Web Portal of Tarlac Agricultural University ROTC Unit

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Article Information

Received: 15-11-2023
Revised: 30-11-2023
Published: 15-12-2023

Keywords
Web-based system; Portal; Electronic information resources; Reserve Officers' Training Corps (ROTC); Web interface; Software

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Abstract

Web Portal of Tarlac Agricultural University ROTC Unit explores the development of a web-based system tailored to the specific needs of the Reserve Officers' Training Corps (ROTC) Unit at Tarlac Agricultural University (TAU). The research addresses the challenges associated with manual document filing and data management in a growing educational institution. The system aims to improve data management and access for the ROTC Unit at TAU through the development of a web portal, ultimately enhancing the efficiency of the unit's operations and aligning with the broader trends in information management. The developed web portal was evaluated in terms of functionality, reliability, maintainability, portability, usability, and efficiency, resulting in a Highly Acceptable evaluation from the end-users and IT experts.

1. Introduction

A portal is a web-based system that aggregates data from various sources into a single user experience and displays the most necessary details for the user's context. Simple web portals developed into portal systems that enable digital customer experience efforts over time.

The information revolution and technical developments that drove the web created an unprecedented demand for many types of electronic information resources, including their storage, organization, dissemination, access, and retrieval (Saadi, 2016). The "Reserve-Officers' Training Corps (ROTC)" is a program established under Sections 38 and 39 of Republic Act No. 7077 to give military training to tertiary level students in order to motivate, train, organize, and mobilize them for national defense preparation, according to the NSTP Act (Manila Bulletin, 2022).

Manual document filing may be quick, simple, and essential in the early stages of an organization. However, manual filing may become a highly time-consuming activity as the company expands. Since the Tarlac Agricultural University (TAU) Reserved Officer Training Corps (ROTC) Unit uses manual data keeping, the researchers decided to create a web interface for it. Manual data storage requires a lot of room, is prone to damage and loss, is difficult to modify, has a long access time, and is more expensive. Furthermore, ROTC will soon be required, so there will be new information and more to keep. President Ferdinand Marcos, Jr. is urging Congress to make the Reserve Officers' Training Corps program mandatory in senior high school, following the

proposal of his ally Vice President Sara Duterte; "the goal is to encourage, train, organize, and mobilize students for national defense readiness, which includes disaster preparedness and capacity building for risk-related scenarios," he explained (CNN Philippines, 2022). Sara Duterte, Vice President and Secretary of Education (DepED), emphasized that the required Reserve Officers Training Corps (ROTC) will only apply to students in higher education or tertiary level (Malipot, 2022).

Approximately all of the alumni and army reservists of TAU ROTC Unit proceeds to the office and inquire to acquire copies of their serial numbers, but because it is manually recorded, it takes time before they can discover the applicant's serial number. The serial number is one of the conditions for enrolling for army education. The time spent looking for information will be reduced with the help of the portal. The greater the number of papers saved, the more time it takes staff to search storage space and folders for the data they want. This raises the proportion of manual filing in terms of staff expenses. Staff have less time to accomplish vital and productive work as a result.

The ROTC web portal is proposed to modify the process of the existing manual system. This study aims to create a web portal using a basic-level programming language, heuristic algorithm, and open-source software to automate some of the ROTC related workings and find them in a short span of time.

1.1 Literature Review

As a type of knowledge management system, a web portal provides a rich place for users to communicate and obtain information, as well as communications networks such as free email or content distribution.

Since this necessitates a high number of repeated tests for one drug on each individual tool to help, the portal will require a new normalization step to examine the spread of such data as stated by Williams & Mirams (2015).

Ofoegbu E et al. (2015) emphasized that the incorporation of information technology methods to maximize previously existing practices is to be promoted, since any chance of moving the country from an undeveloped to a developed nation may be realized via the infusion of information technology techniques and technologies.

Yıldırım & Bostancı (2021) added while also having a considerable advantage in managing their population.

It is also mentioned by Wan Adnan et al. (2017) that governments throughout the world have recognized and prioritized e-government deployment to improve service delivery to their populations.

Whereas a portal is an important learning and research tool for students' academic pursuits, we can only call it a successful educational information system if we see voluntary continuing usage after intervention Chen & Chengalur-Smith (2015).

