized system that will monitor the academic performance of every student enrolled at Quirino State University from admission until course completion. Several features of the developed system are intended to resolve issues encountered in the current processes of monitoring and evaluating student performance. These features include reducing data entry by allowing data to be inputted only once and providing automatic processing instructions, automating the master list of students by providing an electronic database for data storage, expediting credits evaluation by containing a complete listing of subjects required in the university's courses, generating reports on academic progress, and providing alerts to students.

In the system developed by Bias et al. (2022), the CLASSALI online learning tool was designed to assist Makati Public Elementary Schools in identifying at-risk

students and adjust their educational strategies to meet their academic needs. The software includes a Virtual Classroom, an Online Quiz, a Grading System based on DepEd grades, a CLASSALI Forum, and Data Analytics Reports for monitoring learner progress and learning contexts. The system is intended to serve as a collaborative online space where instructors and students can work simultaneously, providing students with cognitive exercises to assess their knowledge of specific subjects. The CLASSALI Forum is designed to facilitate student connection and social interaction. Overall, the system seeks to improve academic performance and meet the educational requirements of elementary school students in Makati.

According to Ayuyang (2019), Interactive Learning (iLEARN) is a MOODLE-based e-learning portal that enables students and teachers to share knowledge anytime and anywhere. This platform's primary objective is to assist educators in developing online courses where instructors and students can collaborate and interact online. Instructors can deliver lessons, administrate exams, and manage students' scores and grades online. In contrast, students can submit their requirements online, download resources, take exams, and track their progress based on their teachers' grades. The platform was stored on a Ubuntu Linux Server 14.04 LTS server, with Apache as the web server, MySQL as the backend database, and PHP as the parser. As a result, the platform makes the instructional process more efficient and accessible, improving instructors' teaching methods and strategies and students' academic performance.

According to the system developed by Jhoan (2023), TelEducation LMS is a specialized learning management system developed for Isabela State University-Ilagan Campus in the Philippines. The system is user-friendly, extremely adaptable, and includes cohort management. The TelEducation LMS integrates collaborative communication tools and notifications for faculty and students, facilitating the uploading and downloading of lecture notes. Additionally, it allows teachers and students to monitor progress. The teacher's course website functions as a virtual classroom for teachers to manage their learning resources, whereas the student's course website gives students access to enrolled courses, modules, quizzes, and their progress.

Tubongbanua (2017) developed a system that improves operations by implementing a web-based information and monitoring system for the Cagayan de Oro Academy for International Education. The system was designed to facilitate a variety of school-related transactions and to provide a complex and flexible online platform. The researchers used the Prototyping Life Cycle Model to develop the proposed system to streamline traditional transaction processing and reduce the routine and repetition of manual tasks performed by staff members. The system included grade posting, class schedules, student profiles, guardian profiles, staff profiles, and other essential data. By implementing this Web-based Information and Monitoring System, the academy intended to enhance the quality of service provided to its students while reducing administrative burden and saving time for the school administration. The study has significant implications for improving

school monitoring and information management, leading to more efficient operations and enhanced service delivery.

ICTeachMUPO is an e-learning module system designed for faculty and students at Laguna State Polytechnic University in the Philippines, developed by Urera and Balahadia (2019). This system allows instructors to construct classes, approve student enrollment, upload modules or lessons, schedule pre-and post-tests, and track student progress. In the meantime, students can join classes, access pre-test and post-test exams and learning materials, and observe test results. The ICTeachMUPO e-learning module system provides faculty members and students with a comprehensive platform for managing academic activities and tracking learning progress.

Several Student Performance Monitoring Systems in the Philippines have been developed and implemented in response to the need for effective and efficient teaching and learning methods. Some of the monitoring system are integrated within the LMS. The Central Philippine University Graduate Program's current Classroom Management System relies on manually recording student attendance, scores, and grade components, which can be tedious for instructors. To address this, the researchers developed an E-Learning system that could streamline these processes and improve the efficiency and effectiveness of the Classroom Management System. The system developed by Santos, Durano, and Hortillosa (2023) is designed to have an administrator who can manage, maintain, and update learning materials while instructors can create and deliver content, monitor student participation, and

assess student performance. The system developed by Duldulao (2018) aims to monitor the academic performance of every student enrolled in Quirino State University from admission until course completion. The system developed by Biñas et al. (2022) called CLASSALI is an online learning tool that helps identify at-risk students and adjust their educational strategies to meet their academic needs. These studies serve as valuable references for the researchers' proposed study, which aims to develop a student performance monitoring system with analytics that could facilitate the efficient and effective delivery of courses and performance monitoring in an academic institution in the Philippines. Unlike the other systems, the proposed study also features predictive analytics to determine the percentage required for students to qualify for academic honors and an analytics dashboard that allows instructors to monitor and evaluate their students' performance comprehensively.

The system developed by Rabiman et al. (2020) provides an all-inclusive platform for delivering and managing diverse learning materials and monitoring student performance. The system was developed to facilitate the packaging interactive multimedia, instructional materials, lecture assignments, online discussions, learning videos, and even interactive video conferences. It provides class schedules, online grading, attendance monitoring, Study Result Cards, Study Plan Cards, academic information, video conferences, lecture materials, lecture assignments, learning videos, online discussions, and file sharing, among other functions. The developers discovered that using LMS substantially improves student satisfaction and the quality of their learning experiences. Consequently,

LMS has emerged as an indispensable instrument for educators, enabling them to provide engaging and interactive learning experiences to students regardless of their location or background. The adoption of LMS has also facilitated the integration of various teaching and learning resources, allowing instructors to adapt their teaching methods to meet the varied requirements of their students.

Simanullang and Rajagukguk (2020) developed a Moodle-based LMS that enables students to browse videos, courses, discussion forums, messaging, and materials and monitor weekly progress. The developers investigate using Moodle-based learning management systems to enhance student learning activities. The authors describe how this platform facilitates the development and delivery of online courses, enables instructors to monitor student progress, and facilitates student communication and collaboration. Implementing such systems may result in increased student engagement and academic performance and a more flexible and convenient learning environment.

Based on the TaBAT system developed by Safsouf, Y., Mansouri, K., and Poirier, F. (2021), which is designed to work with various Learning Management Systems (LMS) and allows teachers to monitor the progress of their students while also allowing students to visualize their learning process. The authors propose an interpretable visual communication aid as a dashboard for monitoring and controlling the learning process. The authors conclude that TaBAT can effectively increase online learner engagement and success rates.

According to Jayashanka, Hettiarachchi, and Hewagamage (2022), the COVID-19 pandemic has caused Sri Lankan universities to implement entirely online or blended learning environments, making it difficult for students to monitor their progress, performance, and engagement in the course. To address this issue and facilitate student learning, the authors designed and developed a Technology Enhanced Learning Analytics (TELA) interface for the University of Colombo School of Computing (UCSC) utilizing Learning Analytics. Using the Design Science research method, the authors conducted a literature review and two surveys with 136 undergraduate students and 12 instructors to determine the required TELA system features. The TELA dashboard was developed as a Moodle plugin and tested with third-year undergraduate students at UCSC. The results indicated that the TELA interface could increase students' motivation, engagement, and grades by allowing them to compare their progress and performance to those of their peers. It helps to increase their motivation to engage more in the course and boosts their self-confidence, thereby enhancing their grades. The TELA interface is an innovative solution that can improve the quality and effectiveness of student learning in entirely online or blended learning environments.

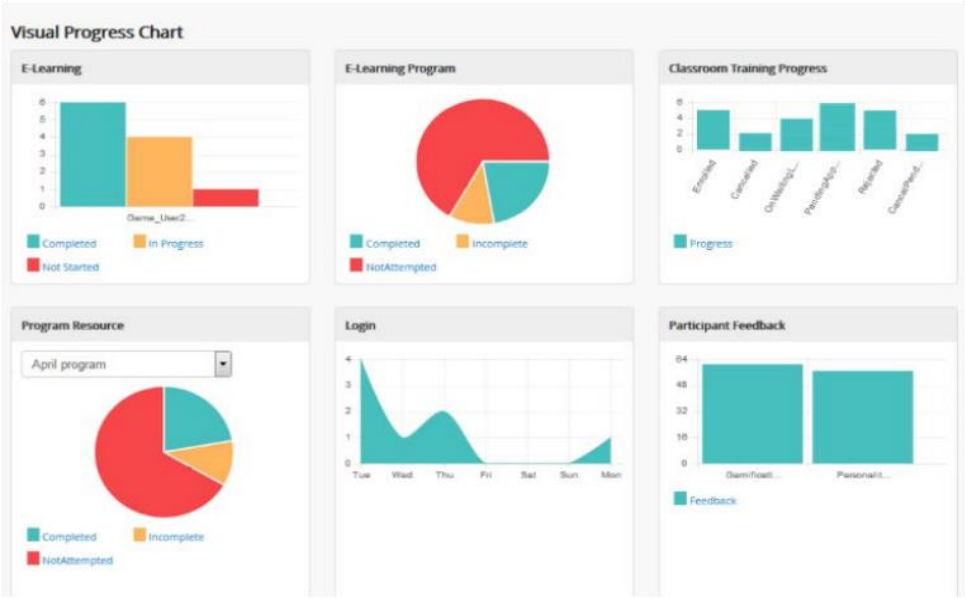
According to Song and Robinson (2019), monitoring student performance over a semester is crucial for students and teachers because it can motivate course redesign, effective student intervention, and practical classroom enrichment strategies. The authors propose a Student Academic Performance System (SAPS) to monitor student progress, which can enhance academic learning and growth.

However, an effective SAPS must be simple to implement, straightforward to interpret, and adaptable to any educational level or course format. In this study, the authors contend that it is essential for educators to implement a SAPS system in every classroom at all instructional levels to track student progress and assist students in achieving their academic goals. They provide evidence that their SAPS system is an effective and complementary aid for monitoring student performance by educators.

Developing Learning Management Systems (LMS) overcomes the limitations of time, place, and frequency of meetings between teachers and students. According to Muhardi et al. (2020), LMS can offer several advantages, such as providing a medium for disseminating subject matter, distributing assignments, facilitating student discussion forums, monitoring student performance, and viewing grades online. A web-based LMS was developed for Sma Negeri 1 Kampar Kiri Hilir to address these needs using the PHP programming language and MySQL. The LMS application has three admin actors: administrators, teachers, and students. The administrators manage the curriculum data, semester years, teachers, students, and subjects. The teachers are responsible for uploading materials, assignments, and activities for the students to complete and monitoring student progress. In contrast, the students can download these materials and complete the assignments and activities. The LMS application has increased teacher and student interaction, providing a support system for learning activities and promoting learning beyond the traditional classroom.

Numerous educational institutions have adopted online learning, necessitating the development of new methods for monitoring and assessing the student's learning process. Widodo J et al. (2022) created The eLSIDA LMS as an interactive learning model by integrating several components, including uploading materials and video animation, video interactive, images, audio, interactive quiz, writing, and progress tracking that could aid students in the lecture process. Developing interactive learning media models can result in two-way interactions, particularly between users and the media, to prevent users from becoming bored rapidly.

Ong Kiat Xin and Dalbir Singh (2021) developed a learning analytics dashboard that is based on Moodle. This dashboard seeks to improve learning outcomes for educators and students by analyzing user usage data. This system can extract data from the Moodle LMS and transform it into meaningful data visualizations, such as tables, line charts, and bar charts. It includes students' achievement in terms of learning outcomes in a line graph, their grades for homework, quizzes, attendance, project marks, and cumulative grades in bar charts. Figure 1 depicts the visual development of students within the system.



Source: (Ong et al., 2021)

Figure 1. Analytics Dashboard.

Santoso et al. (2018) developed a learning dashboard that enables lecturers to monitor student activities in a Student-Centered e-Learning Environment (SCELE) and a learning monitoring tool to visualize and capture data in an easy-to-observe, -analyze, and -target specific concepts. The system resulted in a Moodle plugin dubbed the learning dashboard, which instructors can use to monitor student's learning environments effectively. The dashboard is intended to provide vital information on a single screen in the form of text and graphs, making monitoring activities simpler for instructors.

Amelia and Gufron (2018) have developed an e-learning system that utilizes a student performance monitoring system to increase student motivation in the web programming course. The system is built using the Waterfall Model and utilizes Moodle's content management system. The LMS features multimedia files such as

video, audio, images, flash animation, and online exam facilities with various questions, exercises, and quizzes. The system has three user levels: Student (Registered), Teacher (Administrator), and Admin (Super Administrator). Students can only log in through the frontend display website and can only participate in community forums, practice questions, read courses, and track their progress. Lecturers can log in through the backend and post articles, upload material files for students to download, create exercise questions, and monitor student performance. The Admin has the highest control and can add additional features, set global configurations, manage users, and perform other tasks in the system.

The mentioned systems are similar to the current study as they share a common goal of enhancing the quality of education through technology. The Lipa Grace Academy study aims to design and develop a Student Performance Monitoring with Analytics, while the mentioned studies offer a comprehensive platform for monitoring student performance. Most of the studies are about integrating student monitoring within the LMS. Most cited studies still need the Lipa Grace Academy study feature, which enables teachers to monitor student progress, including incomplete, missing, or completed activities and quizzes, and generate honor rolls. The system also features predictive analytics to determine the percentage required for students to qualify for academic honors and an analytics dashboard that allows instructors to monitor and evaluate their students' performance comprehensively. These features enable teachers to identify areas

where students may be struggling and provide targeted support to help them succeed.

