RSUSafe: Student Daily Health Record Tracking System for RSU Romblon Campus

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ABSTRACT

This study developed RSUSafe, a COVID-19 website dedicated to tracking the daily health records of students at Romblon State University - Romblon Campus. The specific objectives include the creation of an easy-to-use mobile responsive website that can track daily health data for students participating in flexible face-to-face courses. Additionally, the system incorporates a notification mechanism for both the school nurse and symptomatic students, accessible through the school nurse's web portal. This study was conducted in the first semester of academic year 2022-2023. Considering time constraints and student availability, a sample of 100 responses was collected using the convenience sampling method. To ensure the effectiveness of RSUSAFE, proper reporting and evaluation of the acceptance of the system using the ISO/IEC 25010: 2011 standard was also conducted. Results showed that the RSUSafe system is evaluated as highly suitable, highly efficient, highly reliable and highly secured. The results of this study are expected to significantly contribute to improving health surveillance practices in academic institutions.

Keywords: *health tracking website, RSU safe, health report, daily health records*

INTRODUCTION

One of the most recent global public health emergencies is the COVID-19 pandemic, which began in China and has spread to practically every country in the world (Tria, 2020). This disease is caused by a novel coronavirus: SARS-CoV-2, previously known as 2019-nCoV (Guo et al., 2020). Its symptoms include cough, fever and shortness of breath which can be transferred through close contact with an infected person by coughing, sneezing, respiratory droplets or aerosols (Adnan Shereen et al., 2020).

Consequently, schools and universities conducting in-face classes have been temporarily closed due to the risk of faster transmission of the said virus inside the four corners of the learning institution (UNESCO, 2020). This closure has affected more than 1.2 billion learners worldwide with more than 28 million learners in the Philippines (UNESCO, 2020). As a result, the Department of Education came up with guidelines regarding the implementation of online and modular distance learning (Department of Education,

2020). Plans to conduct the pilot implementation of limited face-to-face delivery in low-risk areas of COVID-19 transmission for January 2021 have been approved by the President (Department of Education, 2020b) but were eventually recalled due to the emergence of a new strain of the virus (Department of Education, 2020c).

The reopening of schools must be carefully planned to ensure the safety and well-being of students, teachers, as well as non-teaching staff (Sarmiento et al., 2021). Indeed, even presently, instruction pioneers should connive with apparently incomprehensible decisions that balance health risks associated with face-to-face learning against the instructive requirements and educational needs of students which may be better served when they are attending their physical schools.

Given the abovementioned information, one of the foreseeable conflicts when face-to-face classes resumes is the rampant upsurge of COVID-19 cases in school if minimum health and safety procedures will not be strictly implemented in different areas of learning. Moreover, the rapid spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exceeded the capacity of many public health agencies to undertake traditional contact tracing (Kleinman & Merkel, 2020). The European Union recommends that relaxing social distancing measures in education such as reopening schools should only occur after there is clear evidence
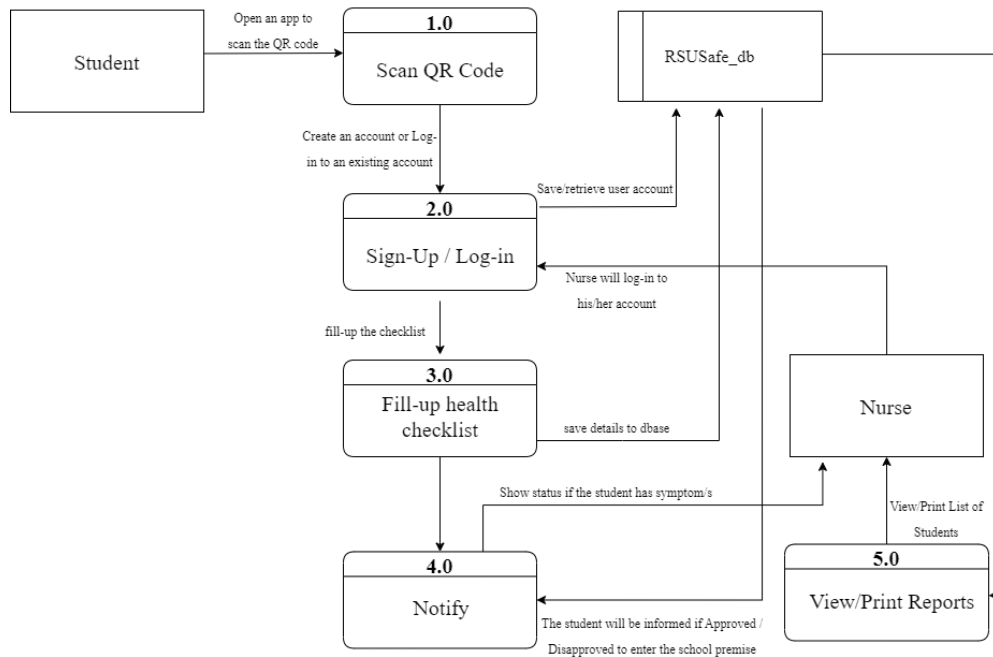
Figure 1. Data Flow Diagram of the System

