isKalusugan: A Proposed Health Services Unit Management System for the University of the Philippines Visayas

A Special Problem
Presented to the Faculty of the
Division of Physical Sciences and Mathematics
College of Arts and Sciences
University of the Philippines Visayas
Miagao, Iloilo

In Partial Fulfillment of the
Requirements for the Degree of
Bachelor of Science in Computer Science

By:
Kismet Fran P. Suan

2025

This thesis, entitled "**isKalusugan: A Proposed Health Services Unit Management System for the University of the Philippines Visayas** ", prepared and submitted by **Kismet Fran P. Suan**, in partial fulfillment of the requirements for the degree of **BS Computer Science** is hereby accepted.

Ara Abigail E. Ambita, Asst. Prof
Thesis Adviser

Christi Florence C. Cala-or, Asst. Prof
Thesis Panelist

Joanah Faith J. Sanz.
Thesis Panelist

Accepted as partial fulfillment of the requirements for the degree of **BS Computer Science**.

Arnel L. Tampos (Ph.D.)
Division Chair, Physical Sciences and Mathematics

Table of Contents

List of Tables

List of Figures

Abstract

This study presents the design and implementation of a web-based management system particularly managing the Annual Physical Examinations for the Health Services Unit (HSU) at the University of the Philippines Visayas (UPV). The system enhances efficiency, accessibility, and communication by streamlining annual health examinations, optimizing scheduling, and improving service flow. Key features include online and in-person examination options, a scheduling system, a queueing system to manage no-shows, and a rescheduling feature with validation controls. Additionally, an announcement panel, events section, and documents repository facilitate seamless information dissemination. Usability testing conducted with UPV Constituents yielded a System Usability Scale (SUS) score of 88.75 , indicating an above-average and excellent user experience for the developed system

Acknowledgements

Chapter 1

Introduction

In recent years, there has been an increased demand for integrating healthcare and technology to alleviate the ongoing healthcare crisis.[1] These technologies may include electronic health records (EHRs), telemedicine, and etc. A much broader term for this is eHealth. The Health Information and Management Systems Society (HIMSS) defined eHealth as "the application of Internet and other related technologies in the healthcare industry to improve the access, efficiency, effectiveness, and quality of healthcare services provided to the patients." [2] While eHealth is the big picture, telemedicine is a specific subset of this that focuses more on delivering healthcare remotely [3]. On the other hand, Health Information Systems (HIS) encompass systems that aim to facilitate healthcare management and decision-making [4]. It includes electronic health records (EHR), clinical and hospital management, etc.

In the Philippine context, the primary healthcare concern is to "reach the

unreachable" ensuring that even the most remote populations receive adequate medical attention. Currently, 70% of the population residing in these rural areas is still facing difficulties in accessing high-quality inpatient and outpatient healthcare services[5]. Furthermore, at the height of the COVID-19 pandemic, there was a notable surge in the adoption of Health Information Systems. These systems were utilized to enable seamless consultations and appointments with qualified medical professionals in the comfort of the patient's homes. As such, the Department of Health emphasized that the use of these eHealth interventions is crucial to the expansion of access to healthcare services in the Philippines. [6]

One prominent and promising avenue for the application of eHealth is within educational institutions, particularly universities and colleges. The University of the Philippines - Visayas has its own paper-based health services unit (HSU). The UPV HSU is composed of medical professionals - doctors and nurses, and administrative staff. This outdated paper-based system brought a lot of challenges and difficulties not only for HSU personnel but also for the UPV constituents. These difficulties revolve around delayed enrollment in the student's registration process due to pending accountabilities with HSU. Furthermore, the problem of lost medical certificates, either due to students misplacing them after their examinations or mishandling within the paper-based system of the HSU administration, adds to the burden of the students and the HSU staff. Moreover, the outdated communication and announcement methods of the HSU, relying solely on email or social media

platforms for inquiries and consultations, create inefficiencies in addressing these inquiries or scheduling appointments. This problem is compounded by the lack of a real-time scheduling system.

In light of these issues, the present study seems crucial to implement isKalusugan - a proposed UPV HSU Management System. isKalusugan is a web-based management system for the Health Services Unit at the University of the Philippines Visayas which offers to provide features that enhances the efficiency of the University's Health Services Unit.

1.1 Problem Statement

The Health Services Unit (HSU) of the University of the Philippines Visayas (UPV) faces inefficiencies due to its manual, paper-based processes. Limited options for annual physical health examinations restrict flexibility, requiring in-person submissions that inconvenience many constituents. Manual scheduling of medical exams burdens staff and leads to service disruptions.

Scattered communication channels and the absence of a centralized platform for updates hinder the timely dissemination of health-related information. In addition, rescheduling physical exams is difficult, with no streamlined process, leading to potential mismanagement. The lack of visibility for health events and the absence of a centralized repository for forms further reduce efficiency and accessibility.

These challenges highlight the need for a digitized system to improve service delivery and user experience.

Summary of Challenges

The existing processes at the UPV HSU are inefficient and outdated, leading to administrative burdens, reduced accessibility, and dissatisfaction among UPV constituents. These challenges highlight the need for a health management system with the following features:

- Flexible options for annual health examinations (online and in person).
- Optimized scheduling for in person examinations.
- A centralized announcement panel for seamless communication.
- A queuing feature for handling no-shows during Annual Physical Examinations.
- A robust rescheduling feature to manage and validate appointment changes.
- An event section to promote engagement with health-related activities.
- A document section for convenient access to forms and guidelines.

By addressing these issues, the HSU can significantly enhance the quality and efficiency of healthcare services provided to the UPV community.

1.2 Research Objectives

1.2.1 General Objectives

The purpose of this study is to design and implement a web-based management system for the Health Services Unit (HSU) of the University of the Philippines Visayas (UPV). This system aims to improve efficiency, accessibility, and communication within the UPV Health Services Unit, catering to the needs of HSU staff, students, faculty, and other community members.

1.2.2 Specific Objectives

Specifically, this study aims to create the following features:

1. **Annual Health Examination Options**

   (a) Allow UPV constituents to select their preferred mode of annual periodic health examination, whether **online** or **in-person**.

   (b) The **online option** enables users to submit required medical documents for verification and validation by HSU personnel.

   (c) The in person option schedules the user to a specific date given the range dates for Annual PE set by the HSU Administrator

   .

2. **Optimized Scheduling System**

   Implement an optimized scheduling feature for the **in-person annual medical examination of students**, streamlining the scheduling process and reducing the workload for HSU staff.

3. **Announcement Panel**

   Provide an **Announcement Panel** for the seamless dissemination of important information, ensuring that UPV constituents and HSU staff are informed about relevant updates, events, and announcements related to university health concerns.

4. **Queueing System**

   Incorporate a **queueing feature** to optimize face-to-face transactions, especially during annual PE. This will handle no-shows during the Annual PE. Users will be marked present for their annual PE attendance and added to the queue upon sign-in at the HSU, minimizing waiting times and ensuring efficient service flow. If a user won't arrive at their assigned schedule by 5:00 PM, they are marked absent.

5. **Rescheduling Feature**

   (a) Provide a **Rescheduling Feature** for students, subject to validation by the HSU.

      i. The student can only reschedule thrice to avoid abuse of the system

      ii. The system will allow the HSU to accept or reject rescheduling requests to prevent misuse.

      iii. Once approved, the system will present the student with the three earliest available time slots to reschedule their physical

examination. They can select any of those dates.

6. **Events Section**

   Include an **Events Section** to keep UPV constituents up to date about upcoming health-related activities, seminars, and outreach programs hosted by the HSU.

7. **Documents Section**

   Offer a **Documents Section** where users can download necessary forms, guidelines, and other health-related documents, improving accessibility and convenience for users.

1.2.3 Scope and Limitations

This study focuses on the development of isKalusugan: A Proposed Health Services Unit Management System for the University of the Philippines Visayas (UPV). The system is designed to address the inefficiencies of the current manual and paper-based processes of the Health Services Unit (HSU) by integrating features such as optimized scheduling, an announcement panel, rescheduling options, and centralized access to health-related documents and updates.

However, the system excludes telemedicine services, as the HSU aims to encourage students to attend in-person consultations for a more thorough

and accurate assessment by healthcare personnel. Additionally, the implementation of a new Electronic Medical Record (EMR) or Electronic Health Record (EHR) system is beyond the scope of this project. The HSU has already adopted CHITS, a PhilHealth-certified EMR system, and does not require further development or integration of another EMR/EHR solution.

These defined boundaries ensure that the project remains focused on improving service delivery and accessibility within the existing framework and resources of the HSU.

1.2.4 Significance of the Research

The introduction of the proposed HSU system not only addresses these challenges faced in the university effectively but also presents an opportunity to revamp healthcare delivery within the campus. This allows more accessible and efficient healthcare for UPV students, faculty, and staff. Furthermore, it will mitigate the barriers to care, reduce wait times, and provide convenient access to various on-campus healthcare resources.

The Researchers

This study provides a great opportunity for the researcher to apply their theoretical knowledge and practical skills to solve real-world problems. This allows them to demonstrate their competency in system design and software development.

The UPV HSU

The development of isKalusugan will significantly improve the operational

efficiency of the UPV Health Services Unit. This will benefit not only the HSU staff but also the university's constituents.

The Computer Science Community

The Computer Science Community also benefits from this study. By contributing to the existing body of knowledge on health information systems, particularly scheduling systems, this research offers a practical perspective on the application of diverse software development tools and methodologies.

Chapter 2

Review of Related Literature

The rapid digitization of healthcare services has transformed how medical institutions manage patient care, scheduling, and documentation. This literature review examines the implementation of digital healthcare management systems, with a specific focus on scheduling systems and electronic health records (EHR) in university health services. By analyzing existing research and case studies, this review will benefit in the development of a health services system for the University of the Philippines Visayas - Health Services Unit (UPV HSU). This review aims to gain a deeper understanding of the current challenges, existing solutions, and gaps, and explore technologies that can be used to develop the system to improve the UPV HSU's operational efficiency.

2.1 Studies on the Usability of Digital Systems in Healthcare

In recent years, medication errors injured 1.5 million people and cost billions of dollars annually worldwide. In the Philippines, the sheer volume and variety of health information have caused problems in the delivery of patient care because they are easily misplaced, can cause repeat diagnostics, and delays in the planning of care and patient discharge. The world expects that technology will somehow alleviate the ongoing healthcare crisis.

A literature review by Sligo highlights the growing pressure on healthcare organizations to implement Health Information Systems (HIS) due to their anticipated benefits. Despite this demand, HIS remains underutilized. The review identifies several challenges: implementing HIS is costly, potentially disruptive to staff and workflows, since it can be a profound agent for change, and poses risks to patient confidentiality and privacy. Similarly, Doherty et al. suggest that one reason HIS is perceived as "failing" is the differing success and failure metrics used by various stakeholders. Whitten's systematic review of HIS cost-effectiveness further underscores this issue, revealing inconclusive evidence that telemedicine—a key HIS application—is a cost-effective method of healthcare delivery. However, it is also the case that these reviews noted methodological shortcomings in studies evaluating cost-effectiveness.

While evidence of HIS effectiveness is often inconsistent or weak, this

does not equate to evidence of ineffectiveness. Karsh et al. argue that health information technology (HIT), including HIS, can improve patient safety and healthcare quality under certain conditions. Similarly, Chaudhry et al. found that HIS can enhance healthcare quality, particularly in preventive health. Benefits include increased adherence to guideline-based care, enhanced surveillance and monitoring, and reduced medication errors. HIS implementation has also been linked to cost reduction, improved efficiency, and higher productivity, delivering a positive return on investment.

Sligo emphasizes that a vital element for an effective healthcare system is having quality, easy-to-use technology that improves the way that people deliver healthcare

2.2 UPV Health Services Unit in a Nutshell

University of the Philippines - Visayas' health services unit is the primary healthcare provider of the universities' faculty, students, staff, and their dependents. In Miagao Campus, the HSU or also known as the Infirmary began its operation in the late 1990s offering medical and dental services such as laboratory testing, x-rays, dental procedures, and is equipped with an ambulance for hospital transfers and emergencies. As stated in the 2023 UPV Handbook, the HSU medical personnels include - five full-time doctors, one reliever doctor, two full-time dentist, two full-time medtechs, one radiology technician, a dental aide, and administrative aides (clerk, utility, drivers). The outpatient services of the infirmary is not only limited

to UPV Constituents but also to the residents of Miagao and other nearby towns. Furthermore, the infirmary also conducts annual medical and dental examinations for students in compliance with the enrollment process. This requirement ensures that all students, faculty, and staff are in good health and do not pose any health risks to themselves or the community.

2.3 The need for technology-driven systems in HSUs

Given the limited manpower and the growing population of the UPV community, the HSU continuously faces challenges in healthcare accessibility on campus, particularly during peak periods like annual medical examinations. Common issues include long wait times, inefficient scheduling, misplaced medical certificates, and difficulty in the re-issuance of medical certificates to students.

2.3.1 Technology-Driven Solutions for Healthcare Units

A case study on the Barriers to the Adoption of Electronic Medical Records in Select Philippine Hospitals by Celis et al. implied that healthcare information systems (HIS) have been widely accepted as a basic form of automation solution among hospitals. HIS includes several modules that facilitate seamless data exchange, allowing organizational members to communicate electronically and eliminating the need for labor-intensive manual processes.

One way to achieve this efficiency is by integrating self-service portals and

automated appointment scheduling, which streamline administrative tasks, reduce paperwork, and enhance service delivery. These digital solutions have been proven to significantly reduce staff workload while improving accessibility for patients.

In university health settings, such systems could enhance operational efficiency by allowing students to upload medical documents, book appointments, and receive automated reminders—minimizing human intervention and reducing long queues.

An example would Harvard University's Health services unit which includes the following features:

- **Upload medical forms online** for health clearance.
- **Check the status of their submissions** without needing to visit the clinic.
- **Receive automated notifications** about missing documents or upcoming deadlines.

In the Philippine context, Ateneo de Manila University has Blue Pass, the University's campus access, health monitoring, and campus tracing app. BluPass encompasses the following features:

- **Portable medical records** – Access and update health records anytime.

- **Online prescriptions & lab results** – View, download, and share verified medical documents.
- **Seamless appointment booking** – Check doctor availability and request consultations.
- **Health-focused social network** – Connect with peers and professionals for medical discussions.

2.3.2 Proposed System for UPV HSU

To improve efficiency and service quality, UPV's HSU can integrate a centralized web-based system incorporating these key features:

1. Online medical form submission portal to streamline documentation for Annual PE.
2. Annual PE Scheduling and Rescheduling feature to automate slot assignment, schedules and minimize waiting times.
3. Queue management system with digital check-ins to optimize patient flow.
4. Automated communication system for notifying students about schedules, missing documents, and examination requirements.

By adopting these technology-driven solutions, UPV's Health Services Unit can enhance accessibility, reduce staff workload, and improve the overall healthcare experience for both students and medical personnel.