Based on the mentioned systems, Student Performance Monitoring has been shown to enhance students' satisfaction and quality of learning experience significantly. LMS can also aid in creating and delivering online courses, monitor student progress, and enable student communication and collaboration. LMS, like TaBAT and TELA dashboards, can effectively improve engagement and success rates among online learners. Incorporating a Student Academic Performance System (SAPS) into every classroom is essential for educators to monitor student progress and help students achieve their academic goals. Developing LMS for schools such as Sma Negeri 1 Kampar Kiri Hilir and using a learning analytics dashboard like the one developed by Ong Kiat Xin and Dalbir Singh (2021) can create a support system for learning activities and promote learning beyond the traditional classroom. The studies demonstrate that LMS, Student Performance Monitoring, and learning analytics dashboards are effective tools for educators to provide students with engaging and interactive learning experiences, regardless of their location or background. These studies are aligned with the proposed project, which utilizes a Student Performance Monitoring platform to track student progress and a dashboard that analyzes learning data to facilitate monitoring and control of the learning process.

Conceptual Framework

The conceptual framework is used to conceptualize and execute the project. The project focuses on Student Performance Monitoring with Analytics, and Figure 2 illustrates the conceptual framework for this project.

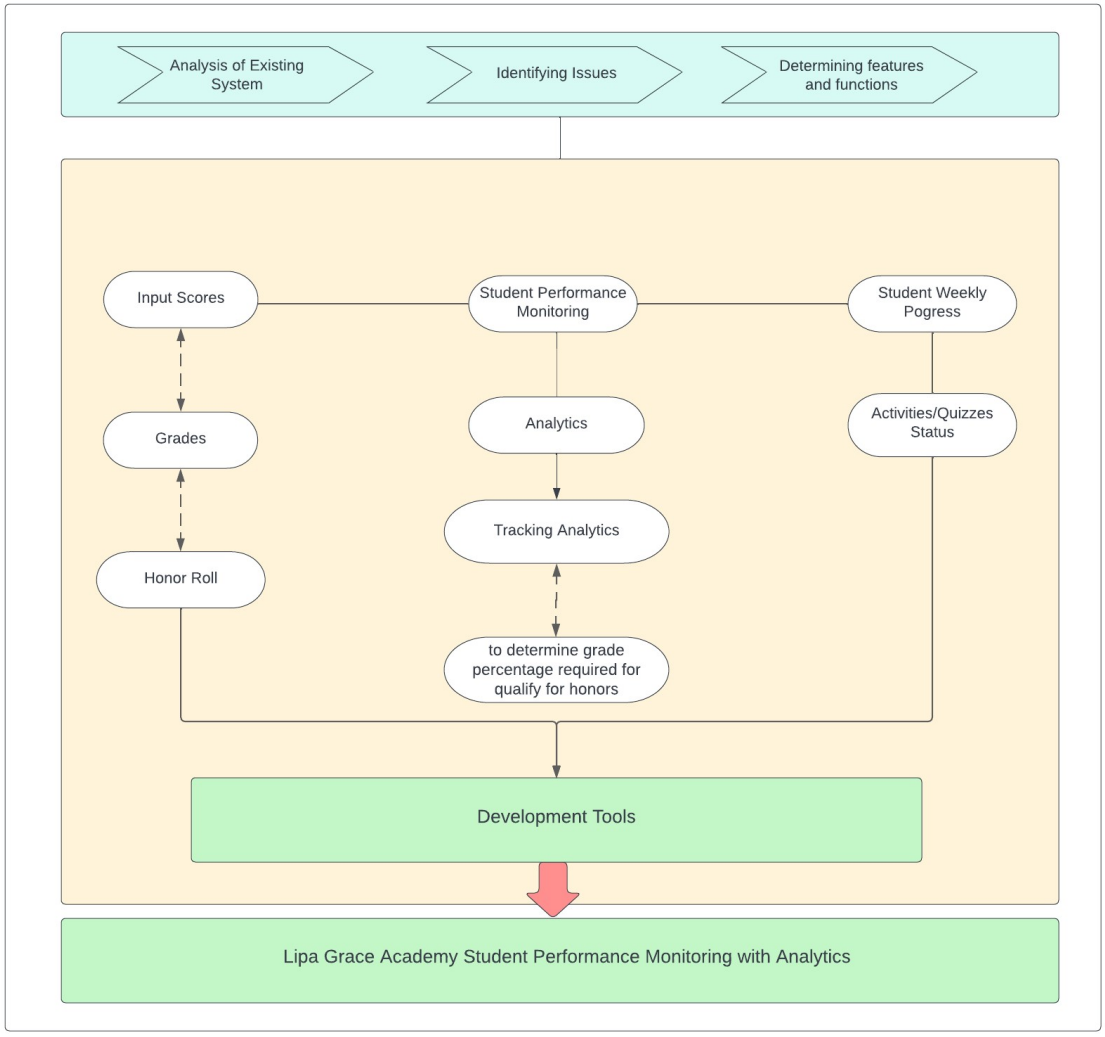


Figure 2. Conceptual Framework

The proponents first considered analyzing the existing systems and identifying problems with the school's current system, such as using a macro spreadsheet to generate weekly reports and the inability of students to access their

grades online. In addition, it describes the process for designing and developing a Student Performance Monitoring System that allows instructors to input student raw scores and weekly progress, and track student performance over time. The framework also includes the development of a dashboard that provides students with a clear view of their grades and weekly progress, including incomplete, missing, or completed quizzes and activities. In addition, the framework integrates analytics into the Student Performance Monitoring System, allowing instructors to analyze student performance and identify areas for improvement. The analytics capabilities tracking analytics for determining the minimum grade point average required for students to qualify for academic honors.

CHAPTER III
DESIGN AND METHODOLOGY

This chapter discusses the research methodology and procedures used in the study. It also includes a discussion on research design and schematics diagrams.

Software Methodology Model

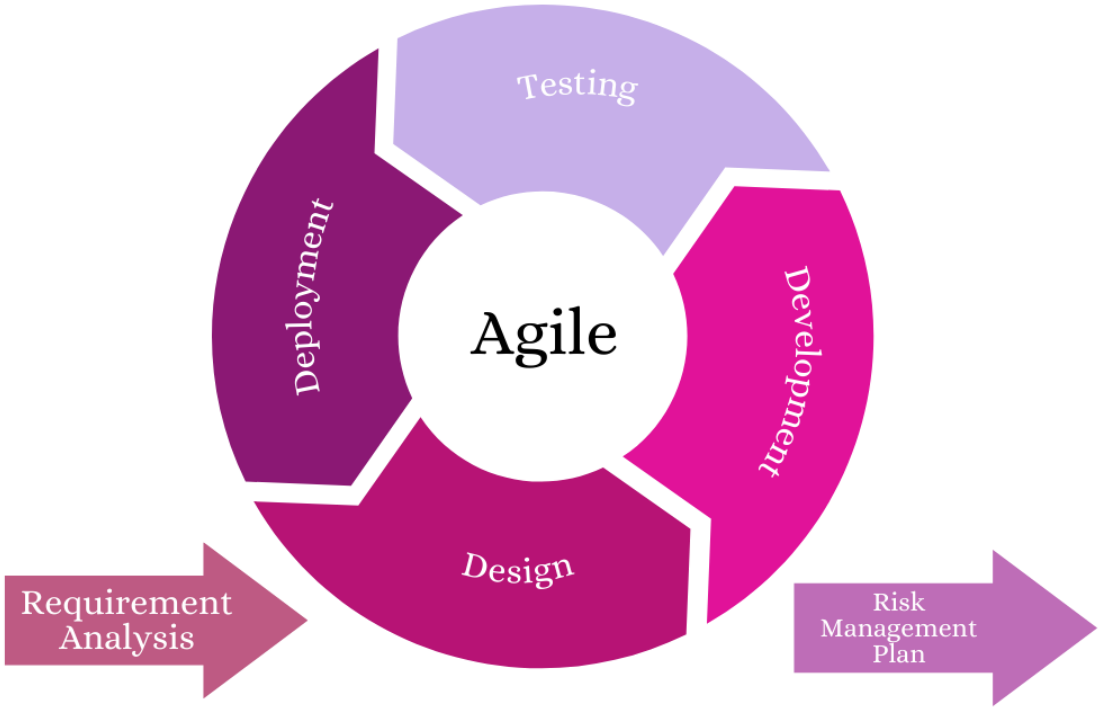


Figure 3. SDLC Model - Agile Method

Figure 3 depicts the prevalent illustration of Agile software development utilized in the system's development. This model comprises seven distinct phases, namely planning, design, development, testing, deployment, review, and launch

Requirement Analysis

The requirement analysis phase is essential in developing Student Performance Monitoring with Analytics for the Lipa Grace Academy. The researchers have collected all the required data to identify and document the stakeholders' needs and expectations. This phase involves identifying, prioritizing, and documenting the system requirements, forming the system's design and implementation basis. The researchers have conducted interviews and surveys with the stakeholders to gather their feedback on the features and functionalities that the new system should have. The requirement analysis phase will produce a detailed report that outlines the system's functional and non-functional requirements, including the user interface, performance, security, and scalability.

Analysis of Existing System

After the researchers conducted the literature review and journals, the proponents found numerous existing Student Performance Monitoring Systems. The differences between the existing and proposed system are shown in table 1.

Table 1

Analysis of Existing System

Existing System	Proposed System
No feature for tracking analytics to determine the percentage required for students to qualify for academic honors.	Provides tracking analytics for teachers and students
No feature for weekly progress reports	Generate weekly progress reports for students and teachers
Does not allow teachers to enter student grades	Teachers can input student grades within the system
Students can't view their grades	Students' can view their grades within the system

Table 1 shows the analysis of the existing system compared to the developed system. Many existing Student Performance Monitoring Systems lack predictive analytics, the ability to input grades, generate weekly progress reports, and view grading cards. On the other hand, the proposed system offers those features. The developed system also provides an interactive student dashboard that allows students to view their grades and progress, including incomplete, missing, or completed activities and quizzes, and track their performance over time.

Fishbone Analysis

The Fish Bone Analysis is a structured diagram that employs a visual representation to identify potential causes of a problem. It proved effective in

identifying and disclosing the system's underlying problems and deficiencies. This tool facilitates a comprehensive brainstorming session to determine the problems' cause-and-effect relationships and interconnections.

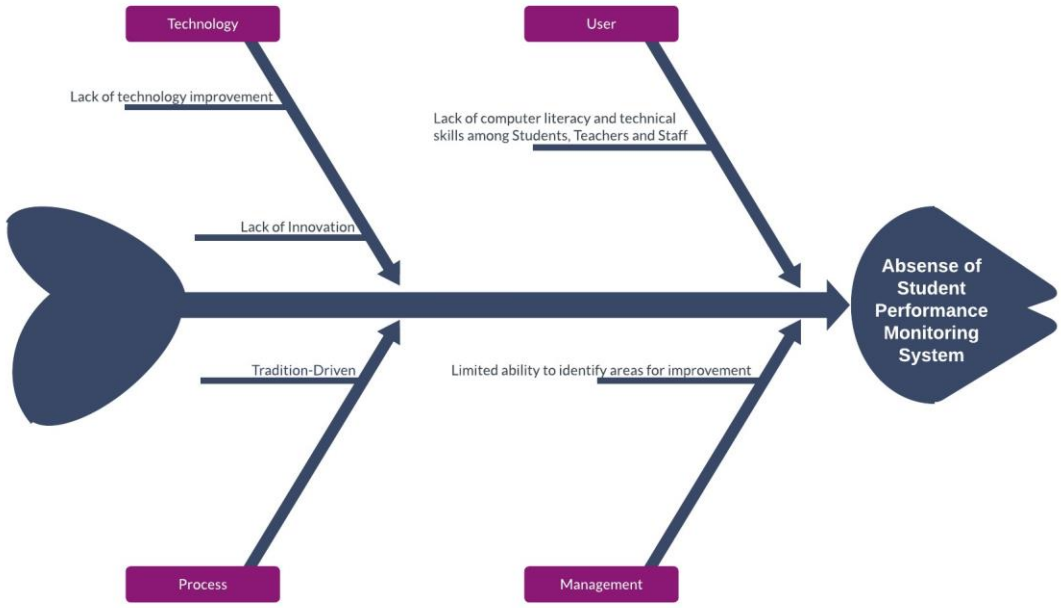


Figure 4. Fishbone Analysis

Figure 4 provides a clear visual representation of factors contributing to the absence of a Student Performance Monitoring System at Lipa Grace Academy. The diagram is divided into four main categories: users, technology, process, and management, each connected to the effect, which is the absence of a student performance monitoring system. Under the user category, the lack of computer literacy and technical skills among students, teachers, and staff significantly contributes to the problem. The system requires specific technical knowledge and skills to navigate and utilize effectively. If users lack these skills, they will not be able to take full advantage of the features offered by the system, including the ability

to monitor student performance. Under the technology category, limited technological improvement and lack of innovation are identified as significant contributors to the problem. It could be due to budgetary constraints or a lack of emphasis on technology as a tool for academic improvement. Under the process category, the tradition-driven nature of the school's academic processes is identified as a barrier to implementing a student performance monitoring system. It may be due to the school's resistance to change or adopting new practices and systems. Under the management category, the limited ability to identify areas for improvement is identified as a key challenge. It could be due to a lack of data analysis capabilities or a need for more emphasis on data-driven decision-making.

System Boundary

A system boundary is a visual tool that indicates the separation of the system from other entities. It can segregate the system from external factors that may impact or be impacted by it.

