Web-based School Appointment System

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The web has recently emerged as a valuable tool for managing scheduling tasks, and web-based appointment systems have become a prominent area of study in educational institutions. Research on user satisfaction indicates that online scheduling provides a highly significant improvement, with most users expressing willingness to use such services again due to convenience and efficiency (Chen et al., 2020; Ostadmohammadi et al., 2025; Kitsios et al., 2023; Zheng et al., 2024).

According to Ala and Chen (2022), manual registration and scheduling procedures are often time-consuming, error-prone, and inconvenient. While this finding was highlighted in the healthcare sector, the same challenges are evident in schools where registrars and administrators handle a large volume of student requests daily. To address this issue, a web-based application can be implemented to manage and book appointments online, enabling students to access the registrar's services without long waiting lines. Such a system, developed with tools like MySQL, PHP, and JavaScript, can reduce unnecessary face-to-face interactions, eliminate redundant paperwork, and improve operational efficiency. Furthermore, it decreases staff workload while increasing

accuracy and user satisfaction among students and faculty. Traditional manual processes often result in duplication of records, scheduling conflicts, and general frustration for both staff and students.

Achieving a flawless manual appointment schedule within a school setting is virtually impossible, as it often leads to long queues at the registrar's office, extended waiting times, and frequent errors when changes or corrections are made. To address these challenges, an interactive web-based solution is essential. While medical appointment systems are more common in other countries, the adaptation of similar technology in the education sector remains underexplored in some regions. This study, therefore, seeks to identify the limitations of existing scheduling systems within schools and propose improvements to enhance efficiency and user experience.

According to Zhao et al. (2017), web-based appointment systems operate in two modes: asynchronous and real-time. In the asynchronous mode, appointment requests are sent via email or online forms and are later processed manually by staff. This process is similar to traditional paper- or telephone-based scheduling, where requests made outside office hours are only addressed when staff return. In contrast, the real-time mode allows students to directly interact with the school's scheduling system, receiving immediate confirmation of their appointment. The real-time approach is particularly beneficial for schools, as it reduces delays, prevents unprocessed requests, and ensures smoother communication between students and registrars.

This study focuses on developing a web-based appointment system accessible across multiple devices, designed with two access levels: administrator and student. By providing a readily available online platform, the system facilitates efficient scheduling of registrar services, eliminating

the need for traditional queuing and manual paging. Students gain the convenience of booking appointments anytime and anywhere, while administrators can better anticipate, organize, and manage daily schedules.

The study aims to design a web-based appointment system for the registrar and students of a private school. The system is expected to streamline scheduling processes, reduce manual errors, minimize waiting times, and enhance overall efficiency. By integrating modern web technology into school administration, institutions can significantly improve service delivery and student satisfaction.

Theoretical Framework

Implementation and Objectives of Web-Based Scheduling

Schools, like hospitals, handle a high volume of scheduling needs on a daily basis. Registrar offices in particular must manage numerous student requests such as enrollment validation, transcript issuance, and consultation appointments. Traditional appointment systems in schools often lead to long queues, manual errors, and scheduling conflicts, which cause frustration for both students and staff. To address this issue, the proposed web-based scheduling system is designed to minimize waiting times and streamline registrar-related processes.

The system accommodates multiple stakeholders, including students, who can book appointments online; registrars and school staff, who manage and update appointment records; and school administrators, who monitor service efficiency. Drawing from best practices such as the DMADV framework (Define, Measure, Analyze, Design, and Verify), Six Sigma methodology, and Business Process Management (BPM), the system standardizes processes, reduces duplication of records, and enhances

service delivery. This integration ensures that both students and administrators can manage appointments seamlessly, improving institutional efficiency while addressing the student body's need for timely academic services.

