EL-KLASE: A WEB-BASED E-LEARNING SYSTEM FOR ANSELMO A. SANDOVAL MEMORIAL NATIONAL HIGH SCHOOL

A Capstone Project Presented to the Faculty of the

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In Partial Fulfillment of the Requirements for the Degree of

Bachelor of Science in Information Technology

Major in Service Management

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APPROVAL SHEET

This thesis study entitled EL-KLASE: A WEB BASED E-LEARNING SYSTEM FOR ANSELMO A. SANDOVAL MEMORIAL NATIONAL HIGH SCHOOL, prepared and submitted by MAGBOO JR, MARVIN M, MENDOZA JOHN PAUL M, and SARABIA FRANCIS EJ D. in partial fulfillment of the requirements for the Degree of Bachelor of Science in Information Technology, has been examined and is recommended for acceptance and approval for Oral Examination.

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ABSTRACT

Title: "EL Klase": A Web-Based E-Learning System for Anselmo A. Sandoval Memorial National High School

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Degree: Bachelor of Science in Information Technology

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Summary:

Because of the COVID-19 restrictions, one of the learning delivery modalities employed by AASMNHS is the Department of Education's Modular Distance Learning, which involves learning without a physical connection between teachers and students. Where should parents or legal guardians pick up the self-learning module at school? The application comes next. The student is responsible for completing the exercises in the modules according to their own learning style. Parents or legal guardians are responsible for returning the modules to the school and organizing them by subject once the learner has completed all of the lessons in the modules. Teachers can monitor and support learners in completing activities in their modules using a checklist provided by the school and filled out by the parents based on what topic the learner has submitted. It will be used to determine which

subjects have already been completed by the students. As of SY-2021-2022, AASMNHS is one of the town's public schools, with 3,695 pupils enrolled in junior and senior high schools. Where all of the activities, including module retrieval and activity submission, are piling up, there are some occasions where, even after the students have completed the activities, some of these activities are misplaced, lost, or destroyed, leaving them with no choice but to repeat them.

The “EL Klase”: A Web-Based E-Learning System for Anselmo A. Sandoval Memorial National High School was designed and developed using HTML, CSS, PHP, MySQL, Xampp and Bootstrap. The developers offered a web-based e-learning platform with a responsive design that works on mobile devices. Admins, teachers, and students are the three sorts of users in the system. The admin is in charge of keeping track of key information like the school year calendar, grade levels, sections, and subjects. Because some of the classes are modular distance learning, the initiative could be helpful today. The faculty or teacher can use this system to distribute soft copies of learning documents to students as well as build a practice quiz and assignment for a class. Students can view announcements, assignments, activities and take the teacher's practice quiz, but they can only take the quiz for the time allotted by the teacher.

ACKNOWLEDGEMENT

Our deepest gratitude goes to God, who has provided everything needed to complete this project and the program for which it was undertaken, deserves our appreciation. There was never a shortage of anything. He took care of everything that would have halted us in our tracks during the studies and strengthened us even in our darkest moments.

Our capstone adviser, Mr. Joshua C. Abella, provided us with important supervision and support during the preparation and completion of our project, and we would like to extend our heartfelt gratitude to him.

To Dr. Ryndel V. Amorado, our capstone instructor, for all the knowledge, wisdom and suggestions for our proposal topic

To Head Teacher II/Officer-in-Charge, Mr. Apolinario B. Mañibo for approving our proposed system at Anselmo A. Sandoval Memorial National High School. We'd like to express our gratitude for their time and expertise, as well as for presenting a subject that is relevant to our theme.

Last but not least, we want to thank our parents, friends, and colleagues for their unwavering support and assistance during this effort. In addition, for their words of encouragement during all of the late nights spent working on the capstone project.

DEDICATION

Many sacrifices have gone into our project. The effort is gratefully and proudly devoted to the people who inspire us. During the completion of this project, parents and guardians, as well as classmates and circle of friends, gave their support.

To our capstone subject advisor and instructor. Above all, we thank our Almighty God for the strength, courage, patience, knowledge, time, and guidance we have received in finishing this task.

M M. M JR

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F E D. S

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CHAPTER I

INTRODUCTION

Project Context

Depending on the COVID-19 constraints and the specific context of the learners in the school or locality, schools may use one or a mix of the learning delivery modalities. Secretary Leonor Magtolis Briones stated that "Despite the challenges and uncertainty created by COVID-19, the Department had to find ways to keep the learning process continuing while ensuring the health, safety, and well-being of learners and teachers." (DepEd, 2021).

Anselmo A. Sandoval Memorial National High School (AASMNHS) is one of the educational foundations in Mabini, Batangas for secondary level education which uses a K-12 educational system. The school delivers a high-quality, equitable, culture-based, and comprehensive basic education to generate graduates who are both intellectually and technologically competent. AASMNHS provides junior and senior high schools as well as a K to 12 basic education curriculum. It is covered by a Department of Education resolution (DepEd). Under the academic track, it features GAS, STEM strand, and ABM strands, as well as a Technical Vocational Livelihood (TVL) track that prepares pupils with technical abilities for its senior high school program.

Because of the COVID-19 restrictions, one of the learning delivery modalities used by AASMNHS is the Modular Distance Learning designed by the Department of Education (DepEd), in which learning takes place without a physical

connection between teachers and learners. Where the self-learning module should be picked up by the parents or legal guardians in school. Next, is application. The learner is responsible for completing the activities contained in the modules in their unique manner of learning. Once the learner completes all their lessons in the modules, the parents or the legal guardian are responsible for returning the modules to the school and sorting them by subject. The checklist is provided by the school and filled in by the parents, based on what subject the learner has submitted, and teachers can monitor and assist learners in completing tasks in their modules. It will be used to determine which subjects the students have already completed. AASMNHS is one of the public schools in town, with 3,695 enrolled students in junior and senior high schools as of SY-2021-2022. Where all of the activities every retrieval of the modules and submission of the activities are getting piled up, there are some instances where even if the students are done with the activities, some of these activities are misplaced, lost, or destroyed, leaving them with no choice but to repeat them, take a picture, and send them again to the subject teacher.

The researchers employed Sustainable Development 4 (Quality Education with target 4.7) or Education for Sustainable Development and Global Citizenship. This research intends to assist and deliver high-quality services while also promoting lifelong learning in the face of difficulties such as the CoVid-19 pandemic. Regardless of the global difficulties confronting the Philippines, education must remain a significant concern in order to protect the abilities, values, and skills that each student possesses.

Given the problems that are cited above, the developers came up with the idea of developing an EL-Klase: A Web-Based E-Learning System for the school that will serve as a module for the teacher and the output. The developers proposed a Web-based method for teachers to save paper effort and costs and prevent the loss/misplacing of the activities. This E-learning system can be accessed by the students, teachers, and school admin for access to admin. The proposed system is responsive so that even if the student opens the system on a mobile phone, it still experiences the same functionalities as the web-based one. The featured system is designed to include modules such as class activities, class updates, creating class, quizzes, exams, and exam results, as well as other informative sections that will undeniably aid in teacher and student communication, collaboration, and efficiency.

The proponent's specialization track is Service Management, which is a customer-focused approach to delivering information technology. Using technology, the proponent wants to deliver a service by making a EL-Klase: A web-based E-Learning system that can help schools manage the students' learnings and to continue learning despite the challenges and uncertainty created by COVID-19.

Purpose and Description

The goal of this research is to provide a solution for manual and modular learning to the teachers and students at Anselmo A. Sandoval Memorial National High School by designing and developing productive learning experiences for

students to be exposed to the majority of learning opportunities. Given that total face-to-face communication is not feasible during the pandemic.

The developers proposed a web-based e-learning platform that also has a responsive design compatible with mobile devices. The system has 3 types of users, which are the admin, teachers, and students. The admin is in charge of maintaining important data such as the list of the school year, grade levels, sections, subjects, etc. The project can also be useful nowadays because some of the classes are under modular distance learning. Using this system, the faculty or teacher can provide soft copies of learning documents to the students, and also, he/she can create a practice quiz and assignment for a class. Students can view announcements, and answer the teacher's given practice quiz, but are limited to the teacher's allotted duration for taking the quiz.

Technology provides innovative and resilient solutions in times of crisis to combat disruption and helps teachers and students interact and communicate virtually. The developers realized that effective learning might be accomplished by using modern technology and the development of a Web-based E-Learning System for Anselmo A. Sandoval Memorial National High School.

Objectives of the Study

This proposed topic aims to develop a Web-Based E-Learning System for the students and faculty of Anselmo A. Sandoval Memorial National High School. It aims to accomplish the following:

1. To develop a responsive Web-based E-learning system intended to support both teaching and learners, as well as student-teacher interaction with interchangeable/responsive functions on any device.
2. To provide a module for the teachers to upload:
    3.1 Announcements
    3.2 Scores
    3.3 activities, quizzes, and exams
    3.4 learning materials.
3. To develop a module for the students to easily submit and manage the activities. View scores, take quizzes, and download learning materials.

Significance of the Study

The goal of this study is to serve as a module for the teacher and student. It is for the teachers to save paper effort and costs and avoid the loss or misplacing of the activities. The said system is responsive, so that even if the student opens the system on a mobile phone, it still experiences the same functionalities as the web-based one.

Scope and Limitations

This section explains the system's overall function, the scope within which it can work successfully, the system's feature limits, and the beneficiaries of the project.

The primary focus of this project is to develop an E-Learning system that helps the teachers and students of AASMNHS by creating a new learning environment. The system relies on Wi-Fi- or mobile data. The system is limited to the students, teachers, and school admin of AASMNHS. The admin can only view, add, edit, and delete the school year, grade levels, class sections, subjects, students, and teachers' information. The teachers can only post announcements, assignments/ activities, quizzes, exams, and other downloadable learning materials that the students need. The students can view the posted announcements, assignments, activities, and quizzes to be answered for the assessment. as well as download the available learning materials that the teacher posted.

Definition of terms

To understand and clarify the terms used in the study, the following are hereby defined:

Covid-19. COVID-19 (coronavirus disease 2019) is a disease caused by a virus named SARS-CoV-2 and was discovered in December 2019 in Wuhan, China. It is very contagious and has quickly spread around the world (NCIRD, 2021). In this study, to show what is the reason why modular distance learning was conducted.

Web-based. It is related to, or using the World Wide Web (Collins English Dictionary, 2014) In this study, web-based is the way to deliver information and services to avoid face-to-face interaction between students, teachers, and admin.

E-Learning. It is part of the new dynamic that characterizes educational systems at the start of the 21st century (Sangrá et al., 2012). In this study, it helps the students and teachers to create and communicate new ideas.

DepEd. The Department of Education (DepEd) is the government agency responsible for the implementation of basic education in the Philippines (Polo Owwa, 2022). In this study, it is responsible for ensuring access to, promoting equality in, and improving basic education.