2.4 The use of Electronic Medical Certificates

Ekonsulta Clinic PH defines electronic medical certificates as digital documents that certifies an individual's health status. This enables medical professionals to electronically sign these documents, enhancing accessibility for patients who can conveniently access their certificates from any location. In schools, medical certificates are often required by the institution as part of the enrollment process. Failure to acquire a valid medical certificate can hinder a student's enrollment process. Moreover, the misplacement of such certificates can cause delays in enrollment, as observed in the case of UP Visayas, where the university's health services unit may not immediately issue replacements. As such, the digitalization of medical certificates is essential in the implementation of Health Information Systems. The use of electronic certificates mitigates the risk of losing paper-based documents. They offer students flexibility and accessibility, thereby enhancing their overall experience. Additionally, if a student's excuse slip is verified for their absence following a telemedicine consultation with a doctor, they can receive a digital medical certificate signed by the HSU. This eliminates the need for patients to return to the infirmary in order to acquire medical certificates.

A prominent telemedicine platform that incorporates digital medical certificates into its application is KonsultaMD. Within the app, medical certificates are issued at the discretion of the attending physician, and patients can conveniently access these documents through the application.

Furthermore, the Philippines' Land Transportation Office has its own LTMS Portal which provides applicants the option to both view and upload medical certificates as part of their license processing. The system also allows users to access, download, and print essential certificates like their student permits.

Several western universities also include the releasing of digital certificates to their University health portal:

1. **MyUofMHealth.org:** The University of Michigan has its own health services system which includes a patient portal. The portal not only offers telemedicine consultation, appointment scheduling and booking, viewing of laboratory results and prescription, but also provides digital medical certificates upon the attending physician's discretion.

Figure 2.1: MyUofMHealth Login Page

2. . **Harvard University Health Services (HUHS) Portal**:

   Harvard University also has its own Health Services System, which is accessible to all Harvard students, members of the Harvard community,

and dependents that received care on the HUHS. Like any health information system, it allows appointment booking, viewing of medical clearances, laboratory results, prescription, and immunization records. The system also notifies the student for any upcoming appointments.

Figure 2.2: Harvard University Health Services Appointment Section

3. **Stanford University myHealth:** Stanford's myHealth offers a platform where patients can view and update medical records, view test results, and schedule appointments. The platform allows in-app payments and also has its own built-in messaging feature that allows real-time communication between the patient and their attending physician

Figure 2.3: Stanford University's myHealth

4. **UMass Patient Portal:** The University of Massachusetts Patient Portal offers a system where students can submit immunization records and other forms, schedule appointments and STI testing, and also be

able to download other necessary medical forms such as excuse letters and medical clearance.

5. **University of Tennessee Chattanooga University Health Services (UHS):** University of Tennessee Chatanooga's UHS is a platform where students can access immunizations records, view and submit health forms necessary for their doctors appointment, allow a secure messaging platform, and access to their university health services accountabilities.

Figure 2.4: University of Tennessee Chattanooga University Health Services (UHS)

6. **University of Science and Technology of Southern Philippines HIMS**: USTP Health Information Management System (HIMS) is a healthcare service system that allows students to consult with attending physicians virtually. Furthermore, the system also offers secure access to patient's personal electronic health records. The university also has its own eClearance system that offers a paperless transaction of the students' clearance so that students will no longer have to visit

> the campus to process clearances which may include pending accountabilities to the health services unit, Office of Student Affairs, library, and their respective colleges and departments. (USTP Digital Transformation, 2021)

Given these literature reviews, it is evident that universities and hospitals worldwide have integrated digital medical certificates into their health information systems to enhance accessibility, efficiency, and record management. By implementing a similar feature in isKalusugan system, we can streamline medical document processing, reduce the risk of misplaced medical certificates, and improve overall healthcare services for the UPV community.

2.4.1 Summary of Literature Review

The literature review explores the integration of digital healthcare management systems, specifically focusing on scheduling systems and electronic health records (EHRs) in hospitals and in some university health services. Studies indicate that while Health Information Systems (HIS) can enhance patient care and reduce administrative burdens, challenges such as high implementation costs and concerns about data privacy remain.

The review also highlights the UPV Health Services Unit (HSU) and its

current operational limitations, including long wait times, inefficient scheduling, and misplaced medical documents. Case studies from other institutions, such as Harvard University and Ateneo de Manila University, demonstrate how technology-driven solutions—such as self-service portals, automated appointment scheduling, and digital medical certificates—can streamline healthcare services.

The proposed system for UPV HSU aims to address these challenges through features such as an online medical form submission portal, automated scheduling and rescheduling, queue management, and electronic medical certificates. By adopting these solutions, UPV HSU can improve accessibility, reduce staff workload, and enhance the overall healthcare experience for students and medical personnel.

Chapter 3

Research Methodology

This chapter presents the tools, techniques, and methodologies used in the development of the isKalusugan system, A Proposed Health Services Unit Management System for the University of the Philippines Visayas It specifies the software and hardware requirements, as well as the comprehensive process involved in creating the system.

3.1 Development Tools

Figma

Figma is a browser-based collaborative design tool that is used to create dynamic and interactive system prototypes. With the app's wide functionality, Figma was used by the developers to create wireframes and a prototype for the proposed system.

VSCode

Visual Studio Code is a lightweight, cross-platform source-code editor

developed by Microsoft. It is designed to provide a fast, efficient, and customizable coding experience for developers working on various programming languages and frameworks. It supports multiple programming and scripting languages like JavaScript, TypeScript, and Node.js. This is the primary source code editor used by the developers in developing the system.

Github

GitHub is a web-based platform for version control and collaboration, widely used by developers for managing and sharing source code. Owned by Microsoft, GitHub provides a centralized repository hosting service that supports distributed version control systems, primarily Git.

Github will be utilized in storing the source code of the system and for the source version control during development

3.1.1 Packages and Application Programming Interfaces (APIs)

The application is built using the MERN (MongoDB, Express.js, React, Node.js) stack with various supporting packages. On the frontend, React serves as the core framework with react-router-dom for routing. State management is handled through Redux Toolkit and redux-persist, while the UI is styled using Tailwind CSS, Flowbite React, and Framer Motion for animations. User notifications are implemented using react-toastify, with axios handling API requests and xlsx for Excel file exports.

The backend, built on Node.js and Express, uses Mongoose for MongoDB integration. Authentication and security are managed through bcrypt and jsonwebtoken, while environment variables are configured using dotenv. Cookie-parser was used for session management, node-cron for scheduled tasks, and nodemailer for email functionality.

3.1.2 Hardware

The hardware requirements for the development of the system include a computer or laptop with the following specifications:

- Processor: Intel Core i5, its equivalent on other brands or higher
- RAM: 6GB or higher
- Storage: 200GB SSD or more for faster data access and retrieval
- Operating System: Windows 10 or higher, macOS, or Linux

These specifications are necessary to ensure smooth development and testing of the system, especially when handling large datasets and concurrent processes.

3.2 Development Framework

Feature-Driven Development (FDD)

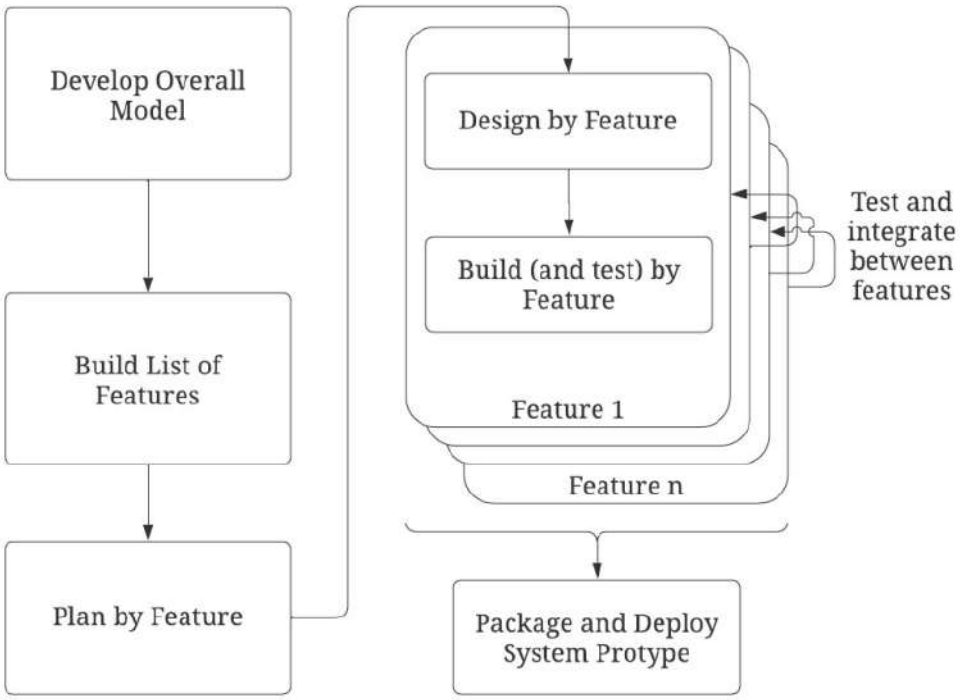


Figure 3.1: Modified Feature-Driven Development (FDD) Framework

The team decided to use **Feature-Driven Development (FDD)** - a framework in Agile methodology that focuses on developing working software with features that satisfy client needs as it ensures the regular and on-time delivery to clients and/or stakeholders [1]. The five (5) steps and key activities in FDD as seen in the figure below are (1.) Develop the overall model, (2) Build the features list, (3) Plan by feature, (4) Design by feature, and (5) Build by feature.

Data Gathering and Documentation

- *Title:* IsKalusugan: A Proposed Health Services Unit Management System for the University of the Philippines Visayas

- *Objectives:* To design and implement a web-based management system for the Health Services Unit at the University of the Philippines Visayas, in order to enhance efficiency, accessibility, and communication within the UPV Health Services Unit (HSU).

- *Problem statement:* The existing manual and paper-based management system poses several challenges, hindering the efficiency, accessibility, and communication within the UPV HSU. Furthermore, the HSU also faces difficulties in terms of the scheduling of the annual medical examinations. Additionally, the problem of lost medical certificates, either due to students misplacing them after their examinations or mishandling within the paper-based system of the HSU administration, adds to the burden of the medical staff and the students. Moreover, the outdated communication and announcement methods of the HSU, relying solely on email or Facebook Messenger for inquiries and consultations, create inefficiencies in addressing these inquiries or scheduling appointments.

- *Stakeholders:*

  - Students and Faculty - main users of the HSU system
  - HSU administration and staff - the admin of the system

  - Other stakeholders — the non UPV stakeholders that uses the services of the HSU

- *Method:* Interviews and consultations — Conduct interviews and consultations especially to the HSU administration to consider their desires for the system.

- *Tools used for requirements gathering and management* Notion for managing project tasks and deadlines (Notion link: IsKalusugan: A UPV HSU System)

Overall Model

The first phase of FDD is to develop an overall model in which project scope and requirements are identified. The team members actively participated that the project scope is within UPV HSU only. Requirements and/or features are identified through some interviews and consultations with the HSU administration and staff. Use-case diagrams are also developed after the requirements gathering to visualize each feature of the system.

Design and Development

In this phase, detailed design documentation will be created for each feature. This may include class diagrams, sequence diagrams or any related design documents. The architecture overview of the FDD model will help

highlight how the features fit into the overall design of the system. Version control will also be used to manage code changes.

Testing

Six (6) UPV constituents were invited to participate in the testing. Among them, 2 acted as admin users while the remaining 4 acted as non-admin users. Among the 2 admin user, 1 admin user (an actual HSU Personnel) was allowed to explore the super admin interface. Majority of the students were from College of Arts and Sciences (2 Biology, 2 Computer Science), and one 1 was from SOTECH. The participants were tasked with exploring and testing the features of the application following the test cases provided.

The test consists of 10-statement questionnaire with a five-point Likert scale. . This survey consisted of 10 questions, each with five response options: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

The following are the questions asked to both the admin and non-admin users:

System Usability Scale (SUS)

	Strongly Disagree				Strongly Agree
I think that I would like to use this system frequently.	1	2	3	4	5
I found the system unnecessarily complex.	1	2	3	4	5
I thought this system was easy to use.	1	2	3	4	5
I think that I would need the support of a technical person to be able to use this system.	1	2	3	4	5
I found the various functions in this system were well integrated.	1	2	3	4	5
I thought there was too much inconsistency in this system.	1	2	3	4	5
I would imagine that most people would learn to use this system very quickly.	1	2	3	4	5
I found this system very awkward to use.	1	2	3	4	5
I felt very confident using this system.	1	2	3	4	5
I needed to learn a lot of things before I could get going with this system.	1	2	3	4	5

3.3 Preliminary Investigation

Data Gathering Results

The development process for creating isKalusugan started with a comprehensive visit to the UPV Infirmary. This phase involved engagement with key personnel and understanding the intricacies of the center's operations. The following sections detail the key activities and information undertaken and gathered during this visit.

Visit to the HSU

During the researcher's visit, they met with the HSU director, administrative staff, and nurses. This introduction provided valuable insights into the roles and responsibilities of various individuals and departments within the HSU.

Stakeholder Identification and Interview

The researcher's interaction with the stakeholders allowed them to gather valuable feedback on the existing system and the challenges they faced. The researchers conducted an interview with students and the HSU Admin to understand how individuals currently feel about the services provided by the Health Services Unit, particularly the Annual Physical Examinations. Through these discussions, it was revealed that students are often frustrated with long queue lines during medical examinations, which add to their fatigue and inconvenience. Several students face delays in enrollment due to pending accountabilities with the HSU, such as lost medical certificates or incomplete

examinations. However, most students have access to the internet, which presents opportunities for digital solutions.

On the other hand, the HSU is facing significant challenges, primarily due to being short-staffed, which limits its ability to efficiently manage the annual periodic health examination process. They expressed a strong desire for a proper communication channel to disseminate their announcements effectively. The HSU also pointed out that students often do not attend to their assigned schedule. As such, they are eager to use technology to address inefficiencies and improve both service delivery and user satisfaction. One solution they pointed out is the use of Online Submissions of documents and medical forms needed for Annual PE. They wish to view documents online and assess if a student is fit for enrollment, if so, they would attach a medical certificate.

Research Insights: Identifying Pain Points

The findings from the research highlighted three main pain points contributing to the inefficiencies of the annual periodic health examination system.

1. First, the annual physical health examination scheduling process was identified as a critical issue, with long waiting times due to students not adhering to their assigned schedules.

2. Second, communication and information dissemination emerged as another significant challenge. Current communication channels are ineffective in announcing health examination dates, leading to confusion and missed deadlines.

3. There is also a lack of clear and timely communication about examination requirements, compounded by difficulties in reaching and engaging the target audience.

4. Finally, the issue of lost medical certificates and the awareness of submission procedures further exacerbates the inefficiencies. The lack of a centralized system to track and retrieve lost medical certificates creates delays and the HSU lacks awareness and information about the requirement for students to submit medical certificates online for enrollment. Together, these pain points underline the need for systemic improvements to streamline the process and enhance user experience.

3.4 User Requirements

Based on the gathered data with stakeholders and observations during the several consultations with the HSU, key user requirements were identified for the development of isKalusugan .