Benefits of Web-Based Scheduling

The benefits of web-based scheduling extend beyond healthcare and are equally relevant in academic institutions. Such systems improve organizational workflows by reducing no-shows, lowering staff workload, shortening waiting times, and increasing user satisfaction (Morales et al., 2024; Cain & Haque, 2008; Zhao et al., 2017). Applied in schools, these outcomes translate into better student experiences, smoother registrar operations, and improved administrative efficiency. Furthermore, web-based scheduling systems allow schools to maintain accurate and organized records of student appointments, track historical data for audits, and generate reports that inform policy and resource allocation. This accessibility and transparency enable administrators to manage registrar services effectively while reducing reliance on manual scheduling. As a result, registrar offices can focus on student support and academic services rather than spending excessive time on routine administrative tasks.

Adoption Challenges and Resistance

Despite the benefits, the adoption of web-based scheduling systems in schools may face several challenges. Concerns often involve implementation costs, system flexibility, and integration with existing school databases. Issues of data security and privacy, particularly when handling sensitive student records, also require careful attention. Transitioning to digital scheduling necessitates staff training and workflow

adjustments, which may be challenging for institutions with limited technical expertise.

On the student side, resistance to web-based scheduling may arise from varying levels of digital literacy and access to devices. While many students are comfortable with technology, others may still prefer in-person requests or traditional methods of communication. However, as seen in the healthcare sector (Morales et al., 2024), organizations are increasingly adopting digital platforms because of their long-term benefits for efficiency and satisfaction. Schools, likewise, can overcome these barriers by ensuring the system is user-friendly, mobile-compatible, and accessible across different platforms.

Building on the insights of earlier studies on web-based appointment systems, this research adapts their lessons to the school context. While prior research highlights the benefits of reducing wait times, decreasing staff workload, and improving user satisfaction (Morales et al., 2024), it also notes barriers related to accessibility, familiarity, and integration. The proposed system for the registrar's office of a private school is therefore designed to leverage these advantages while mitigating adoption challenges. By incorporating dual access controls for administrators and students, ensuring multi-device compatibility, and prioritizing ease of use, the system seeks to streamline registrar appointments, enhance efficiency, and improve satisfaction for all stakeholders involved.

Research Framework

Data

The data collected for this study were taken from the survey results of 27 respondents. The questionnaire was adapted from ISO 25010

standards, covering six quality aspects: system performance efficiency, maintainability, suitability, usability, compatibility, and security. These dimensions ensure a comprehensive evaluation of the system's functionality and reliability in meeting user needs. The researchers ensured that all information gathered would remain confidential, secure, and used solely for research purposes.

To analyze the responses, the researchers employed the weighted mean formula. A four-point Likert scale was used, with the following categories: strongly agree, agree, disagree, and strongly disagree. Each response option was assigned a corresponding mean range, which served as the basis for interpreting the evaluation results. This approach allowed the researchers to quantify user perceptions effectively and assess the system's overall performance.

Experimental Design

Figure 1 illustrates the experimental design of the study from the student's perspective. The process begins with the student accessing the system through the login page. After entering their username and password, the system validates the credentials and grants access to the student dashboard. From the dashboard, students can conveniently view the list of available appointments and proceed with their scheduling activities.

Figure 1
Student login design

Figure 2

Admin login design

Figure 2 presents the experimental design of the study from the administrator's perspective. The process begins with the admin accessing the login page, where a valid username and password must be entered to successfully log in. Once authenticated, the system directs the admin to the administrator dashboard. From this interface, the admin can manage user accounts, oversee appointments, and monitor the overall functionality of the system.

Ethical Considerations

Ethical considerations are crucial in the development and implementation of the proposed web-based appointment system to ensure security, fairness, and equal access for all users. The system must provide services without discrimination based on background, work experience, or socioeconomic status. To enhance inclusivity, multiple access options, such as web-based and telephone scheduling, may be integrated, ensuring that users with varying levels of digital literacy or internet access can still benefit from the system.

To uphold ethical research practices, the following principles were observed:

Participants must not be subjected to harm in any form.

The dignity of all participants must always be respected.

Informed consent must be obtained from participants prior to their involvement.

