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VISITOR MANAGEMENT SYSTEM WITH DECISION SUPPORT

Wu Yitian
[1]St.Paul University Philippines

ABSTRACT

With the high population density in universities and their crucial role in nurturing technical talent, effective visitor management has become essential for campus safety. Since China has reclassified COVID-19 as a Class B infectious disease, universities' stringent campus access approval mechanisms no longer align with the requirements of economic and social development and modern education. Universities need to adopt technologies such as appointment applications to facilitate public visitation reservations, while effectively managing visitors to ensure the normal conduct of educational activities. This research focused on developing a Visitor Management System with Decision Support, implemented as a WeChat Mini Program for Guangdong Preschool Normal College in Maoming. The system was designed to facilitate online visitor reservations, approvals, identity verification, and decision support. It categorized users into four main groups: visitors, department heads, security heads, and guards. The system offers three key benefits: it provides visitors with a convenient reservation process, enables department managers to efficiently review applications with decision-making support, and helps security personnel better monitor campus access through structured information displays. The system has the following main functional requirements: a simplified registration and application process for visitors, an automated notification system for all stakeholders (including approvers, applicants, guards, and departments), an alert list feature for monitoring specific visitors, efficient visitor verification through QR codes and other methods, and comprehensive record-keeping with time monitoring alerts. By leveraging the WeChat Mini Program platform, the system provided several advantages over traditional mobile applications. These included no need for installation, a compact size, rapid responsiveness, low development costs, and no requirement for registration or login. This research seeks to achieve four main objectives: first, to identify the current visitor management challenges at Guangdong Preschool Normal College in Maoming; second, to develop an effective system to address these challenges; third, to evaluate the developed system's compliance with ISO/IEC 25010 Software Quality Standards across eight key dimensions (functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability); and fourth, to identify potential enhancements for system improvement.

Keywords: *Visitor Management System, WeChat Mini Program, Decision Support, Campus Security, ISO 25010, Software Quality Standard*

INTRODUCTION

Safeguarding the welfare of children and youth is of paramount importance (National Association of School Psychologists, 2013). Schools, which host various external visitors for academic exchanges, business negotiations, media interviews, parental visits, and university tours, face significant challenges in managing these individuals. Without effective management, visitors can disrupt the teaching environment, damage campus facilities, or even cause security incidents.

Consequently, robust visitor supervision is a critical aspect of campus security management. According to the Department of Education of Western Australia, individuals entering school campuses without valid reasons are deemed trespassers (Department of Education of Western Australia, 2017a). Trespassers can introduce several security risks, including child abduction, property damage, vandalism, theft, and even sexual offenses (Dalton-Noblitt, 2012).

Given the high population density and the role universities play in nurturing national technical talent, campus safety cannot be underestimated (Zhu, 2022). In Chinese universities, effective visitor management is crucial for maintaining campus security. The Department of Education of Guangdong Province has responded to evolving needs by adapting COVID-19 management measures to treat it as a Class B infectious disease. This adjustment implies that stringent campus access approval mechanisms no longer align with the demands of economic and social development and modern education.

Instead, universities are encouraged to adopt technologies such as appointment apps to facilitate public reservations while ensuring that educational activities proceed regularly. The Department of Education of Guangdong Province has emphasized the need for comprehensive campus security, integrating human, physical, and technological defenses. Preventive measures against threats like theft, fraud, and terrorism are essential to enhance campus safety standards. Guidelines for managing external visitors, including verifying their identity and belongings, must be established to prevent disruptions to the educational environment. Additionally, universities should accommodate public visitation interests through open days, admission publicity drives, and group visits. Enhanced training for security personnel is also critical to ensure they can manage visitors effectively and respond swiftly to any emerging risks associated with increased campus openness (Department of Education of Guangdong Province, 2023).

To uphold campus safety and adhere to higher policy directives, it is essential to develop a comprehensive visitor management system. Such a system will streamline visitor management processes, thereby improving efficiency and accountability.

In visitor management, the security department, responsible for campus safety and entry permissions, operates independently. Consequently, the verification process between visitors and the security department is crucial. Many universities have explored various methods of visitor management to improve efficiency. For instance, at Guangdong Preschool Normal College in Maoming, where the author works, the traditional approach involved telephone confirmations and pen-and-paper registration. Initially, the process required visitors to schedule appointments with hosts, who would then complete a paper visitation form. After department head approval, the form was submitted to the security department for final approval. Once approved, the form was handed to the gatekeeper. Upon arrival, visitors registered their personal details in a logbook maintained by the security department. The gatekeeper would then cross-check the logbook against the submitted form before granting entry. While this system was straightforward, safe, reliable, and cost-effective, it presented several challenges, such as extensive paper use, a time-consuming approval process, illegible handwriting, inefficient searching, and difficulties with long-term preservation.