Feature	Access	Usage
User Sign-in	Users, Admin (role: Dentist, Doctor), SuperAdmin,	Users will enter the provided credentials by the administrators to access the features of the system created for them
Edit Profile	Users, Admin (role: Dentist, Doctor), SuperAdmin,	Users will be able to edit their own profile including their information
View Statistics	Admin (role: Dentist, Doctor), SuperAdmin,	Uses will be able to view statistics in the dashboard such as trends, and other data
Set Pre-enlistment Date	SuperAdmin	Users can set pre-enlistment dates – a range of dates in which users can select their mode of annual PE.
Set Start Date and End Date for Annual PE	SuperAdmin	Users can set start date and end date for annual pe. These dates will be the basis for scheduling users
Choose Mode for Annual PE (Online or In Person)	Users	User can select their preferred mode of Annual Physical Examination
Generate Schedule	SuperAdmin	Users can generate schedule to all students for In Person Annual PE (dates from start end to end date, excluding weekends and holidays)
View Schedules	Users, Admin (role: Dentist, Doctor), SuperAdmin,	Users can view system generated scheduled date for Annual PE
Request to be Rescheduled	Users	Users can submit a request to be rescheduled if they are not available in their original schedule
Handle Reschedules (Approve & Deny Request)	Admin, Superadmin	Users can approve or deny reschedule requests given a justification.
Select Reschedule Date	Users	Users can select one among the three earliest available reschedule dates as their new annual pe schedule
Handle Emergency Reschedule (Reschedule all users on selected date)	Admin, Superadmin	Users can reschedule all users on a given date to a new date in case of emergency

Figure 3.2: User Types and Features

Submit Forms for Annual PE	Users	Users can submit medical forms and other documents needed for Online Annual Physical Examination
Verify Forms (Reject or Accept)	Users, Admin (role: Dentist, Doctor), SuperAdmin,	Users can validate documents submitted by approving and denying their status
Update User Status for Annual PE	Admin (role: Dentist, Doctor), SuperAdmin	User can update status on annual pe
Generate Medical Certificate / Upload Medical Certificate	Admin (role: Dentist, Doctor), SuperAdmin	Users can attach a signed medical certificate to each user or generate a medical certificate from the system
Monitor attendance for In Person Annual PE (Mark user as absent or present)	Admin (role: Dentist, Doctor), SuperAdmin	Users can monitor attendance for annual pe on the day by viewing who's absent or present. Users will be marked absent if unable to attend to their schedule, else present.
Input license number, doctor name, and attached e-signature	Admin (role: Dentist, Doctor), SuperAdmin	Users can input license number, doctor name, and attached e-signature for system medcert generation
Enter Queue for Annual PE	Users	Users can enter the queue for annual pe by scanning qr code in the front desk in the HSU or by logging in to the system during the day of their schedule
Move User to Next Queue	Admin (role: Dentist, Doctor), SuperAdmin	Users can move users to the next queue
Complete User from all queue	Admin (role: Dentist, Doctor), SuperAdmin	Users can complete users from the queue marking them as done for their annual pe.
Track Queue Progress for In Person Annual PE	Users	Users can track the progress of their queue.
View Documents	Users, Admin, SuperAdmin	Users can view documents uploaded in the system
Upload new document	Admin, SuperAdmin	Users can upload documents and forms to the system
Submit a request for Laboratory Exam	Users, Admin (role: Doctor)	Users can submit a request for laboratory exam given a valid reason

3.5 System Design

3.5.1 Context Model

Figure 3.2 illustrates the context model of **isKalusugan**, highlighting how the system interacts with key stakeholders, including the **HSU Super Admin, HSU Staff, and Users (Students)**. . The diagram outlines key interactions, such as managing annual physical examinations (PE), overseeing scheduling and rescheduling, handling medical document submissions, monitoring queue statuses, and generating reports.

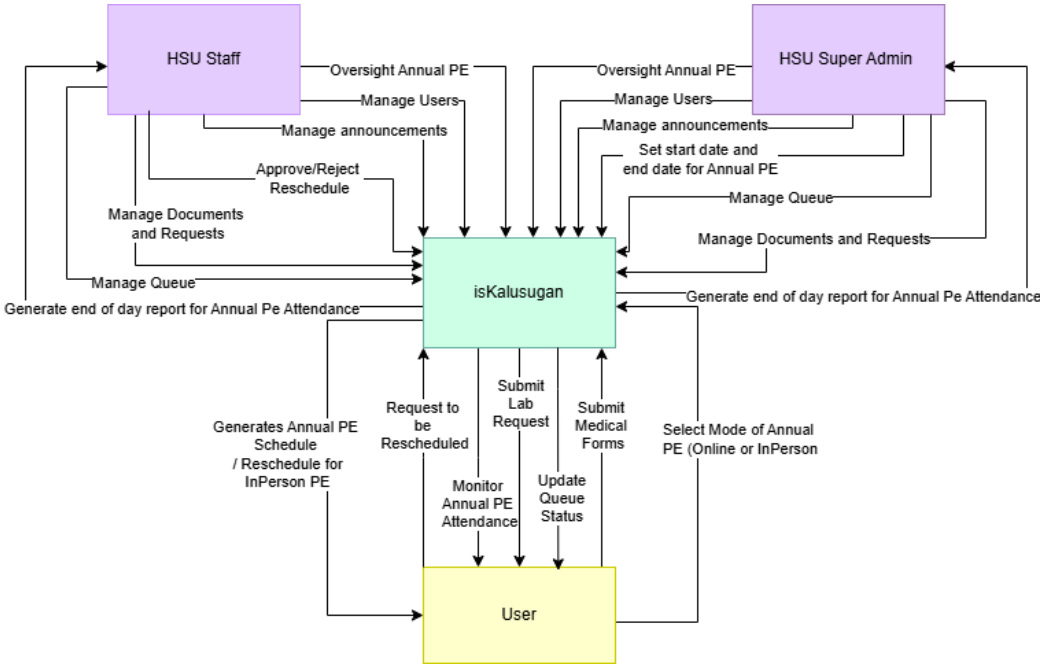


Figure 3.3: Context Model of isKalusugan

HSU Super Admin

The HSU Super Admin oversees the entire system, managing high-level configurations such as setting the start and end dates for the Annual Physical

Examination (PE). They also manage users, announcements, documents, requests, and the queue while generating end-of-day reports for system monitoring.

HSU Staff

The HSU Staff plays a crucial role in the day-to-day management of the Annual PE. They oversee scheduling, approve/reject rescheduling requests, manage documents, requests, and queue statuses, and help ensure a smooth process for students undergoing physical examinations.

User (Students)

The User (Student) interacts with the system by selecting their mode of PE (Online or In-Person), submitting required medical forms and lab requests, requesting rescheduling if needed, and monitoring their queue status and attendance throughout the process.

3.5.2 Use Case Diagram

Figure 3.3 is the use case diagram of the system. It illustrates the functionalities available to each user type, showing how they interact with the system's core processes, such as scheduling, document submission, queue management, rescheduling requests, and announcements.

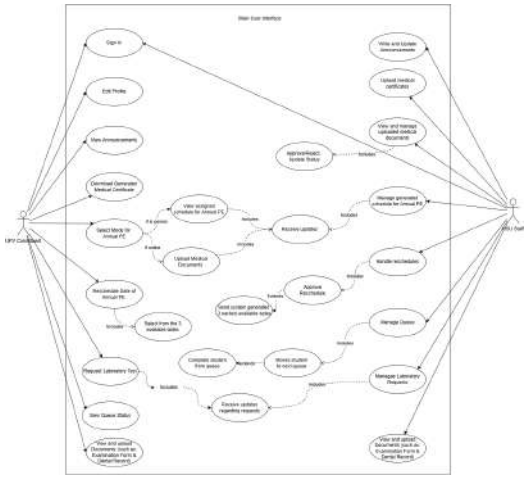


Figure 3.4: Use Case Diagram of isKalusugan

User can perform various actions, including selecting the mode of the Annual PE, uploading medical documents, requesting lab tests, viewing assigned schedules, monitoring queue status, and downloading generated medical certificates.

On the other hand, HSU Staff handles administrative tasks such as managing schedules, approving/rejecting reschedule requests, uploading and managing medical documents, handling laboratory requests, and managing the queue.

3.5.3 Sequence Diagrams

Reschedule Users Sequence Diagram

Figure 3.4 illustrates the sequence diagram of the rescheduling process for the isKalusugan system, detailing interactions between the User (Student), HSU Staff, HSU Super Admin, System, and Database. The process ensures

that rescheduling requests follow a structured review and approval workflow.

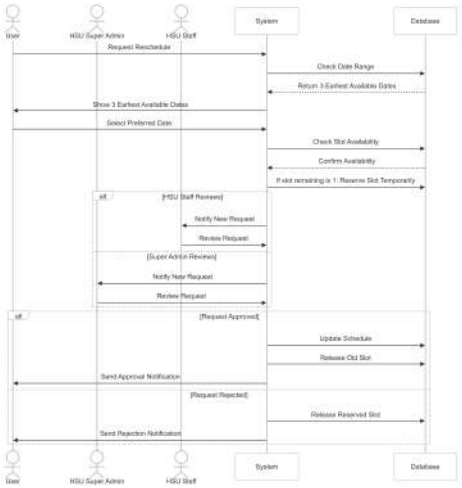


Figure 3.5: Rescheduling Feature Sequence Diagram

Queue Sequence Diagram

Figure 3.5 shows the sequence diagram for the Queue Management during In Person Annual Phyiscal Examinations. It illustrates interactions between the User (Student), HSU Staff, HSU Super Admin, System, and Database when in queue.

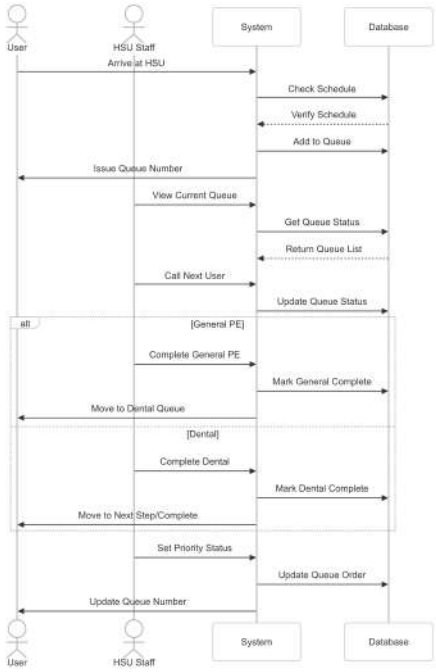


Figure 3.6: Sequence Diagram for Queuing Users during In Person Annual PE

Online Submissions for Annual PE Sequence Diagram

Figure 3.6 outlines the document submission, validation, and approval process in the isKalusugan system. It details the interactions between the User (Student), HSU Staff, System, and Database, ensuring that uploaded medical documents are properly stored, reviewed, and approved or rejected.

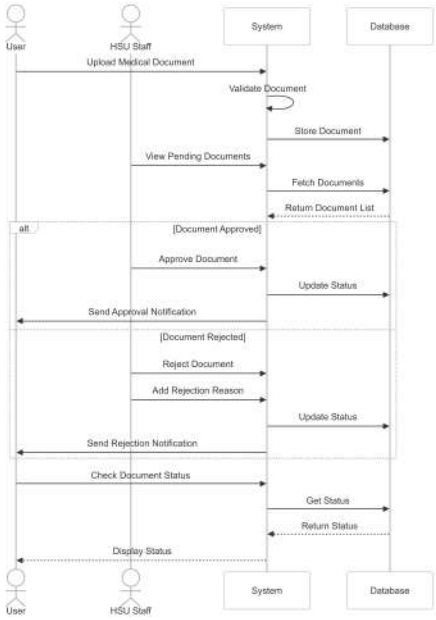


Figure 3.7: Online Sequence Diagram

3.5.4 Database Diagram

The figure below shows the overall database diagram of isKalusugan

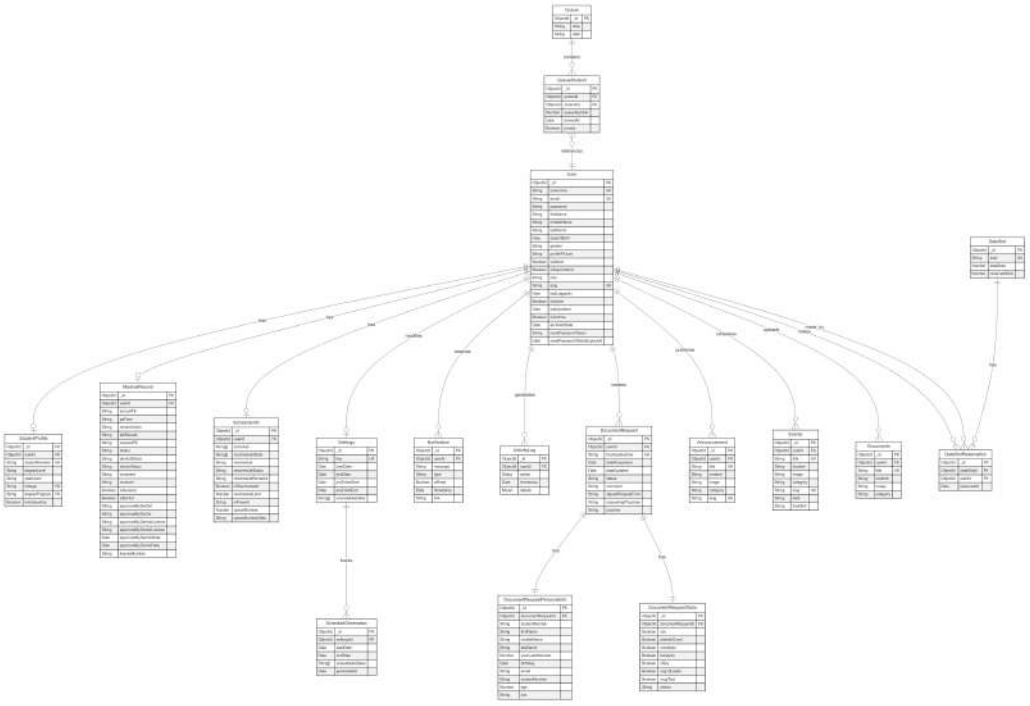


Figure 3.8: Database Diagram

Chapter 4

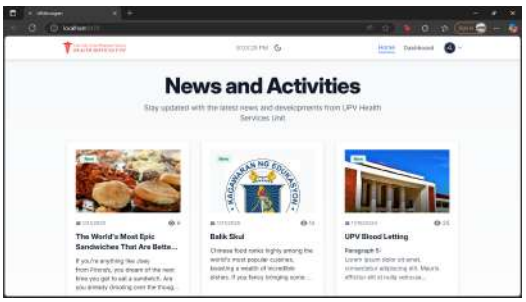
Results and System Prototype

4.1 Prototype

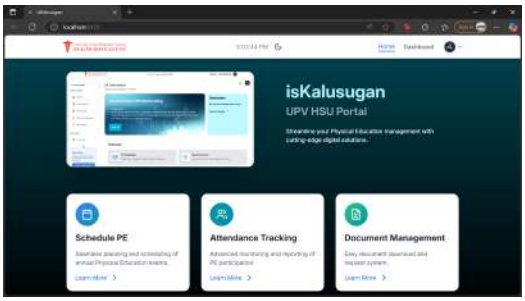
4.1.1 Landing Page

Figure showcases IsKalusugan's landing page. It features pages including home, news, services, and contact. Users will first see this page when visiting the HSU website. A log in button is also included on the top right of the page to ensure that user's can quickly access their accounts.