According to Roszak et al. (2016) educational portals integrate and enable communication in the remote learning process, allowing for the formation of learner communities, information transfer, examination, and assessment of learning results.

Portals, particularly those accessed via mobile devices, are a vital point of communication between residents and the government, hence more work in developing such portals is required. The continual evolution of technology and the information society will never cease to push as stated by Dečman (2016).

Sedek et al. (2018) cited Ebrahim & Irani (2005) that E-government architecture defines the standards, infrastructure components, applications, technologies, business model, and rules that organizations may use to collaborate more effectively.

Jessy et al. (2016) pointed out that it is serious for academic organizations affiliated to educational institutions to emphasize knowledge sharing in order to serve their students and professional users by offering access to knowledge resources and information via a web portal.

In addition to that, Secreto & Pamulaklakin (2015) stated that the online student portal performs functions such as online registration, grade viewing, record requests, fee payment, and information hub. Learners should be able to access student services at a time and location that is convenient for them. This might be accomplished by making these services available on the internet.

A Web portal, sometimes known as a public portal, is a website or service that provides a wide range of information and services, such as e-mail, blogs, search engines, and online shopping malls.

As stated by the study of Durga & Rao (2016) the initial Web portals were online services like AOL that provided Web access, but most traditional search engines have now turned themselves into web portals in order to attract and retain a wider audience. Web portal allows universal access, handles structured and unstructured data, allows for multi-channel consistency, and allows for messaging and notification automatic tuning: ubiquitous content can be tuned based on customization, location, browser, and so on and integration with other systems.

According to the research Krishna (2022) the student portal is a web portal that contains all of the information and services that students require, and it can be deployed within a specific organization or with global access.

In addition, Bringula (2015) mentioned that a web portal combines information, content, and enterprise applications, resulting in a single point of access to the World Wide Web.

Yalagi & Dangare (2015) explain further that a web portal's primary function is to facilitate information sharing across the internet. Shahid et al. (2023) similarly stated that Web portals' key goals are to provide interactive integration of numerous functions that confirm various needs in an effective manner.

(Rodafinos et al. (2018) mentioned that the Monash Psychology Research Portal is user-friendly, allowing students and researchers to undertake all components of a research project completely online, inside a single unified and accessible research environment.

Demchenko (2021) identified in the study that the volume of scientific articles in a certain subject of science makes it harder to understand them over time. Furthermore, the enormous number of information sources makes it difficult to find the data we require. A tightly tailored web gateway is required to overcome these difficulties.

Once fully implemented and understood by users, these web portal systems can help universities realize their educational ambitions and goals, provided that top management and other stockholders are committed to the entire process as stated in the study of Claude Byungura Tutor et al. (2015).

According to Coughlin et al. (2017), web portals have become an increasingly common feature of modern life. They pull together information from several sources in a consistent manner, allowing companies and institutions to deliver a more consistent appearance and feel for diverse apps, content, and database information.

Web portals enable the remote and local interconnection of e-contents using a hypertext system that offers access to documents written in hypertext markup language (HTML) as stated by Jessy et al. (2016).

A web portal is more than a website, intranet, extranet, front end for a business application, collaboration software, knowledge management solution, or search engine; it is a browser-based user interface to all of the above components

2. Research Methods

An overview of the researchers' methodology to be used in their study and development of the IT solution is provided. The researchers will be using Agile Development Model to guide the phases of their work.

One of the models used in software development is the Agile Development Model. It is one of the most recent and effective methods to be established in the software development business. The design concept is never completely frozen or set in stone, but it has allowed it to adapt as new ideas are introduced with each version. End users may be given demos at the conclusion of each iteration, and their comments may influence the following round of improvements. The iterative cycle is repeated until the project is completed with a requirement that precisely satisfies the aim. Since Agile approaches are incremental, the major benefit is faster software development and continual value delivery to the client or user.

The researchers selected the Agile approach because it is appropriate for the project, given the number of studies, prototyping, and design required in such a short period of time.

Fig 1. Model of Agile Methodology

Brainstorming. Throughout this period, the researchers collected data. The IT solution is being created to solve a specific problem. Initial needs were also mentioned while developing the project: the outcome; the features it will support and those it will not support. The researchers scheduled a visit to the area. The goal is to figure out what the system's goals are. Users were interviewed, observed, and an initial survey was conducted at this phase. The data was analyzed by the researchers to determine whether the study was feasible. Throughout this period. The researchers adhered to the guidelines for extensive user involvement.