that the spread has decreased for a significant period, there is sufficient health system capacity to cope with future peaks, and countries have sufficient monitoring and testing capacity to quickly detect and isolate infected people (Day, 2020). Durrheim et al. (2021) affirm that digital contact tracing via a smartphone can be considered as a form of public health intervention against COVID-19. Kleinman and Merkel (2020) asserted that digital contact tracing utilizes electronic information to identify infection exposure; therefore "it has the potential to address limitations of traditional contact tracing, such as scalability, notification delays, recall errors and contact identification in public space."

This study aimed to address the issues mentioned by providing a way to help maintain the health and safety of students who will participate in the said limited face-to-face classes by developing a mobile website that will monitor the daily health record of students from the moment they arrive inside the school premises up to the time they will be returning to their respective homes.

Consequently, contact tracing remains one of the essential and crucial needs in dealing with a pandemic because it allows rapid detection of cases based on information gathered from affected individuals about other people, whom they may have had recent contact with. Advances in digital technologies have made it possible to use cellular phones in the contact tracing process. The mobile website was developed and made possible through the use of Visual Studio Code by Microsoft Corporation. The website provided four main features which will be discussed further in the latter parts of this study. The system employed the student's

information, assistance of teaching and non-teaching staff, and the school nurse to determine the health status of those entering the university. This way, contact tracing and exposure mitigation will be manageable inside the campus.

Objectives

This study aimed to develop a COVID-19 website used for tracking student's daily health records in Romblon State University – Romblon Campus which has the following features: user-friendly graphical user interface for students; track the daily health record of students who will participate in the flexible in-face classes; generate a personal Quick Response "QR" Code specific for RSU- Romblon Campus only; notification status for the school nurse and symptomatic student that is posted on the web portal of the school nurse; and produce reports. Moreover, the system was tested for acceptability using the ISO/IEC 25010:2011 standard across functional stability, performance efficiency, reliability, and security.