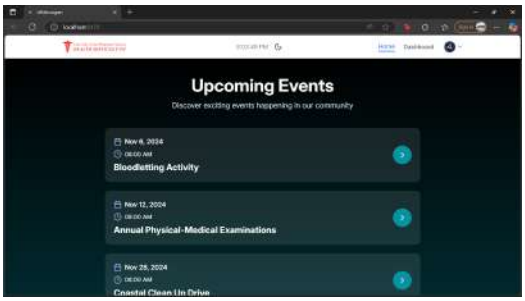
(a) Landing Page 1



(b) Landing Page 2



(a) Landing Page 3



(b) Landing Page 4

4.1.2 Dashboard

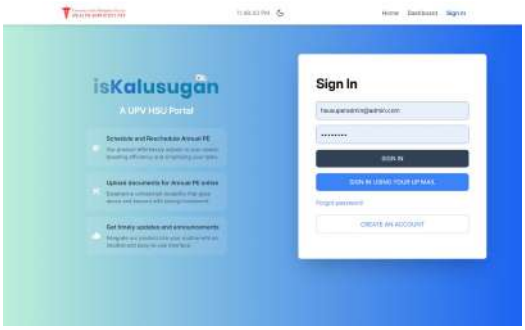
The login page of IsKalusugan requires users to authenticate before accessing the dashboard. The system offers two views: User View and Admin View, with navigation facilitated through quick links and a sidebar for easy access.

Dashboard. The header displays the current time, and user profile. The navigation bar includes Home and Dashboard, with the latter highlighted as the active page. The left sidebar contains a Quick Menu with essential features such as Home, Documents, Annual Physical Examination (PE), Announcements, and My Profile. A Settings section allows account management, while a Help Center button provides support for the UPV-HSU portal.

The main content area features an announcement banner displaying the latest admin-posted updates. To its right, a Reminders panel notifies users of upcoming events categorized under Today and This Month, with an option to view all events. Below, the Quick Access panel provides direct links for viewing Annual PE Status and submitting or tracking document requests.

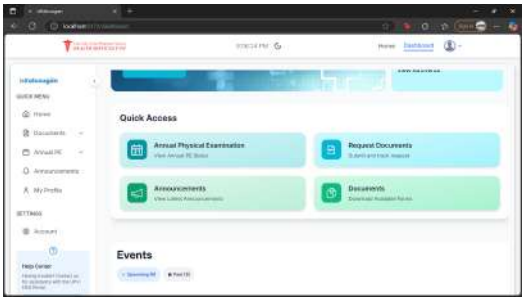
For admins, an additional section displays system statistics, including the number of processed documents, scheduled and rescheduled users, along with graphical data visualization.

Login Page



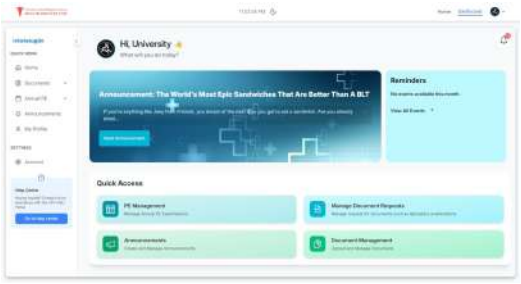
Dashboard User

(a) Dashboard User 1

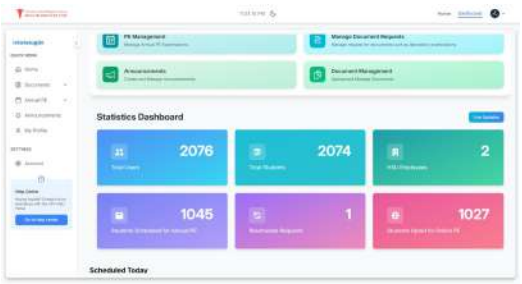


(b) Dashboard User 2

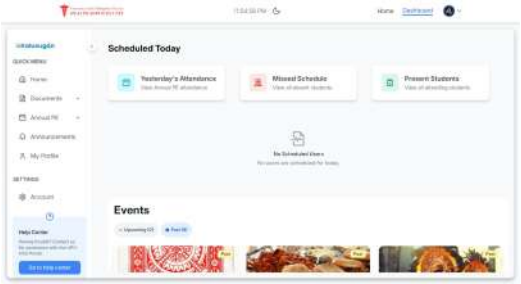
Dashboard Admin



(a) Dashboard Admin 1



(a) Dashboard Admin 2

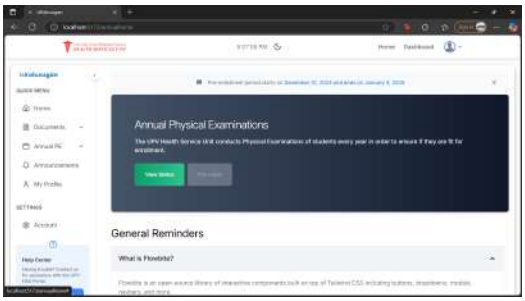


(b) Dashboard Admin 3

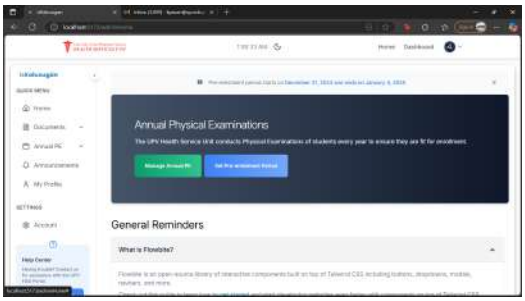
4.1.3 Annual PE Main Page

The Annual Physical Examination (PE) Dashboard is presented below. This dashboard features two primary buttons: one for viewing the status of the Annual PE and another for setting the pre-enlistment date, the latter being exclusively accessible to admins and HSU Staff. The pre-enlistment date defines the allowable period during which users can select their preferred mode of Annual PE, either online or in-person.

In addition to these functionalities, the Annual PE Dashboard also includes a Reminders Section, which provides users with relevant notifications and important dates

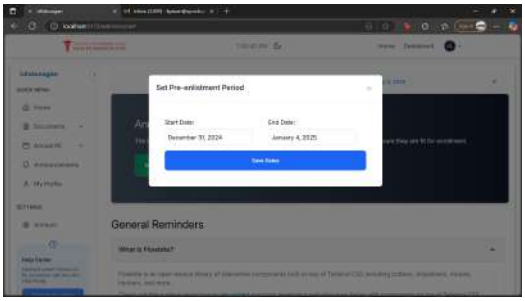


(a) User View

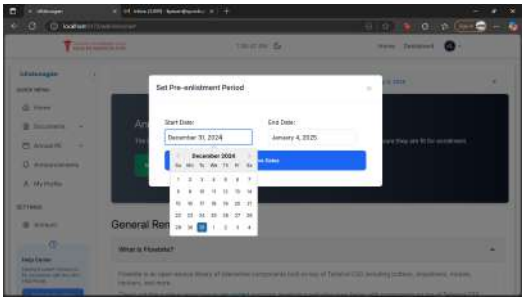


(b) Admin View

Admin: Set Pre-enlistment Period



(a) Pre Enlistment Set

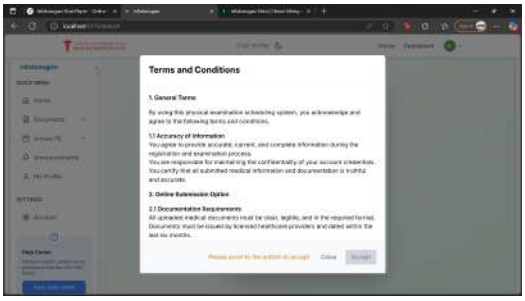


(b) Pre Enlistment Set

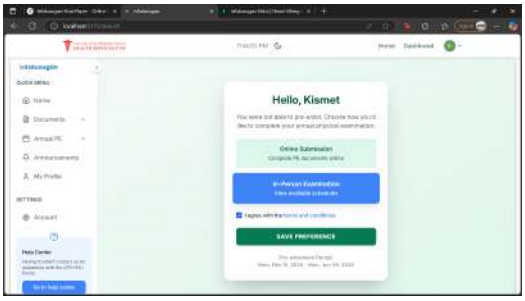
Unable to Pre-enlist

If a student is unable to pre-enlist their preferred mode for the Annual PE, they will be given an opportunity to select their preferred option. If they choose the online mode, they will be prompted to upload the required documents and forms for validation. If they opt for an in-person examination, the system will automatically suggest the three earliest available slots, allowing them to choose their preferred schedule. This ensures flexibility while maintaining an efficient scheduling process. The scheduling logic used here is the

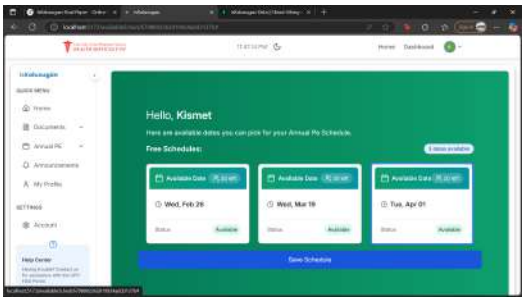
same one with the rescheduled users logic.



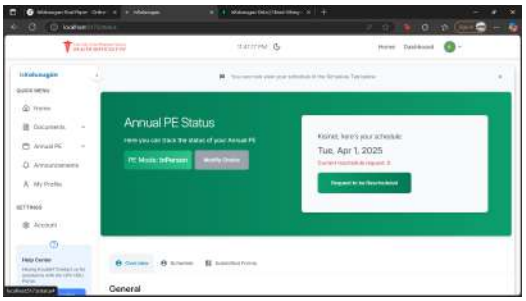
(a) Terms and Condition



(b) Mode of PE Selection



(c) 3 Earliest Available Date for Schedule



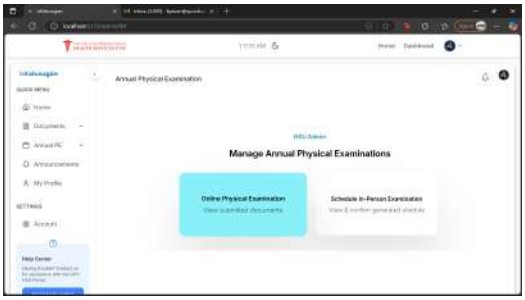
(d) User Schedule

4.1.4 Annual PE Mode: Online.

In the Online Mode of the Annual Physical Examination (PE), the user interface enables users to submit the required documents for evaluation by the Health Services Unit (HSU). Once submitted, the admin is responsible for verifying these documents and taking appropriate actions, such as approving or rejecting the submission. If approved, the admin can automatically generate a medical certificate to user profile. If rejected, the admin must provide a justification for the decision.

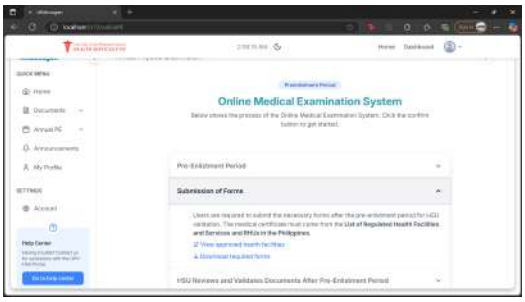
For the medical certificate, system will get the approver's details such as name and their license number. During account creation, only the medical practioner can input their license number. Furthermore, the generate medical certificate button can only be accessed by the medical practioners.