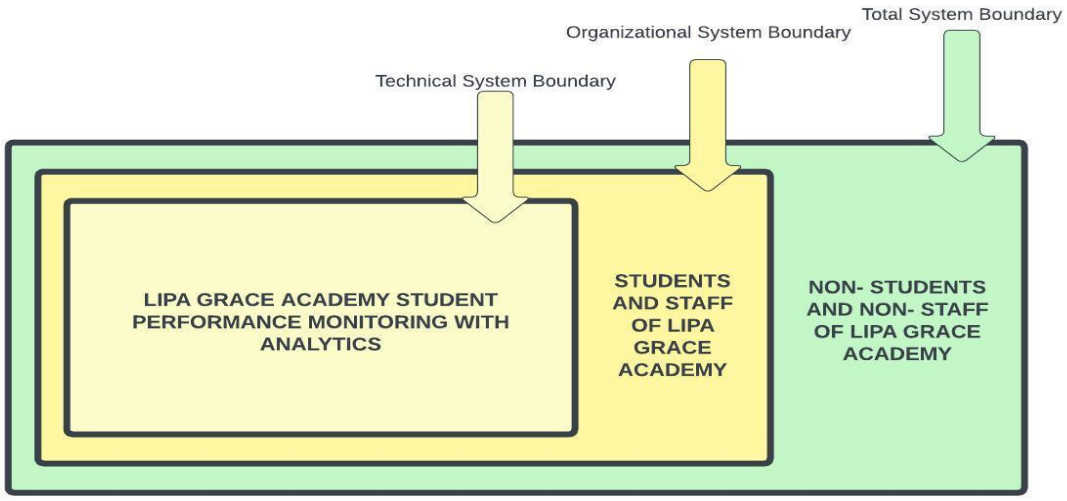


Figure 5. System Boundary

Figure 5 depicts the system boundary for the Lipa Grace Academy Student Performance Monitoring with Analytics. This figure is a plain and concise illustration of the system's scope. The system is intended to assist the students and faculty of Lipa Grace Academy. Non-students and non-employees of the Lipa Grace Academy are expressly excluded from the system, as defined by the system boundary. Defining the system boundary this way ensures that all stakeholders comprehend its purpose and scope, allowing them to collaborate effectively on its development and implementation. The system boundary is the basis for successful collaboration and effective system implementation.

Hardware Requirements

To use the system, users must have the hardware specifications listed in Table 2. These specifications have minimum and recommended requirements, which users must follow to ensure the system is easy to use and interact with.

Table 2
Hardware Requirements Specification

Hardware	Minimum Requirements	Recommended Requirements
Processor	Dual-core processor (2 GHz or faster)	Quad-core processor (2.5 GHz or faster)
RAM	2 GB	4 GB or Higher
Storage	16 GB	32 GB or Higher
Internet Connectivity	10 Mbps speed	20 Mbps speed or faster

The system's hardware requirements are displayed in Table 2. Dual-core processors with speeds of 2 GHz or higher are required, while quad-core processors with speeds of 2.5 GHz or higher are recommended. The minimum amount of RAM required is 2 GB, while 4 GB or higher is recommended. Minimum storage capacity is 16 GB, while 32 GB or higher is recommended. A minimum bandwidth of 10 Mbps is required for internet connectivity, while a speed of 20 Mbps or higher is recommended for optimal system operation.

Software Requirements

The software specifications and requirements for using the application are presented in Table 3. These specifications and requirements are essential to ensure compatibility and proper functioning of the application.

Table 3
Software Requirements Specifications

Software	Specification
Operating System	Windows, Linux, Mac
Web Browser	Google Chrome, Mozilla Firefox, or Microsoft Edge

Table 3 illustrates the specifications of the software requirements that are essential for the application to operate seamlessly on the user's devices. The application can be operated on Windows, Linux, or Mac operating systems. It is also

necessary to use web browsers such as Google Chrome, Mozilla Firefox, or Microsoft Edge to run the application without any difficulties.

Functional Requirements

In developing the system, certain requirements were incorporated into the backbone design. This phase tackles the functions of the system to be developed. The requirements will be categorized based on the system users, including teachers, students, and administrators. The functional requirements for each user will detail the necessary features and functionalities needed to fulfill their tasks. This will provide the framework for the system's design, development, and testing, ensuring that it meets the needs and expectations of its users. The system must have the following capabilities:

1. User Management
    1.1. The system should permit administrators to create and handle user accounts for teachers and students.
    1.2. User roles and permissions should be defined to ensure appropriate access levels and data security.
2. Grade and Score Management
    2.1. The system should enable teachers to input and update grades and scores for various activities, assignments, and assessments.
    2.2. It should support different grading scales, such as percentages, letter grades, or grade points.

2.3. Teachers should be able to view and analyze grade distributions for individual students and the entire class.

3. Progress Monitoring

3.1. The system should allow teachers to generate progress reports for individual students, showcasing their performance over a specific period.

3.2. It should allow students to view weekly progress, which includes incomplete, missing, or completed activities and quizzes.

3.3. Progress reports should include comprehensive summaries of student performance in different subject areas.

4. Analytics and Insights

4.1. The system should provide tracking analytics to determine the percentage required for students to qualify for academic honors.

5. User Interface and Accessibility

5.1. The system should have a user-friendly interface, intuitive navigation, and a clear information display.

5.2. It should be accessible to teachers and students from various devices, including computers, tablets, and smartphones.

Non-Functional Requirements

This section demonstrated the efficiency and effectiveness of the developed system. The researchers established four standards for evaluating the system's workability: performance, security, usability, and reliability.

1. **Performance**

It must handle many users and concurrent transactions without significant performance degradation. Response time for user interactions should be within under 5 seconds.

2. **Security**

The research team should incorporate robust protocols to guarantee the system's data and features' confidentiality, integrity, and availability. Implementing user authentication and authorization mechanisms ensures only authorized users can access the system's data and functionalities.

3. **Usability**

The system must be user-friendly and easy to use. It should have clear and intuitive interfaces that are easy to navigate.

4. **Reliability**

The system must be reliable and recover quickly from unexpected errors or system failures. The system should be able to handle heavy usage without experiencing crashes or downtime. Developers should conduct rigorous testing to ensure the system meets these reliability requirements.

Constraints

This section details the software utilized for the system and underwent a comprehensive evaluation for its deployment and implementation. A constraint refers to the restrictions on software development that must be met. This enables the team to limit the software options for use in creating and implementing the system.

Table 4

Constraints

Programming Languages	Speed	Flexibility
Laravel	Moderate	Flexible
Django	Fast	Highly Flexible

Table 4 shows the software limitations or constraints. The developers rated different software options based on their speed and flexibility. Laravel was ranked moderate and flexible, while Python was ranked as Fast and Flexible. According to Keshav (2020), Django provides built-in support for most trending databases, primarily focusing on relational databases, while PHP lacks this facility, although it offers more database selection options, including NoSQL databases. According to 18Pixels (2023), Django's well-designed tools, including an ORM, an admin interface, and a templating engine, enhance productivity in web development, allowing for the rapid and efficient construction of complex web applications which is appropriate for the system.

Trade-Offs

To develop the system, developers can utilize multiple programming languages for project development. Table 5 shows some potential programming languages options that could benefit the project.

Table 5
Trade-Offs

Options	Programming Languages
Design A	Python Django Angular Bootstrap MySQL
Design B	PHP Laravel Vue.js MongoDB
Design C	Ruby Ruby on Rails PostgreSQL

Table 5 shows the three options of programming languages that the developers will use in developing the system. Design A consists of Python as the primary programming language, with Django as the web framework for server-side development. Angular is the library used for front-end development and Bootstrap for CSS styling. MySQL is the choice of database management system used to store and manage data.

Design B uses PHP as the primary programming language, with Laravel as the web application framework. Vue.js is the library used for front-end development, and MongoDB is the database management system used for data storage and retrieval.

Design C uses Ruby as the primary programming language, with Ruby on Rails as the web application framework. PostgreSQL is the database management system used for data storage and retrieval.

Design

System Architecture

Figure 6 illustrates the system architecture of Student Performance Monitoring with Data Analytics and E-Learning Management System for Lipa Grace Academy. System Architecture is a critical aspect of any software project and serves as the backbone of the entire system. It is responsible for organizing the different layers of the system and ensuring that they work together seamlessly.

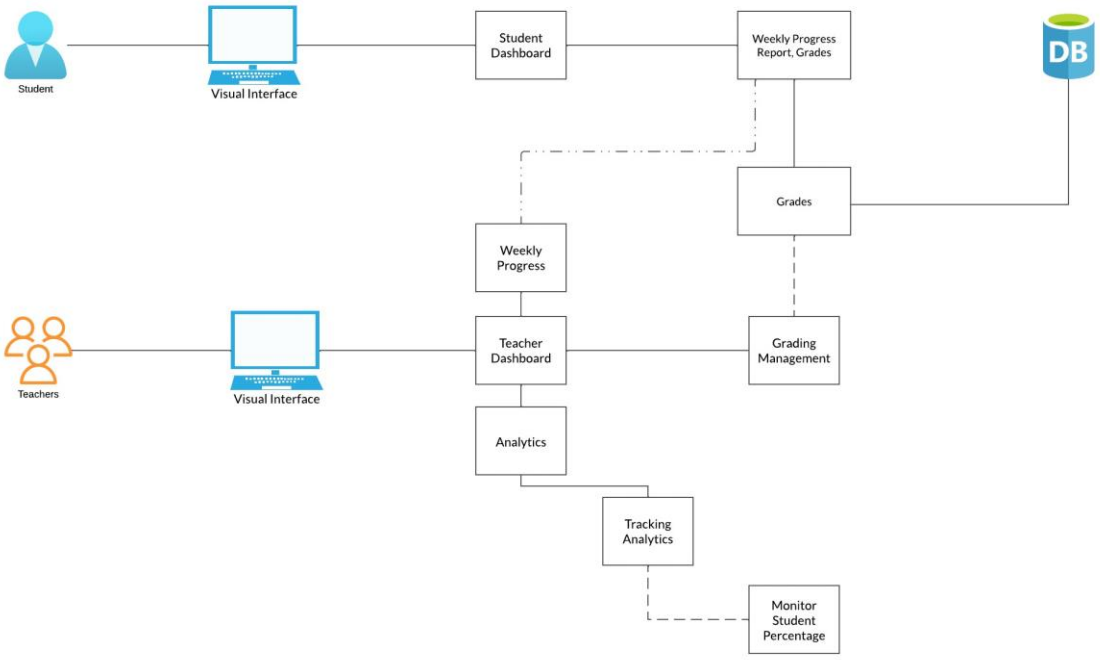


Figure 6. System Architecture

Data Flow Diagram

This section is a graphical representation of the functions or processes involved in capturing, manipulating, storing, and distributing data between the E-Learning Management system and its environment, as well as between different components of the system. The following diagram helps to visualize the flow of information through symbols.

As illustrated in Figure 7, it serves as the compass that guides us through the intricate web of interactions between the Student Performance Monitoring System and the external entities that are integral to its operation, such as students, teachers, and administrative personnel.

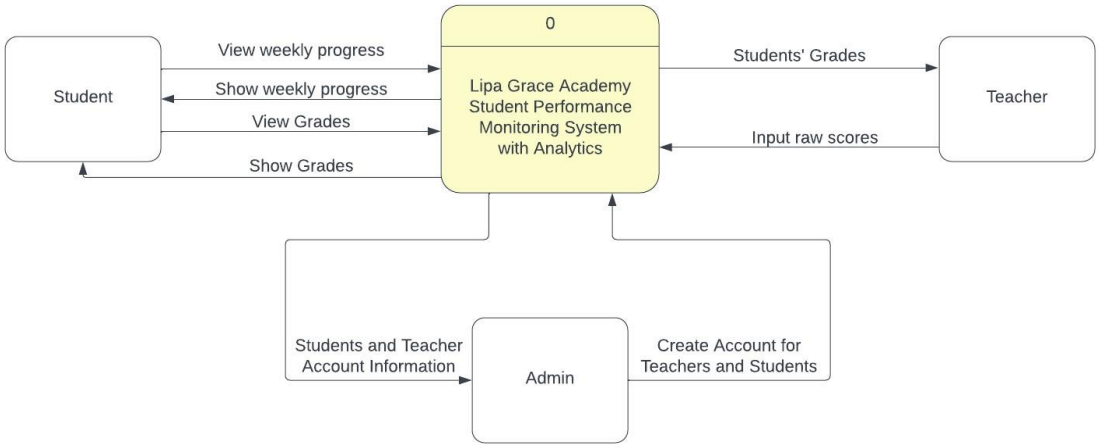


Figure 7. Context Diagram

Based on the context diagram shown in Figure 7 refers to the system under consideration as a single high-level process. Also, the system's relationship with other external entities such as Students, Teachers, and Admin is illustrated.

Figure 8 shows the Level 0 DFD for students. It shows the different processes by which students can interact with the system.