K-12. enhanced the Philippine Basic Education System by strengthening its curriculum and increasing the number of years for basic education (Berto, 2019). In this study,This curriculum includes the school specified in the research.

CHAPTER 2

REVIEW OF RELATED SYSTEMS AND STUDIES

This chapter largely highlights the various studies, concepts, and associated systems utilized in the project's creation, which have a substantial impact on the variables included in the study. The data in this part provides the developers with the knowledge and background they need to conceptualize, create, and implement the project.

Technical Background

Various software was utilized to assist developers in creating high-quality software across the software development life cycle. The developers have combined the various technologies utilized in this project to meet the goals discussed in the first chapter.

Visual Studio Code. It is a free and open-source text editor that supports a broad range of programming languages, including Java, C++, and Python, as well as CSS, Go, and Dockerfile. Furthermore, users may add on and even create new extensions for VS Code, such as code linkers, debuggers, and cloud and web development support.

With support for hundreds of languages, including syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more, VS Code was used to build the system's architecture and functionality.

JavaScript. This, like Java, is a programming language created by Sun Microsystems in collaboration with Netscape that can be embedded in normal HTML pages. Although JavaScript is based on the Java grammar, it is a scripting language and cannot be used to develop standalone applications. Instead, it is mostly used to generate dynamic, interactive Web sites.

Bootstrap was used since it is the most popular CSS framework for developing responsive and mobile-first websites. Bootstrap includes HTML and CSS-based design templates for typography, forms, buttons, tables, navigation, modals, image carousels, and many others, as well as optional JavaScript plugins.

PHP. stands for: Hypertext Preprocessor, a well-known programming language which is usually used for web development and to develop dynamic web pages. Hypertext pertains to files linked together using hyperlinks, such as HTML files. The developers used PHP code on HTML for web processes. It has an important role in the system because almost all the processes on the database were executable using PHP codes.

CSS. CSS, which stands for Cascading Style Sheet, is a style sheet that is used to improve the display of web pages. CSS codes can be written independently of HTML code. This property makes it perfect for generating a consistent design across several web pages.

CSS was employed by the developers to improve the design of the web portal's interface. It was used to alter HTML structures in order to create a more attractive look.

HTML (Hypertext Markup Language) is the most frequent markup language for web pages. It holds all the information and functions within the website. From displaying text, tables, dividers, pictures, and other items, HTML is greatly involved. It can also embed scripts in languages such as JavaScript for better functionality of HTML web pages.

XAMPP is a totally free and simple-to-install Apache installation that includes MariaDB, PHP, and Perl. The XAMPP open-source software has been designed to be extremely simple to install and use. It is an open-source web solution bundle that contains the Apache distribution for numerous servers as well as command-line executables.

MySQL is an open-source relational database management system. It is based on the structured query language (SQL), which is used for adding, removing, and modifying information in the database.

MySQL was used by the developers as the database management system in this study. It acts as a server, providing multi-user access to a number of databases. It has good qualities like scalability and flexibility. It has strong data protection,

which provides a powerful mechanism to make sure only authorized users have an entry to the database server.

Apache. The most common Web server software is the Apache HTTP Server. It allows a computer to host one or more websites that are accessible through the Internet via a Web browser. Apache enables the developer's system to run server-side programs such as PHP.

Related Local System

In today's information world, the function of education in providing excellent education is under threat. Today, new technology is being used in schools as well. E-learning is defined as learning that is made possible or assisted by the use of digital tools and materials. E-learning is less expensive and more accessible. In the thesis entitled " E-Learning Fundamentals for Batangas State University" (Mercado et al., 2013), they aimed to develop an online program on CS Fundamentals. It was designed for the students 'learning process that is accessed via the internet. The said system can be used as primary material for topic discussions not only for the students but also for the professors, computer enthusiasts, academic community and for the future researchers.

The system that was developed by Guerra et al. (2009), the E-learning on Computer Organization and Architecture (ECOA) system, is a web-based learning system that allows students to access the online course at any time and from any

place. This is believed to improve both the students' learning processes and the instructors' teaching approaches. The aforementioned technology will also remove or greatly decrease the requirement for a classroom or teacher infrastructure. The web-based program delivers functions such as accessibility to course materials, which makes the students' learning process more competent, and the E-learning on Computer Organization and Architecture is more accessible and would boost learning efficiency. The mentioned study includes feature limitations such as uploading lecture materials, making announcements, and a grading system administered by the instructor. The system does not include the sending and receiving of data such as assignments, exercises, and reports.

Traditional education is still the most important educational system in the world. Other successful teaching approaches will become available with the development of new educational technology, particularly in the middle of a pandemic.

The system E-learning System for Comprehensive Examination Course for CICS conducted by Cabalfin et. Al (2016) mainly focused on designing and developing E-learning course materials for the Comprehensive Examination course. It is a web-based application that will be accessible through a web browser and focused on the core and major subjects of BSIT, BSCS, and BSCpE. This website can reduce or eliminate the practice of distributing hard copies of the course

lessons. It will provide an alternative method of teaching the subject and an additional supplement for students.

On the other hand, the system by De Sagun et al., (2018) also aims to develop a Learning Management System with Analytics that processes and monitors student records and performance. Through the said system, the teacher can access the results of the exams and quizzes of the students through graphs called "Analytics." They can also give lectures and lessons to the students by uploading them on a website. The system is said to help the students have an efficient and interactive learning management system. The system also changes the manual way of taking exams and evaluating their scores since they can view their academic performance through Analytics.

The research, entitled The Effect of Web-Based Learning Management System on Knowledge Acquisition of Information Technology Students at Jose Rizal University, undertaken by Ebardo et al., (2010), intends to map the performance of information technology enrolled students for two parts. The project aims to enhance students' learning curves, provide high-quality content resources, and discover strategies to advance learning through the integration of quality content delivery and instructional design, as well as a significant investment in the use of an LMS.

The system by Bayani et al., () entitled Stand Alone Learning Management System with Android Application, is a school based technology that serves as a

module of the teachers and the output of the students, (admin and user) that bonafide the primary beneficiary of Batangas State University students prior to College of Industrial Technology department. The system provides easy and accessible learning management online. The featured system is designed to have class activities like quizzes, exams, updates for the class and other activities, quizzes and downloadable lectures.

Related Foreign System

The evolution of IT presents new aspects to the quality advance and improvement of e-learning courses. Its technological structure has an important role in this context; it is understood that one can outline courses and provide the acquisition of knowledge from techniques and appropriate technologies (Pimentel, Freitas & Siqueira, 2011). Accordingly, it was observed that there are gaps in e-learning theories, especially regarding the use of an LMS for managing distance education, since none of the theoretical framework studies presented this issue in depth. The understanding of this aspect, suppressed by literature, deserves attention, corroborating with the aforementioned vision of Bach, Domingues and Walter (2013).

During the Covid-19 epidemic, IAIN Surakarta's learning management system-built Moodle-based online learning to improve the efficacy of online learning management. Moodle is meant to facilitate the establishment of interactive learning styles, which is consistent with the platform's philosophy. This idea is

backed by the social construction theory, which holds that individuals learn best when they engage with learning material, create new content for others, and converse with other students about the information (Nash & Rice, 2018). According to current study, Moodle-based learning management systems are believed to be web-based flexible learning that provides interactive learning akin to conventional learning (Coman et al., 2020). As a result, researchers attempted to determine the usefulness of utilizing Moodle produced by IAIN Surakarta by measuring the use of Moodle features.

E-learning is one way to integrate student learning needs with technology (De Clunie et al., 2013). It was also explained that in the learning management system, planning needs to pay attention to performance expectancy, effort expectancy, social influences and facilities (Ramllah & Nurkhin, 2020).

Bach, Domingues, and Walter (2013), in turn, conducted a systematic review of Brazilian scientific production on the use of IT in education between 1997 and 2011 and discovered that there are large concentrations of studies on the implementation and management of distance learning courses, use of IT in education, quality evaluation and satisfaction in using an LMS, pedagogy, and didactics in the distance learning content, evaluation of professional skills and competencies re For them, it illustrates the transformation of many colleges to distant education, as well as the ongoing debates over their benefits and limits.

With computer and telecommunications development new possibilities appear to teach at a long distance. The introduction of web-based student learning systems has been adopted by many schools to overcome many of the limitations of the typical teacher-centric educational model. It also enables providing learning environments that improve contact and increase student interaction.

A Mobile and Web-based Student Learning System, built by Madeira et al., (2009), is anticipated to give students a tutorial, a series of exercises with various directed questions, interactive animations, assessment tools, a chat room, and a game for evaluation purposes. The study's limits include subjects focusing on energy information such as energy sources, energy and the environment, electricity energy, and energy efficiency.

Several research results indicated the use of various applications of e-learning (Samudi et al., 2020). La Consolacion University Philippines developed a web-based classroom named Eliademy, this platform besides having benefits in learning management, also has its own challenges, especially regarding the need for a strong internet connection (Francisco & Barcelona, 2020).

Lim et al., (2007) conducted Computer-based Testing of the Modified Essay Question in order to produce a modified essay question (MEQ) including a changing case scenario, which assesses a candidate's problem-solving and reasoning skills rather than simply factual recall. Despite the fact that the MEQ was previously

administered using pen and paper, the indicated target university has used computer-based testing (CBT) since 2003. The aforementioned web portal effectively conducts online examinations twice a year.

The system, titled MBA in Agribusiness and Commerce (AGRIMBA) – a tool for lifelong and e-learning developed by Csapo et al., (2010), aims to improve students' business skills as well as provide an effective way of intensifying participating teaching staff's contacts (personal and web-based) within the network, as well as with the globalized world of agribusiness. The system provides flexible learning resources such as topic workbooks, case studies, exercises, and other teaching materials that are posted on the website for both academic staff at the different schools and participating students to access.

The system created by Nie et al., (2017) entitled Implementation of Learning Management System Based on Cloud Computing, aims to design an efficient learning management system based on cloud computing for programming learning, which can advance student learning and interacting. The system is designed based on cloud computing platforms, which can provide shared computer processing resources and data to computers and other devices on demand.

According to Macfadyen and Dawson (2010), considerable student information may be collected from an LMS and may assist instructors in extracting and visualizing real-time data on student involvement and the likelihood of success

in their courses. Nonetheless, e-learning experts are concerned about the technological side, particularly the utilization of information technology, as well as the ability of an LMS to share, discourse, interact, and work on collaborative elaboration (Oliveira, 2012).

The use of a learning platform is a central point in determining the success of online learning. Based on recent research (Rakic et al., 2020), he found that there was a significant correlation between the abilities of students and the platform used. In addition to the ability, other research showed positive progress from students (Chung & Ackerman, 2015).

Synthesis

The system El-Klase: A Web-Based E-Learning System for Anselmo A. Sandoval Memorial National High School has similarities to both local and foreign systems discussed in the related system when it comes to goals, targets, scale, concept, and functionality of the system.