The privacy and confidentiality of participants must be guaranteed.

A sufficient level of data protection must be maintained to safeguard information.

Anonymity of participants and institutions involved must be preserved.

Deception or misrepresentation of the study's objectives must be strictly avoided.

Any affiliations, sources of funding, or potential conflicts of interest must be fully disclosed.

Communication regarding the study must be conducted with honesty and transparency.

Misrepresentation of findings or biased interpretation of data must be avoided at all costs.

By adhering to these ethical standards, the study ensures that the integrity of the research process is maintained, participants' rights are protected, and the developed system upholds trust and accountability.

System Development Approach

This study adopted the Agile methodology in developing the proposed web-based appointment system. The Agile method was chosen because it promotes flexibility, continuous improvement, and close collaboration with users throughout the development process. The first step involved planning, during which the requirements of the system were identified based on the needs of the target users, students and school administrators.

Figure 3

Agile methodology
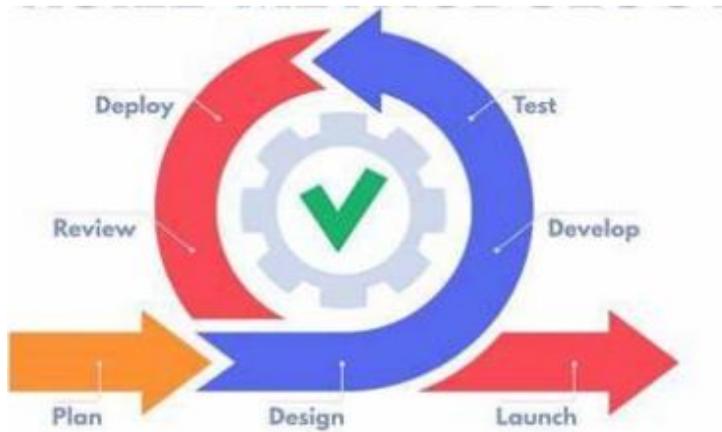
The next phase was design and development, where various programming languages and applications were utilized to build the system's functionalities and interface. Particular attention was given to creating a user-friendly visual design to ensure accessibility for students and administrators. Testing was then conducted to verify whether the system's functions were working correctly and whether the design was operating as intended. Only when no major errors were found did the researchers proceed to the deployment stage. In this phase, the system was reviewed and retested to ensure stability, reliability, and efficiency before being launched for use.

The system provides two distinct access points: one for students and another for administrators. Students are required to sign up using their student number to create an account. Once registered, they can log in with their credentials to request appointments with the registrar's office. Administrators, on the other hand, are given unique access codes to log in directly. From their dashboard, they can view student information, monitor requests, review requirements, and approve or deny appointments according

to the schedule.

Procedures of Different Phases

Implementation. The web-based appointment system was implemented in the registrar's office. Through this system, students can submit appointment requests online, while the registrar administrator can review, accept, or deny the requests. This feature eliminates the need for long queues and manual scheduling, streamlining the registrar's daily operations.

Testing. System testing played a critical role in development. Without rigorous testing, it would be impossible to verify whether the system performs as intended. Testing ensured that all functions were fully operational, user inputs were correctly processed, and errors were minimized. Continuous testing also provided opportunities to refine both functionality and design prior to full deployment.

Deployment. The system was deployed in the registrar's office, with the registrar administrator serving as the primary administrator and students as the main end-users. Deployment included installation, configuration, and another round of pilot testing to ensure that the platform operated smoothly within the school's environment.

Maintenance. To guarantee long-term efficiency and reliability, the system will undergo quarterly maintenance. This includes performance checks, database reviews, and backup creation to secure information and prevent data loss. Regular maintenance ensures that the system remains functional, secure, and responsive to the evolving needs of students and administrators.

Technical Framework

Materials

  The primary materials used to access and operate the web-based appointment system include computers, laptops, mobile phones, and other internet-enabled devices. These devices serve as the main tools for both students and administrators in utilizing the system's features.