METHODOLOGY

Data Flow Diagram

A data flow diagram depicts the flow of information through a process or system. It contains information on the procedure, as well as the output and entity (Fig. 1).
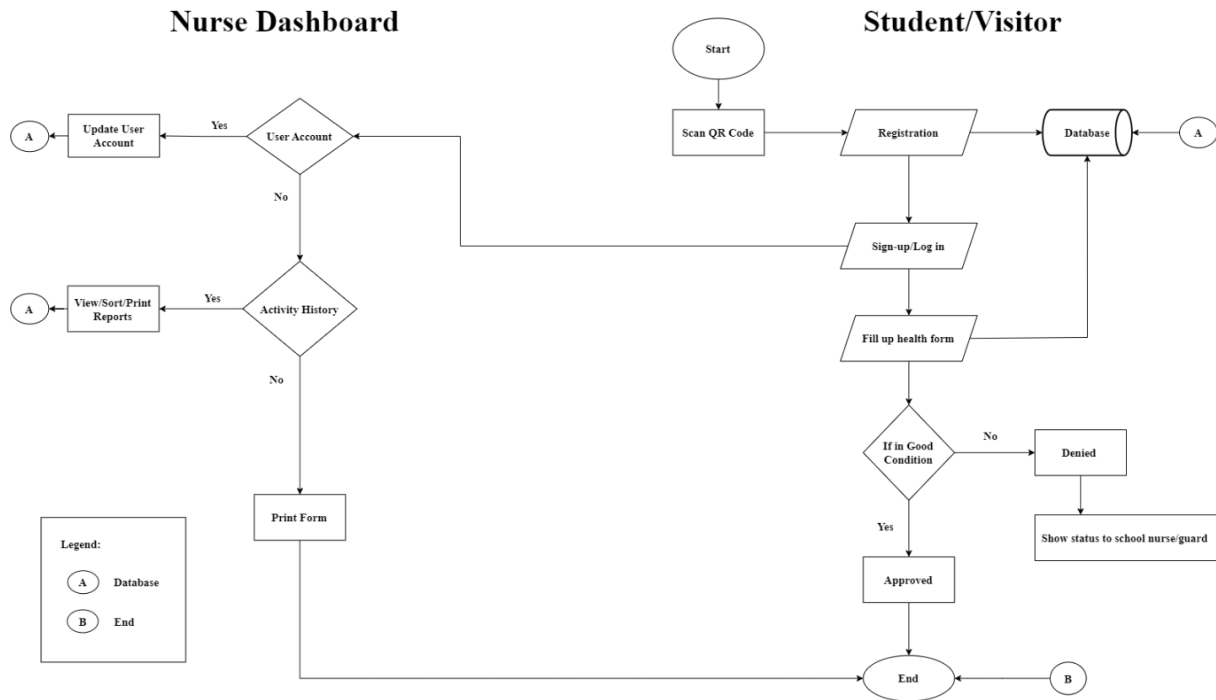
Figure 2. System Flowchart

The student will first scan a QR code, which will direct them to a landing page where they may log in or sign up. Input data will be saved in a database. Afterward, the student will complete a health questionnaire. The system will assess and then determine whether the student is with or without COVID-19 symptoms and if they be granted entrance to the school premises. The dashboard will be accessed by the nurse and will produce consolidated reports.

System Flowchart

The operation of the system will begin once a student scans the QR code on the school gate (Fig. 2). When the student scans the QR code, it will direct them to a landing page where they have the option to log in or register. If the student meets all of the registration requirements it will be saved in the database (Fig. 3);

however, if the student fails to meet the requirements, the student's registration will be automatically rejected. The student will then complete a health checklist form every time they are to enter the campus, and the data will be saved again in a database (Fig. 4). The system will assess whether the student passed the health form. If yes, the student will be accepted and permitted to physically attend classes; if not, the student will be informed with a status on his or her screen that he or she is in bad condition thus prohibiting him or her from entering the school.