The developed system provided in the related system focuses on the accessibility of the learning process, boosts learning efficiency, aims to enhance student learning curves as well as provides high-quality content. However, researchers observed that the linked system's scalability is limited and concentrates on a small number of users. In terms of Cabalfin et al. Al (2016), entitled, E-learning System for Comprehensive Examination Course for CICS, primarily concentrated on creating and producing E-learning course materials for the Comprehensive

Examination course, which exclusively focused on core and major subjects such as BSIT, BSCS, and BSCpE. Furthermore, some local studies are restricted in that they do not contain the sending and receiving of data such as assignments, exercises, and reports.

The aforementioned system greatly assisted the current researchers in providing a solution for manual and modular learning to the teachers and students at Anselmo A. Sandoval Memorial National High School by designing and developing productive learning experiences for students to be exposed to the majority of learning opportunities. Given the impossibility of comprehensive face-to-face contact during the pandemic.

Conceptual Framework

The research aims to improve efficiency and effectiveness, improve user accessibility and time flexibility to engage learners in the learning process. The system provides a platform to make the role of teachers easier in making their lessons, activities, and quizzes. For the students to avoid losing or misplacing the activities after submitting. Teachers and Students from Anselmo A. Sandoval Memorial National High School are the first to benefit from this scheme.

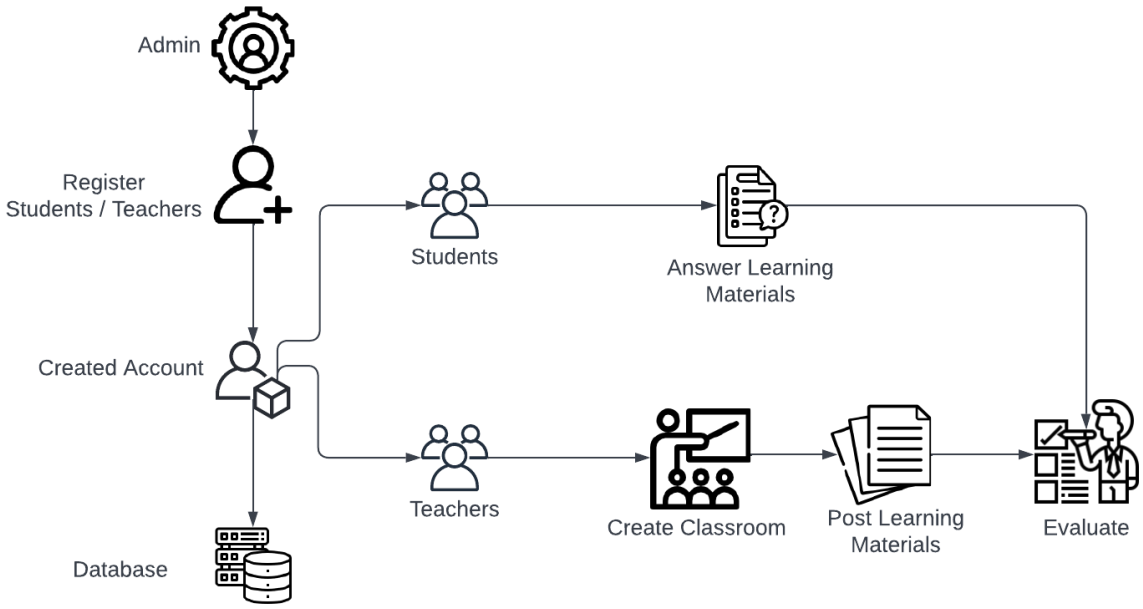

Figure 1. Conceptual Framework

Figure 1 represents the process of the EL-Klase system where the users can access the system. Firstly, the administrator is the one who can make an account for the student and teacher by registering all the necessary information needed. After the admin makes an account, the student and teacher can now log in to the system. Next is the teacher, after logging in the teacher are the one who can create a classroom and add student that is being assigned to them, next is after creating the classroom the teacher now can post the learning materials that the students needed like module, activities, assignment, and quizzes, after posting the student can view the posted learning materials and answer them and submit for the teacher to evaluate and post scores in the system to be view by the students.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter covers all the discussions on the conceptual design and system architecture of the system. It also shows the development approach and design used.

Data Model

The Agile Model, as represented in Figure 2, was used to develop the study. The requirements analysis phase, design phase, development phase, testing phase, and implementation phase comprise the agile paradigm. A project management technique, such as the Agile method, is distinguished by the utilization of short work cycles that allow for quick development and, if necessary, frequent adjustment.

The researchers went on to study the manual process employed by the Anselmo A. Sandoval Memorial National High School in the existing technique of teaching, disseminating, and compiling modules and student activities, which served as the backbone of the agile method, and as a result, the researchers developed the concept and swiftly determined the success of building its system. Agile project management is an approach that is often utilized to deliver difficult projects due to its flexibility. It promotes teamwork, flexibility, continual progress, and high-quality output. The researcher decided on this technique since it seeks to be simple and quantifiable.

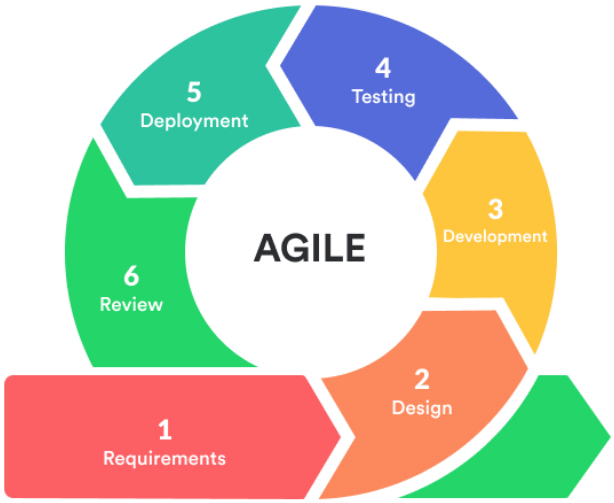

Figure 2. Agile Method

The first phase begins with a requirement analysis to discover the needs of the users and the prerequisites for the project's success. The next phase is design, which narrows down to finding the most effective and efficient developments in order to provide a solution to the problem of Anselmo A. Sandoval Memorial National High School students' module distribution and having an alternative way of learning. The following phase is the creation of the system based on the requirement analysis. The testing phase is used to identify and analyze the system's quality. There is implementation and support while the system is being deployed. The system is now available for user review, approval, feedback, and change after the implementation phase.

Requirements Analysis

The problem was evaluated here in order to discover the need for developing the system's features. The researchers gathered data for the process of distributing and compiling modules and activities that the schools currently have, and discovered that they are still using manual service, which results in students losing and misplacing activities that they passed, resulting in a lack of passed activity by students and a lower mark. As a consequence, this system was able to automate the aforementioned procedure at Anselmo A. Sandoval Memorial National High School, resulting in a better and more secure system.

Analysis of the existing system

There is no E-learning system at Anselmo A. Sandoval Memorial National High School. The AASMNHS used modular distance learning, in which the student's guardians had to go to school to obtain the modules, which the student had to answer and assess, and the guardian had to return the answered modules to the school. These completed modules or student activities continue to pile up, with some of the activities becoming misplaced or lost.

Fishbone Diagram

Figure 3 illustrates a fishbone diagram illustration of the major challenge considered in project development.

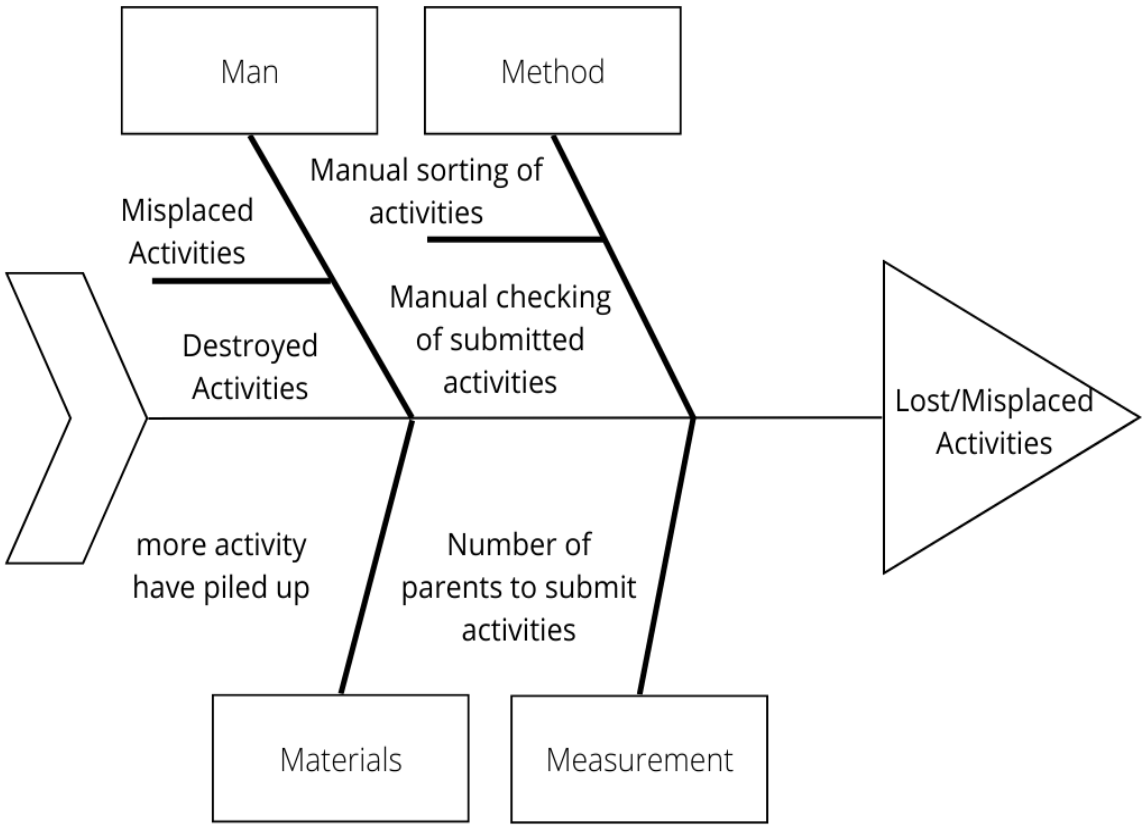

Figure 3. El-Klase Fishbone Diagram

As per the graphic, the biggest issue with the project was the students' misplaced and lost activities. Both students and teachers are battling with activity submission and module dissemination. Even though the students have completed the exercises, some of them are misplaced, lost, or damaged, leaving them with no option but to repeat them, take a picture, and submit them back to the subject instructor. The bones were also identified using a varied technique, machine, man,

measurement, and materials. The first category in this diagram was the method of manual sorting of activities, in which students or their guardians must attend school nearly every week just to pass their activities, and teachers must manually sort it according to class and subject they belong to, and teachers should manually check the submitted activities. Following that is the man and measurement; due to the large number of students enrolled in Anselmo A. Sandoval Memorial National High School who come to the campus almost every week for submitting and passing activities; there have been cases where student activities have been misplaced and destroyed due to the school manual process. Finally, the materials where the activities and learning materials have no dedicated storage and are at danger of being lost or destroyed.