With technological advancements, many schools in Western countries and developed regions have implemented modern visitor management systems that offer online reservations and data analytics capabilities. These systems, often available as web applications or H5 solutions, include features like

QR code scanning or facial recognition for visitor verification. Some institutions have developed dedicated visitor management apps to enhance the visitor experience further.

At Guangdong Preschool Normal College, a web-based visitor management system was introduced to streamline online visitor applications and approvals. This system significantly reduced paper usage, improved data accuracy, and enhanced processing efficiency, proving beneficial for campus visitor management. However, as time progressed and usage increased, several issues emerged. For example, the system lacked notification alerts, making it difficult for approvers to process requests promptly. Users struggled to remember the system's website address, and frequent password resets due to infrequent use created inconvenience. Additionally, the absence of user authentication features, records of entry and exit times, and data statistics posed challenges.

Visitors have reported that the initial registration process required extensive information, raising concerns about information leakage. They also experienced lengthy approval times, which sometimes led to applications expiring without response. Department heads have found the system inconvenient as it requires repeated account logins, adding to their already extensive daily tasks. The lack of notification alerts often leads to overlooked approval requests. For security personnel, the inability to pre-calculate daily visitor numbers poses a security risk, highlighting the need for a more effective system.

As an IT teacher at the school, the security department leaders hoped the author could develop a new visitor management system with Decision Support to address existing issues and enhance user experience. Traditionally, visitor management systems are considered non-essential, infrequently used lightweight applications (Ding, 2022). However, the cost of developing and maintaining a dedicated app is often prohibitive. After researching potential solutions, it was determined that redeveloping the system as a WeChat Mini Program would be a viable option. Given the advantages of WeChat Mini Programs—such as no installation requirements, low resource usage, minimal development barriers, and rapid iteration speeds—along with their broad user base and diverse terminal features, WeChat emerges as the optimal solution for this purpose (Yu, 2023).

To effectively utilize a WeChat Mini Program, the system's architecture, user interface, and user login validation need to be redesigned from the ground up. This redevelopment incorporated additional features, resulting in an entirely new system. The goal was to create a WeChat Mini Program application for the Visitor Management System with Decision Support that offers enhanced customization, lower operational costs, and robust decision support capabilities.

By undertaking this research and implementing the proposed system, the existing shortcomings in visitor management processes can be addressed. This lead to an improved user experience for visitors and greater efficiency in the school's visitor management practices.

Additionally, this research allowed the investigators to refine their development skills and enhance their scientific research capabilities. The insights and expertise gained will serve as a solid foundation for future research endeavors, enabling researchers to make even more significant contributions to their field.

Conceptual Framework

This study focused on developing a visitor management mini-program with integrated decision support capabilities. To ensure proper scrutiny and authorization for campus entry, the mini-program provided a streamlined process for visitors to make reservations conveniently. This enhancement simplified the entry process and reduced administrative burdens.

For department managers, the mini-program facilitated the review and approval of visitor information without the need for face-to-face interactions. It also offered decision-making suggestions, thereby improving the efficiency of their decisions. This feature contributed to a more streamlined and effective approval process.

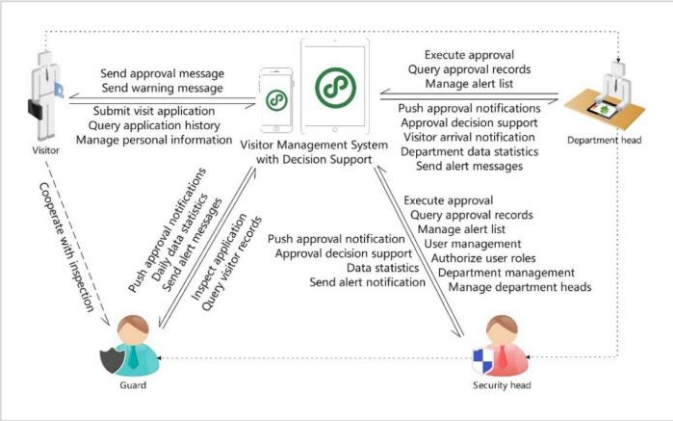
Security personnel benefited from the system’s structured information displays, which enhanced

their ability to ensure campus safety. By providing organized and accessible data, the mini-program supported security staff in maintaining a secure environment more effectively.

For the school, the adoption of this digital visitor management approach not only improved operational efficiency but also significantly reduced paper usage, promoting eco-friendly practices. Ultimately, through rigorous visitor tracking and management, the system aimed to minimize campus security risks and ensure the safety of students and staff.

Figure 1

System Overview Diagram (Wu 2023)



Through initial discussions with the security head of Guangdong Preschool Normal College in Maoming and an evaluation of the existing campus security management process, the functional architecture for the system was outlined.