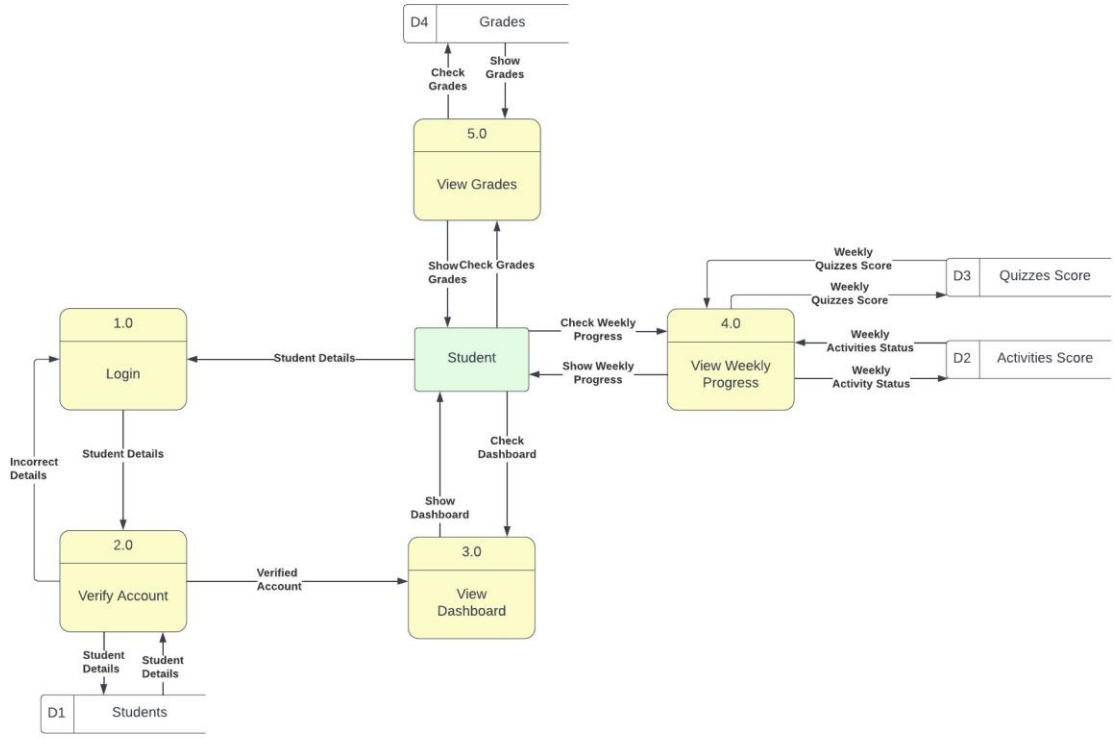


Figure 8. Level 0 DFD for Students

Figure 8 includes login, viewing the dashboard, and viewing weekly progress and grades. The arrows between the entities and processes indicate the system's data flow and operations. It also shows the four data stores responsible for storing and managing data.

Figure 9 shows the Level 0 DFD for teachers. It shows the different processes by which teachers can interact with the system.

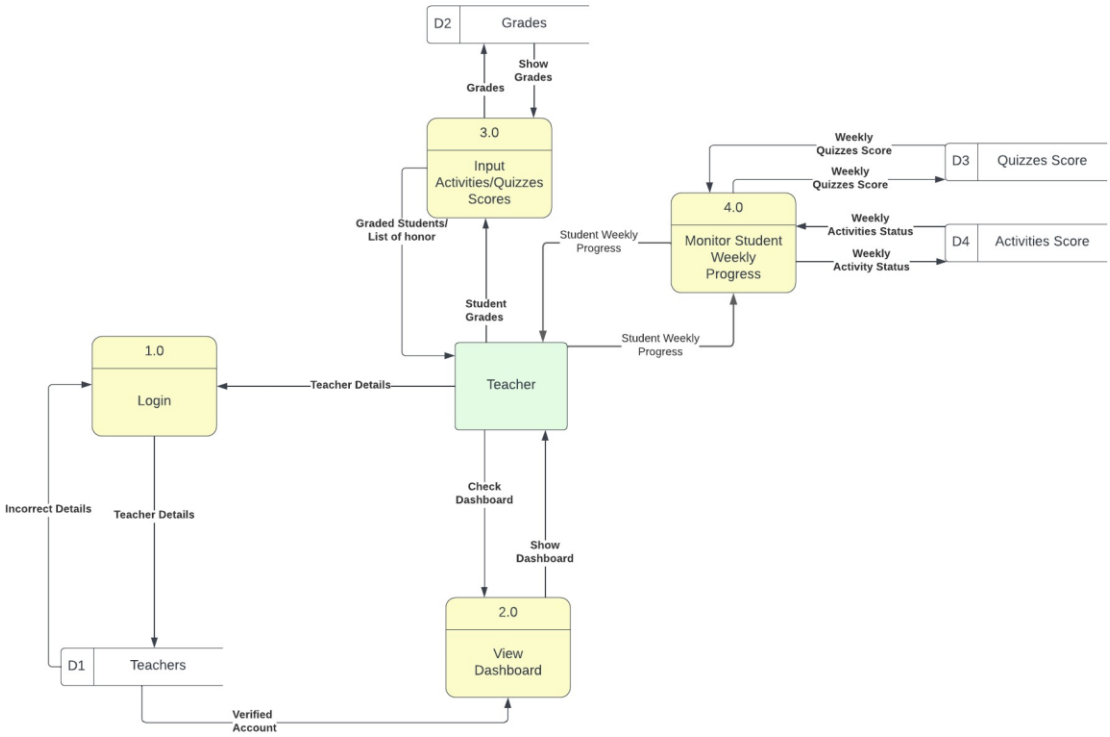


Figure 9. Level 0 DFD for Teachers

Figure 9 include login, viewing the dashboard, inputting quizzes and scores, and monitoring student weekly progress. The arrows between the entities and processes indicate the system's data flow and operations. It also shows the five data stores responsible for storing and managing data.

Figure 10 shows the Level 0 DFD for admin. It shows the different processes by which the admin can interact with the system.

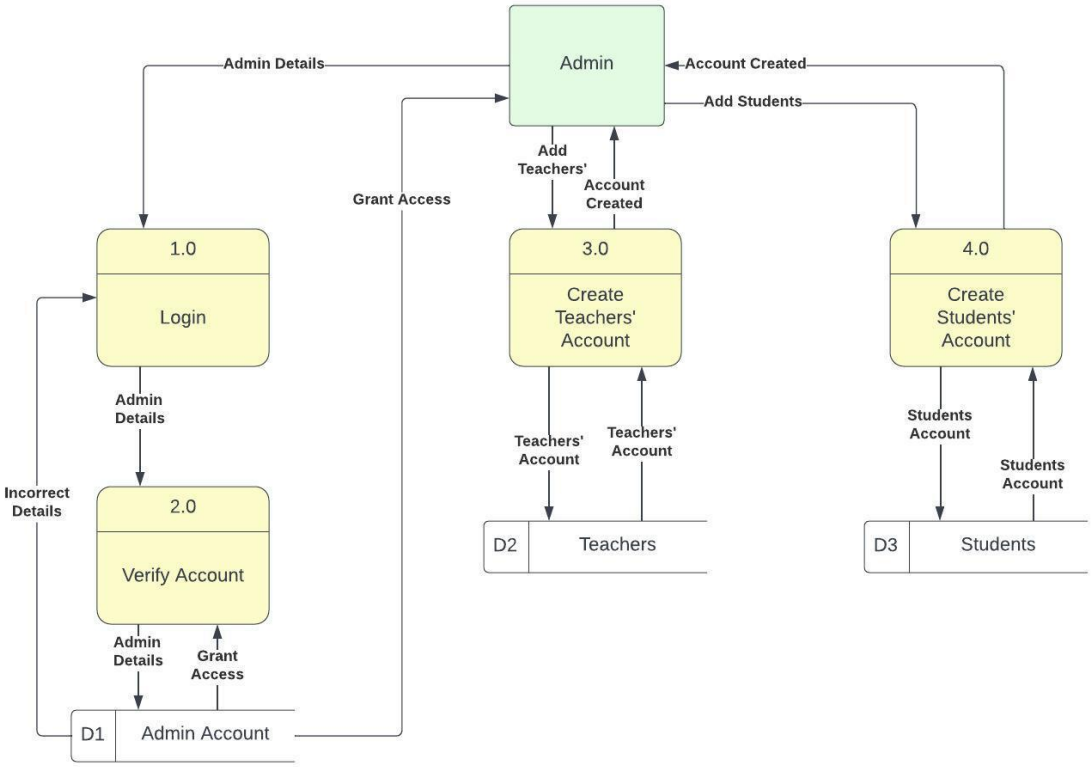


Figure 10. Level 0 DFD for Admin

These include login and creating teachers' and students' accounts. The arrows between the entities and processes indicate the system's data flow and operations. It also shows the three data stores responsible for storing and managing data.

Use Case Diagram

Figure 11 presents the Use Case diagram, showcasing various user categories, including Students, Teachers, and Admin, and their corresponding use cases. The interactions depicted with the Student Performance Monitoring System outline the relationships between the users and the various use cases they may encounter.

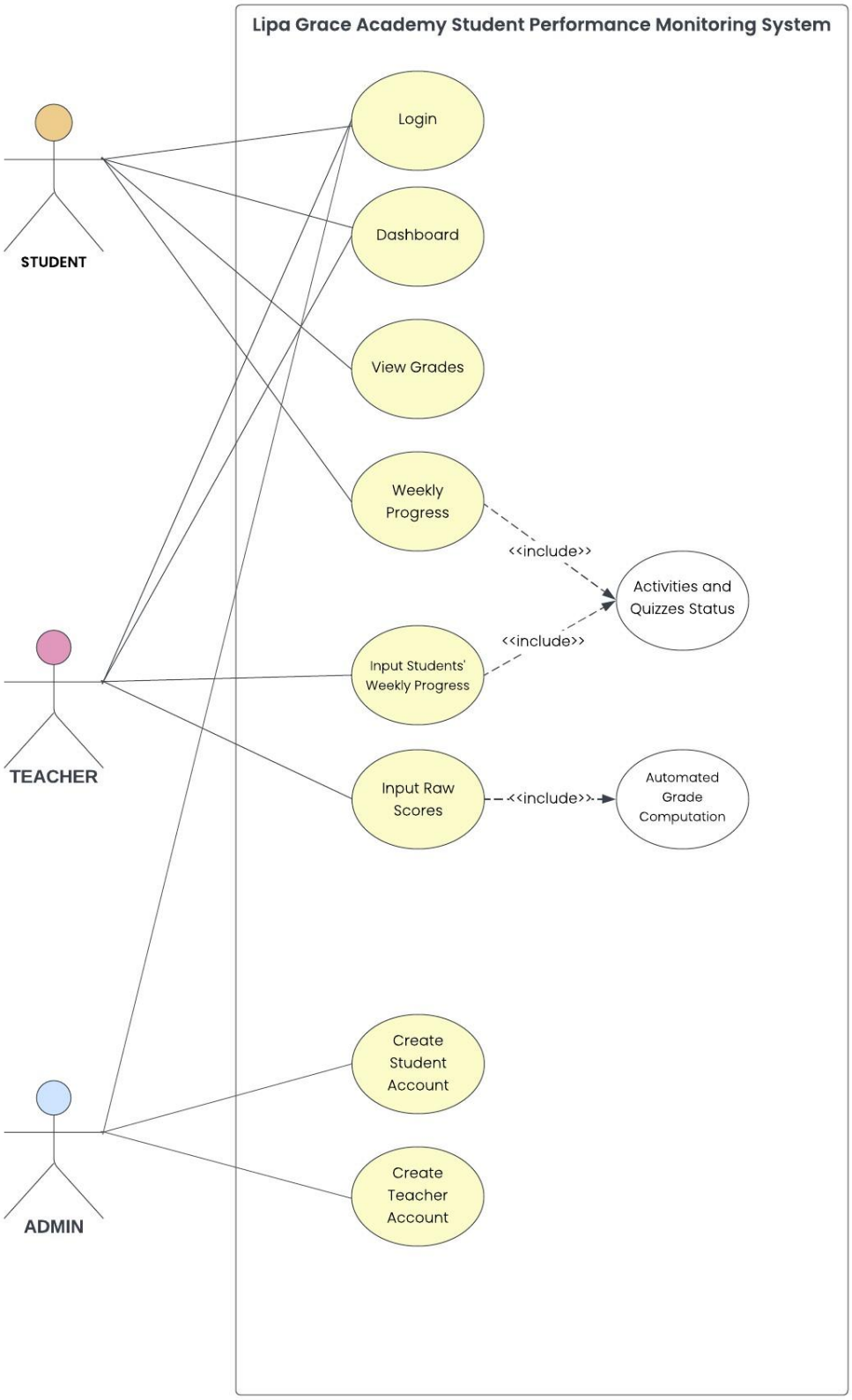


Figure 11. Use Case Diagram

Based on the Use Case Diagram, the teacher can view the student's weekly progress, including the attendance and tardiness report, and Activities/Quizzes Status. Moreover, students can monitor their weekly progress, including Activities and Quizzes status. They can also view their grades online. This dashboard provides students with a comprehensive view of their weekly progress and allows them to monitor their learning. Moreover, the admin is responsible for managing all information accounts of teachers and students. In addition, they can create accounts for teachers and students.

Sequence Diagram

Figure 12 depicts an interaction diagram that elucidates the procedure of executing operations in Student Performance Monitoring with Analytics. The diagram outlines the messages being sent and received.