System Boundary

Figure 4 illustrates the project's system boundary, which includes the many units participating in the system. It also shows how the system functions as a whole.

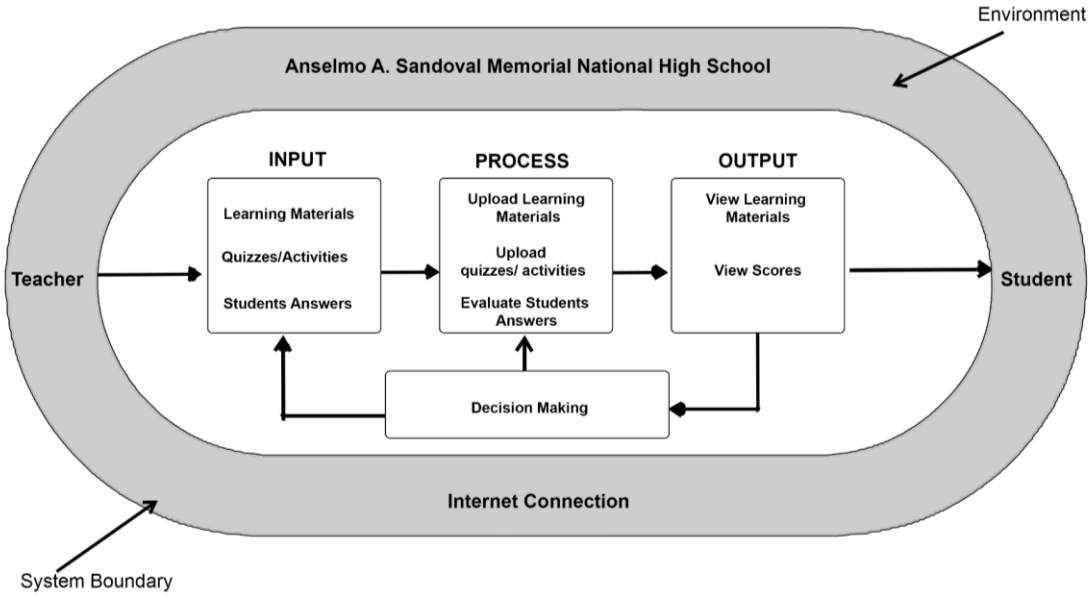

Figure 4. El-Klase System Boundary

The system is designed for the security and convenience of distribution and answering learning materials of the teachers and students. The system was composed of three different users for it to work as expected. The users of the system were school admin, teachers and students of Anselmo A. Sandoval Memorial National High School (AASMNHS). The school admin was responsible for managing the information of teachers and students. The system is allowed to upload learning material, upload quizzes/activities and evaluate students' answers.

Software Requirements Specification

The software requirements considered in the application's implementation are shown in Table 1. The first column lists the software required, while the second column lists the type and specifications. This aided in the creation of El-Klase: A Web-based E-learning System for Anselmo A. Sandoval Memorial National High School.

Table 1. Software Requirements

Software Requirements	Type / Specification
Operating System	Windows 7 (64-bit) or higher version (Preparable Windows 10)
VS Code	Version 1.67 or latest version
XAMPP	Xampp v.9.3.28
PHP	Version PHP 7.4
Java Script	ECMA-262 Edition 9
CSS	Version 4.15 or higher
HTML	HTML 5
MySQL	Version 5.7 or higher

Hardware Requirements and Specifications

The proposed system must meet the minimum hardware requirements, which include processor speed, disk storage, RAM size, and other hardware specifications for performance and full system utilization.

Table 2. Hardware Requirements

Hardware Requirements	Type / Specification
Processor Speed	Intel i3 or higher
Disk Storage/Space	500gb hdd / 264gb ssd
RAM	At least 4gb or higher
Others	CD-ROM or DVD-ROM Drive Keyboard Mouse Monitor Router

Functional Requirements

The researchers considered the following functional requirements in developing the system.

1. **For Admin**

    1.1. Add, edit, delete student information

    1.2. Add, edit, delete teacher information

    1.3. Add an entry like:

1.3.1 Grade Level

1.3.2 Class Section

1.3.3 Subject

2. For Teacher

2.1. The teacher can create his/her Class

2.2. After creating a class, the teacher View the students for that particular class

2.3. Upload Downloadable materials for his/her class

2.4. Create practice quizzes for students

2.5. Grade students' assignment

2.6. Post announcements

2.7. Message co-teacher or students

3. For Student

3.1. Sign in for his / her account

3.2. Can view classmates in his / her class

3.3. Answer practice quizzes

3.4. View evaluation of assignment and quizzes

3.5. Download downloadable materials in a class

3.6. Upload downloadable material

3.7. Message a teacher or his/ her classmate

Non-Functional Requirements

The following non-functional requirements were considered by the researchers in developing the expected output of the study.

1. **Availability**

   The system is available online and downloadable.

2. **Maintainability**

   The system is maintainable in terms of bugs and errors.

3. **Security**

   The system is accessible for registered users only.

Multiple Constraints

The researchers identified the study's many limits since it is one of the approaches to identify which apps and programming languages developers may

employ in the system. The development team also examined factors such as speed, performance, usability, and scalability.

Table 3 displays the designed system's value and weight. According to the performance, scalability, speed, and user-friendliness requirements.

Table 3. Value and Weight

Value	Performance	Scalability	Speed	User Friendly	Total
Weight	40%	30%	20%	10%	100%

Table 4 shows the programming language used. As opposed to the other potential device designs, System A uses the programming language of choice.

Table 4. Trade-offs and Constraints of Multiple Criteria

Options	Programming Language
System A	XAMPP, PHP, HTML, CSS., Bootstrap, JavaScript
System B	HTML, JavaScript. CSS, NodeJS
System C	Java, Oracle, MongoDB

Table 5 displays the Performance Criteria Rating, which describes the design based on the purpose of each number. It evaluated the system's performance, scalability, speed, and usability. The researchers scored the systems from one (1) to three (3), with one (1) being the best and three (3) being the worst. They also looked at which designs worked extraordinarily well. The percentage displays how high the average of each device is using the Normalization Formula mentioned below.

$$PC_{norm} = 9 \frac{Max_{raw} - PC_{raw}}{Max_{raw} - Min_{raw}} + 1$$

Table 5. Performance Criteria Rating

Option	Performance	Scalability	Speed	User Friendly
A	**1**	**2**	**1**	**1**
B	**2**	**1**	**2**	**2**
C	**2**	**1**	**2**	**1**

Table 6 displays the calculated Normalized Performance Criteria. The number marked by each System design is the computed value, and Total is the number of computed constraints. On performance, scalability, speed, and user

friendly, System A scored the highest total with a total average of 7.75, while System B received 3.25 and System C received 5.5.

Table 6. Normalized Performance Criteria

Option	Performance	Scalability	Speed	User Friendly	Total
Design 1	**10**	**1**	**10**	**10**	**7.75**
Design 2	**1**	**10**	**1**	**1**	**3.25**
Design 3	**1**	**10**	**1**	**10**	**5.5**

Trade-offs

All of the design options are capable of assisting in the development of El-Klase. Each design option has its own set of advantages and disadvantages. However, with high efficiency, reliability, and overall performance, researchers decided to use Design 1 during the system's development phase.

Design

The developers presented the design and architecture of the developed system in this phase, this relied on the requirements phase’s work.

Context Diagram

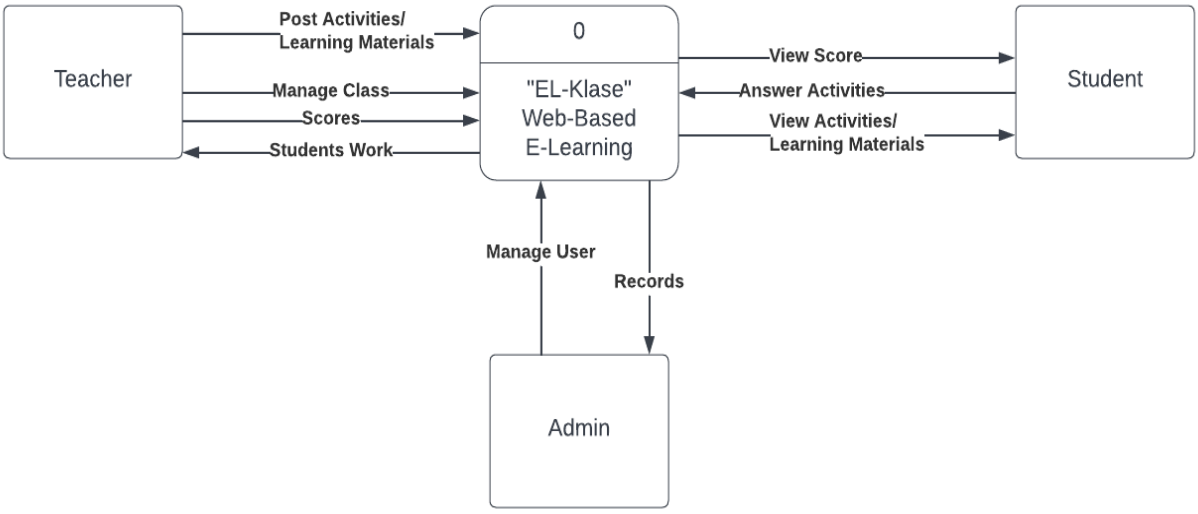

Figure 5. Context Diagram

Figure 5 illustrates the system's context diagram, which includes a list of all possible major users such as Admin, Teacher, and Student. Where administrators have all the ability to manage and modify both teacher and student records within the system. As shown above, teachers can post and upload activities, particularly learning materials, manage classrooms, and view and check students' work. In addition, students can view and respond to their activities and assignments, as well as view answers. Students can also view and download educational materials for offline purposes.