Admin View

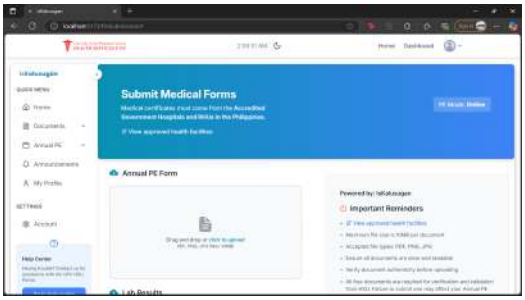


(a) Admin View

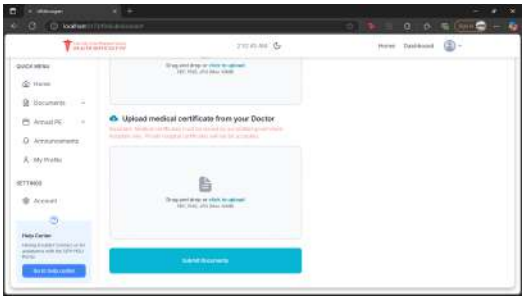
Submitting Documents



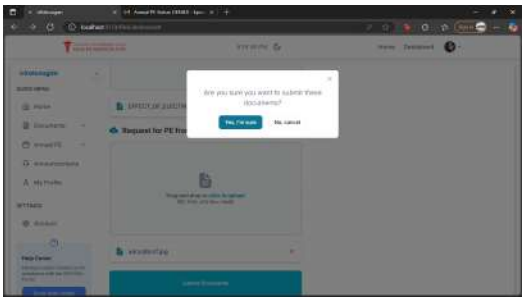
(a) Online View



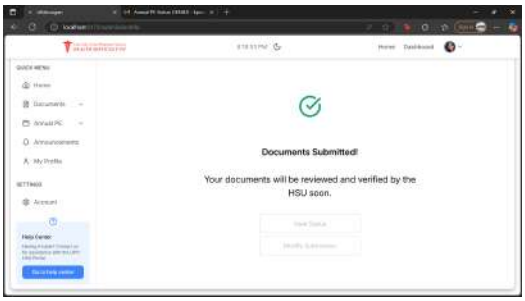
(a) Document Submission



(b) Document Submission

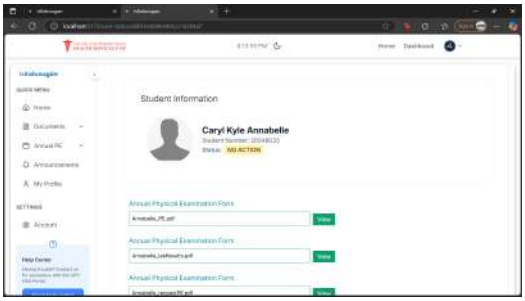


(c) Document Submission

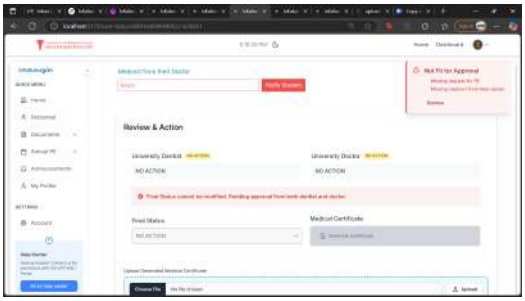


(d) Document Submission

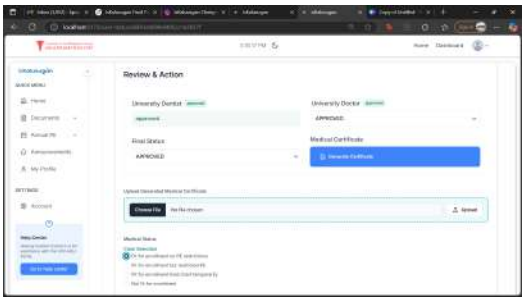
Admin: Approve/Deny Documents



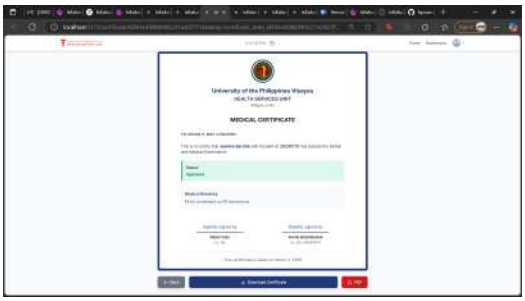
(a) Manage Request



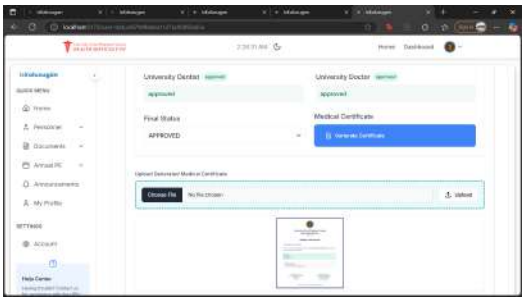
(b) Manage Request



(c) Manage Request

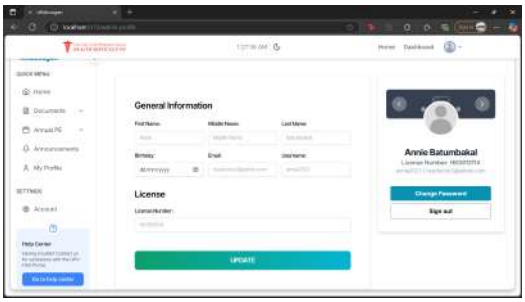


(d) Manage Request



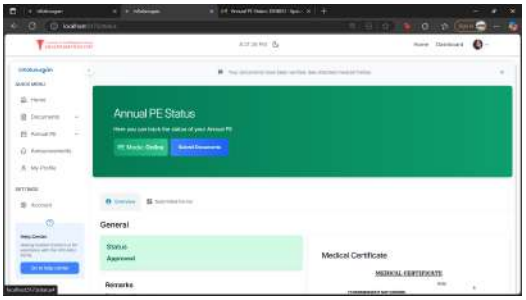
(e) Automatically attach medcert once generated

Admin: Enter license number



(a) License can be added during edit profile

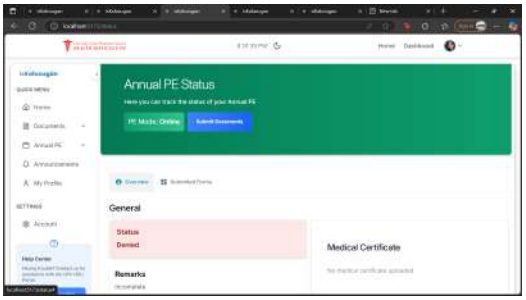
View Status: Approved



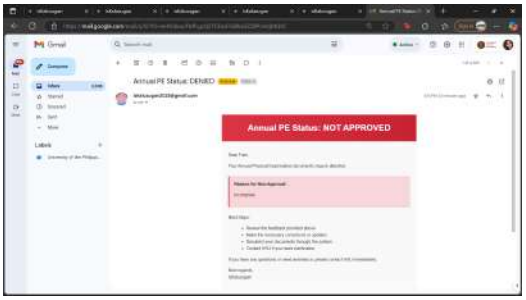
(a) Manage Request

(b) Manage Request

View Status: Denied



(a) Manage Request

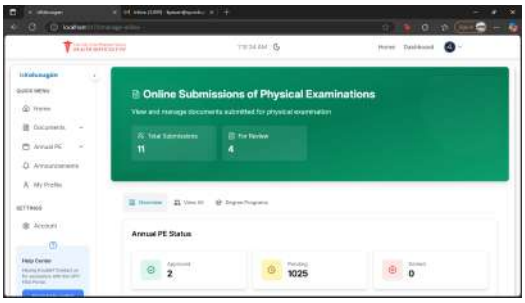


(b) Manage Request

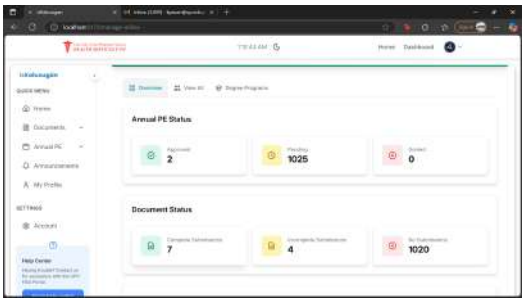
Admin View: Dashboard for Online

The Admin View provides administrators with an overview of all students who have opted for the Online Mode of the Annual Physical Examination (PE). It displays all relevant sutdent information and categorizes users based on their document submission status, displaying the number of students with complete, incomplete, or missing submissions. Additionally, the dashboard includes options to filter students by course or college, allowing admins to view all students enrolled in Online Annual PE, regardless of their submission

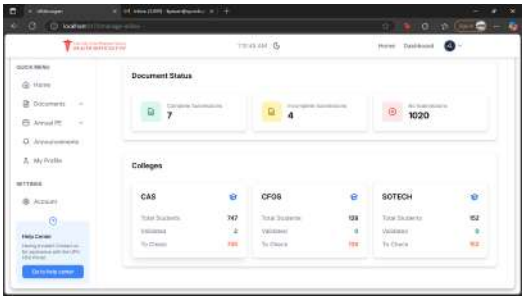
status.



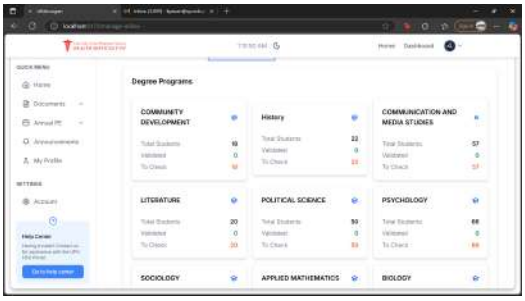
(a) Admin Dashboard



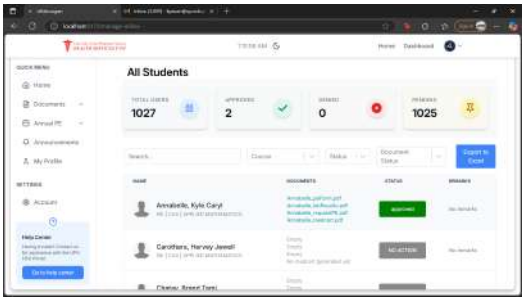
(b) Admin Dashboard



(c) Admin Dashboard



(d) Admin Dashboard



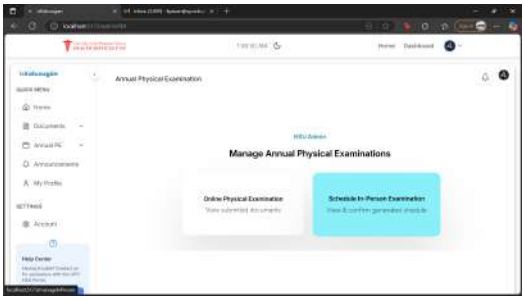
(e) Admin Dashboard

4.1.5 Annual PE: In Person

The figures below shows the dashboard for InPerson annual Physical Examination. Admin features include the following: Setting Annual PE Start Date

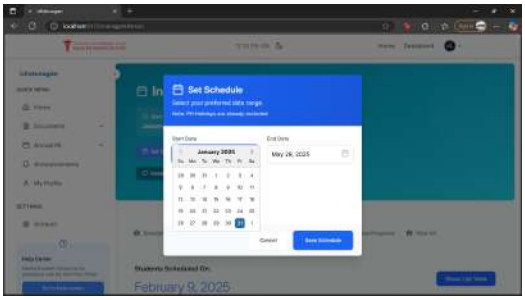
and End Date, Generating schedule to all users opted for In Person given the start date and end dates. Once generated, it notifies the user via in-app notification or the admin may click the email schedule to all students feature which notifies the students their schedule via email.

Admin View

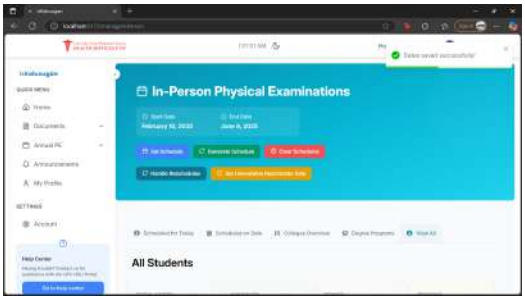


(a) Admin View

Set Schedule

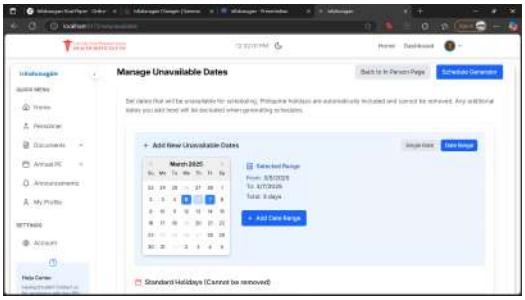


(a) Set Schedule

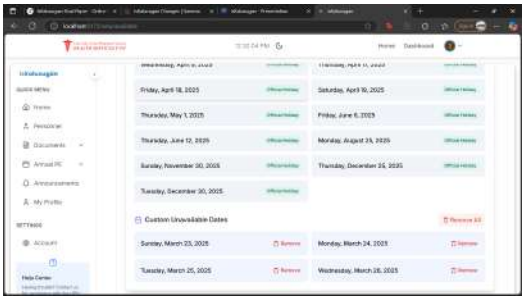


(b) Set Schedule

Make some dates unavailable

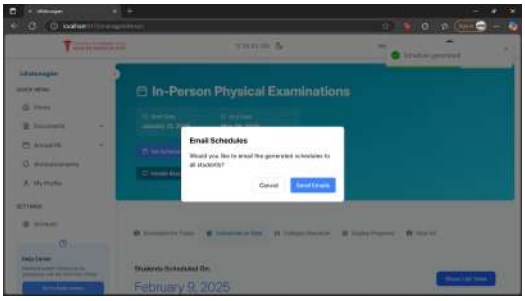


(a) Set Unavailable Dates

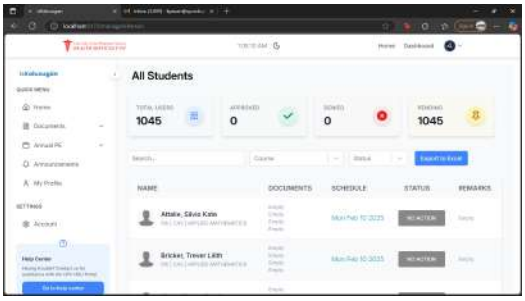


(b) Set Unavailable Dates

Generate Schedule

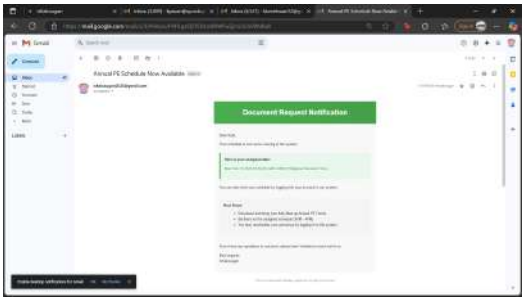


(a) Generate Schedule



(b) Generate Schedule

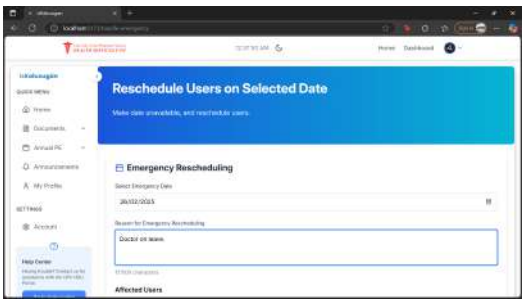
Email Schedule to Users



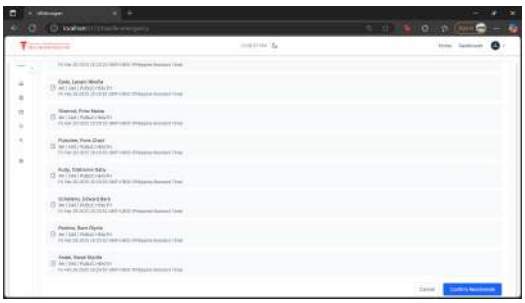
(b) Email Schedule

Handle Emergency Reschedule

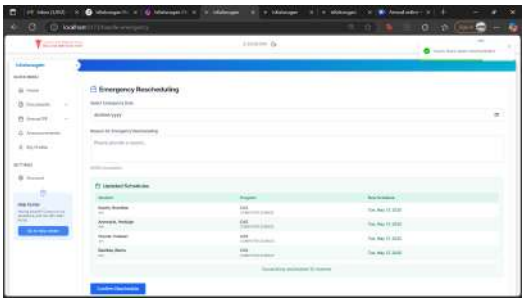
The Handle Emergency Reschedule feature allows administrators to manage user schedules in cases of emergencies. This functionality enables admins to view users scheduled for a specific date and reassign them to the next earliest available slot. The system automatically checks for available slots and determines whether a student can be accommodated; if not, it moves to the next available date. Additionally, administrators are required to provide a reason for the rescheduling to ensure transparency.



(a) Reschedule bulk users



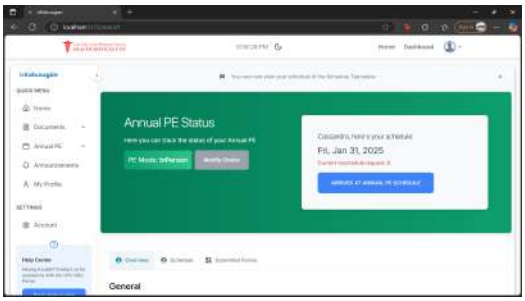
(b) Show previous schedule



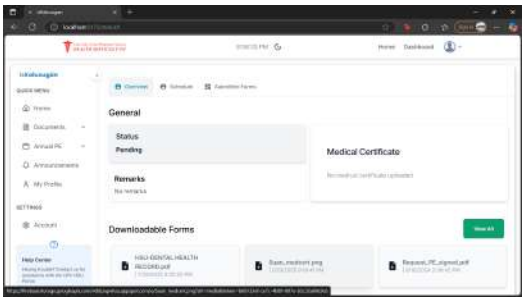
(c) Show new schedule

Status Page

The Status Page provides users with essential information regarding their scheduled date for the Annual Physical Examination (PE). It includes a Reschedule button, allowing users to modify their annual pe schedule if needed, along with an indicator displaying the number of reschedules remaining (maximum 3 to avoid abuse of the feature). Upon arrival at the Health Services Unit (HSU) on their assigned date, the Reschedule button automatically updates to an Arrived at Annual PE button. If the user fails to attend, the system notifies them and prompts them to reschedule. Additionally, the Status Page features a Reminders section for important notifications and a Documents section displaying all submitted files, if available.