Software

  The development of the web-based appointment system required specific software tools. Visual Studio was used to compile and manage program codes, while XAMPP version 3.3.0 was employed to configure and manage the MySQL database as well as to run the local server environment.

Hardware

  Since the system is a web-based application, it does not demand high-end hardware specifications. It is designed to be accessible on commonly available devices, ensuring inclusivity and usability for all intended users. Minimum requirements include:

  Processor: Intel Core Duo or higher

  Operating System: Any version of Windows, macOS, or Linux

  Mobile Compatibility: Any Android version and other mobile operating systems

  Device Type: Desktop computers, laptops, tablets, and smartphones

  This setup ensures that the system remains cost-effective and widely accessible, even without advanced or expensive technology. The system is designed to be accessible and flexible across multiple platforms. While a computer is typically used by administrators for database management and

system operations, the appointment system is also accessible through Android phones and other mobile devices. This feature allows students to conveniently manage appointments outside of school premises and prepare before visiting the registrar's office. By ensuring compatibility with both desktop and mobile devices, the system provides greater convenience, flexibility, and user readiness.

Modeling

Figure 4 outlines how a student can interact with the web-based appointment system. The process begins with the creation of a student account. If the student already has an account, they may proceed directly to the login page using their registered username and password. Once logged in, the student can schedule an appointment by filling out the necessary details and submitting an appointment request through the system.

Figure 4
Use a case diagram for the web-based appointment system
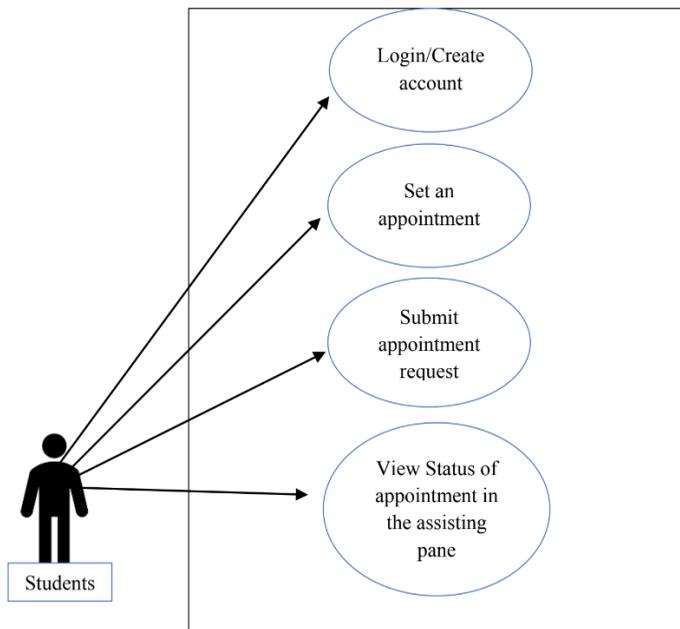
After submission, the student may track the status of their appointment in the designated status pane, which provides real-time updates regarding approval or denial by the registrar's office. In addition to appointment scheduling, students have access to account management features, such as updating their profile information, changing their password, and maintaining their personal records.