Data Flow Diagram

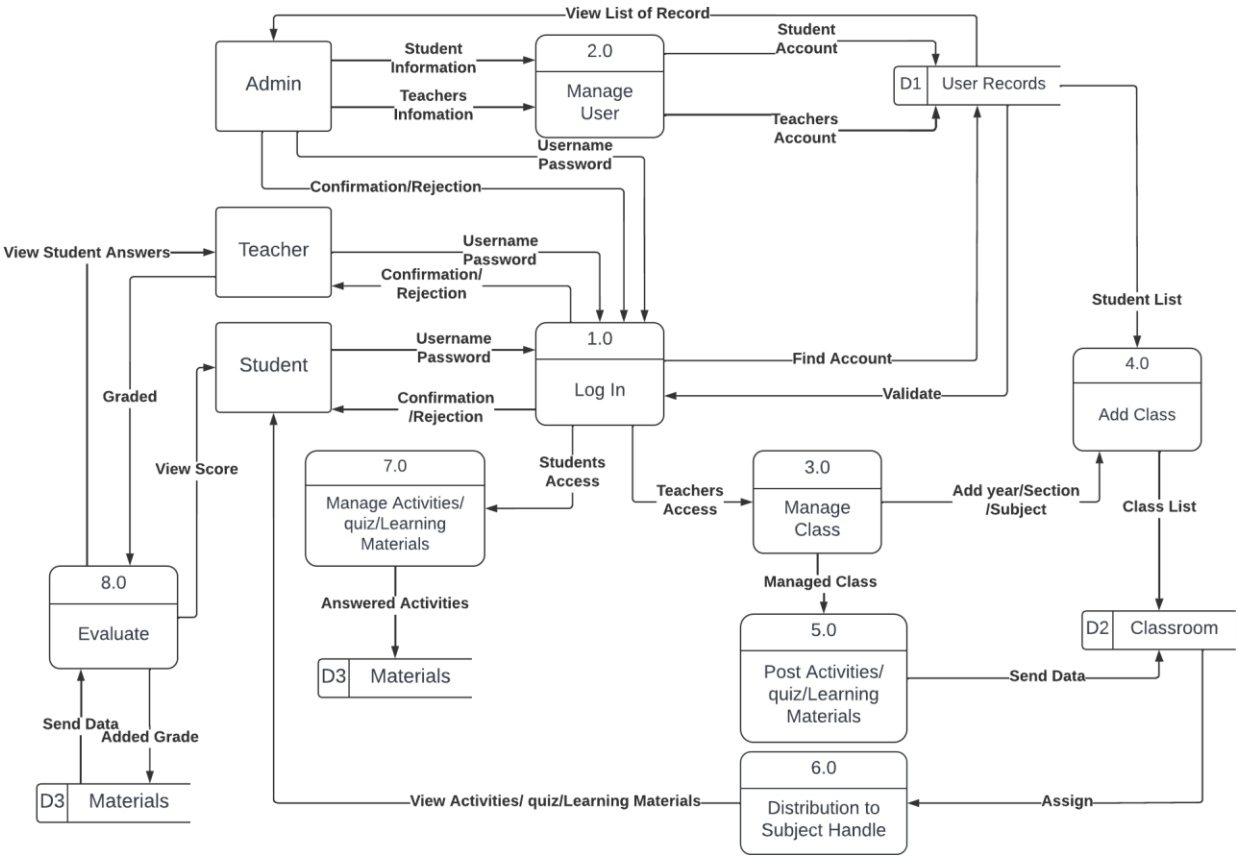

Figure 6. Data Flow Diagram

Figure 6 illustrates the process flow of the system. Figure 6 depicts a data structure in its entirety, emphasizing how it communicates with external organizations. The strategy recommended simplifies and expedites the task. It depicts the transfer of data from school admins, teachers, and students of AASMNHS into the system's database. Users could log in their registered account to the system. Admin could add students and teachers' information. Teachers would manage class by adding class student lists, posting learning materials/modules to the subject that they handled and giving grades to the activities that their students

passed. Students could view the materials that the teachers posted and answer the pending activities/quizzes.

Use Case Diagram

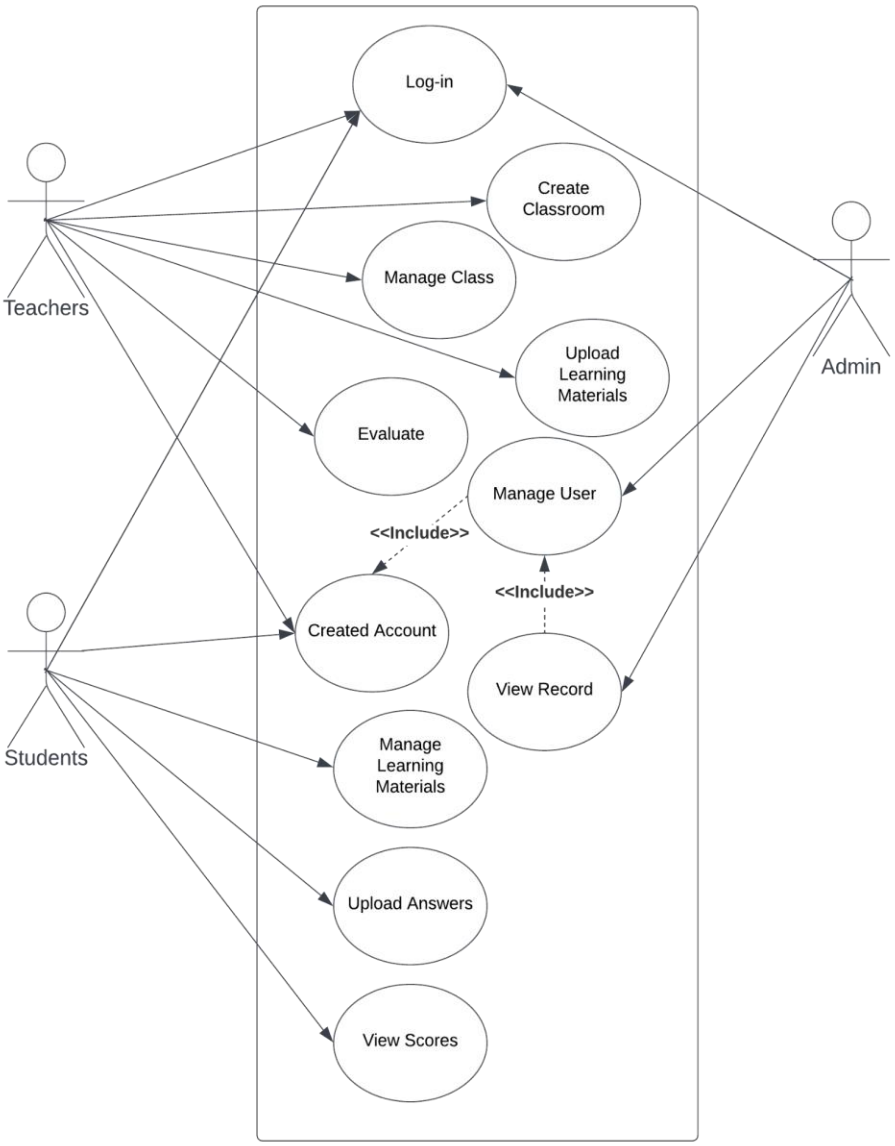

Figure 7. Use Case Diagram

Figure 7 shows UML sequence diagrams that indicate how the flow was carried out across the system. It depicts the interaction between the system and the users, as well as the system's ordered functional needs.

User Interface

The researchers created a possible system interface. This section contains the primary functions of each and every system user.

Admin

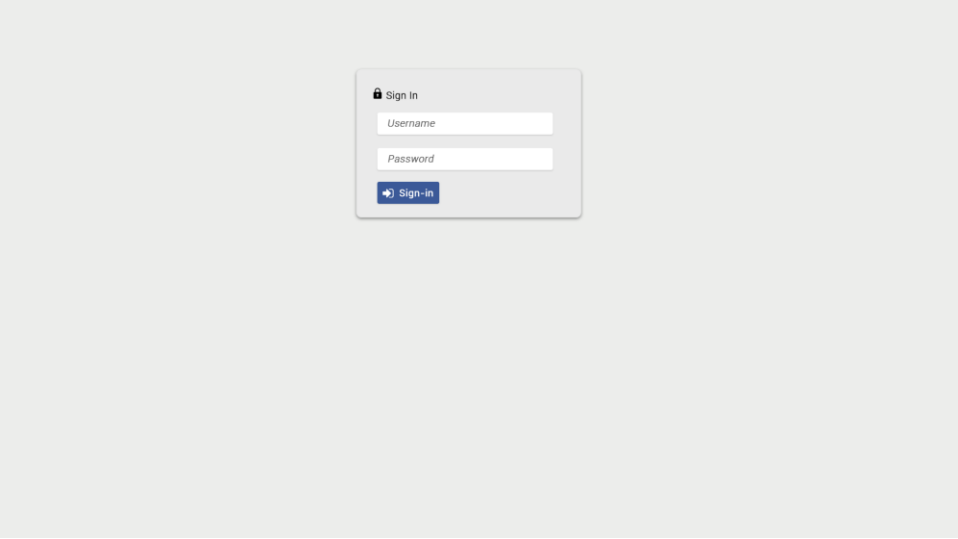

Figure 8. Administration Log in

Figure 8 illustrates the admin login interface, which the researchers made formal for system clarification.

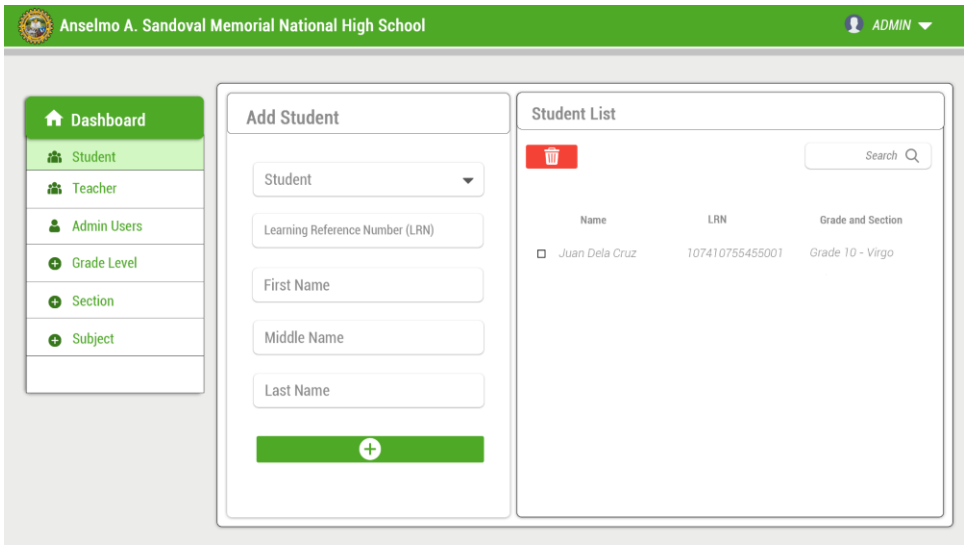

Figure 9. Administration Add Student

The graphic above depicts the process of adding students, which contains essential information such as complete name and Learners Reference Number (LRN). It also includes navigation with all of the administrator's functions.