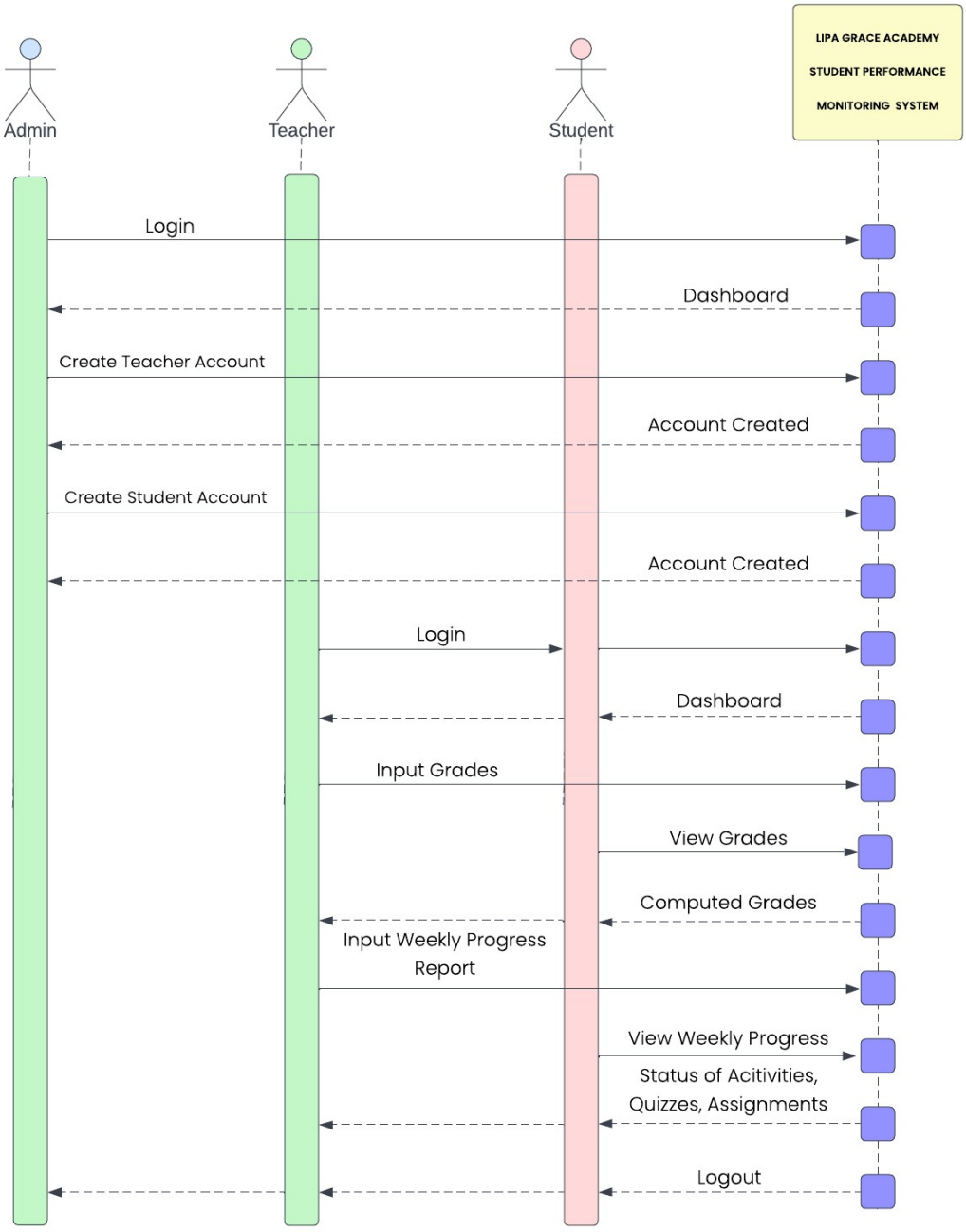


Figure 12. Sequence Diagram

Figure 12 shows the sequence of events which is arranged chronologically to depict how a user progresses through a page. The researchers also enumerated the objects implicated in the operation, such as Admin, Teacher, and Student, which are listed from left to right about when they would take part in the message sequence

Database Design

Figure 13 shows the proposed system's database design, including several interconnected databases.

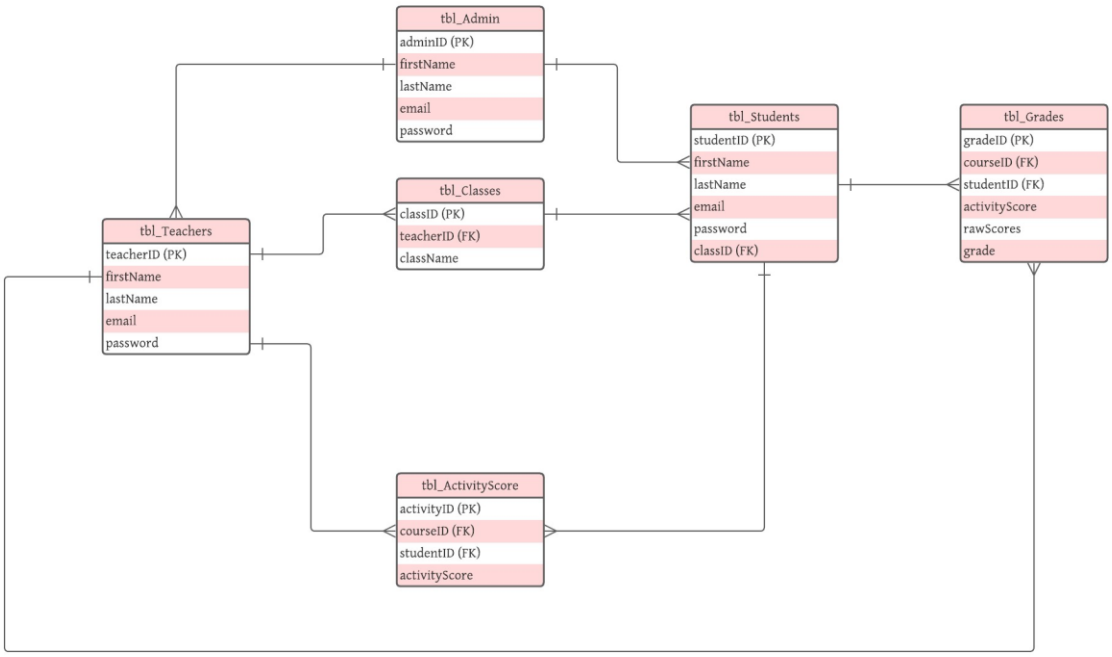


Figure 13. Database Design

Figure 13 shows the proposed system's database design, including several interconnected databases. The system has three main types of users: administrators, teachers, and students. The Admin database is connected to the Teachers database through a one-to-many relationship, where one admin can manage many teachers. The Admin database is connected to the Students database through a one-to-many relationship, where one admin can manage many students. The class database has a one-to-many relationship with students because one class can have many students. Similarly, the teachers' database has a one-to-many relationship with classes since

a teacher can have many classes. Additionally, the Teachers database is linked to the Quiz Score database through a one-to-many relationship, where one teacher can input many quizzes scores. The Students database is related to the Attendance database through a one-to-many relationship, where one student can have many attendance records. The Students database is connected to the Activity Score database through a one-to-many relationship, where one student can have many activity scores. Finally, the Students database is related to the Grades database through a one-to-many relationship, where one student can have many grades.

Deployment

The researchers will use this phase as a guide for implementing the Student Performance Monitoring System with Analytics at Lipa Grace Academy. Table 6 lists the activities associated with this phase.

Table 6
Deployment Process Activities

Activities	Development	Testing	Deployment	Maintenance
Develop system requirements and specifications				
System design and architecture				
Database design and implementation				
Front-end development				
Back-end development				
Unit testing				
User acceptance testing				
Data migration and system installation				
Training for teachers, students, and admin				
System launch				
Bug fixes and updates				

Maintenance

Maintenance is essential in software development to preserve the system's dependability, effectiveness, and stability. Table 7 depicts the completed maintenance plan, which includes adaptive, corrective, preventative, and corrective

maintenance categories. In addition, the plan specifies the time intervals at which each type of maintenance must be performed.

Table 7
Maintenance Plan

System	Maintenance Type	Time Interval	Owner
Lipa Grace Academy Student Performance Monitoring System with Analytics	Adaptive	As needed	Thea Clarisse P. Delos Santos
	Corrective	As needed	Keanne E. Lopez
	Preventive	Quarterly	All researchers
	Perfective	As needed	Jussel Elejorde

In Table 7, the researchers included corrective maintenance, which entails resolving issues within the system, such as bugs or errors, to restore it to its normal operation state. This form of maintenance is essential for ensuring the system operates smoothly and uninterruptedly. Adaptive maintenance, on the other hand, entails modifying the system to accommodate the changing requirements of the users or adapting to new technologies. As the academy's and its students' requirements change, the system must evolve to accommodate these alterations. Preventive maintenance entails actions designed to avert the occurrence of prospective system problems. This form of maintenance includes routine system updates, data backups, and security checks to safeguard the system against cyber threats and data loss.

Lastly, perfective maintenance focuses on enhancing the system's efficacy and functionality. This form of maintenance aims to optimize the system's functionality, improve the user experience, and introduce new features that will benefit the users.

Approximately 20% of the maintenance work involves addressing errors, while the remaining 80% consists of modifying existing systems to accommodate external changes, incorporating user-requested enhancements, and re-engineering applications for use.

Risk Management

Risks are possible occurrences that, if they occur in a project management setting, can be considered problems that must be effectively addressed. To ensure that a project remains on track and achieves its objectives, it is essential to identify, analyze, and respond to any potential risks that may arise throughout its life cycle. Risk analysis and management will be critical project management practices throughout the investigation to minimize the occurrence or impact of unexpected circumstances. Although it is impossible to forecast the future with absolute certainty, a simple risk management process to anticipate project uncertainties and mitigate their effects could substantially impact the entire project. This strategy increases the probability that the project will be completed successfully and mitigates potential hazards. Five risks that could substantially impact the proposed monitoring system have been identified.

Risk 001: Technical issues. Complex technical procedures may fail or break down during the development and deployment of a student performance monitoring system, resulting in a system outage or data loss. Technical issues such as software bugs, server crashes, hardware malfunctions, compatibility issues, and slow response time could significantly affect the system's functionality and performance.

Risk 002: Data privacy and security. The system will collect and retain sensitive information, including student grades and attendance records. The system's security and privacy measures must be robust enough to prevent unauthorized access, data intrusions, and cyberattacks that could compromise the integrity and confidentiality of the system.

Risk 003: User adoption. The system is success depends on teacher, student, and administrator adoption. If users find the system difficult, time-consuming, or unresponsive, they may not implement it, resulting in low system adoption and decreased engagement.

Risk 004: Resource availability. To develop, deploy, and maintain the system, sufficient hardware, software, and technical expertise are required. The system may not operate as intended if resources are insufficient or unavailable, leading to system failure or performance issues.

Risk 005: Lack of training and support. To effectively use the system, instructors, students, and administrators may need to acquire new skills and adapt to new procedures. Without appropriate training and support, users may find it

difficult to understand and employ the system's capabilities effectively. This may result in dissatisfaction, system errors, or low usage, reducing engagement and productivity. Inadequate training and support may also result in improper system usage, resulting in data errors or security breaches.

Risk Matrix	**SEVERITY**					
L I K E L I H O O D		Negligible	Minor	Moderate	Significant	Severe
	Very likely	Low med	Medium	Med High	High	High
	Likely	Low	Low Med	Medium	Med High	High
	Possible	Low	Low Med	Medium	Mid High	Med High
	Unlikely	Low	Low Med	Low Med	Medium	Med High
	Very unlikely	Low	Low	Low Med	Medium	Medium

Figure 14. Risk Matrix

Figure 14 illustrates the Risk Matrix, which classifies and provides additional information about the previously mentioned risk. This matrix will serve as the basis for Table 8 risk analysis.

Table 8
Risk Analysis

ID	RISK	Category	Likelihood	Severity	Impact
001	Technical issues	Technical	Very Likely	Significant	High
002	Data privacy and security	Security	Likely	Significant	High
003	User Adoption	User	Possible	Moderate	Medium
004	Resource availability	Resource	Possible	Significant	Med High
005	Lack of training and support	People	Likely	Moderate	Medium

Table 8 illustrates the most significant risks that could significantly impact the e-learning management system are Technical Issues, Data Privacy and Security, and User Adoption. Technical issues, such as software bugs, server crashes, hardware malfunctions, and slow response time, are highly probable and may result in system downtime or data loss. With sensitive data such as student and teacher information, and student grades being collected and stored, there are also significant risks associated with data privacy and security. Integrity and confidentiality of the system could be compromised by unauthorized access, data breaches, or cyberattacks. User adoption is also a potential risk, as the success of the system is contingent on the users' willingness to implement and effectively utilize the system. If users find the system to be difficult time-consuming, or unresponsive, they may not employ it, resulting in low system usage and decreased engagement. To ensure

the success and sustainability of the system, it is crucial to manage and mitigate these risks.

Table 9
Risk Treatment

Risk	Risk Treatment
Risk 001: Technical Issues	To mitigate this risk, the risk treatment could entail conducting thorough testing and quality assurance processes before system deployment to identify and resolve potential technical issues. In addition, regular system maintenance and modifications could be implemented to keep the system optimized and in line with the most recent technological standards.
Risk 002: Data Privacy and Security	The system should be designed with robust security and privacy measures to mitigate data security and privacy risks. The system should employ robust encryption to safeguard sensitive data such as student grades and information. Access to the system should be restricted to only authorized personnel using secure login credentials and multi-factor authentication.
Risk 003: User Adoption	User Adoption entails addressing potential user issues by designing the system to be intuitive and user-friendly, undertaking user testing and feedback, providing comprehensive training and support materials, and involving users in the development and enhancement of the system.
Risk 004: Resource Availability	Identifying and securing the resources required for system development, deployment, and maintenance. This may involve hardware, software, and technical knowledge. It is crucial to assess the available resources exhaustively and identify any potential gaps.
Risk 005: Lack of Training and Support	Provide users with adequate training and support. The training should cover the system's capabilities, best practices for system utilization, and cybersecurity precautions to prevent data breaches. Additionally, the training should be tailored to various user groups, such as teachers, students, and administrators, to ensure they have the necessary skills and knowledge to use the system effectively.