Figure 5

Use case diagram for the web-based appointment system for an administrator
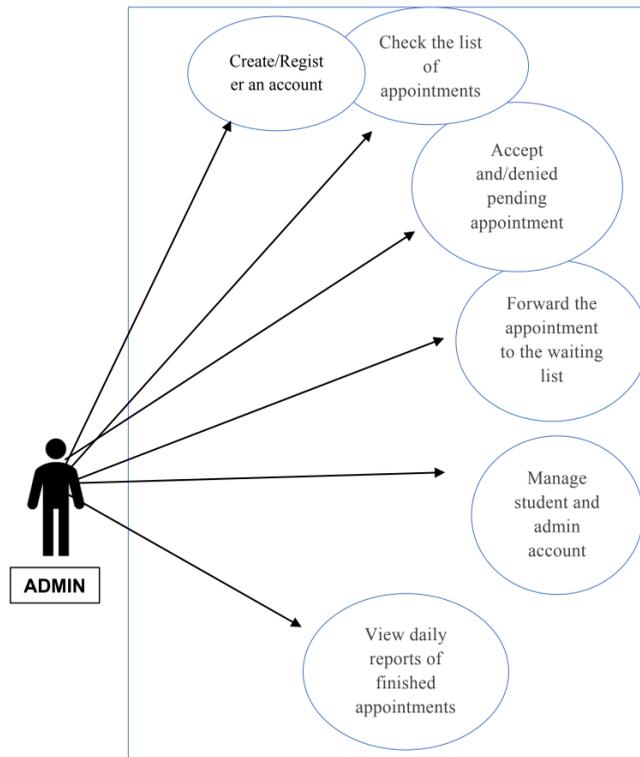
The administrator's role in the web-based appointment system begins with the creation of an account. If the administrator already has an existing account, they can proceed directly to the login page using their assigned credentials. Once logged in, the administrator gains access to the

admin dashboard, where they can perform various management functions.

Administrators can view the list of appointments submitted by students and take necessary actions by either accepting or denying pending appointment requests. Approved appointments are automatically moved to the waiting list for processing, while denied requests are recorded for monitoring purposes.

In addition, administrators are responsible for managing student and administrator accounts, ensuring that user information remains updated and accurate. The system also provides the administrator with access to daily reports summarizing completed appointments, which supports record-keeping, monitoring, and decision-making for the registrar's office.

Figure 6

Database schema of the study
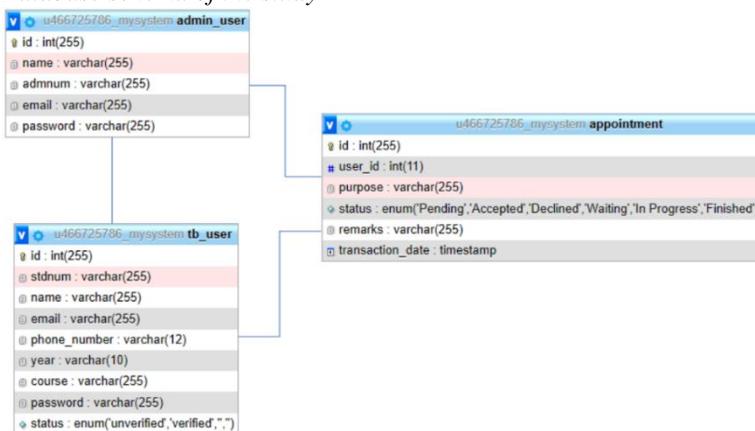
User GUI

The following figures present the design of the developed system.

Figure 7 displays the login page for students, where they can either log in to an existing account or register for a new account. The interface is designed to be user-friendly, allowing students to quickly access the system

for appointment scheduling or account management.

Figure 7

Login page

Figure 8

Student login page
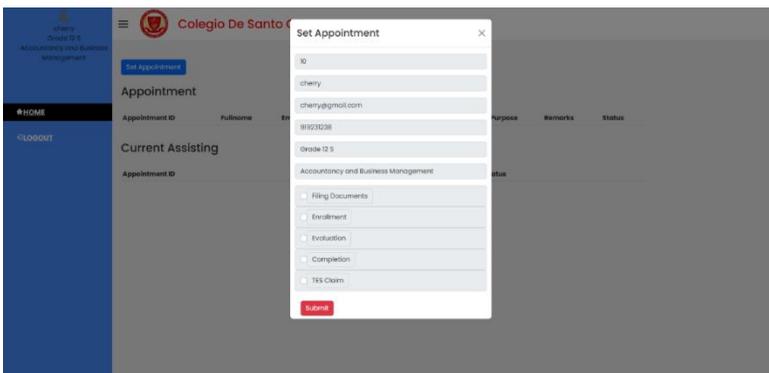

Figure 9

Setting appointment page

Figure 8 shows the login page for students, where they can either log in to their existing account or register for a new one. Meanwhile, Figure 9 presents the appointment system dashboard. Inside the appointment system, students can find the Home button, the Logout button, and an option to set an appointment.