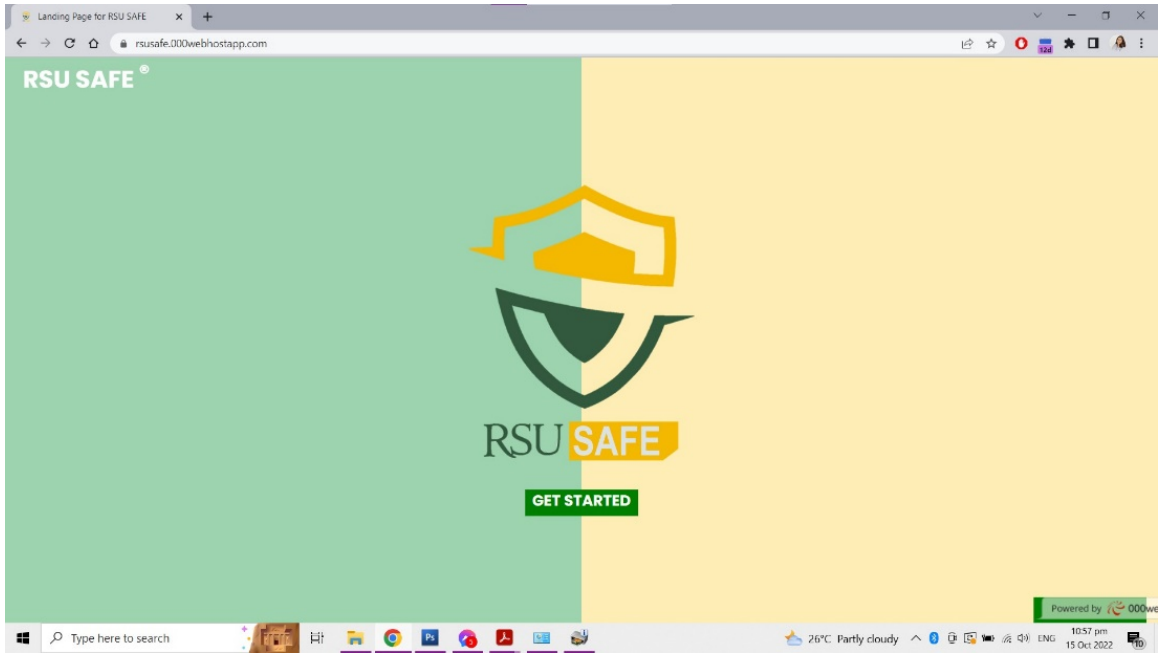Figure 3. Tbl Registration

Figure 4. Tbl Hform

Figure 5. RSUSafe Website Graphic User Interface (Web Version)
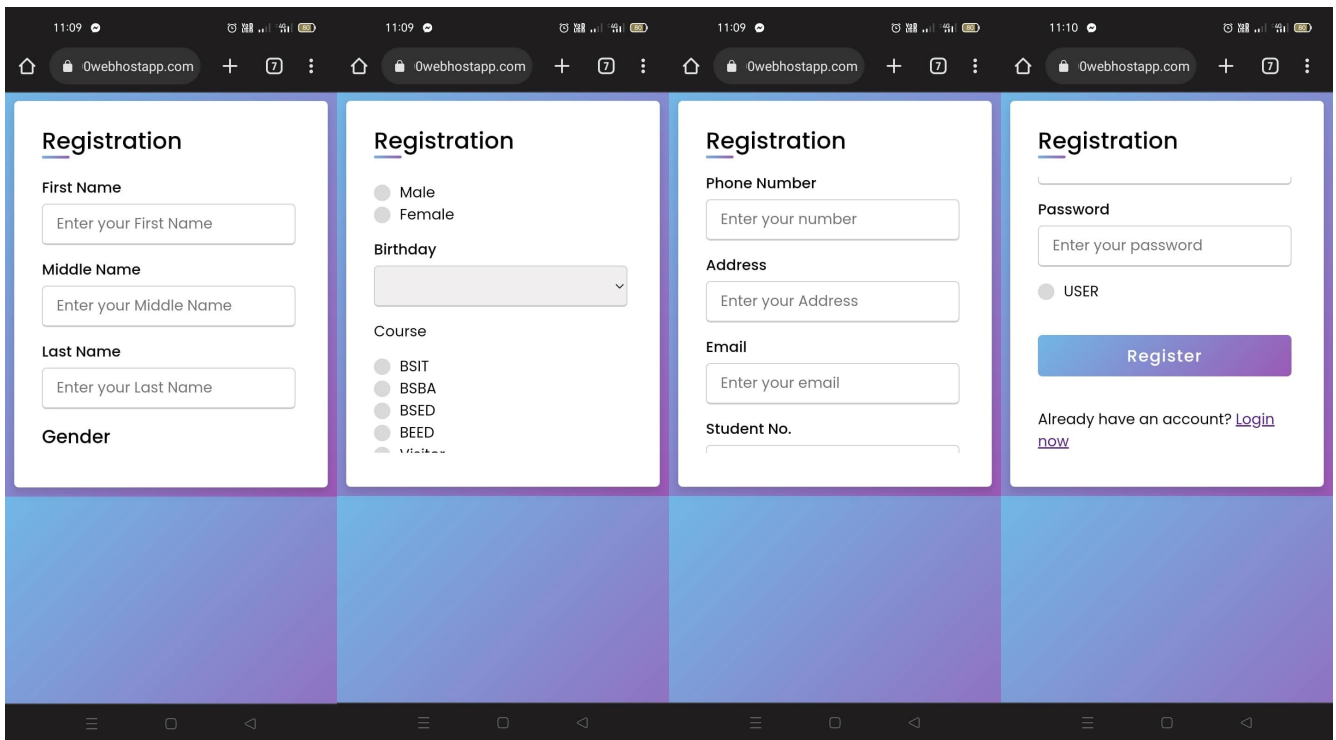