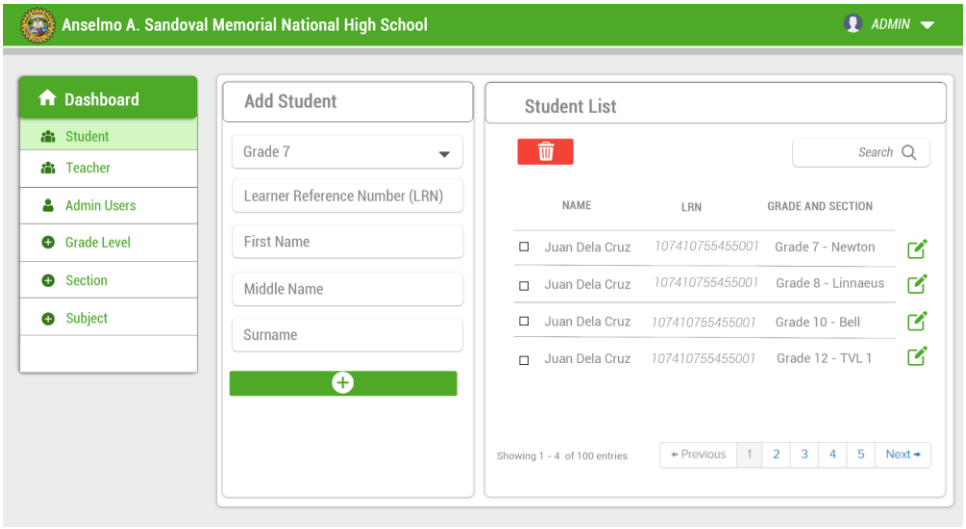

Figure 10. Admin View List of Student

The figure above illustrates all of the lists of students that are enrolled and registered for that particular school year. If necessary, the administrator can delete and modify student information.

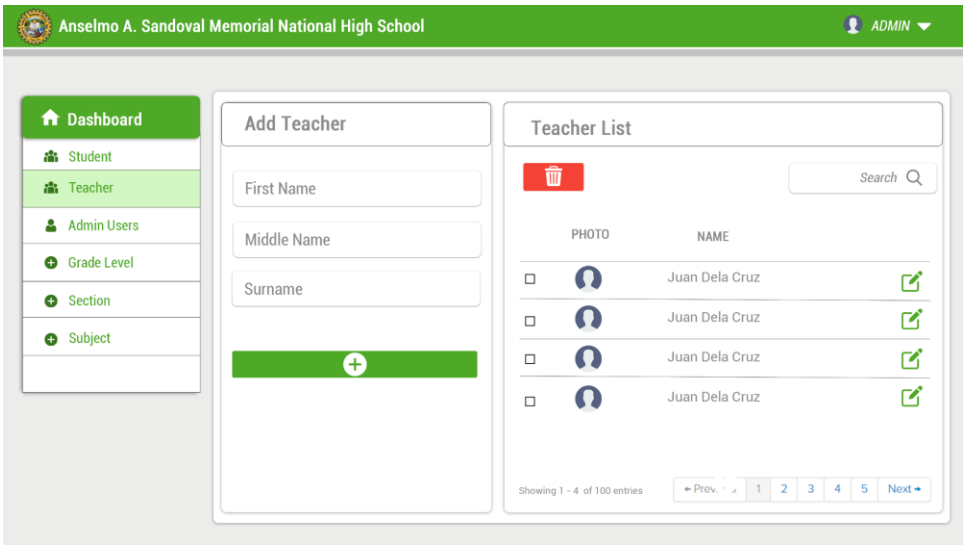

Figure 11. Administration Add Teacher

Figure 11 illustrates the interface through which administrators may add teachers. Administrators can also delete and change information.

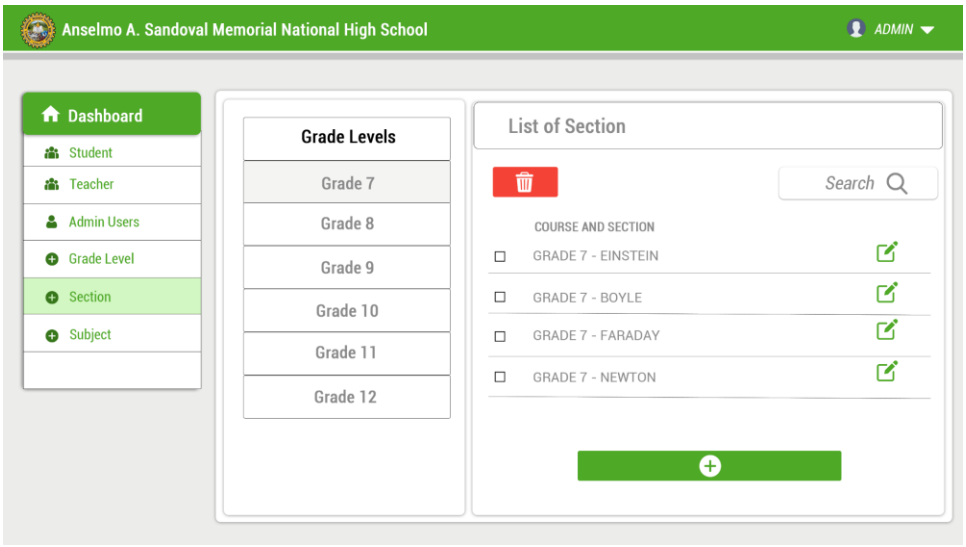

Figure 12. Administration View List Section

The diagram above depicts the administrator's view list of all and every section per grade level. The administrator has the capacity to alter the records.

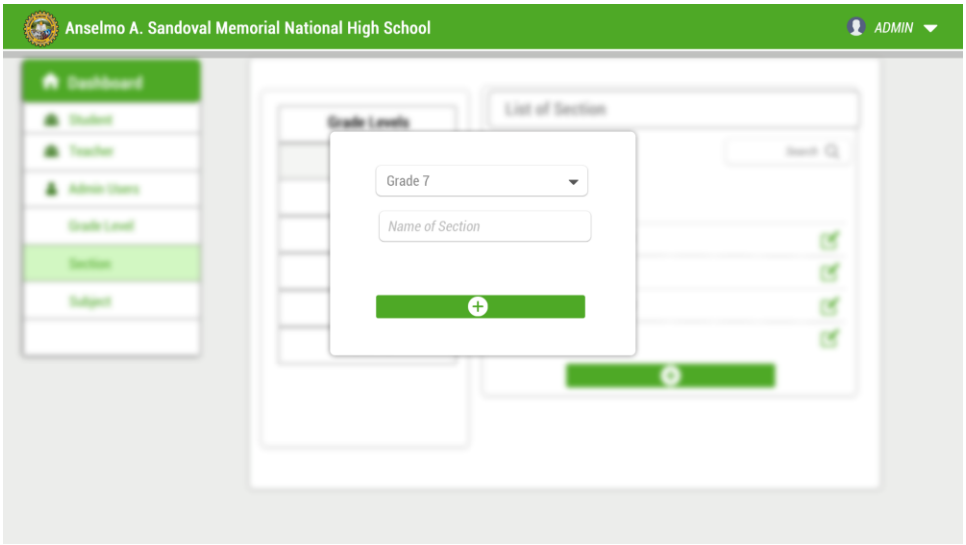

Figure 13. Administration Add Section

The figure illustrates how the administrator can easily add sections per grade level, after adding sections. They can simultaneously see the list of certain section on that particular grade level.

Teacher

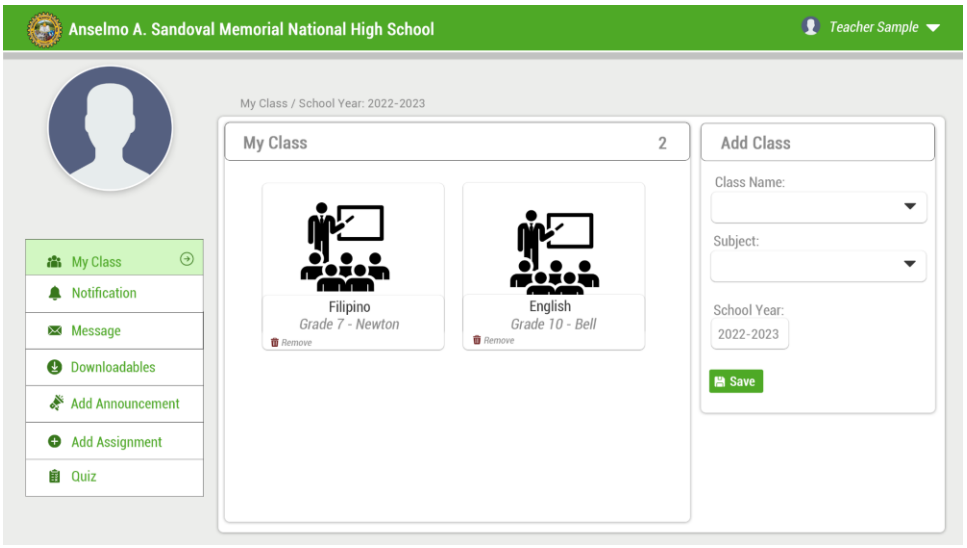

Figure 14. Teacher View Class

Figure 14 portrays the teachers' interface after logging in, where they can see their respective classes and each teacher has the ability to Add, Edit, and Modify classes they have and easily save them.

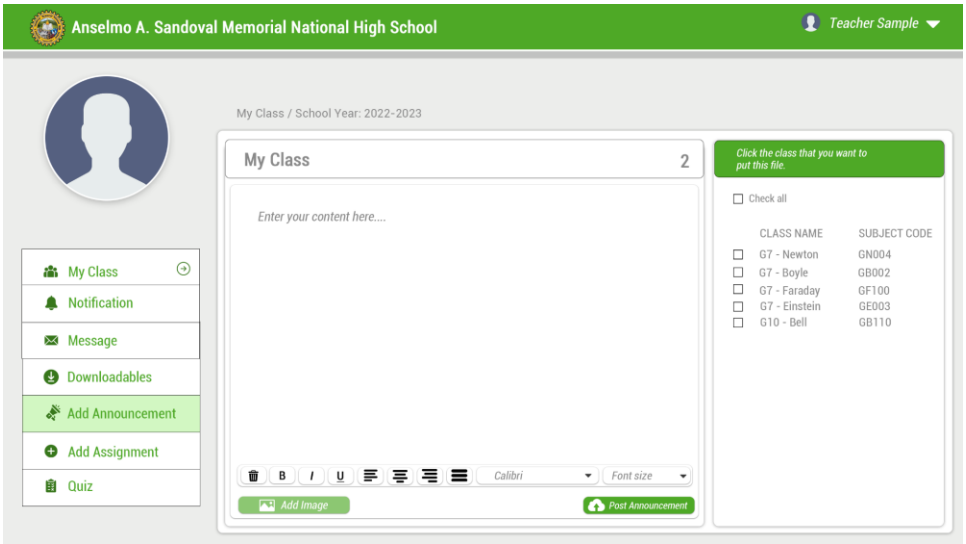

Figure 15. Teacher Add Announcement

Figure 15 represents a text box in which teachers can make announcements. For instance, teachers could indeed add announcements for exact dates of examinations for each section and class they instruct.