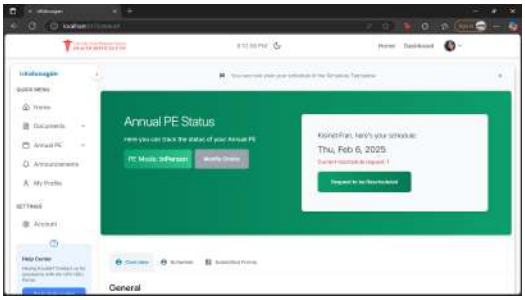


(a) Status Page

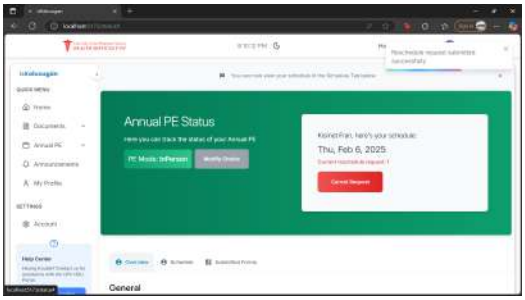


(b) Status Page

Request to be Rescheduled Page



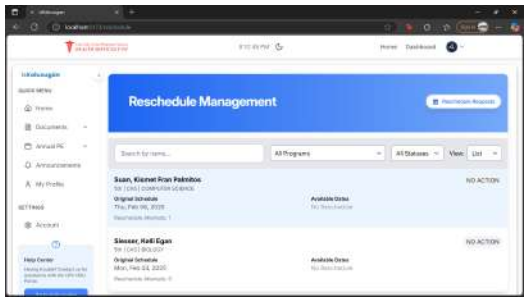
(a) Reschedule Page



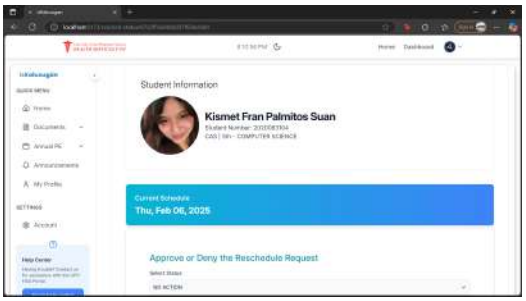
(b) ReschedulePage

Admin Side: Approve/Deny Reschedule

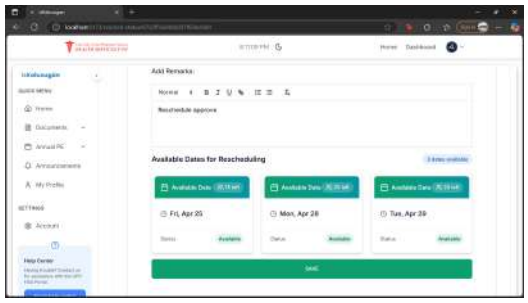
The figures below illustrate the Admin Reschedule Page, which displays all users who have submitted a reschedule request along with the necessary details. The page includes each user's current schedule and the three earliest available dates for rescheduling. Admins have the authority to approve or deny requests if deemed unnecessary. Upon approval, the system generates three available dates, allowing the user to select their preferred option. To prevent race conditions, the system automatically monitors slot availability and locks a date with only one remaining slot for the specific user's reschedule request. Additionally, if a request is rejected, admins are required to provide a reason for the denial. Once a student selects their new schedule, it decrements their remaining reschedule request and also unlocks the date with 1 slot left if it is not picked.



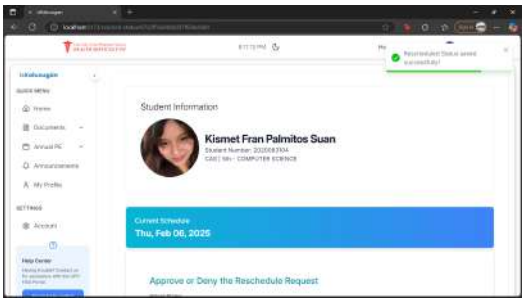
(a) Manage Reschedule



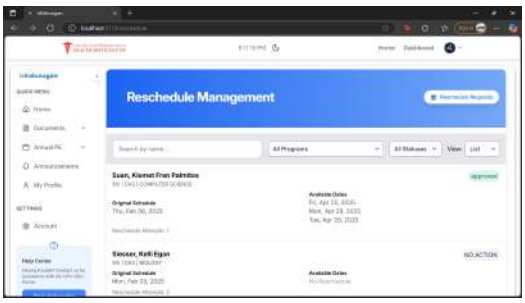
(b) Manage Reschedule



(c) Manage Reschedule

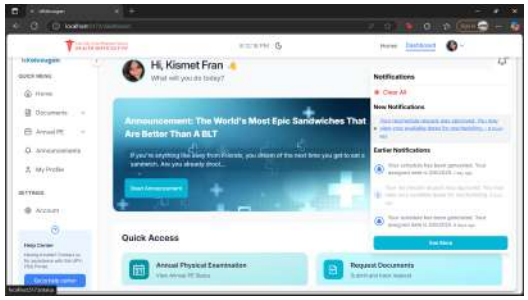


(d) Manage Reschedule

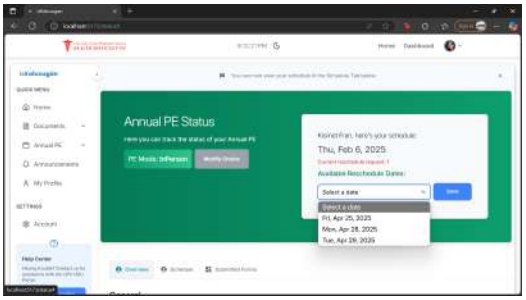


(c) Manage Reschedule

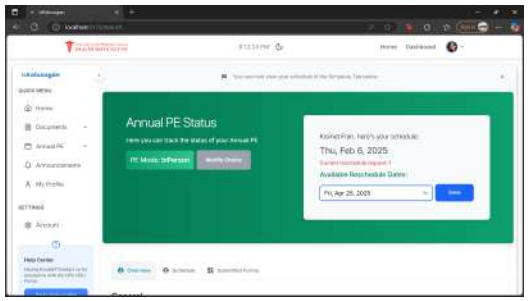
User Side: Selecting a New Schedule



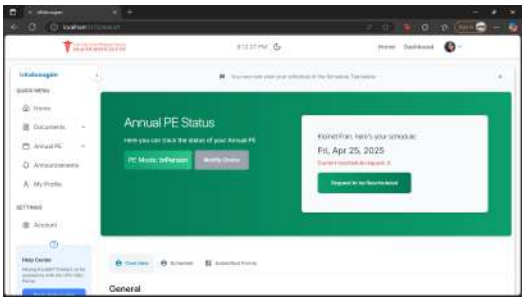
(a) Selecting a Schedule



(b) Selecting a Schedule



(c) Selecting a Schedule

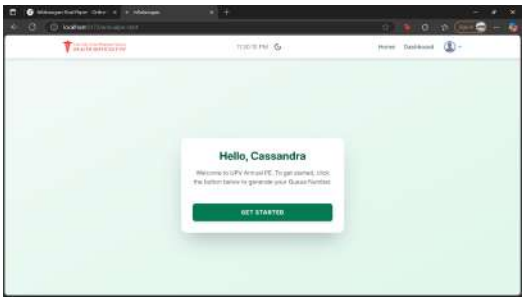


(d) Selecting a Schedule

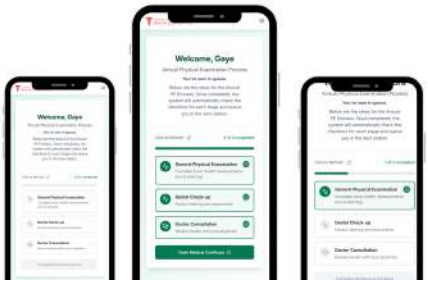
4.1.6 Queue Management for In Person Annual PE

One of the key features of the Annual PE System is Queue Management, which handles the queue for users scheduled on a given date. Users can enter the queue by logging in at the front desk or scanning a QR code available there. Once scanned, they are automatically added to the queue, and the system generates a unique queue number for tracking. Additionally, the system provides real-time queue updates, allowing users to see their current step in the Annual PE process and what comes next.

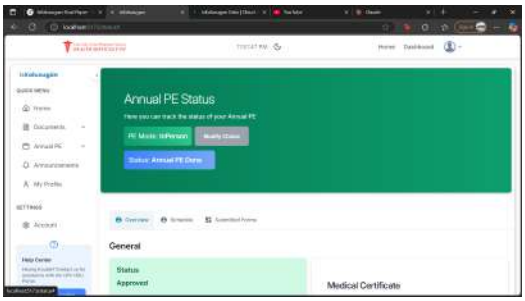
User View: Track Queue Updates



(a) User logins for Annual PE Queue



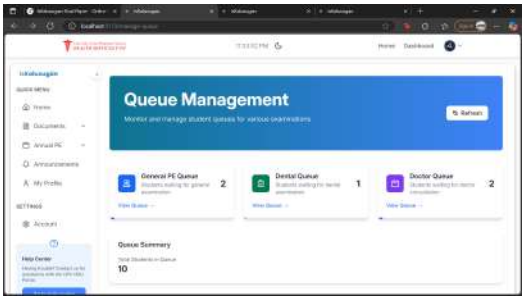
(b) Track Updates on Queue Status



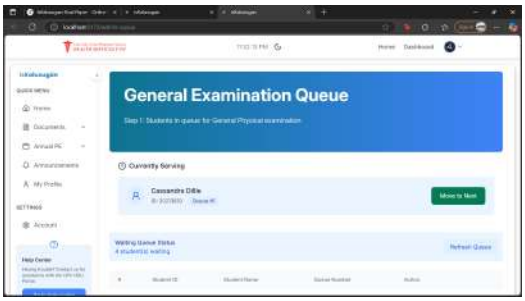
(a) User Status Page After Completing Annual PE

Queue Management Dashboard

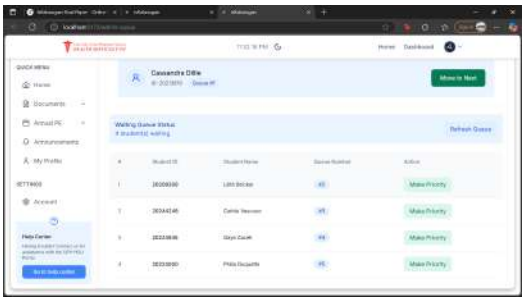
Admins and HSU personnel can access the queue management dashboard by logging in with their credentials. The dashboard displays the total number of students queued at each step, as well as the overall queue status. Admins have the ability to advance users to the next step, automatically removing them from their current position. They can also prioritize specific users, moving them to the top and reorganizing the queue accordingly. Once users reach the final step, admins can mark their Annual PE as complete, triggering a notification to inform them.



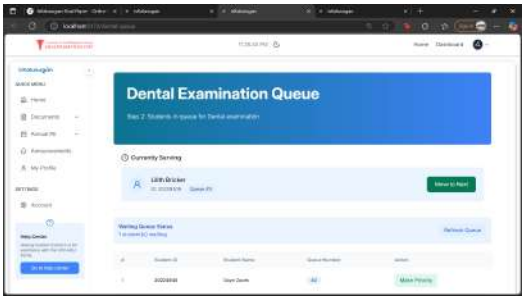
(c) Admin Queue Dashboard



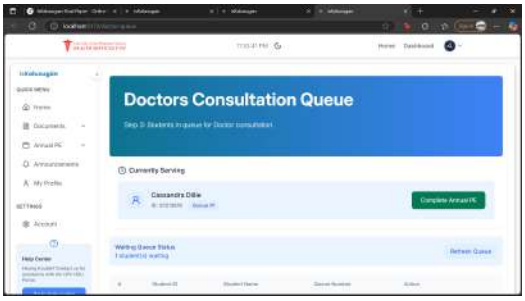
(b) General PE Queue



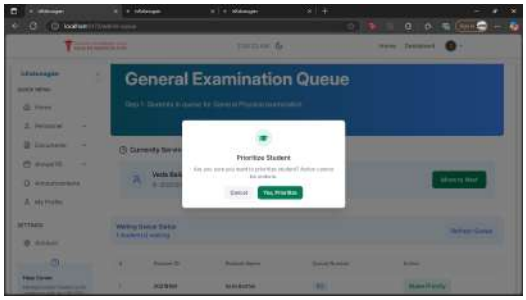
(c) General PE Queue



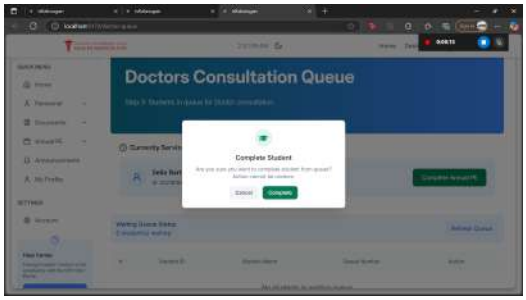
(d) Dental PE Queue



(e) Doctor PE Queue



(f) Make Priority Confirmation Modal

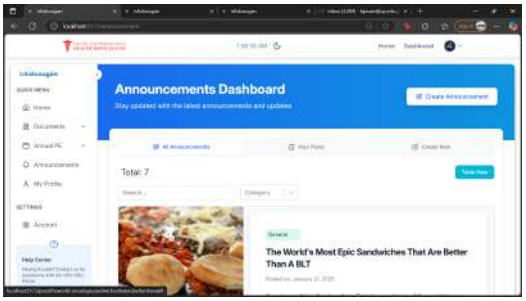


(g) Complete Student Confirmation Modal

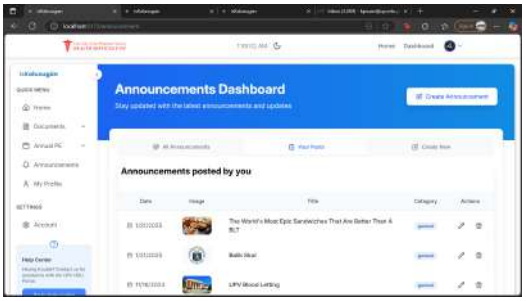
4.1.7 Announcements

IsKalusugan features an Announcement System that enables admins to create, edit, and delete announcements, while users can view, read, filter, and search published updates. This ensures effective communication between the administration and users regarding important information and updates.