Figure 6. Registration

Figure 7.A. Dashboard of User Accounts

Figure 7.B. Dashboard of Activity History

Figure 7.C. Print User Account

Figure 7.D. Print Activity HistoryPrint User Account

Figure 8. Health Form

Figure 9. QR Code

The nurse will also have an account to log in, where she can have access to the system's data. The dashboard will display all of the student's information and data. The administrator can sort and print the needed report from the database.

Software Development Tools

This study was designed to meet the desired needs and meet the requirements based on the analysis. Software Development Tools Coding was written and configuration was performed to network the software. The designed system was deployed on a server for a series of real user tests. Functional testing was conducted and users were trained to operate the system. At this stage, the researchers looked at the actual functionality of the website. It underwent continuous development, functional testing, and continuous revisions.

The hardware specifications were complied to ensure that the hardware infrastructure functions optimally during critical stages of system development and testing, contributing to the overall success of the developed system.

Study Participants

At the time of the study, RSU Romblon Campus had a total population of 1,960 students disaggregated per department as follows: Business Administration = 948 (444 males, 507 females); Education = 700 (193 males, 507 females); and Information Technology = 312 (207 males, 105 females). Twenty-five students from each department were chosen based on convenience sampling procedure due to time constraints and availability of students, making a total of 100 responses for the battery assessment. A survey using an evaluation tool was conducted to provide tangible information that would give a reliable and valid assessment of the system.

Figure 10. Nurse's Acceptability Evaluation Tool

RESULTS AND DISCUSSION

One of the study's specific objectives is to develop a website that provides a user-friendly graphical user interface (GUI) for students. This feature of the system may look different depending on the end user for whom the product is designed, and in the case of this website, the clients are students. Thus, even if this website offers numerous advanced features, the researchers made it possible to produce and make it user-friendly by designing a simple, clean, and intuitive interface. This is due to the reason that the researchers were gearing towards user-friendly GUIs because these are typically more successful than those with complex, convoluted interfaces that are difficult to use. Moreover, clients and end-users often avoid unreliable products, such as software programs that are full of bugs. The screen-capped version of the website's user interface is presented in Figure 6.

The website offers an easy-to-navigate system wherein students will be easily directed to where they clicked. For example, both in the desktop and phone versions, the respondents will see a 'Get Started' button which takes them to the login screen of the website. Presented on the login screen is the fill-out box where the end-user and the administrator will input their username and password to access the site. After logging in, the website for the end-users will proceed to the

completion of the health form for health status assessment which is shown in Figure 8.

As for the administrator, after logging in, the site will automatically redirect to the dashboard wherein students' information and activity history are provided and presented. To justify the website's feature of offering a user-friendly GUI, icons and buttons can be easily clicked and navigated as presented in the aforementioned figures in the study.