Figure 10

Setting an appointment

Figure 10 shows the system designed for students to conveniently set or request appointments.

Figure 11

Submitting an appointment

Figure 11 shows the system design interface for submitting an

appointment.

Figure 12

Appointment listing

Figure 12 shows the system design interface for viewing the appointment assistance status on the assistance pane.

Figure 13

Admin login page

Figure 13 shows the system design interface for the administrator login and account registration.

Figure 14

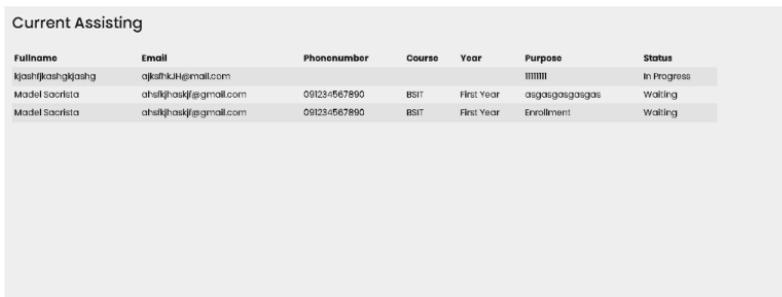*Admin list of appointments*

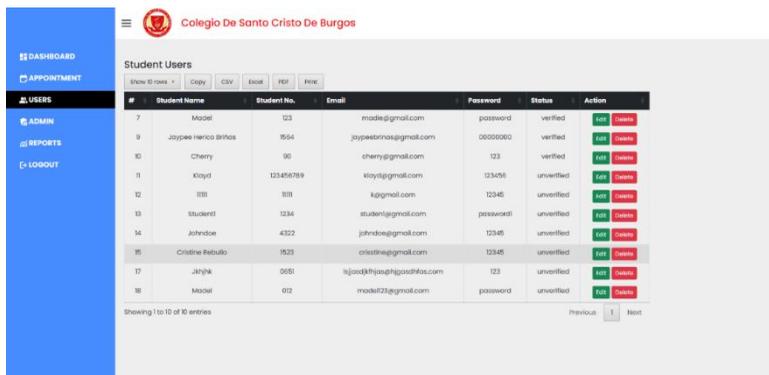**Figure 15**

Accepting appointments
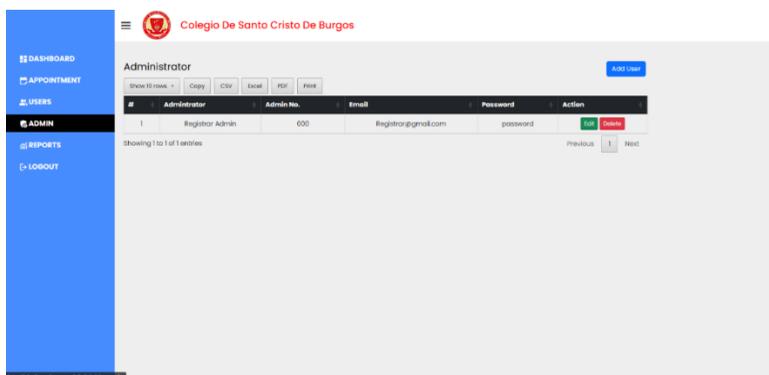

Figure 16

Waiting list

Figures 14 to 16 present the different system design interfaces for the administrator. Figure 14 shows the page design of the admin dashboard, where the administrator can access the appointment list, system users, system admins, reports, and the logout button. Figure 15 illustrates the

system design interface where the administrator can accept or deny pending appointment requests from students. Lastly, Figure 16 displays the system design interface that allows the administrator to forward an appointment to the waiting list.