The specific system requirements were established as follows:

1. Streamline Registration and Application: The system should simplify the registration and application process, allowing visitors to easily submit their visitation requests.
2. Notification System: Approvers must receive notification messages whenever a new application is submitted. Additionally, applicants should be notified once the approval process is complete.
3. Alert List Functionality: The system should include an alert list feature. If a visitor on this list submits an application, the approvers should be alerted.
4. Guard Notifications: Upon the approval of a new application, the school's guards should receive notification messages. Guards should also have the capability to view all approved visitors for the day.
5. Simplified Visitor Verification: Verification for visitor entry should be straightforward, using methods such as QR code scanning, phone number input, or ID card numbers.
6. Department Notifications: After visitors enter the campus, the departments they are visiting should receive notification messages.
7. Record Keeping and Alerts: The system should maintain records of visitor entries and exits from the campus. If visitors exceed their allowed time on the premises, the security department personnel should be notified.

These requirements aimed to enhance the efficiency and effectiveness of campus visitor management, ensuring smooth operations and increased security.

Statement of the Problem

This study aimed to develop a Visitor Management System with Decision Support.

Specifically, this research sought to address the following questions:

1. What are the current problems and challenges faced by Guangdong Preschool Normal College in Maoming regarding campus visitor management in the following areas?
   - 1.1 Excessive User registration information;
   - 1.2 Difficulty in the log in progress;
   - 1.3 Time Consuming in the Approval Process;
   - 1.4 Frequent Logging In of Users;
   - 1.5 Insufficient Capability of the Correct System;
   - 1.6 Manual Visitor's check-in.
2. What system can be developed to effectively address the problems and

challenges the school faces in managing external visitors?

3. What is the extent of compliance of the developed system with the ISO/IEC 25010 Software Quality Standards in terms of:

3.1 Functional Suitability
3.2 Performance Efficiency
3.3 Compatibility
3.4 Usability
3.5 Reliability
3.6 Security
3.7 Maintainability
3.8 Portability

4. What enhancement can be made to improve the developed system?

METHODOLOGY

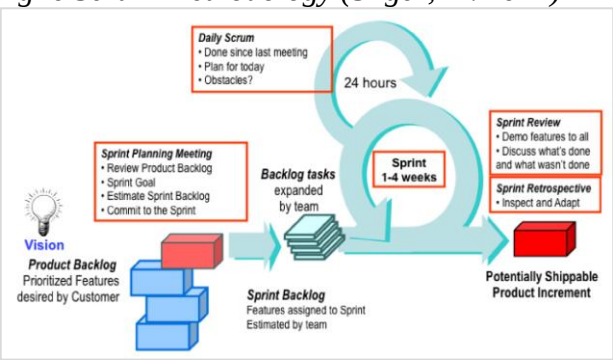
Research Design

The study made use of a descriptive developmental research approach.

The qualitative method was used to a document and analyze the difficulties encountered in the process of visitor management. Furthermore, the quantitative method was used to evaluate the extent of compliance of the Visitor Management System with Decision Support with the ISO/IEC 25010 Software Quality Standards.

Figure 2

Agile Scrum Methodology (Sliger, M. 2011)



Developing the Visitor Management System with Decision Support using agile methodology and the Scrum framework followed these features:

Online visitor appointment
Application approval
Notification
Visitor identity verification

Scrum consisted of the following 5 stages:

Step 1. Product Backlog Creation. In this initial phase, the researcher, serving as the Product Owner, identified and prioritized the product backlog items. This backlog included user stories where team members, such as visitors, department heads, security heads, and guards, could add, modify, and delete tasks related to the Visitor Management System with Decision Support.

Step 2. Sprint Planning and Backlog Creation. Next, the team focused on creating the sprint backlog by selecting essential user stories and breaking them into smaller, manageable tasks. The goal was to develop a detailed strategy for completing each task, with an emphasis on prioritization.

Step 3. Working on Sprint. During this stage, the user stories were translated into specific tasks within the sprint backlog, initiating the development process. The team began work on the Visitor Management System with Decision Support, including tasks such as developing pages and components for the WeChat Mini Program.

Step 4. Testing and Product Demonstration. Upon completing tasks, the system underwent rigorous testing to ensure functionality. To keep testing costs manageable, the team chose between incorporating QA or focusing on fewer user stories; the former was found to be more effective. Each completed sprint ended with a product demonstration for stakeholders, primarily the Product Owner, to gather feedback and assess satisfaction levels.

Step 5. Retrospective and Next Sprint Planning. In this final phase, the team engaged in a retrospective to review the sprint's outcomes, discussing successes, challenges, and areas for improvement. Insights gained from these discussions, along with lessons learned, were used to plan the next sprint, fostering a culture of continuous improvement.

System Architectural Design

The system framework design for this study was meticulously crafted to ensure seamless collaboration between the front-end and back-end components, incorporating modern technologies and methods. The primary objective was to build a secure, efficient, and feature-rich visitor

management system, ultimately enhancing the school's visitor management process.