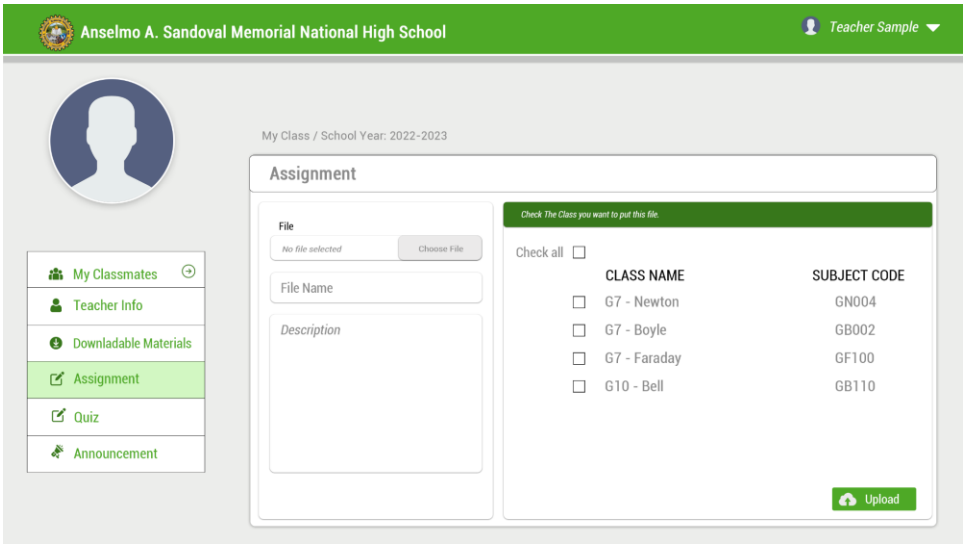

Figure 16. Teacher Add Assignment

Figure 16 shows that teachers can add assignments and post them for a specific class. They can also include all of the classes they instruct.

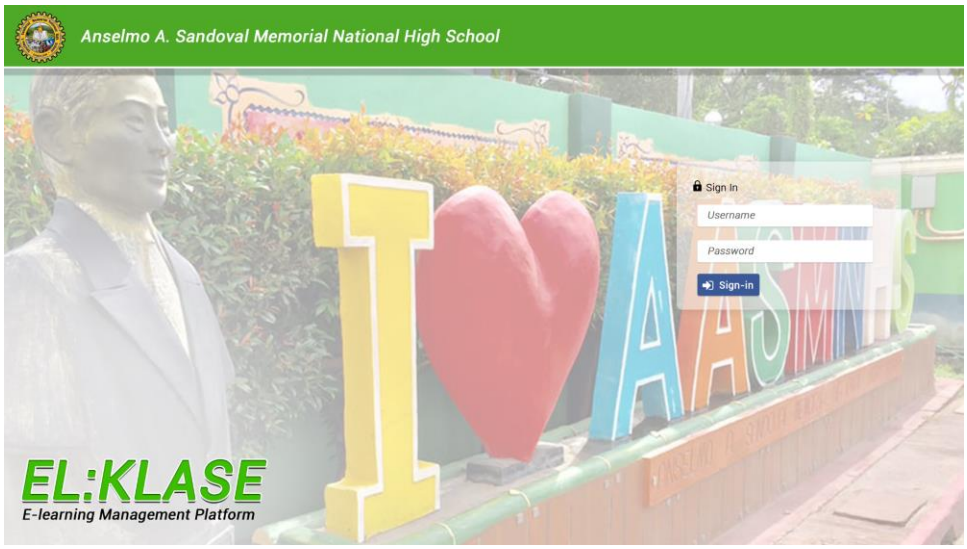

Figure 17. Login Interface

Figure 17 shows the possible login interface of the user which is all the enrolled students of Anselmo A. Sandoval Memorial National High School. The researchers are planning to add the system title for the recognition of the study.

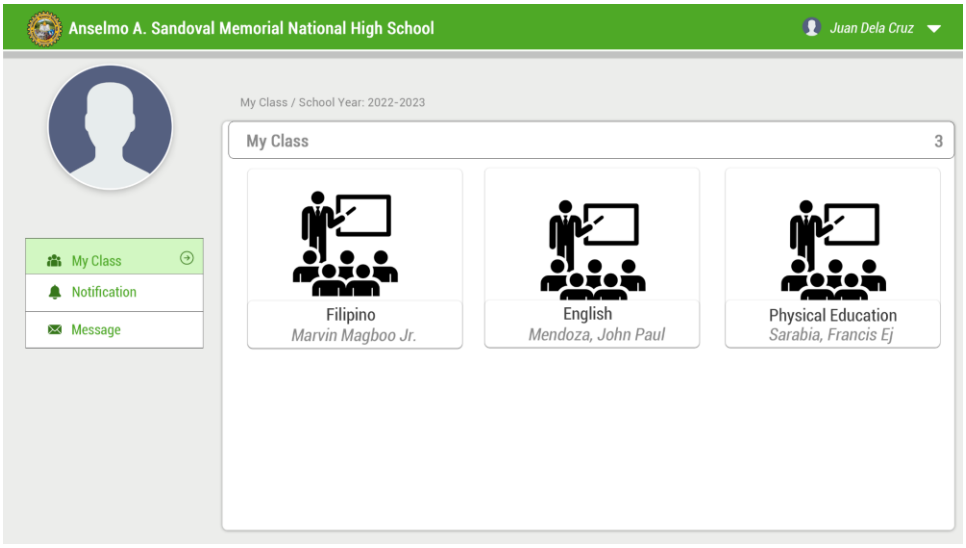

Figure 18. Student List Class

The figure above explains how users can saw their classes added by them subject instructors.

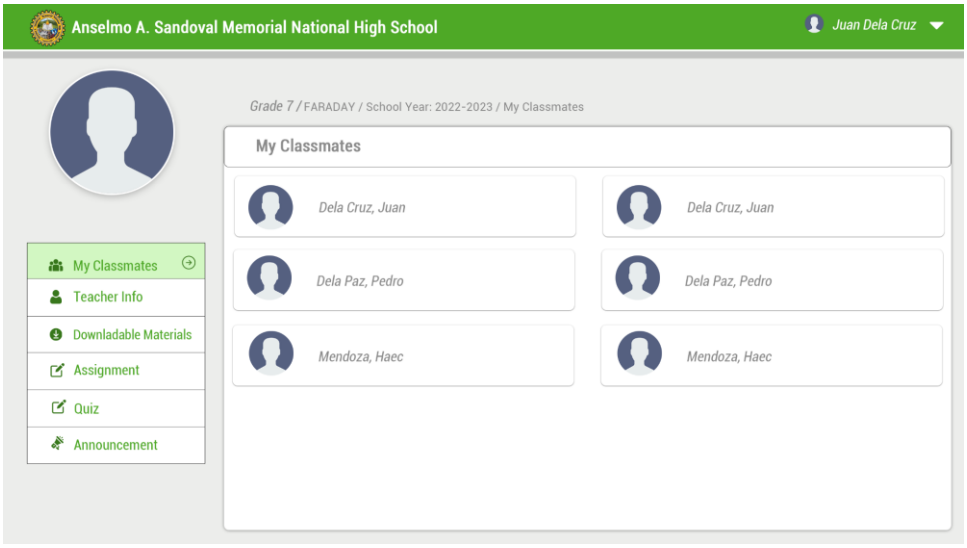

Figure 19. Student View List of Classmates

Figure 19 depicts how each student can see their classmates in all of their classes. Considering that students in each subject may differ from one another.

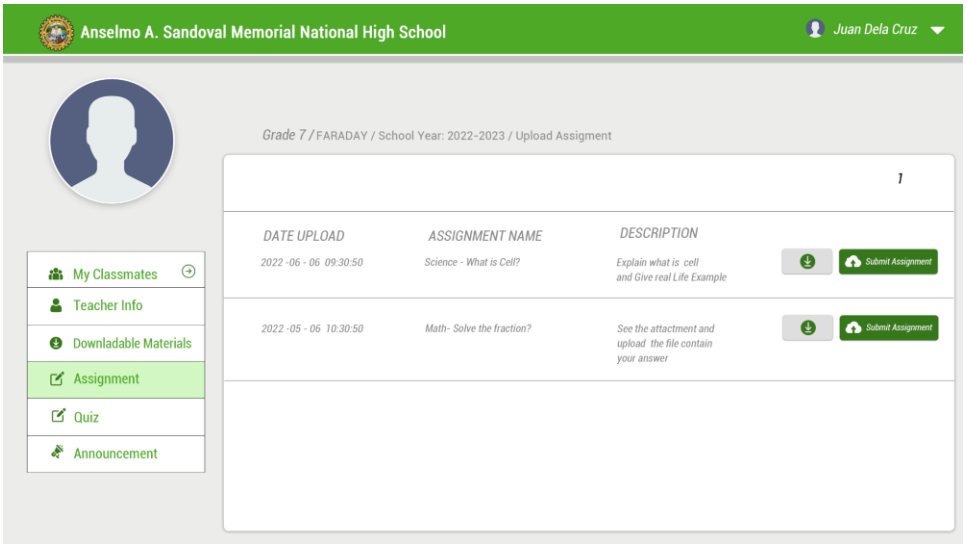

Figure 20. Student View Assignment Materials

In this figure, students can see their assignment and can download the upload assignment materials by their instructor for offline purposes.

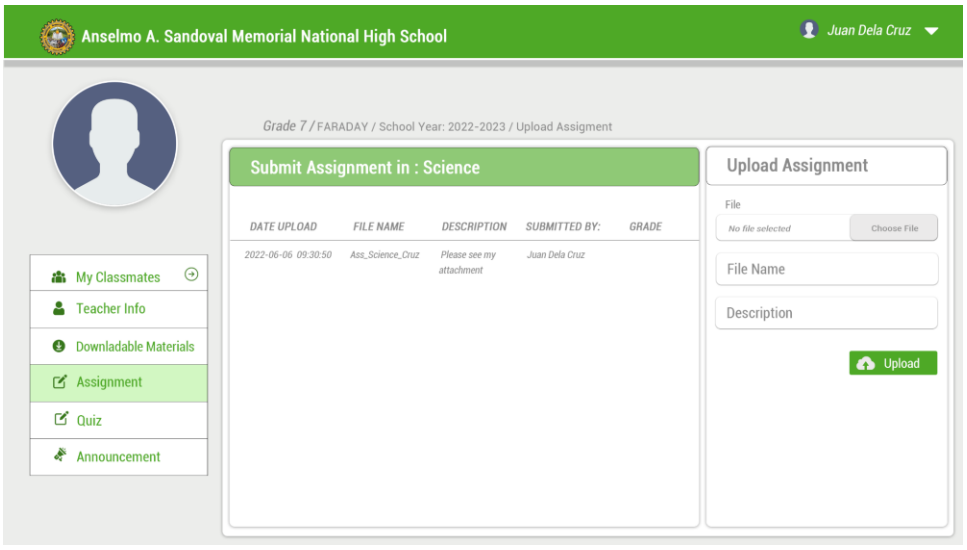

Figure 21. Student Submit Assignment

Figure 21 depicts the interface through which students can submit assignments. They can instead upload a file such as docx, pdf, or excel, or simply take a picture of their work and freely add the filename and description of their work. Furthermore, the grade of their assignment is displayed here after their instructor has reviewed it.