Figure 17

Managing student account

Figure 18

Administrator account

Figures 17 and 18 illustrate the system design interfaces for account management. Figure 17 shows the interface where the administrator manages student accounts, while Figure 18 presents the interface for

managing administrator accounts.

Development

The web-based appointment system was developed using Visual Studio Code for programming, XAMPP to configure the local server and database, and phpMyAdmin for managing the MySQL database. The system incorporates JavaScript (JS), HTML, and CSS to build its functionality and user interface. The system includes:

Login and logout pages for both students and administrators.

An administrator dashboard that displays user statistics, appointment lists, and other management features.

Features for students to create accounts, schedule appointments, and track appointment status.

This combination of programming languages and tools ensures that the system is interactive, user-friendly, and fully functional across multiple devices.

Testing

Testing is a critical phase to ensure that the system performs as intended and meets the requirements of both students and administrators. In this phase, the researchers present a testing plan and operating procedure for each system function. Before implementation, two major testing stages are conducted:

Test Case: Specific scenarios are created to evaluate the correctness of each function, ensuring that inputs produce the expected outputs.

Test Approach: The overall strategy to assess system performance, reliability, usability, and security, including both functional and non-functional testing.

These testing procedures ensure that any errors or issues are identified and resolved prior to deployment, guaranteeing that the web-based system is reliable, efficient, and ready for use.

Test Approach

Both students and administrators can interact with the web-based appointment system according to their assigned roles and functions. The system is designed to provide the expected outputs and responses for each user type, ensuring that students can schedule and track appointments while administrators can manage requests, monitor schedules, and generate reports efficiently.

The web-based appointment system was deployed in the registrar's office, as it is specifically developed for the school's administrative processes. Deployment includes installation, configuration, and initial testing within the school environment to ensure full functionality.

For system maintenance, the research team will remain available to address issues, perform updates, and conduct routine maintenance after deployment. This ongoing support ensures that the system remains efficient, secure, and reliable for both students and administrators over time.

System Testing and Observations

The researchers present accurate and honest observations regarding the proposed web-based appointment system. Key observations and findings include:

The administrator account creation function operates successfully.

Administrators can view and manage the list of student appointments efficiently.

Administrators can accept or deny appointment requests submitted

by students.

The system allows administrators to manage both student and administrator accounts effectively.

Administrators can view daily reports summarizing completed appointments.

Students can create and log in to their accounts without issues.

Students can set or schedule appointments using the system.

Appointment requests are successfully submitted and recorded in the system.

Students can view the status of their appointments through the designated interface.

Students can manage and update their personal account information securely within the system.

These results confirm that the web-based appointment system is functional, reliable, and meets the intended objectives for both administrators and students.

Evaluation of the System

The system was evaluated using a survey administered to 27 respondents consisting of students and administrators. The questionnaire was designed based on ISO 25010 standards, covering the following aspects: functional system performance efficiency; system maintainability; system suitability; system usability; system compatibility and system security. To analyze the responses, the weighted mean formula was applied. The survey employed a four-point Likert scale with the following categories: strongly agree, agree, disagree, and strongly disagree. Each response option was assigned a mean range to facilitate the evaluation and interpretation of the system's effectiveness.
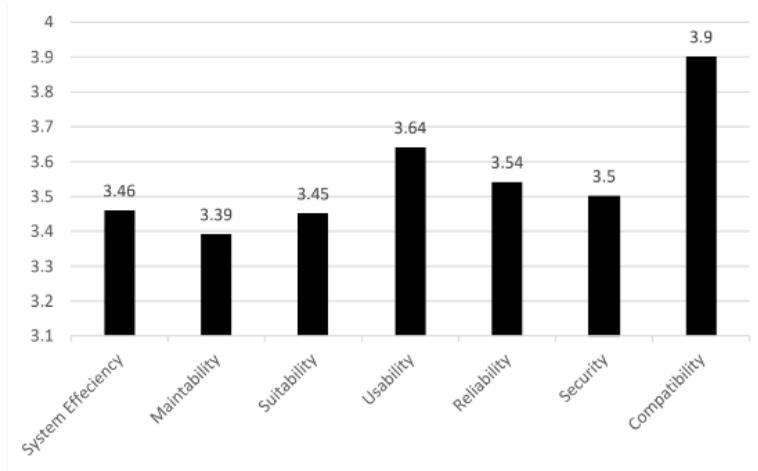
Figure 19