To achieve this, the system framework was divided into two main components: the front-end, represented by the WeChat Mini Program, and the back-end, consisting of the API interface service. This design aimed to create an efficient and robust Visitor Management System with Decision Support. The following was a detailed description of each part of the system framework:

Front-end (WeChat Mini Program)

The front-end section focused on developing multiple pages and components to deliver a user-friendly interface and a seamless operational experience. Through the WeChat Mini Program, users could easily perform visitor management tasks. To facilitate data interaction between the front-end and back-end, the system primarily relied on the wx.request() interface method provided by the WeChat Mini Program. This communication mechanism ensured efficient and secure data transmission, enhancing the overall functionality and reliability of the system.

Back-End (Api Interface Service)

The back-end section was developed using the Java programming language, leveraging the Spring Boot framework and Maven for construction to deliver efficient and stable API interfaces. The use of Spring Boot's flexibility and strong ecosystem support contributed significantly to the system's scalability and maintainability. Controllers were used to expose the API's control layer, facilitating seamless data interaction with the front-end.

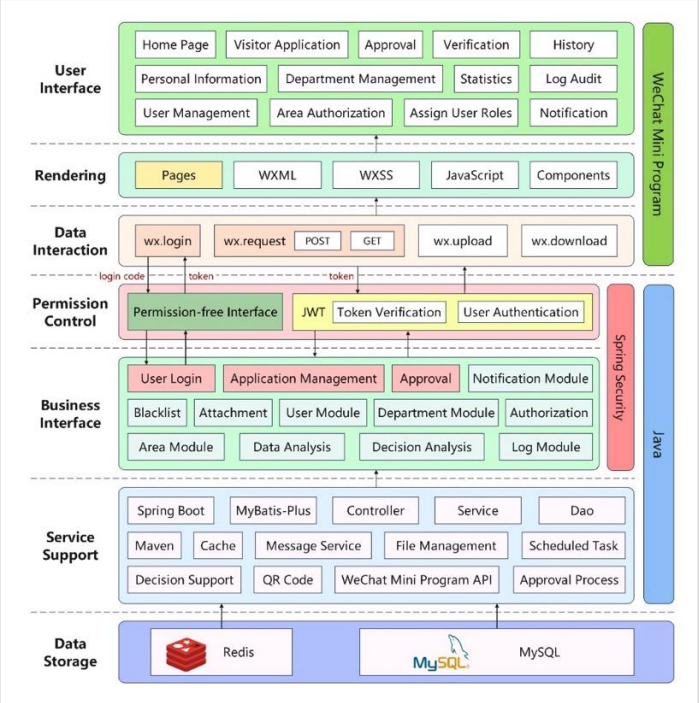
To ensure robust system security, Spring Security was employed to manage authentication at the method level for the API. This approach guaranteed that only authorized users could access specific system functions, thereby enhancing the overall security of the system.

In terms of system functionality, MyBatis-Plus was utilized to implement the persistence layer, enabling efficient interaction with the database and ensuring effective data management. The system also included features such as file management, scheduled tasks, and decision support, all designed to meet diverse operational requirements.

For the database, MySQL was selected as the primary data storage engine. To optimize data retrieval speed and enhance system responsiveness, Redis was employed for data caching, particularly for data that involved frequent queries. This caching mechanism not only alleviated the load on the database but also significantly improved the overall performance of the system.

Figure 3

System Architecture Design Diagram



Software and Hardware Requirements

Table 1

Requirements for User Device

Minimum Recommended Hardware Requirements	
Processor	CPU: 4 cores 2GHz
Operating System	OS: iOS / Android
RAM: Storage:	2GB At least 128gb
Network	WiFi / Cellular Data

Table 2

Requirements for Server

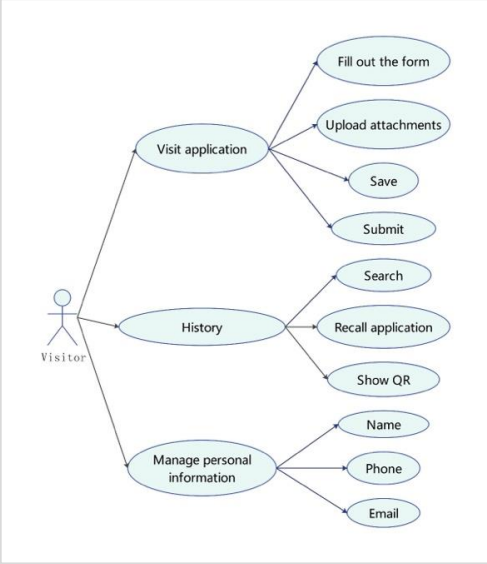
Minimum Recommended Hardware Requirements