Table 9 outlines various risk management strategies, but only one team member is required to monitor the risk trigger and implement the outlined countermeasures. Table 10 describes the role of the risk proprietor, who is responsible for promptly reporting any modifications and implementing countermeasures.

Table 10
Risk Ownership

ID	Risk	Owner
001	Technical Issues	Thea Clarisse P. Delos Santos
002	Data Privacy and Security	Thea Clarisse P. Delos Santos
003	User Adoption	Keanne E. Lopez
004	Resource Availability	Jussel Elejorde
005	Lack of Training and Support	Jussel Elejorde

CHAPTER IV
RESULTS AND DISCUSSIONS

This chapter conducts a comprehensive analysis of the impact and implications arising from the implementation of the Lipa Grace Academy Student Performance Monitoring System with Analytics. This system, designed to enhance academic management and student performance assessment, is scrutinized for its potential benefits and limitations. The researchers exploration aims to provide valuable insights applicable to both academic research and practical application within the educational context of Lipa Grace Academy.

A web-based Student Performance Monitoring System with Analytics

The developers created a web-based system, The Lipa Grace Academy Student Performance Monitoring with Analytics, where teachers can input grades and scores for various activities. With analytics integration, the system can provide significant insights into student performance, such as tracking analytics for tracking the required percentage for academic honor and percentage of each activities. The system is accessible through web browsers on both mobile phones and desktop computers, providing a user-friendly interface for students and teachers. It was specifically designed to facilitate the efficient tracking of student performance within Lipa Grace Academy.

Input raw scores for students' weekly progress tracking

Figure 15 shows where the teacher can input students raw scores that will contribute to students weekly progress tracking.

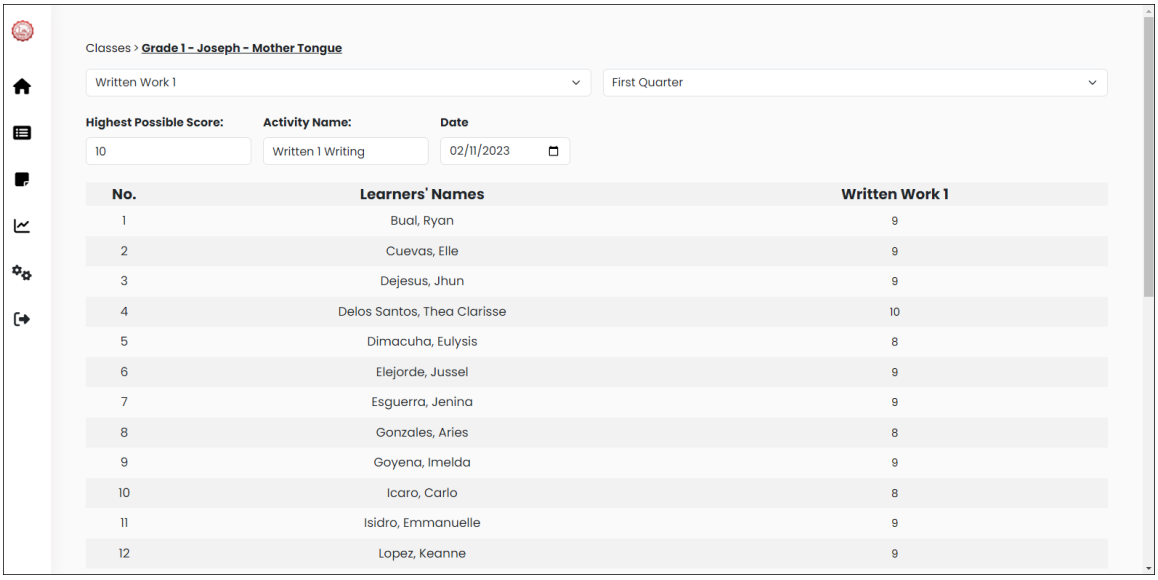
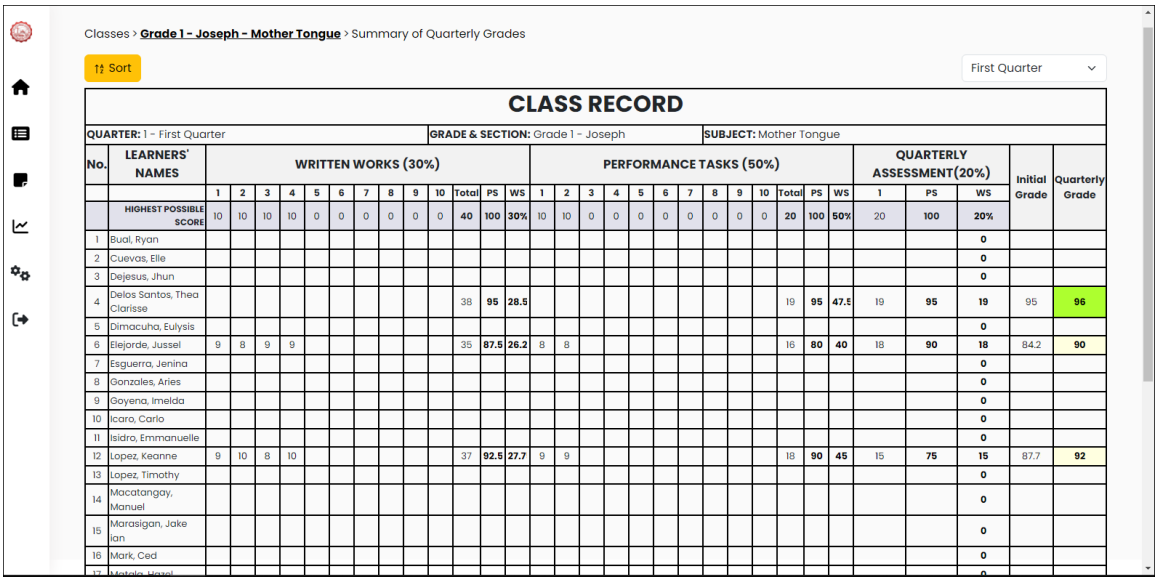


Figure 15. Input raw scores for students' weekly progress tracking

The researchers have successfully implemented a user-friendly interface for teachers to input raw scores for various student activities. Activities are presented in a dropdown menu. Each activity displays the activity name, date, and the highest possible score. The results indicate that this feature has streamlined the process of data entry, improving efficiency and accuracy in record-keeping, and contributing to effective tracking of students' weekly progress.

Class Record containing generated raw scores from weekly progress

Figure 16 shows the class record of the system where the raw inputs will be generated from weekly progress.



Classes › Grade 1 - Joseph - Mother Tongue › Summary of Quarterly Grades

Sort | First Quarter

CLASS RECORD

QUARTER: 1 - First Quarter | **GRADE & SECTION:** Grade 1 - Joseph | **SUBJECT:** Mother Tongue

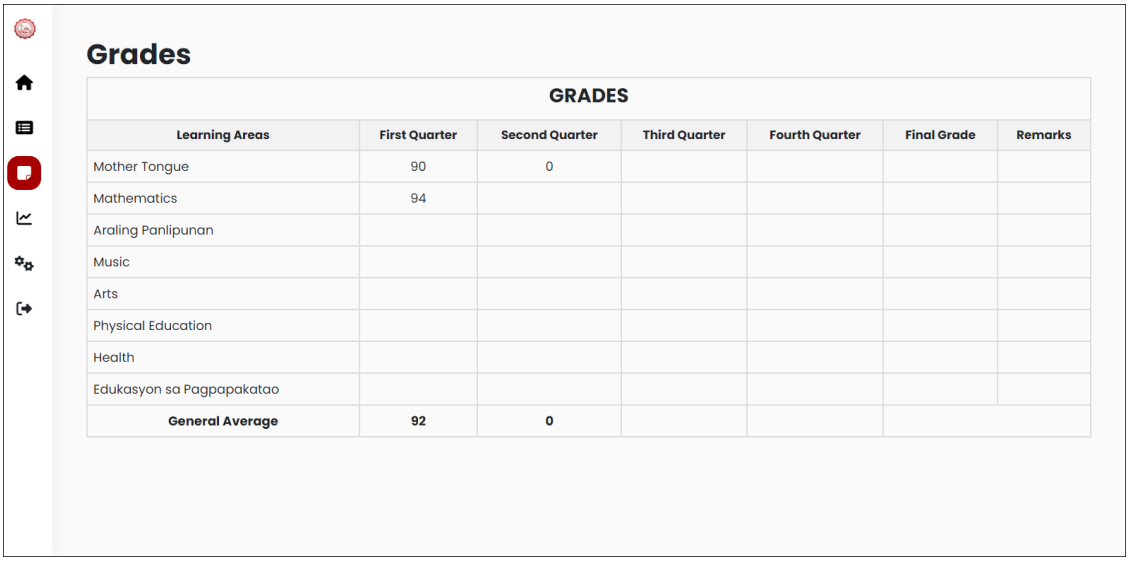
No.	LEARNERS' NAMES	WRITTEN WORKS (30%)													PERFORMANCE TASKS (50%)													QUARTERLY ASSESSMENT(20%)			Initial Grade	Quarterly Grade
		1	2	3	4	5	6	7	8	9	10	Total	PS	WS	1	2	3	4	5	6	7	8	9	10	Total	PS	WS	1	PS	WS		
	HIGHEST POSSIBLE SCORE	10	10	10	10	0	0	0	0	0	0	40	100	30%	10	10	0	0	0	0	0	0	0	0	20	100	50%	20	100	20%		
1	Bual, Ryan																													0		
2	Cuevas, Elle																													0		
3	Dejesus, Jhun																													0		
4	Delos Santos, Thea Clarisse											38	95	28.5											19	95	47.5	19	95	19	95	96
5	Dimacuha, Eulysis																													0		
6	Elejorde, Jussel	9	8	9	9							35	87.5	26.2	8	8									16	80	40	18	90	18	84.2	90
7	Esguerra, Jenina																													0		
8	Gonzales, Aries																													0		
9	Goyena, Imelda																													0		
10	Icaro, Carlo																													0		
11	Isidro, Emmanuelle																													0		
12	Lopez, Keanne	9	10	8	10							37	92.5	27.7	9	9									18	90	45	15	75	15	87.7	92
13	Lopez, Timothy																													0		
14	Macatangay, Manuel																													0		
15	Marasigan, Jake Ian																													0		
16	Mark, Ced																													0		
17	Matela, Hazel																															

Figure 16. Class Record containing generated raw scores from weekly progress

The successful implementation of automatic raw score generation from weekly progress inputs is evident. The system efficiently generates initial grades based on DepEd's transmutation table. This achievement streamlines the grading process and ensures consistency with standardized grading criteria.

Students' Grades

Figure 17 shows the grades of the students per subject quarterly.



Grades

GRADES

Learning Areas	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Final Grade	Remarks
Mother Tongue	90	0				
Mathematics	94					
Araling Panlipunan						
Music						
Arts						
Physical Education						
Health						
Edukasyon sa Pagpapakatao						
General Average	**92**	**0**				

Figure 17. Students' Grades

A transparent view of their grades, has been effectively implemented. Through the graphical representation of grades for each subject and quarter, students now have easy access to their grades per quarter as well as the general average.

Students' Weekly Progress

Figure 18 shows the students weekly progress for each subject.

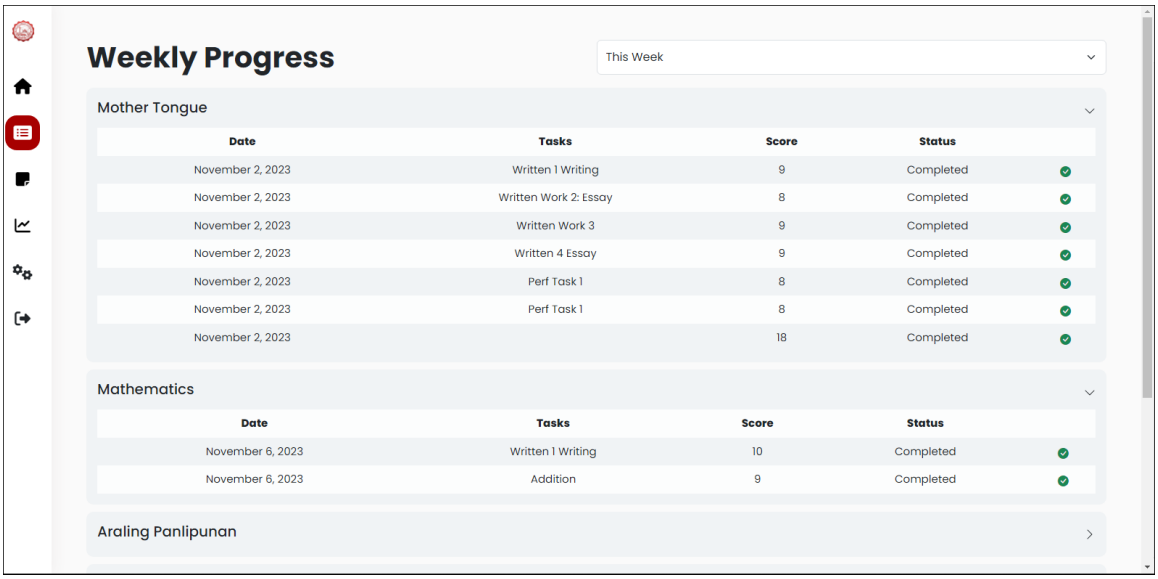


Figure 18. Students' Weekly Progress

The researchers successfully implemented a comprehensive view of students' weekly progress, which includes completed and missing activities. For each subject, the system offers comprehensive details about the tasks, including the score attained by the student and the status of those tasks. In instances where no progress is recorded for a particular subject in a given week, it is clearly indicated as "No weekly progress for this subject.