Dashboard

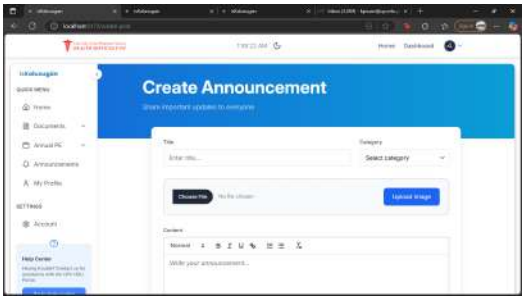


(a) View Announcement 1

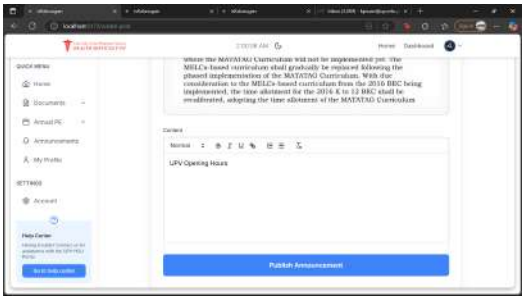


(b) View Announcement 2

Create an Announcement



(a) Create Announcement 1

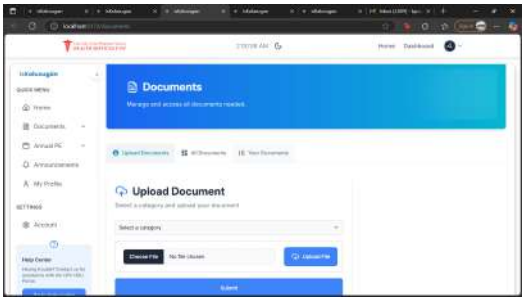


(b) Create Announcement 2

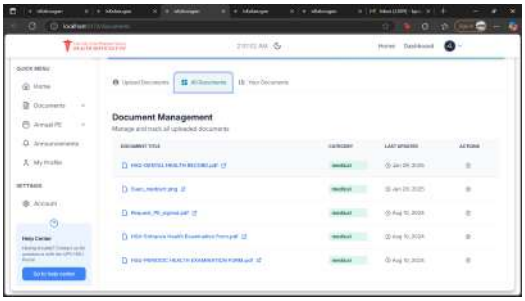
4.1.8 Documents

IsKalusugan also includes a Document Management System, allowing admins to upload, categorize, and delete documents, while users can view and download necessary files. The admin document dashboard provides functionalities for managing uploaded documents, viewing all files uploaded by individual admins, and accessing documents shared across the system.

Dashboard



(a)Documents

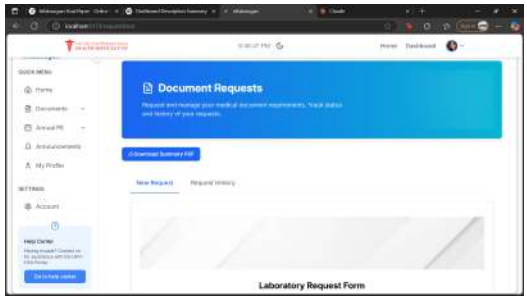


(b) Documents

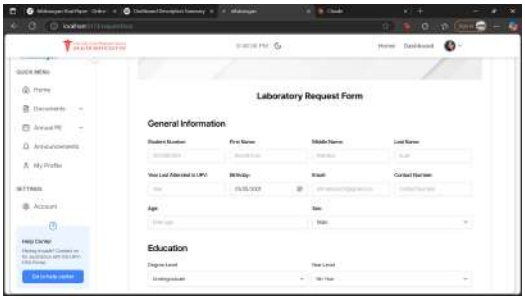
Submit and Track Document Request

The figure below illustrates the Submit and Track Document Request feature for users. This functionality allows users to request a laboratory exam and specifying the reason for their request. Upon submission, users can choose to pay via GCash or Online Banking and email the receipt to the HSU, or opt for in-person payment at the Cashier Section of the HSU. Additionally, users can monitor the status of their request using their transaction number and download the lab request form if it has been attached by HSU staff or an admin.

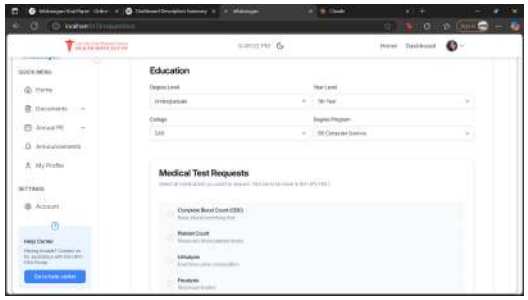
- **Request Form**



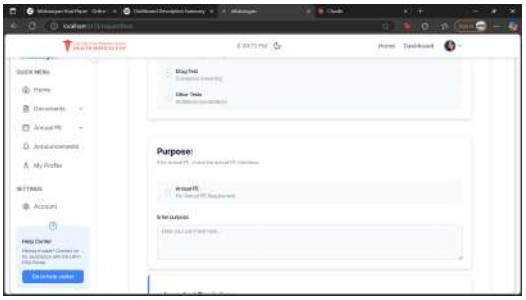
(a)Laboratory Request Form



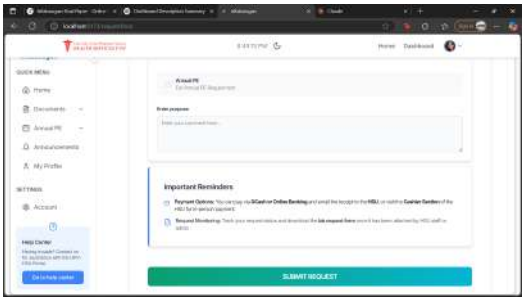
(b) Laboratory Request Form



(c)Laboratory Request Form

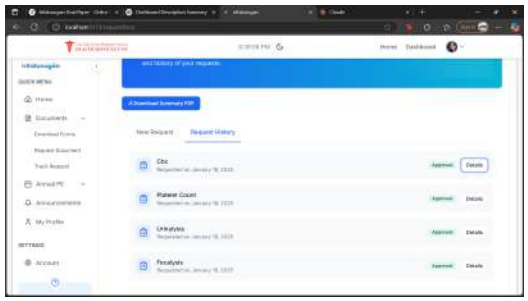


(d) Laboratory Request Form

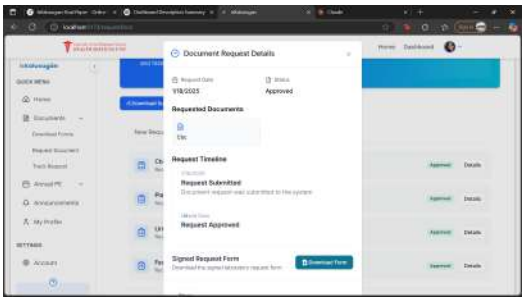


(e)Laboratory Request Form

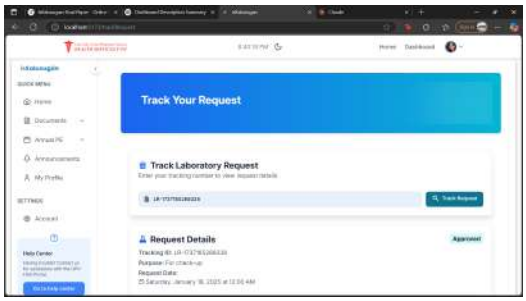
- **Track Request**



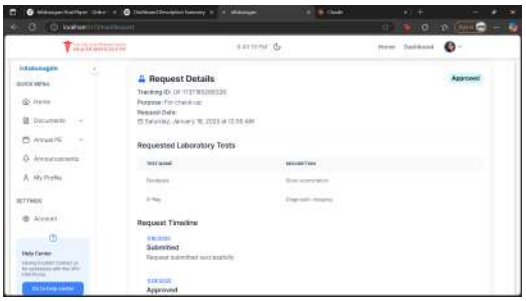
(a) Track Request



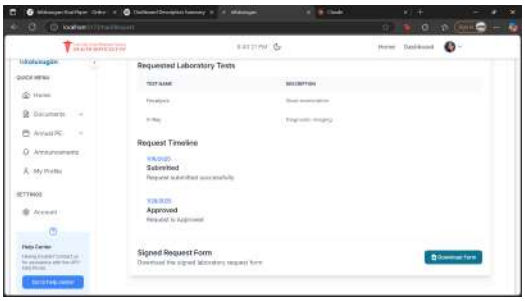
(b) Track Request



(c)Track Request using Transaction Number



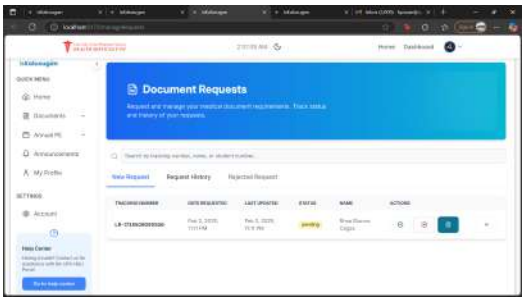
(d) Track Request using Transaction Number



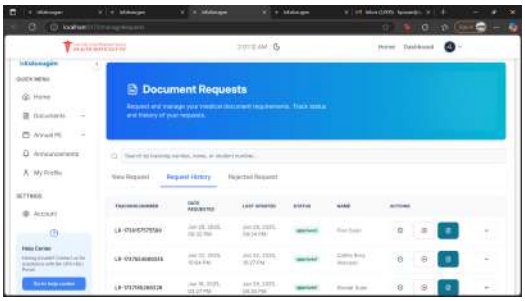
(e)Track Request using Transaction Number

Manage Document Request

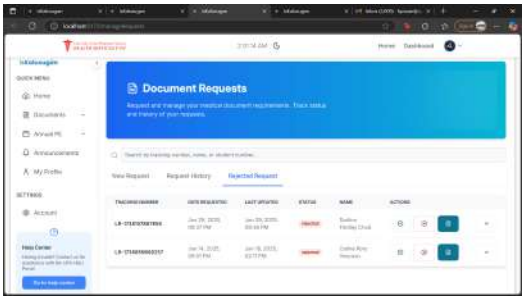
The figure below illustrates the Manage Document Requests feature for admins. Document requests are categorized into New, Approved, and Rejected, allowing for efficient tracking. Admins can search for specific requests and receive notifications when a new request is submitted. Upon reviewing a request, admins can approve or reject it, providing justifications and reasons for their decision. Additionally, they have the option to attach the requested document and notify the student via email regarding the status of their request.



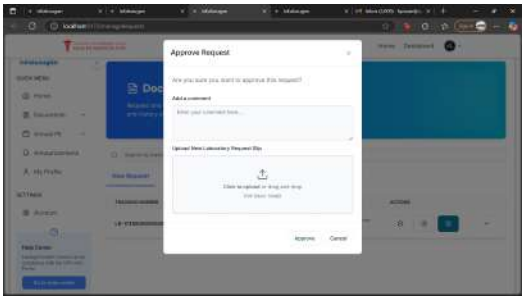
(a)Documents



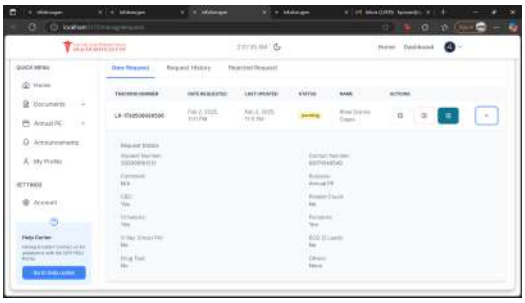
(b) Documents



(c)Documents



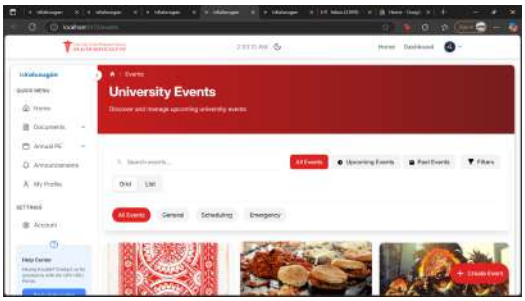
(d) Documents



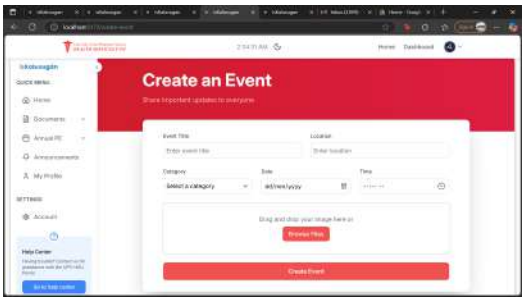
(e)Documents

4.1.9 Events

The Events feature shown below is quite similar to the Announcement System. Here admins can add events including the event name, title, time and date, and location. On the other hand, users can view the published events.



(a) View all Events

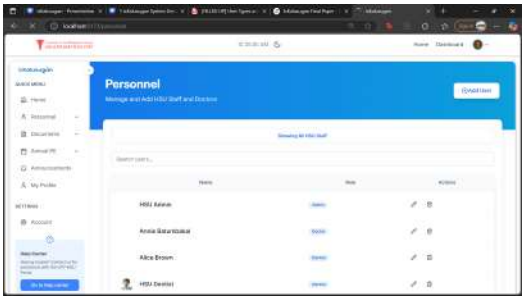


(b) Create Event

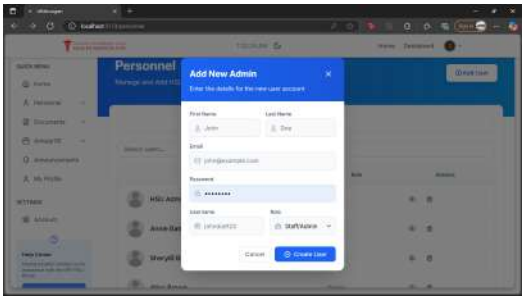
4.1.10 Manage Accounts

The manage accounts feature shown below allows the superadmin to add and delete UPV staff. In addition, they can view, add, import multiple students in CSV/Json format, and archive graduating students from the database. Superadmin can also restore archived students and export student data to excel as backup. This will prevent unnecessary data accumulation, optimize database performance, and ensure faster system loading times.