Processor	CPU: 4 cores 2GHz
Operating System	OS: Windows / macOS / Linux
RAM: Storage:	4GB At least 128gb
Network	Broadband Internet connection

To clearly illustrate the functions associated with each role in the system, the following use case diagram was created:

Figure 4

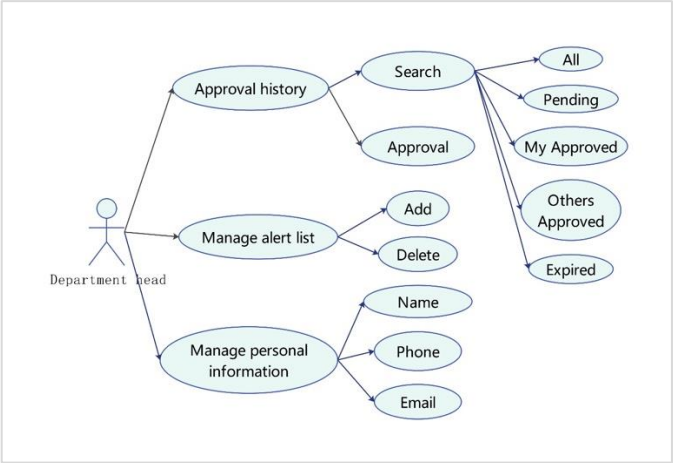
Use Case Diagram for Visitor



Visitors could submit visitation applications through the system, query their historical application records, and recall applications that had not yet been approved.

Figure 5

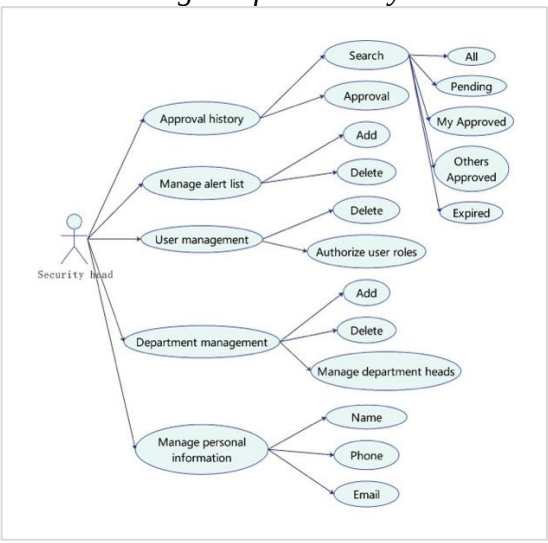
Use Case Diagram for Department Head



Department heads had the authority to approve applications submitted by visitors. The system offered decision support to assist department heads in making informed decisions, allowing them to approve or reject visitor applications based on historical data. Additionally, if a visitor was identified as a potential risk, department heads could add them to an alert list.

Figure 6

Use Case Diagram for Security Head

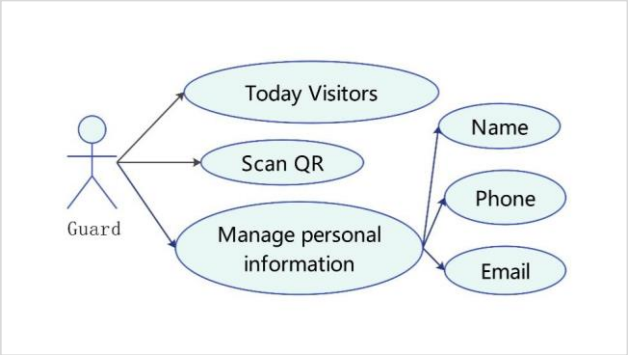


The security head was tasked with approving applications that had already passed departmental review. Similar to the department head, the security head received decision support from the system, which also allowed them to add visitors to an alert list if necessary. Beyond approval duties, the security head had broader administrative responsibilities, including managing users, authorizing user roles,

overseeing departments, and supervising department heads.

Figure 7

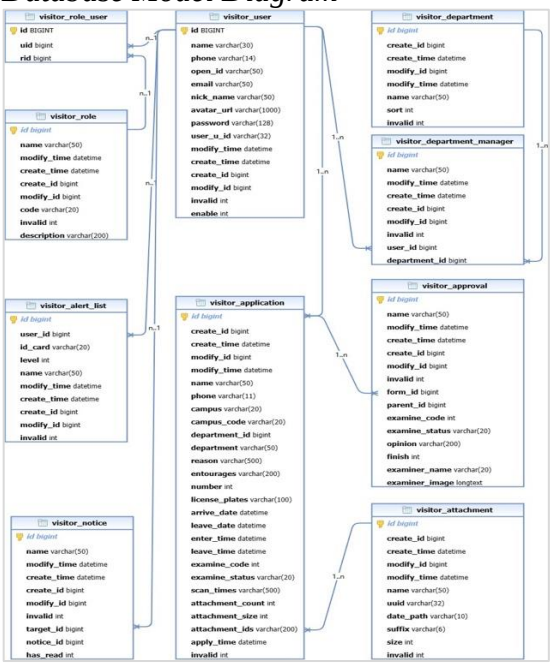
Use Case Diagram for Guard



The guard could view all approved visitation applications for the day and verify the identity information of visitors.