System evaluation

Figure 19 shows how well the system performs its functions. All three indicators, software functionality, responsiveness to user needs, and error-free operation, received weighted means above 3.3, with an overall average weighted mean (AWM) of 3.46, interpreted as "Strongly Agree." This suggests that users found the system highly efficient and responsive, meeting its intended performance goals with minimal issues.

Maintainability assesses whether the system is easy and cost-effective to manage. Users strongly agreed that the system is easy to maintain (3.37), has low maintenance costs (3.36), and remains upgradable (3.35). With an AWM of 3.39, the system demonstrates good maintainability, ensuring sustainability over time with minimal technical challenges.

Sustainability focuses on the long-term usefulness and error-free functionality of the system. All three functions, suitability for the registrar, accuracy of transactions, and error-free operations, scored between 3.43 and 3.47, yielding an AWM of 3.45. This indicates strong user confidence in the system's ability to remain effective and useful in the future.

Usability evaluates user interaction with the system. Respondents strongly agreed that the system has a user-friendly interface (3.49), is easy to operate (3.50), and easy to learn even for non-technical users (3.48). With an AWM of 3.64, the highest among the categories, usability emerges as one of the strongest features, reflecting the system's accessibility to diverse users.

Reliability relates to the consistency of system performance. Users strongly agreed that the system is reliable for the registrar (3.88), for students (3.49), and in its functions (3.43). The AWM of 3.54 shows that reliability is a major strength, enhancing trust in the system for critical operations.

Security measures the protection of data and authentication processes. Respondents strongly agreed on the system's confidentiality (3.20), secure data handling (3.30), and identity authentication (3.10). Despite slightly lower scores compared to other dimensions, the AWM of 3.50 indicates that users perceive the system as sufficiently secure, though improvements could still be made in authentication.

Compatibility checks whether the system works across devices and locations. The system was found to be compatible with different devices (3.50), accessible anywhere (3.47), and usable by multiple users at once (3.56). The AWM of 3.90 is the highest across all categories, highlighting compatibility as the system's strongest feature.

The graph visually presents the evaluation results across the seven dimensions (performance efficiency, maintainability, sustainability, usability, reliability, security, and compatibility). It likely shows that all dimensions scored in the "Strongly Agree" range (above 3.20), with Compatibility and Usability ranking the highest, while Security scored slightly lower but still within "Strongly Agree." The figure supports the

conclusion that the system is well-developed, user-friendly, reliable, and future-ready. The system evaluation demonstrates consistently strong performance across all dimensions, with the highest strengths in compatibility, usability, and reliability. While all areas achieved positive feedback, Security is slightly lower, suggesting it could be prioritized for future improvement.

Conclusion

The developed web-based appointment system effectively addresses the challenges associated with traditional appointment scheduling. The system allows both administrators and students to create and manage accounts efficiently. For administrators, the system provides the ability to view the list of scheduled appointments, accept or deny student appointment requests, and transfer approved appointments to a waiting list. Administrators can also manage student and administrator accounts and access detailed reports, including both recent and historical records of completed appointments. For students, the system enables the creation of accounts, submission of appointment requests, and tracking of appointment status, providing a convenient and accessible platform for scheduling registrar transactions.

Further testing and evaluation demonstrated that the system meets the standards outlined in ISO/IEC 25010, confirming its efficiency, maintainability, sustainability, security, usability, and reliability. These results indicate that the system is a practical and effective solution, significantly improving the appointment scheduling process compared to traditional manual methods.

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