Aside from the goal of providing a user-friendly interface, the website aimed to craft a digital health record that has the capability of tracking the daily health status of students who will participate in the flexible in-person classes. The screen-capped version of one of this website's features- digital recording has been presented (Figs. 7A-7B).

Simply put, contact tracing is a system used to slow the spread of infectious diseases like coronavirus. Numerous processes are needed in order to perform successful health tracing especially during this trying times. But these manual daily health tracking is very time-consuming. Hence, in order to cut down on the manpower needed to manage these processes, a wide array of digital tools is surfacing around the world. As shown in Figures 8A-8C, the website offers an ease of work for the university nurse in monitoring the ins and outs of the student as well as their daily health status. In addition, the website is considered to be a key dimension of the institution's strategy as it moves towards the goal of reducing instances of contact when the virus is passed on while people are asymptomatic. Tracking the daily health status of students in RSUSafe website involves numerous data that is vital to health assessment. It includes the following: (1) health form provided by the school nurse; (2) basic symptom assessment e.g. fever, cough, cold etc. (3) temperature of the student before entering the school premises.

One more feature of the website is generating a Quick Response "QR" Code (Fig. 9). RSUSafe website has its own generated QR code for students to use when accessing the website. Aside from the ease of using and the convenience of using mobile devices to scan QR codes, students which are the end-users were drawn to perceived exclusivity. The QR code that is provided for students to scan is made only for Romblon State University- Romblon Campus so that the data will remain intact in one institution. Besides that, QR codes provide the affluence of just scanning and redirecting to the website in an instant rather than typing lengthy words just to access the website.

Besides developing advance yet easily understood features, another key goal of this research is to produce adequate reports. Printing consolidated, accurate, and reliable result can be seen on dashboard and is easily accessible to the school nurse for compiling and recording (Figs. 7C-7D).

The admin's point of view contains basic information of the students – last name, first name, middle name, course, contact number, address, email, username, password; and an action key to either delete it or not. The activity history of students entering the school facilities is also tracked. This is an option which is controlled by the administrator of the website which in this case is the school nurse. The information contained in the dashboard were as follows: last name, first name, middle name, course, contact number, address, temperature, place to visit, reason to visit, date of visit, and the status of the student whether approved or denied. This information is made available for the nurse to be able to monitor each student's health before entering the school premises.

Figures 7C-7D, provide adequate data including printable report which can be compiled by the school nurse in order to produce daily, monthly, and weekly assessment of students' health status. Further, adequate or complete data contains (1) full name of student; (2) program taken; (3) contact details and address; (4) date and place to visit; and (5) remarks if the student is in a good condition or not. The website was assessed and evaluated by the school nurse to ensure that the system really produced adequate reports (Fig. 11).

Figure 10 presents the result of the nurse's acceptability evaluation of the website. The given statistical tool was based on ISO 25010:2011 standards wherein every feature of the application should adhere to the quality provided by the said standardization tool before allowing end-users to utilize it. All tests presented were given a "Functional" rating by the school nurse which will serve as the administrator of the website. The website is deemed efficient based on the ratings of the nurse.

The last specific objective of the study was to test the acceptability of the system using ISO 25010:2011 standard. International Organization for Standardization 25010:2011 is labelled as systems and software engineering. It is used as a quality model composed of five characteristics wherein some of which are further minimized into sub-characteristics that relate to the outcome of interaction when a product is used in a particular context. The following are the aspects of the system subjected for acceptability test: (1) Functional Suitability, (2) Performance Efficiency, (3) Reliability, and (4) Security. Data were gathered after the respondents used and evaluated the system.

Table 1 shows the result on the Software Evaluation for the performance of the RSUSafe System under functional suitability. Results showed that the system is highly suitable across functional completeness (M=4.67), functional correctness (M=4.55), and capacity (M=4.53). The overall mean for functional suitability was 4.58 indicating high functional suitability of the RSUSafe System.