Figure 8

Database Model Diagram



Participants of the Study

The purpose of this system was to simplify the management process of campus visitors, ensure campus safety, and improve the work efficiency of various departments. The primary users of the system were divided into four roles: visitors, department heads, security heads, and guards. The following table indicated the number of participants involved in the research and feedback process for each role.

Their functions were also outlined in the table

Table 3

Participants of the Study

Participants	Frequency	Percentage
Visitors	65	70.00%
Department Heads	10	11.00%
Security Heads	3	3.00%
Guards	5	5.00%
IT Expert	10	11.00%
Total	93	100.00%

As shown in the table, visitors were the primary users of this system. They were required to proactively enter their personal information into the system, including their name, contact details, time of visit, and purpose of visit, and then submit a visitation request. Once their application was approved, they could use the system's identity verification feature to enter the campus. Their primary concerns included the clarity of the application process, the convenience the system provided, and potential areas for improvement in the interface and operation.

Department heads were responsible for approving visit requests related to their department. The system automatically pushed these requests to the relevant department heads, allowing them to review the visitor's information, purpose of the visit, and other details before deciding whether to approve or reject the request. Their main focus was on the timeliness of approval notifications, the completeness of the visitor information collected, and the system's effectiveness in facilitating visitor accommodation.

Security heads were tasked with approving visitation requests that had already been approved by the respective departments. They had access to all visitation requests and made the final decision on approvals. Additionally, they could view statistical data within the system, such as the number of visitors and the frequency of visits, to better prepare for campus security. Their primary concern was whether

the system enhanced the efficiency of visitor management and contributed to maintaining campus safety.

Guards were responsible for verifying the identity of visitors upon their arrival. They had access to all approved visitation requests for the day, focusing on the effectiveness and security of the visitor identity verification process.

IT experts played a crucial role in the study by providing technical guidance and expertise on the design and implementation of the system. Their involvement was key to ensuring the technical robustness and functionality of the Visitor Management System with Decision Support.

The participation of these diverse groups was significant in ensuring that the design and implementation of the Visitor Management System with Decision Support met the specific needs of each user role.

Instrumentation

This study utilized the following tools to ensure the accuracy and comprehensiveness of the data collected:

Interview Guide. To identify and address the issues encountered during visitor appointment booking, department head approval of applications, and security department verification of visitors, a comprehensive evaluation was conducted. This process aimed to uncover any challenges faced by users in each stage of the system's operation.

ISO 25010 Standardized Questionnaire. To ensure that the Visitor Management System with Decision Support meets the software quality standards, the researcher employed the ISO 25010 Software Quality Standards Questionnaire. This tool was used to evaluate various aspects of the software, including functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability

Data Gathering Procedures

In order to enhance the data collection process of this study, the researchers followed the steps outlined below:

1. The researcher obtained clearance from the Ethics Review Committee of St. Paul University Philippines to ensure the ethical soundness of the research.
2. The researcher sought endorsement from the thesis adviser and the Dean of the Graduate School for data gathering.
3. The researchers sought permission from Guangdong Preschool Normal College in Maoming to engage with the school's department heads and visitors for data collection purposes.
4. Before the data collection, the validity of the data tools was established and identified, and identification of the study participants was undertaken.

Prior to data collection, the technologies that were used to gather the data were validated and identified, and steps were made to identify the study participants.

5. Informed consent/assent from the participants was sought to ensure that the study conformed with the ethics norm of research.
6. Upon the approval of Guangdong Preschool Normal College in Maoming, the researcher conferred to the school on the details of the gathering.
7. To support what was expressed in the series of participant interviews, direct observations were also made.

Researchers experienced and observed for themselves how visitors applied for appointments and how the approval process proceeded.

8.Further, a questionnaire based on ISO/IEC 25010 software quality standards was used by IT experts in assessing the developed system's extent of compliance with the said standards.

Upon completion of the system development, IT experts were invited to conduct comprehensive testing and evaluation of the developed system. This verification process ascertained whether the system aligned with the ISO/IEC 25010 standards, thus ensuring the quality and performance of the system.

Data Analysis

The data obtained by the researchers were treated and analyzed using the data analysis tools below.

Thematic Analysis. This was used to document and analyze the problems and challenges encountered in the existing processes.

Mean. This was used to determine the developed system's extent of compliance with the ISO/IEC 25010 Software Quality Standards.

Below is the scale used to interpret the means.

Table 4.