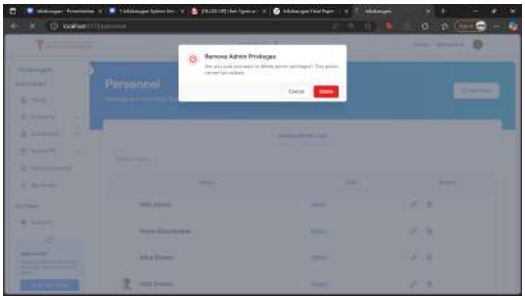
Manage Staff



(a) View all Staff

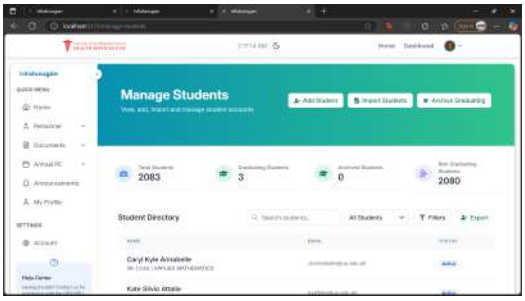


(b) Add Staff

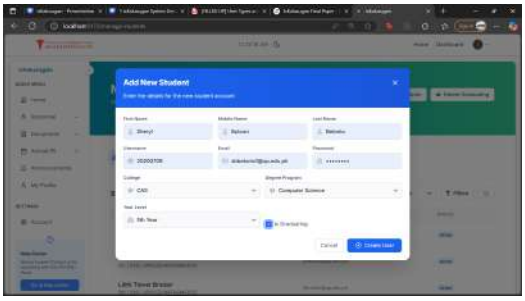


(c) Delete Staff

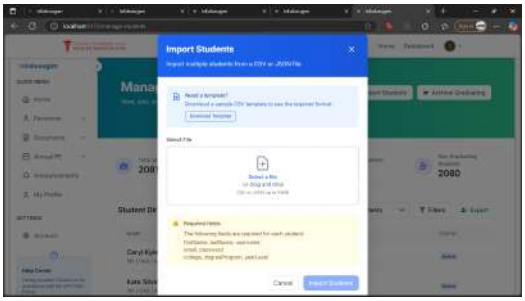
Manage Students



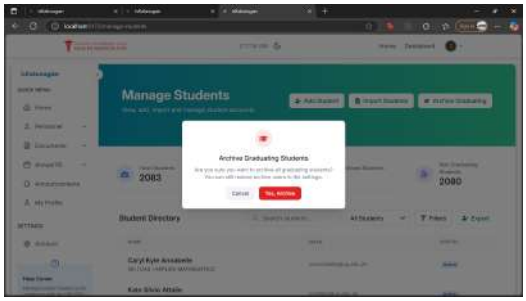
(a) View all Students



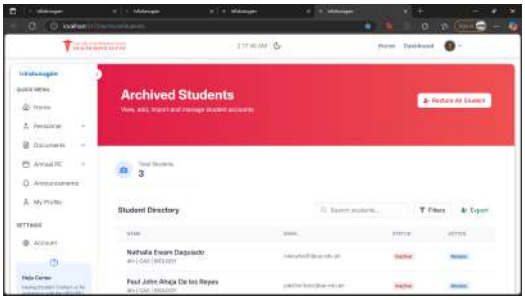
(b) Add Student



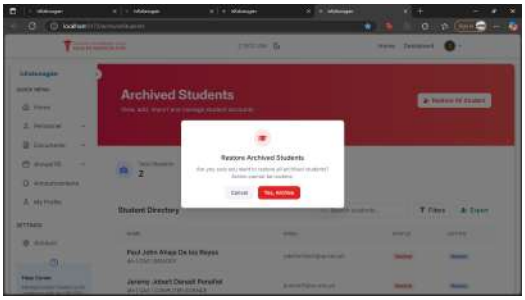
(c) Import Students in csv/json format



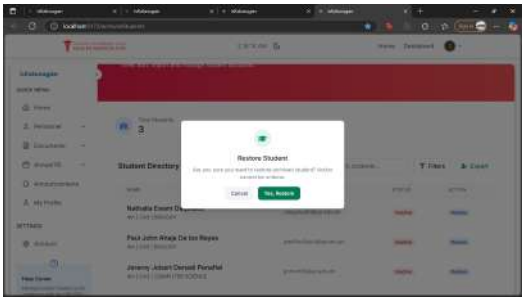
(d) Archive All Graduating Students



(e) View All Archived Students



(f) Restore all Archived Students



(g) Restore selected archived student

4.1.11 Activity Logs

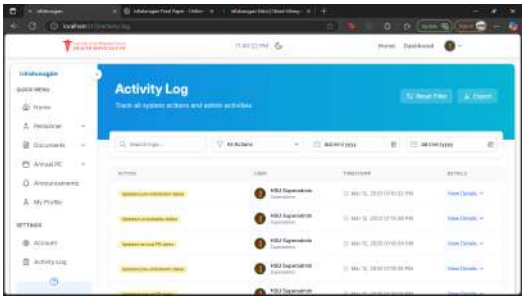
IsKalusugan offers an acitivty logs feature that allows the superadmin to track all system actions and admin activities

Each log entry includes essential details such as:

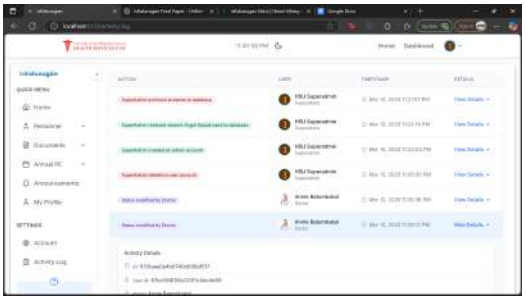
- **User Information:** The name, role, and unique ID of the user performing the action.
- **Target User:** The student or individual whose record was modified.
- **Action Taken:** A description of the modification, such as "Status modified by Dentist" or "Document approved by Doctor."

- **Timestamp:** The exact date and time when the action occurred.
- **Additional Details:** Other relevant information

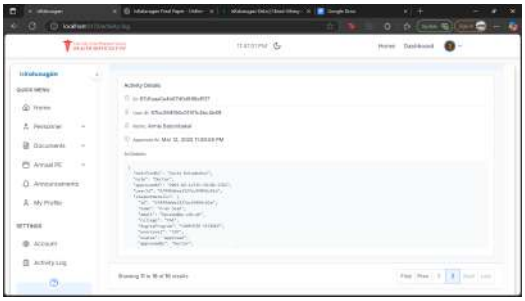
Activity logs help the superadmin monitor the system, identify potential problems, and maintain record of interactions within the system.



(a) View all activity in the system



(b) View all activity in the system



(c) View all activity in the system

4.2 Testing

The functionalities of the IsKalusugan system were evaluated through usability testing conducted with six (6) respondents using the System Usability Scale (SUS) questionnaire. Six (6) UPV constituents were invited to

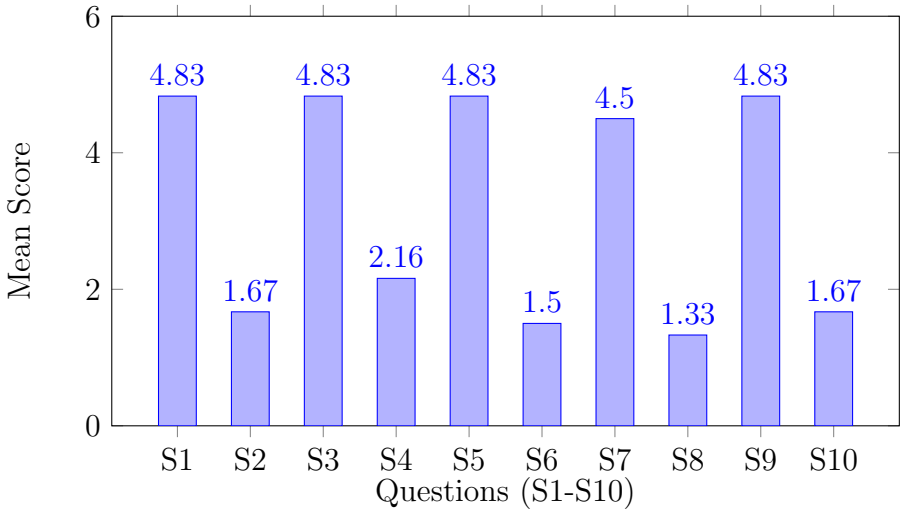
participate in the testing. Among them, 2 acted as admin users while the remaining 4 acted as non-admin users. Among the 2 admin user, 1 admin user (an actual HSU Personnel) was allowed to explore the super admin interface. Majority of the students were from College of Arts and Sciences (2 Biology, 2 Computer Science), and one 1 was from SOTECH. The participants were tasked with exploring and testing the features of the application following the test cases provided.

The test consists of 10-statement questionnaire with a five-point Likert scale. . This survey consisted of 10 questions, each with five response options. Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Test cases were first implemented to assess whether each feature, including online and in-person examination options, scheduling, queue management, and document submissions, rescheduling with validation controls, functioned as intended. Following the evaluation, the respondents completed the SUS questionnaire via Google Forms.

Table 1 presents the SUS scores for IsKalusugan, revealing a mean score of 88.75, which signifies an excellent and above average user experience. This suggests that the system effectively enhances efficiency, accessibility, and communication in managing annual health examinations. Additionally, respondents provided recommendations for further improvements to refine the system's functionalities. A few of their recommendations for future development include allowing user to select their preferred timeslot and making the application available for all platforms

SUS Individual Scores Table for Users

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Individual SUS
R1	5	2	5	2	5	2	5	1	4	1	90
R2	5	2	5	3	5	1	5	1	5	1	92.5
R3	5	1	4	1	4	1	3	2	5	2	85
R4	5	2	5	3	5	2	4	1	5	2	85
R5	4	1	5	2	5	1	5	1	5	1	95
R6	5	2	5	2	5	2	5	2	5	3	85
									Average SUS Score:		**88.75**



Mean Scores for Each Question (S1-S10)

4.3 Summary of Results

Table summary for performance

Metric	Before	After	Improvement
Scheduling Time	Manual assignment, posted on Facebook	2 - 15 seconds	Faster
Form Submission	Google Forms & emails	Direct submission in the system	More Efficient
Notifications	Manual email follow-ups	Automated alerts via email & in-app	Instant Communication
Medical Certificate	Paper-based, often misplaced	Stored in system, accessible anytime	Eliminates loss issues

Previously, scheduling relied heavily on manual processes, where HSU would assign schedules based on COLSEC data and post the list on Facebook, leading to delays and inefficiencies. Now, with the automated scheduling feature, HSU can generate schedules for students in just 2.07 seconds, notifying them within the system application and in their emails about their assigned schedule, drastically reducing administrative workload and processing time.

In the past, students submitted documents for Online Annual PE via Google Forms and email, which often led to missing or misplaced files, and some may be overlooked.

For HSU staff, manually checking emails for submissions is time-consuming. On average, it can take 2 to 5 minutes per email to download attachments, verify details, and categorize submissions. If there are hundreds of students, this process can take several hours or even days to complete. With isKalusugan, form submissions are now centralized within the system, eliminating the need for manual email verification. The system also includes an

in-app 'Notify Student' button, allowing HSU staff to directly send email notifications to students about missing documents. The system tracks students who have submitted complete, incomplete, or no documents at all. Making it easier for the HSU to determine whether to reject or approve the Annual PE status of each student.

Chapter 5

Conclusion and Recommendation

5.1 Conclusion

This study developed a web-based management system for the Annual Physical Examinations of the Health Services Unit (HSU) at the University of the Philippines Visayas (UPV). UPV constituents can log in to schedule In-Person Annual PE (with rescheduling and queue management) or complete Online Annual PE (document submission and medical certificate generation). Additional features include an announcement panel, events section, and document repository.

The system streamlines the Annual PE process by offering students the flexibility to choose between Online and In-Person PE. If they opt for In-Person PE, the system automatically schedules them, while an automated rescheduling feature suggests available dates for them to reschedule, considering holidays, unavailable dates, and slot limits.

The new automated system significantly improves scheduling and document submission processes for HSU. Previously, schedules were manually assigned and posted on Facebook, causing delays. Now, scheduling takes just 2.07 seconds, with instant notifications sent via the system and email.

Document submissions, once managed through Google Forms and emails leading to lost or overlooked files are now centralized in isKalusugan. Manual email verification, which took 2-5 minutes per submission, is no longer needed. HSU staff can track submission status and notify students of missing documents with a single click, streamlining approvals and reducing administrative workload.

Based on usability testing and survey results, IsKalusugan demonstrates excellent usability in addressing the challenges of managing Annual PE Examinations. Respondents evaluated the system using the System Usability Scale (SUS), yielding a score of 88.75, which signifies excellent usability in terms of effectiveness, efficiency, and overall user experience.

5.2 Recommendation

For future work, it is recommended to allow users to select their preferred timeslot (Morning or Afternoon) for scheduling In-Person Annual PE. This feature would provide greater flexibility and convenience, helping to reduce congestion and improve the overall scheduling process.

Additionally, incorporating a Dental appointment booking system with real-time appointment availability and automated reminders via email or

SMS could further enhance user experience and minimize missed appointments. Currently, dental appointments are booked through Facebook, which may not be the most efficient or accessible method. Integrating this service into the system would greatly, improve appointment management, and ensure better communication between users and HSU Staff.

Automated reminders for upcoming schedules can also be implemented. Furthermore, it is suggested to add a date selector for available rescheduling dates instead of showing the three (3) earliest available dates in case users are unavailable to those 3 system generated ones.

Bibliography

[1] University of the phillipines - visayas student handbook. https://www.upv.edu.ph/files/upv-student-handbook-22-23.pdf, 2023.

[2] Community health information tracking system (chits). https://www.pchrd.dost.gov.ph/heartnovation/community-health-information-tracking-system-chits, n.d.

[3] et al. A. Nasution. Developing smart appointment and scheduling system for innovation in smart universities. *ResearchPublish.com*, 2015.

[4] C. Ang-Muñoz. Readiness and acceptance of philippine general hospital medical staff for telemedicine as alternative method of patient consultation during the covid-19 pandemic and post-enhanced community quarantine period. *ResearchGate*, March 2022.

[5] A. Cablles. Acceptability of information technology systems developed for distant philippine communities among local health providers. *Research Gate*, February 2021.

[6] D. A. Jr Cordero. An evaluation of the philippine healthcare system: Preparing for a robust public health in the future. *Journal of Preventive Medicine and Public Health*, 55(3):310–311, 2022.

[7] Dane. Healthcare information and management systems society, 2023.

[8] et al. E. Bassey. A web-based medical appointment scheduling with sms alert notification system. *ResearchGate*, December 2020.

[9] National eHealth Program Management Office – Department of Health eHealth MITHI Cluster. National ehealth context (overview).

[10] G. Anuran et al. Telemedicine services in the university of the philippines health service during the covid-19 pandemic: A two-week process documentation and analysis. *Acta Medicine Philippina*, April 2021.

[11] R. S. Evans. Electronic health records: Then, now, and in the future. *Yearbook of Medical Informatics*, 25:S48–S61, 2016.

[12] et al. G. Pare. Prioritizing the risk factors influencing the success of clinical information system projects. *Methods of Information in Medicine*, 47(3):251–259, 2008.

[13] et al. G. Pare. Assimilation of medical appointment scheduling systems and their impact on the accessibility of primary care: Mixed methods study. *PubMed*, November 16 2021.

[14] R. Haux. Health information systems – past, present, future. *International Journal of Medical Informatics*, 75(3):268–81, 2006.

[15] S. P. Kossman. Perceptions of impact of electronic health records on nurses' work. page 337–341, 2006.

[16] World Health Organization. *The World Health Report 2008: Primary Health Care: Now More than Ever*. Geneva, 2008.

[17] Henry Potts, J. Keen, T. Denby, Imogen Featherstone, David Patterson, J. Anderson, Trisha Greenhalgh, L. Colligan, Pippa Bark, J. Nicholls, A. Shah, Deborah Swinglehurst, Geoff Wong, C. Martin, and Ann Blandford. Towards a better understanding of delivering e-health systems: a systematic review using the meta-narrative method and two case studies. 2011.

[18] C. H. Tsai, A. Eghdam, N. Davoody, G. Wright, S. Flowerday, and S. Koch. Effects of electronic health record implementation and barriers to adoption and use: A scoping review and qualitative analysis of the content. *Life (Basel, Switzerland)*, 10(12):327, 2020.

[19] S. Upadhyay and H. Hu. A qualitative analysis of the impact of electronic health records (ehr) on healthcare quality and safety: Clinicians' lived experiences. *Health Services Insights*, 15, 2022.

[20] et al. Y. Kuo. Medical appointment overbooking and optimal scheduling: tradeoffs between schedule efficiency and accessibility to service. *Springer Link*, February 28 2019.