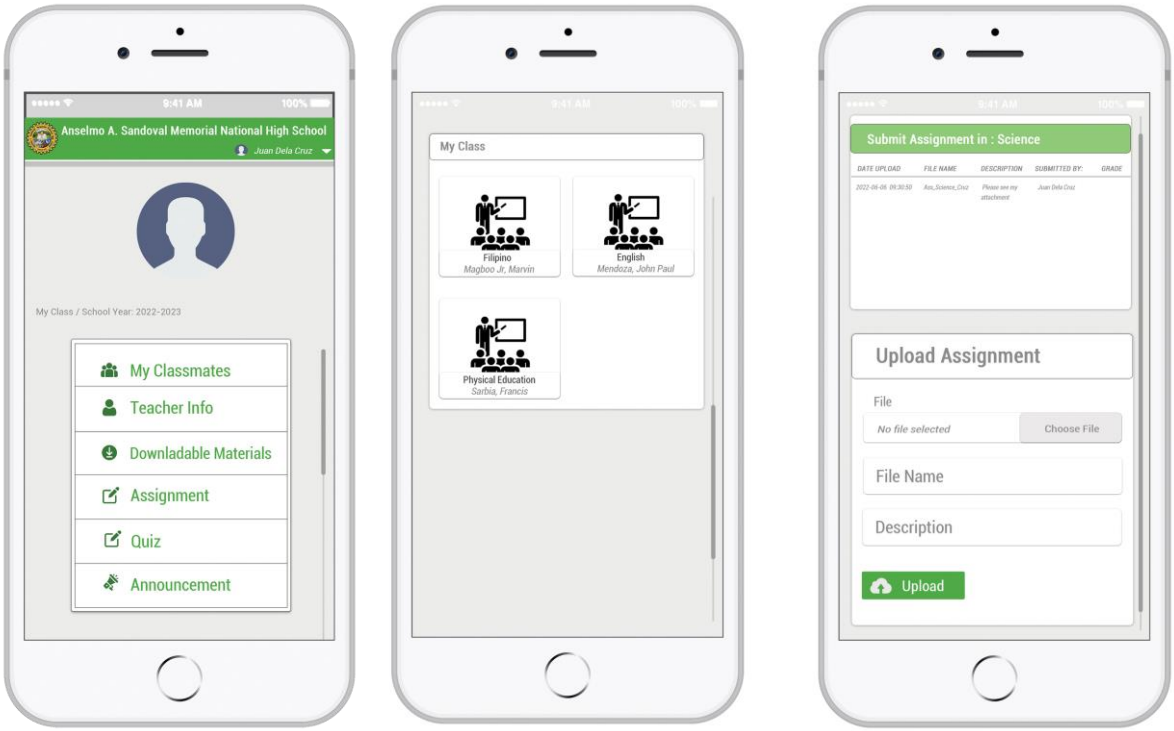

Figure 22. Student Mobile Responsive View

The figures above demonstrate how responsive the El-Klase is, as well as its design to be compatible with various devices such as different Web browsers, tablets, and mobile devices.

Database Design

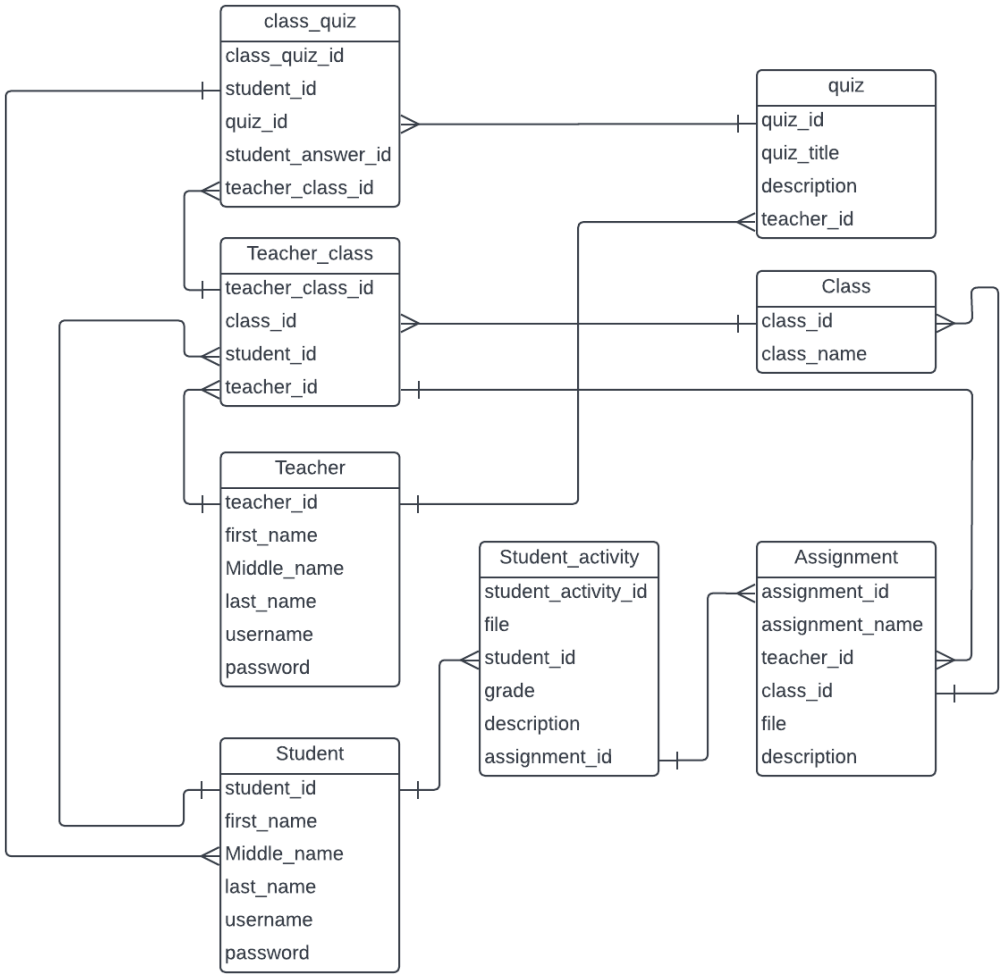

Figure 23. Database Schema

Figure 23 shows the database design of the system is depicted. The database design is made up of eight (8) entities or tables that are linked together to form the overall database architecture. However, only the most important tables are shown in this diagram.

The information of the students and teacher added by the administrator is connected to the database of each entity, and these databases are connected to the teacher's class database in creating a classroom, where the databases of quiz and assignment are connected. The student's answers to the assignment go to a database that is connected to the student activity database. All of these entities serve an important role in the system since they hold all of the information and data that keeps it flowing efficiently.

Development

The developers discussed the development tools and requirements utilized in the development process at this phase.

Web Application

A web application is used in this framework. Web apps are popular because they can be designed for a variety of purposes and are available to anyone. Web apps can be accessed via the internet and do not need to be downloaded.

Database

The MySQL real-time database was used in the designed system. This database can easily handle massive volumes of information. In database-connected apps, data fields can be quickly modified and updated if they are written correctly.

Testing and Evaluation

The researchers validated and tested the technology throughout this phase. The researchers applied ISO/IEC 25010:2011 to assess if the system effectively fulfills the demands based on the data collected throughout the requirements process and validates whether the system matched the study's goals.

In general, these qualities show how thoroughly the component is tested:

1. Meets the specifications that determined its design and development,
2. Responds to all types of inputs efficiently,
3. Performs its tasks in an appropriate period of time; and
4. Achieves the overall goal of the stakeholders.

Figure 24. Software Evaluation

Figure 24 displays the surveying process. The ISO/IEC 25010:2011 quality in use model consists of 5 characteristics (some of which are further broken into sub characteristics) referring to the outcome of the interaction when a product is utilized in a certain environment. The quality model's scope of application includes supporting the specification and evaluation of software and software-intensive computer systems from various perspectives by those involved in their acquisition, requirements, development, use, evaluation, support, maintenance, quality assurance and control, and auditing.

Table 8 covers the testing assessment characteristics and sub-characteristics that were utilized in constructing a questionnaire to evaluate the system's performance based on the criteria mentioned in the table.

Table 7. ISO Characteristics and Sub-Characteristics Adopt in the Study

Characteristics	Sub-Characteristics	Explanation
Functionality	Suitability	The software can perform the task required.
	Accurateness	The system gives results as expected.
	Security	The software does not allow unauthorized access.
Reliability	Maturity	Most of the faults in the software are eliminated over time.
	Fault Tolerance	The software is capable of handling errors.
Usability	Understandability	The user can comprehend how to use the system easily.
	Learnability	The user learns to use the system easily.
	Operability	The user can use the system without much effort.
	Attractiveness	The interface looks good.

Risk Management Plan

This Risk Management Plan explains how hazards related to the established system, as well as its goals, were discovered, analyzed, and handled. It specifies

how risk management activities will be carried out, recorded, and monitored throughout the capstone project's lifecycle. The Risk Management Plan was created during the planning phase and is continuously monitored and updated.

Risk Management Procedure

The following procedures were considered to assess the possible risk in the deliberation of the design and development of the system.

Process

Risks are detected as early in the project as feasible to reduce their impact. Throughout the process, the established system guaranteed that risks were actively detected, analyzed, and controlled. The methods for doing so were laid out in the section on how to create a risk management system.

Risk Analysis

All risks were evaluated in order to determine the range of possible project outcomes. The researchers estimate the likelihood of each risk occurring and define the severity of each risk during the risk management process.

Qualitative Risk Analysis

The probability and impact of occurrence for each identified risk was assessed by the researchers using the following approach:

Probability

1. High

Greater than 80% probability of occurrence

2. Medium

Between 40% and 80% probability of occurrence

3. Low

Below 40% probability of occurrence

Impact

1. High

Risk that could have a significant impact on the project's cost, schedule, or performance.

2. Medium

Risk that has the potential to have a minor impact on the

project's cost, schedule, or performance**.**

3. Low

Risk that has relatively little impact on cost, schedule or performance

Risks

Below are the risks considered in the development of the system.

Table 8. Risk Evaluation

ID	Risk	Risk Severity	Risk Likelihood	Risk Level
1	Loss of signal during transaction	Tolerable	High	High
2	Delayed project task	Undesirable	Possible	High
3	Technical Problems (Crashes, System Malfunction, etc.)	Tolerable	Medium	Low
4	Security threats	Undesirable	Possible	High

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