Likert Scale Used to Interpret the Means

Scale	Mean Range	Descriptive Interpretation
5	4.20 - 5.00	Very Great Extent
4	3.40 - 4.19	Great Extent
3	2.60 - 3.39	Moderate Extent
2	1.80 - 2.59	Low Extent
1	1.00 - 1.79	Very Low Extent

RESULTS AND DISCUSSION

This chapter presents the results of the data analysis and the IT experts' evaluation of the developed system with the ISO/IEC 25010 Software Quality Standards.

1. Problems and Challenges Faced by Guangdong Preschool Normal College in Maoming Regarding Visitor Management on Campus

1.1 Excessive User Registration Information

To prevent malicious user registrations and ensure user authenticity, the system required users to fill in personal information upon registration. This included the user's real name, mobile phone number, and ID card number, raising concerns among users about potential data leakage.

1.2 Difficulty in the Log in Progress

Every time they used the system, users were required to log in with their account credentials. Due to the infrequent use of the system, users were prone to forgetting their passwords, which also posed a risk of account misuse.

1.3 Time Consuming in the Approval Process

The approval process for visitor appointment requests was both time-consuming and inefficient, as approvers had to proactively log in to check for applications requiring approval, making the process drawn-out. Expired appointment requests continued to be displayed in the approval list.

1.4 Frequent Logging in of Users

Department heads and Security heads needed to log in frequently to check for new visitor requests, and visitors also had to log in frequently to check the status of their applications.

1.5 Insufficient Capability of the Correct System

The security department was unable to calculate the daily number of visitors, making it challenging to allocate sufficient personnel for processing.

1.6 Manual Visitor's Check-In

The system only recorded information related to visitor appointments. Upon entering the campus, visitors still required manual verification and handwritten registration of entry and exit times.

2. Developed System to Effectively Address the Identified Problems and Challenges Faced by the School in Managing External Visitors

Development of the Visitor Management System with Decision Support

Description of the Proposed System

The Visitor Management System with Decision Support was developed as a WeChat Mini Program to streamline visitor online booking and approval processes at Guangdong Preschool Normal College in Maoming. This system went beyond traditional visitor management by incorporating features such as online reservations, one-click login, proactive notifications, and decision support capabilities. By leveraging the WeChat ecosystem, it offered benefits such as no installation requirement, a compact size, and rapid responsiveness, significantly improving the visitor reservation experience and overall management. The system's backend was built using Java, Spring Boot, MySQL, and MyBatis-Plus.

Furthermore, the system supported four user types: visitors, department heads, security heads, and guards. Visitors used the Mini Program to submit visit requests, which were then reviewed and approved sequentially by department heads and security heads. Finally, guards verified the visitors' identities. While the system primarily operated on Android and iOS, it was also compatible with Windows, Mac, and Linux platforms.

Table 12 shows the extent of compliance of the developed system with the ISO 25010 Software Quality Standards in terms of portability.

The results reveal that the developed system, in terms of portability, yielded a category mean of 4.30, which is described as very great extent. The lowest-rated item is "Replaceability. The system can replace another specified software product for the same purpose in the same environment" with a mean of 3.40 described as "Great Extent". This means that the developed system can be seamlessly transferred from one hardware, software, or operating/use environment to another with greater ease and efficiency, though there is room for enhancement in its replacement capabilities.

The findings of the study were consistent with Zulfa et al. (2020), which indicated that the system was compatible with various operating systems and software with different characteristics. Consequently, ensuring the highest quality of the system's portability was crucial. This quality assurance was evaluated according to the ISO/IEC 25010 standards, focusing on sub-characteristics such as Adaptability, Installability, and Replaceability. The results matched the expert assessments shown in the table, demonstrating that the system easily adapted to new environments, installed smoothly, interfaced well with existing systems, and could be readily replaced with similar products.

Table 5

Summary of the Developed System's Extent of Compliance with the ISO/IEC 25010 Software Quality Standards

Dimensions	Category Mean	Descriptive Interpretation
A. Functional Suitability	4.63	Very Great Extent
B. Performance Efficiency	4.43	Very Great Extent
C. Compatibility	4.15	Great Extent
D. Usability	4.45	Very Great Extent
E. Reliability	4.23	Very Great Extent
F. Security	4.06	Great Extent
G. Maintainability	4.32	Very Great Extent
H. Portability	4.30	Very Great Extent
Overall Category Mean	4.32	Very Great Extent

Table 13 presents the summary of evaluation conducted by the IT experts of the developed system's extent of compliance with the ISO/IEC 25010 Software Quality Standards. The results reveal that the developed system complied with the ISO/IEC 25010 Software Quality Standards in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability to a very great extent. This is supported by the overall mean of 4.32. This highlights the system's excellence across critical quality dimensions, underscoring its effectiveness, reliability, and user satisfaction

The general evaluation results from IT experts align with the findings of Handayani et al. (2021), who assessed the Quality Assurance of the Sayurbox Mobile Application. Their study tested eight ISO 25010 characteristics—Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability—along with their respective sub-characteristics. Consequently, these findings suggest that the developed system meets the required standards and achieves a relatively high level of software quality.