Table 1. Functional Suitability of the RSUSafe System

Functional Suitability	SA (5)	A (4)	FA (3)	D (2)	SD (1)	Mean	Verbal Interpretation
1. Functional completeness	71	25	4	0	0	4.67	Highly Suitable
2. Functional correctness	60	35	5	0	0	4.55	Highly Suitable
3. Functional appropriateness	60	34	5	1	0	4.53	Highly Suitable
Mean						**4.58**	**Highly Suitable**

Table 2. Performance Efficiency of the RSUSafe System

Performance Efficiency	SA (5)	A (4)	FA (3)	D (2)	SD (1)	Mean	Verbal Interpretation
1. Time behavior	72	20	8	0	0	4.64	Highly Efficient
2. Resource utilization	73	23	3	1	0	4.68	Highly Efficient
3. Capacity	66	29	4	1	0	4.60	Highly Efficient
Mean						**4.68**	**Highly Efficient**

Table 3. Reliability of the RSUSafe System

Reliability	SA (5)	A (4)	FA (3)	D (2)	SD (1)	Mean	Verbal Interpretation
1. Maturity	49	47	3	1	0	4.44	Reliable
2. Availability	63	31	6	0	0	4.57	Highly Reliable
3. Recoverability	56	37	7	0	0	4.49	Reliable
Mean						**4.5**	**Highly Reliable**

Table 4. Security of the RSUSafe Sytem

Security	SA (5)	A (4)	FA (3)	D (2)	SD (1)	Mean	Verbal Interpretation
1. Confidentiality	64	30	6	0	0	4.58	Highly Secured
2. Integrity	62	34	4	0	0	4.58	Highly Secured
3. Accountability	64	32	3	0	1	4.58	Highly Secured
Mean						**4.58**	**Highly Secured**

Table 2 shows the result on the RSUSafe System in terms of performance efficiency. Results showed that the system is highly efficient across functional time behavior ($M=4.64$), resource utilization ($M=4.68$), and functional appropriateness ($M=4.60$). The overall mean was 4.68 indicating the system's high performance efficiency.

Shown in Table 3 are the evaluation results of the RSUSafe System for reliability. Findings showed that the reliability of the system ranged from reliable to highly reliable as in terms of its indicators such as maturity ($M=4.44$), availability ($M=4.57$), and recoverability ($M=4.49$). The overall mean was 4.50 implying that the system is highly reliable.

Table 4 shows the evaluation results of the RSUSafe System for its security features. Results showed that the system is highly secured in terms of its indicators such as confidentiality ($M=4.58$), integrity ($M=4.58$), and accountability ($M=4.58$). The overall mean was 4.58 implying that the system is highly secured.

In general, the result of the overall acceptability through ISO 25010:2011 suggests that the overall aspect of the system is ready for deployment and implementation. The website is suitable and ready for use in serving its purpose of tracking the daily health record of students in Romblon State University – Romblon Campus.

CONCLUSION AND RECOMMENDATIONS

The RSUSafe system was developed in order to track students' daily health records in Romblon State University- Romblon Campus. Further, data from users and filled-out health forms were recorded and stored in the database, which is reliable in generating the reports that depend upon the school nurse's choice of date. The admin could sort, add, and delete users' data and accounts. The website feasibly provided the following features: (1) a user-friendly GUI for students; (2) daily health status tracking; and (3) easily accessible QR code specific for Romblon Campus only. The system was developed acceptable to the students of RSU - Romblon Campus and evaluated using ISO 25010:2011 standards implying that the system is ready for deployment in RSU - Romblon Campus.

To future developers and adapters, this system may be developed through the addition of innovative features such as infrared technology to read the temperatures of the students and visitors and autofill the form when it is done. The current interface may also be enhanced such as the addition of visit history and making this available for the end-users to see, consultation booking and safe trace which contains accessing the current location of the students to track and trail down the places they entered around the university premises.

AUTHORS' CONTRIBUTIONS

Mindoro-Mesana serves as the teacher adviser while the rest of the authors are students for A.Y. 2023-2024.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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