Student Analytics

Figure 19 focuses on empowering students by providing them with analytics to track their weekly progress, incorporating incomplete, missing, or completed activities and quizzes.

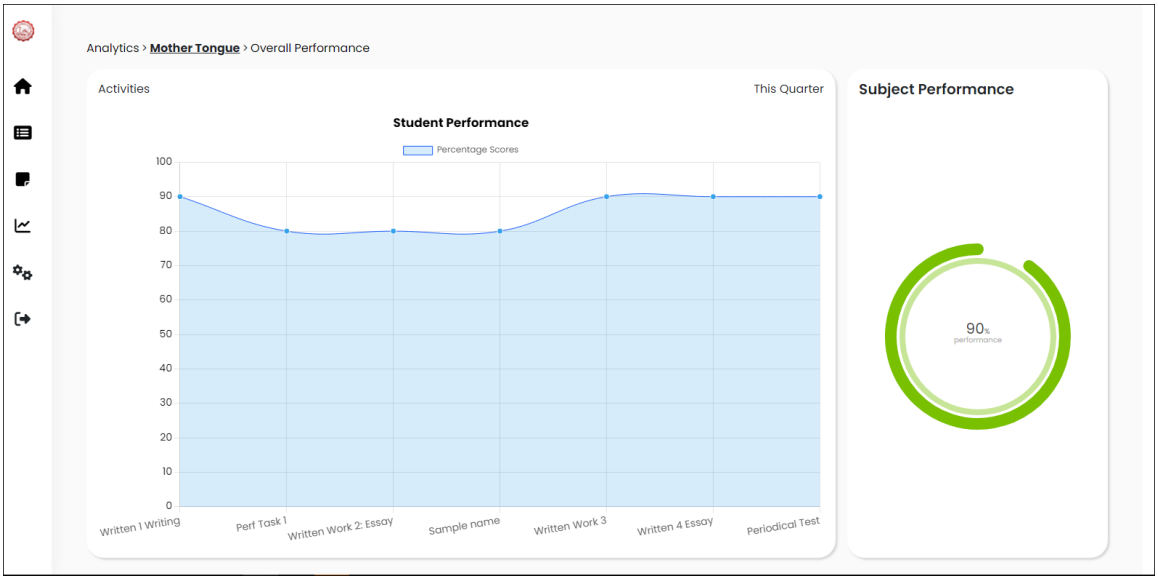


Figure 19. Student Analytics

The successful integration of tracking analytics into our system has provided a powerful tool for analyzing student performance. The user interface (UI) now includes a line chart that visually represents the percentage of students' activities based on the highest possible score for each activity. This feature has not only been effectively implemented but also demonstrates its potential to offer valuable insights into individual and overall student performance. It empowers both students and educators with a data-driven approach to understand strengths and areas in need of improvement.

Tracking Analytics for determining the percentage required for students to qualify for academic honors.

Figure 20 shows tracking analytics to determine the required percentage for students. This feature is designed to provide clarity and motivation for students to strive for academic excellence.

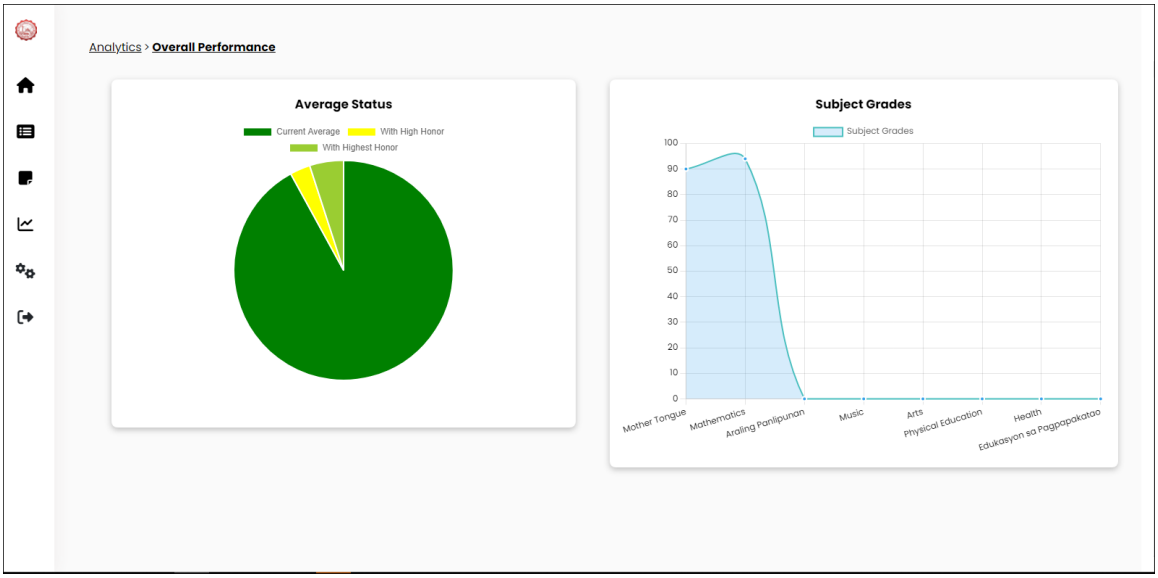


Figure 20. Tracking Analytics for determining the percentage required for students to qualify for academic honors.

The successful integration of tracking analytics has empowered students to track their progress toward achieving academic honors. Within the user interface (UI), students can access an informative pie chart representing their overall performance. This pie chart consists of segments, with one segment dynamically moving based on the student's current average. Through this successful implementation it allows students to actively track their progress and ascertain how much they need to improve their average to achieve academic honors.

CHAPTER V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The summary of findings, conclusions, and recommendations based on the goals of the finished project titled "Lipa Grace Academy Student Performance Monitoring System" are presented in this chapter.

Summary of Findings

The objective of the study is to develop a Student Performance Monitoring System with Analytics for Lipa Grace Academy. In the pursuit of this goal, we established a set of objectives and research purposes that led us to several significant findings.

The Student Performance Monitoring System significantly empowers teachers by streamlining administrative responsibilities such as grading and progress tracking. Additionally, the systems provide a clear view of grades and weekly progress. This transparency had a transformative effect, fostering a sense of responsibility among students for their own learning journey. Analytics integration was critical in enabling data-driven decision-making. It allows teachers to recognize and address the issue of students compromising their needs in order to complete their tasks. Analytics for tracking of academic percentage for honor roll is provided too. The development and successful implementation of the Lipa Grace Academy Student Performance Monitoring System with Analytics represent a significant step toward data-driven academic management and improving the overall learning experience for both students and educators at Lipa Grace Academy.

Conclusion

Based on the findings of the researchers, the following are concluded:

1. The first objective aimed to empower teachers by facilitating the input of raw scores for various student activities, assignments, and assessments, which significantly contributed to the tracking of students' weekly progress. The successful implementation of this objective not only lightened the administrative workload for educators but also enhanced their ability to focus on effective teaching practices. Additionally, the feature that enables teachers to view class records containing generated raw scores from weekly progress was met with success. This achievement greatly streamlines the grading process and ensures alignment with standardized grading criteria, marking a pivotal step toward improving the academic management at Lipa Grace Academy.
2. The second objective was to provide students with a transparent view of their grades, including details about incomplete, missing, or complete activities and quizzes, while also enabling them to track their performance over time. The successful implementation of this objective had a transformative effect on students, fostering greater involvement in their own education and enhancing their accountability for their learning path.
3. The third objective focused on integrating tracking analytics into the system to analyze student performance and identify areas for improvement. This feature has been successfully implemented, providing both students and

educators with a data-driven approach to understand strengths and areas in need of enhancement. The successful implementation of this feature encourages students to set academic goals and work toward their attainment.

Recommendations

After determining the conclusion, the developers provide the following recommendations for further improvements for the Lipa Grace Academy Student Performance Monitoring System with Analytics.

1. Develop a mobile application of the system for students.
2. Include notifications once their weekly progress is released.

APPENDICES

Appendix A

Schedule and Timeline

Figure 21 is the timeline of activities along with the associated information such as relevant dates, duration and with the specific task.

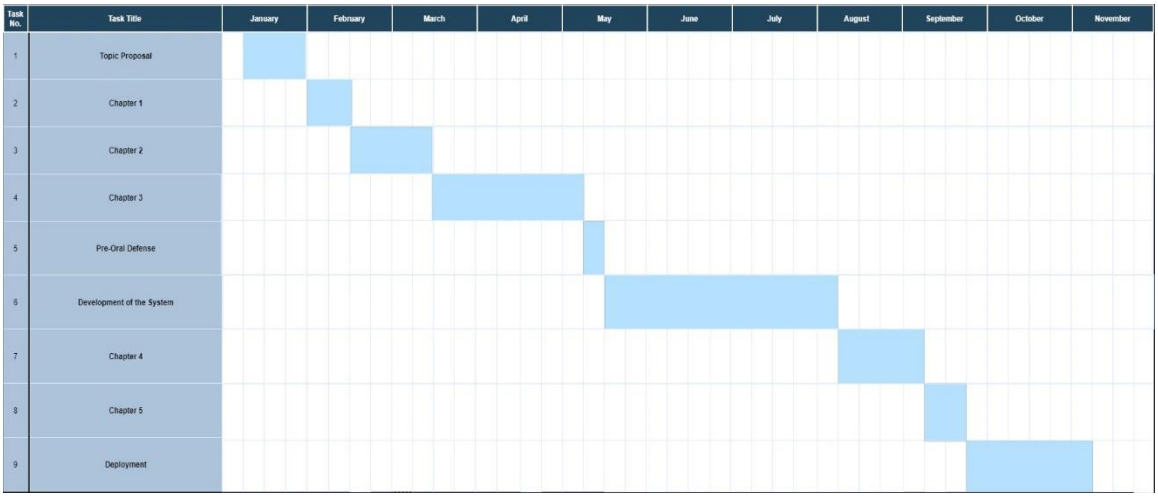


Figure 21. Schedule and Timeline

Figure 21 outlines the sequence of tasks and activities, along with their respective start dates, durations, and their associated information. The project's journey begins with the initial topic proposal, followed by the phases dedicated to chapters 1 through 3, leading up to the pre-oral defense. Subsequently, it transitions into the system development stage, followed by the completion of chapters 4 and 5, and ultimately culminating with the deployment phase. Each task within these stages is carefully outlined to provide a clear picture of the project's progression and the key milestones achieved along the way. It ensures that the capstone project proceeded systematically and efficiently.

Appendix B

Roles and Responsibilities

The responsibilities of every group member are assigned according to their roles and capabilities, to guarantee the success of the systems deployment, the distribution of each role was distributed based on the discussion the programmers have conducted which is presented in Table 11.

Table 11

Roles and Responsibilities

ROLES	NAME	ADDRESS	CONTACT NUMBER
Lead Programmer UI Designer	Thea Clarisse P. Delos Santos	San Roque, Rosario Batangas	09083444771
UI Designer QA Tester	Jussel Elejorde	San Jose, San Antonio Quezon	09099807343
UI Designer QA Tester	Keanne E. Lopez	Namuco Rosario Batangas	09924921355

Table 11 contains the members' names, contact details, roles, and tasks to the development of the system. This level of organization and clarity is essential for effective project management and communication, ultimately contributing to the successful execution of the project.

Appendix C

Budget Cost Management

Table 12 shows how much money was spent during the development of the project.

Table 12
Budget Cost Management

Software Application/Tools	Description	Cost
Web Hosting	A service that allows the system to be accessible in the internet	₱1,360.00 / monthly
Domain (.org)	A unique web address that serves as an online identity	₱500.00

Table 12 details the budget allocated for specific software applications and tools, along with their descriptions and associated costs. Specifically, the cost breakdown includes expenses for essential components such as web hosting, which ensures the system's accessibility on the internet, incurring a monthly cost of ₱1,360.00, and the acquisition of a unique web address with the ".org" domain, serving as the project's online identity and incurring a one-time cost of ₱500.00. These financial details are crucial for transparently tracking and managing project expenses, ensuring the prudent allocation of resources throughout the development process.

Appendix D

Bionote

Thea Clarisse P. Delos Santos was born in Rosario, Batangas. She currently living at Sanroque, Rosario Batangas and she finished her Senior High School at STI College Lipa in 2020. She currently studying at Batangas State University – Alangilan Campus with the degree of Bachelor of Science in Information Technology major in Business Analytics.

Jussel Elejorde was born in Rosario, Batangas. He currently living at San Jose, San Antonio Quezon and he finished his Senior High School Holy Family Academy in 2020. He is currently studying at Batangas State University – Alangilan Campus with the degree of Bachelor of Science in Information Technology major in Business Analytics.

Keanne E. Lopez was born in Rosario, Batangas. She currently living at Namuco, Rosario Batangas and she finished her Senior High School at STI College Lipa in 2020. She currently studying at Batangas State University – Alangilan Campus with the degree of Bachelor of Science in Information Technology major in Business Analytics.

APPENDIX F

Users Manual

Homepage

Figure 22 shows the homepage of the system.

Figure 22. Homepage

1. Click on the "Login" button located on the homepage.
2. Upon clicking the "Login" button, a modal window will pop up, presenting the login form.
3. Enter email address and password and designated role.