3. Enhancements Proposed to Improve the Developed System

The Visitor Management System with Decision Support, developed as a WeChat Mini Program for Guangdong Preschool Normal College in Maoming, serves as a critical tool for managing visitor interactions. To further enhance the system's functionality, IT experts recommended implementing a user feedback mechanism, allowing

visitors to rate and provide feedback on their experiences. Additionally, they suggested leveraging data analysis to enable more intelligent and comprehensive data-driven decision-making.

Summary of Findings

Based on the results of the study, the following findings were generated:

1. *Problems and Challenges Encountered by Guangdong Preschool Normal College in Maoming regarding Visitor Management on Campus*

After conducting inquiries and surveys with visitors, department heads, security personnel, and guards at Guangdong Preschool Normal College in Maoming, several problems and challenges were identified:

1.1 Excessive User registration information
1.2 Difficulty in the log in progress
1.3 Time Consuming in the Approval Process
1.4 Frequent Logging In of Users
1.5 Insufficient Capability of the Correct System
1.6 Manual Visitor's check-in

2. *Developed System to Effectively Address the Identified Problems and Challenges Encountered by the School in Managing External Visitors*

The Visitor Management System with Decision Support was developed specifically for Guangdong Preschool Normal College in Maoming to address the identified problems, issues, and challenges related to visitor management on campus.

3. *Extent of Compliance of the developed System with the ISO/IEC 25010 Software Quality Standards.*

The IT experts generally assessed the developed system's extent of compliance with the ISO/IEC 25010 Software Quality Standards as "Very Great Extent" in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

4. Enhancements Proposed to Improve the Developed System

The Visitor Management System with Decision Support, developed as a WeChat Mini Program for Guangdong Preschool Normal College in Maoming, could be further improved by incorporating user feedback mechanisms. IT experts suggested adding features that allow visitors to rate and provide feedback on their visits. Additionally, they recommended using data analysis to enable more intelligent and comprehensive data-driven decision-making.

RECOMMENDATIONS

Based on the conclusions drawn, the following recommendations were proposed by the researcher:

1. Guangdong Preschool Normal College in Maoming may consider adopting and utilizing the developed system which offers convenient visitor appointment and approval features for both visitors and campus administrators.
2. Visitors should utilize the WeChat Mini Program to streamline their visitation process. By systematically submitting required details and keeping track of the application status in real-time, visitors should ensure a smooth and efficient entry into the campus. The convenience of QR code verification should be used to minimize wait times and simplify the check-in process, thereby enhancing the overall campus visiting experience.
3. Department heads should:
   - 3.1 take advantage of the automated notification and streamlined approval process offered by the system to ensure that visitor information is comprehensive, clear, and standardized; and
   - 3.2 use the system's capability to provide visitor history and risk assessment to make informed decisions, and rely on real-time updates and alerts to manage departmental guest reception tasks efficiently, fostering a secure and organized environment.
4. Security heads should:
   - 4.1 leverage the system to elevate campus safety through precise and efficient visitor management.
   - 4.2 make the most of the integrated warning list feature and the unified platform for reviewing and approving visitor entries to enhance the effectiveness of security protocols.

4.3 utilize access to comprehensive visitor statistics and real-time data analytics to make informed, data-driven decisions for proactive campus security management.

5. Guards should:
   5.1 utilize the system for quick verification by utilizing the system for quick verification of visitors through QR code scanning and accessing a real-time visitor list; and
   5.2 used streamlined process to reduce manual workload, minimize communication errors, and ensure accurate identity verification, allowing guards to concentrate more effectively on maintaining campus safety and security.
6. The researcher should present his study to the Guangdong Preschool Normal College in Maoming and provide necessary training for users in different roles with a comprehensive system usage guide.
7. The future researchers may continue to conduct similar studies that will improve the features of the proposed system based on the enhancement made by the experts.

CONCLUSIONS

Based on the findings and results of the study, the following conclusions were drawn:

The Visitor Management System with Decision Support, developed as a WeChat Mini Program, represents a cutting-edge solution designed to transform how educational institutions handle campus visits. This system enhances security, efficiency, and user engagement.

Given that Guangdong Preschool Normal College in Maoming required a more straightforward, user-friendly, and secure visitor management system, the new solution was designed to facilitate easy access reservations for visitors and assist the school in effectively managing them. Consequently, the researcher developed an efficient and user-friendly system that adheres to ISO Quality standards and meets the specific needs of Guangdong Preschool Normal College regarding campus visitor management.

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