1. If your email address, password, and role are correct, you will be directed to your account dashboard, granting you access to the system's features and functionalities based on your role.

STUDENT HOMEPAGE

Figure 23 shows the student homepage of the system. It has a calendar, announcements, and a section for today's activities.

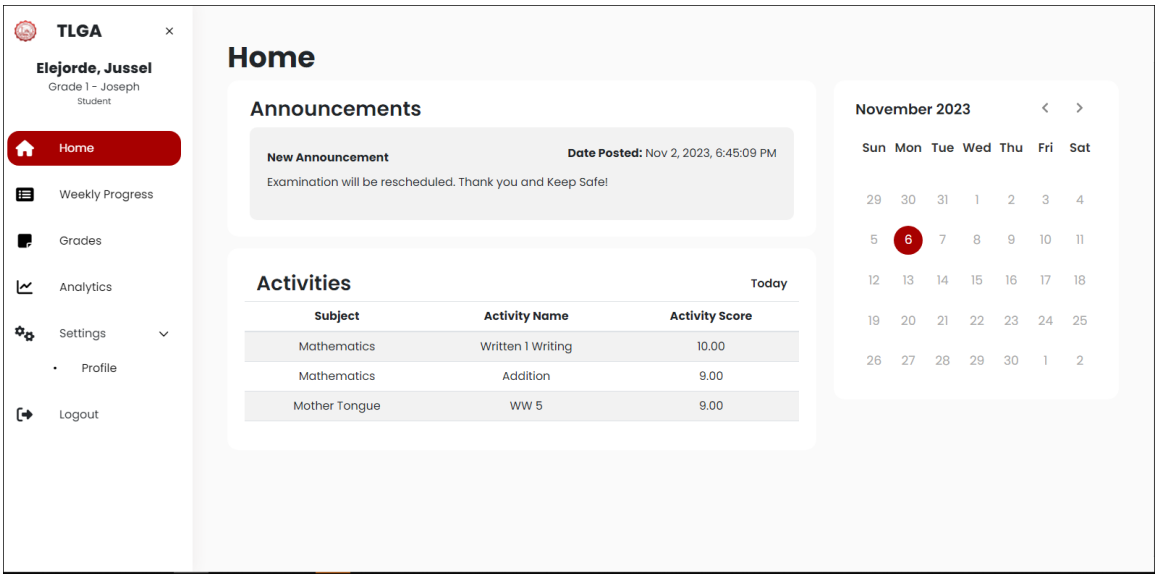


Figure 23. Student Homepage

1. Click on the "Home" option in the side menu bar to return to your home page.
2. Click "Weekly Progress" to view and track your weekly progress for various activities and assignment.
3. Click on "Grades" to access your academic grades for individual subjects and quarters.
4. Choose "Analytics" to explore data-driven insights into your academic performance, including charts and visualizations.
5. To access and edit your profile information, click "Profile."

Students' Weekly Progress Page

Figure 24 shows the interface of the weekly progress page of the students.

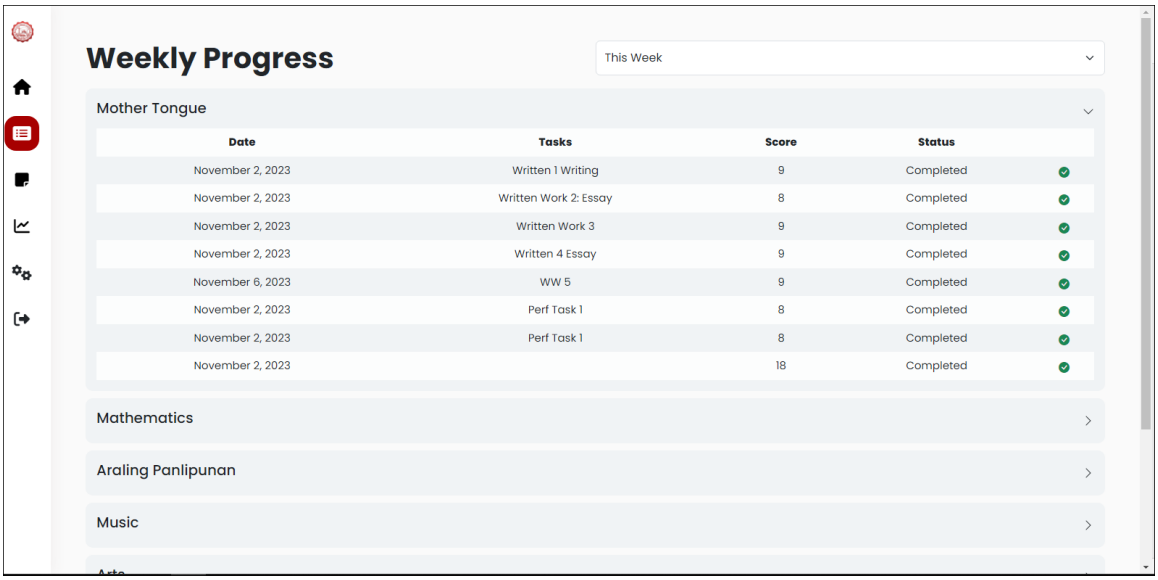


Figure 24. Students' Weekly Progress Page

1. You will find a filter option that allows you to sort activities.
2. By default, activities are displayed weekly. To filter activities by a specific month, select your desired month from the dropdown menu.

Teachers' Homepage

Figure 25 shows the interface of the weekly progress page of the students.

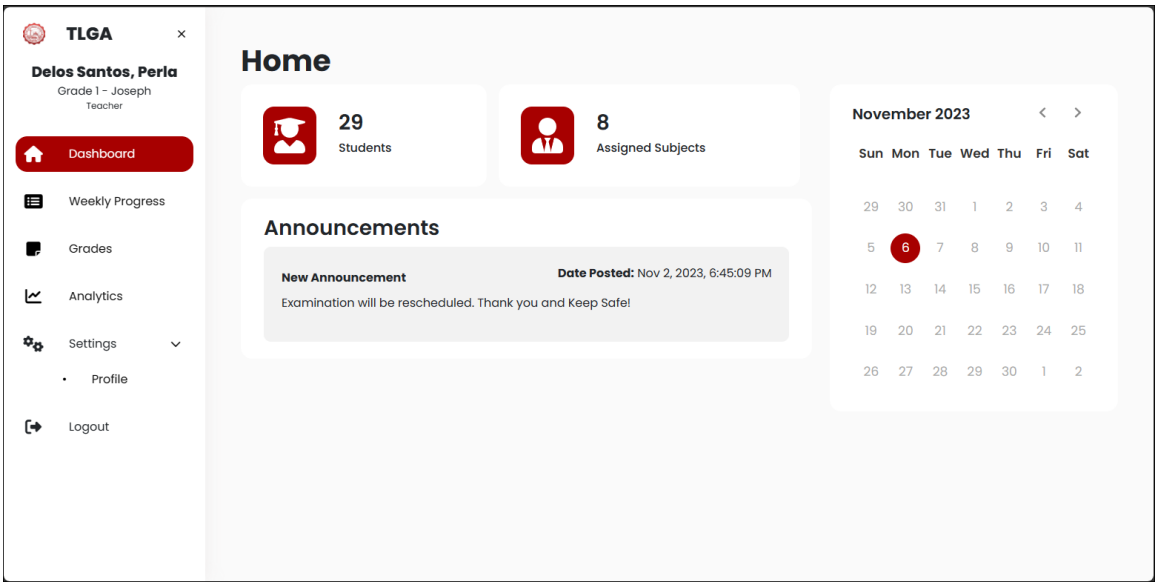


Figure 25. Teacher Homepage

1. Click on the "Home" option in the side menu bar to return to your home page.
2. Click "Weekly Progress" to input raw scores for various student activities, assignments, and assessments.
3. Click on "Grades" to access and view the generated raw scores from weekly progress, as well as academic grades for individual subjects and quarters.
4. Click "Analytics" to explore data-driven insights into student performance, including charts and visualizations.
5. To access and edit your profile information, click "Profile."

Teachers' Weekly Progress Page

Figure 26 shows the interface of the weekly progress page of the students.

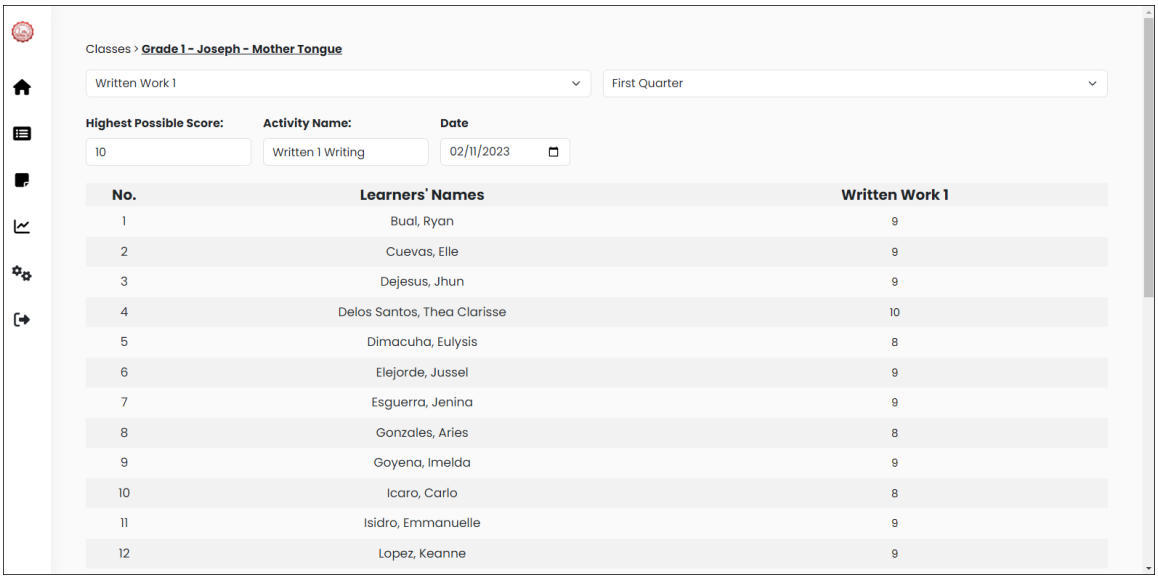


Figure 26. Teachers' Weekly Progress Page

1. After selecting an activity, you will see a list of learners' names, along with their current scores.
2. You have the option to edit and update these scores by clicking on the respective learner's score field.
3. After selecting an activity, you will see a list of learners' names, along with their current scores.
4. Set the highest possible score, activity name, and date for that activity.
5. You have the option to edit and update these scores by clicking on the respective learner's score field.
6. After selecting an activity, you will see a list of learners' names, along with their current scores.
7. Click "Save" to save the changes made.

Teachers' Class Records Page

Figure 27 shows the interface of the weekly progress page of the students.

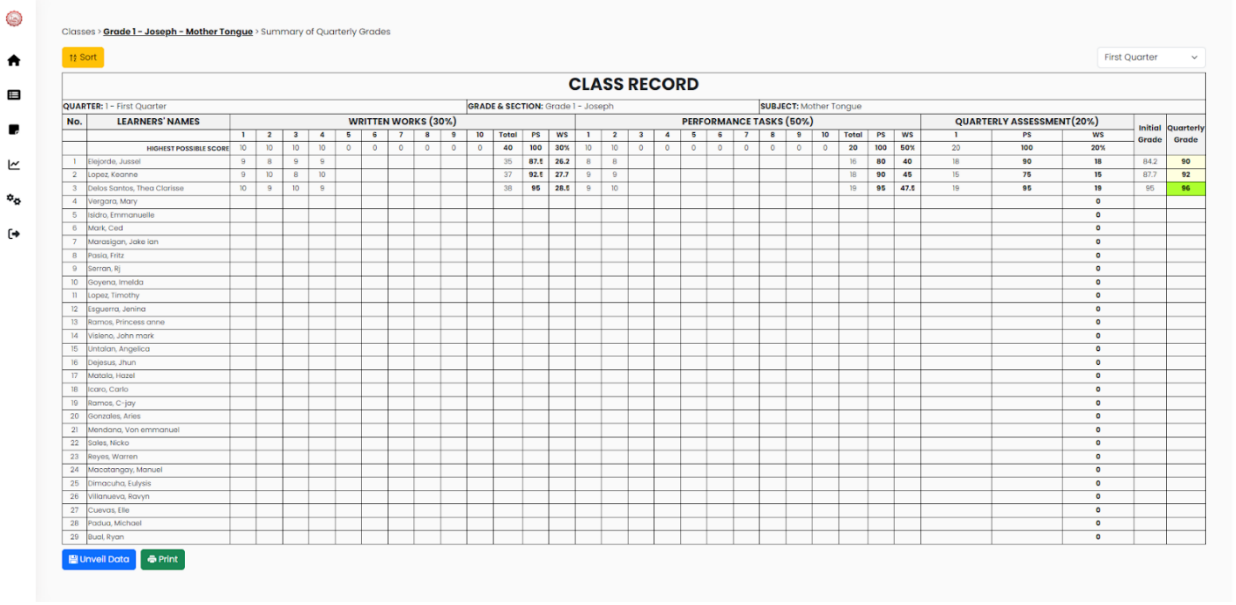


Figure 27. Teachers' Class Records

1. On the Teacher Class Records Page, you will see a selection option to filter and choose the specific quarter for which you want to manage and release student grades.
2. Use the dropdown menu to select the desired quarter for grade management.
3. Click the "Unveil Data" button. This action will release the current grades for students based on your input and the selected quarter.

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