Design. During this step, the researchers organized a meeting with former ROTC Coordinator Cpt Ronimo G. Ubaldo Inf PA (Res). During this phase, the user responded to actual functioning prototypes of the system. Design components will be improved based on user feedback. The researchers will create the system using HTML, JavaScript, and CSS on the front end and PHP, Java and MySQL on the back end. Proponents utilized jQuery (a JavaScript framework) for front-end web design for desktop viewing; Adobe Photoshop CC for graphics and producing source images such as logos and background pictures.

Development. During this stage, the researchers wrote code and transformed the documentation design into existent software. It is considered the longest period of all.

Quality Assurance. At this stage, the researchers will ensure that the project is functional and bug-free. A set of tests will be performed to check that the programs were created in accordance with the objectives that the developers sought to achieve.

Deployment. The researchers' project will be sent to the users at the final phase. It might be used as a demonstration or in real life. The researchers will update or add new features to the installed program and fix defects on a regular basis.

Data Gathering Procedures

The researchers used number of ways to gather data suited for the development of the study. It served as their guide to meet their target objectives. The following tools have been used to gather information.

Literature Survey. A literature review is an effective method for acquiring vital information. The internet is the most visible source of information and reference that may be utilized to look for content connected to any study or research. Nonetheless, in order to obtain good and reputable materials, internet research necessitates the researcher's diligent and critical eyes.

Interviews. The researchers conducted an interview with the user to get information on what are possible requirements for the system.

Questionnaire. The researchers will use a questionnaire to collect comments from users during the system evaluation.

System Design

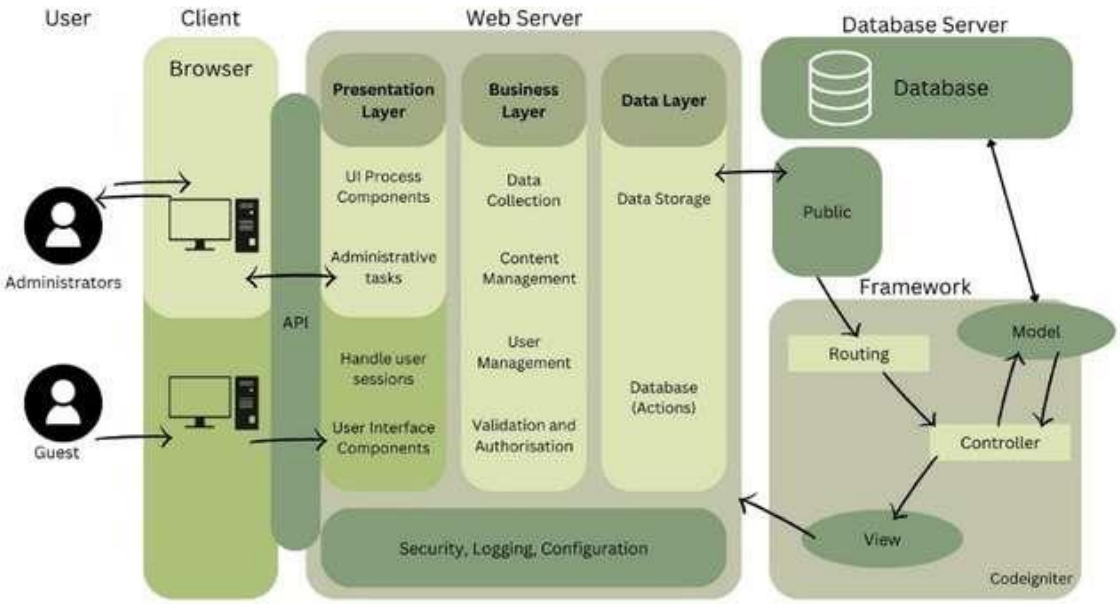

Fig 2. System Architectural Design

Figure 2 shows that the system consists of four main parts: the user, the client, the web server, and the database. It shows that the user will interact to the client. Then using an API, the user can already access the web server. The web server will request information or data to the database, and then the system will display it to the user. It is the same to the database; the difference is that it has an admin and student user type. If the user will log in, it will show the result table that contains the data.

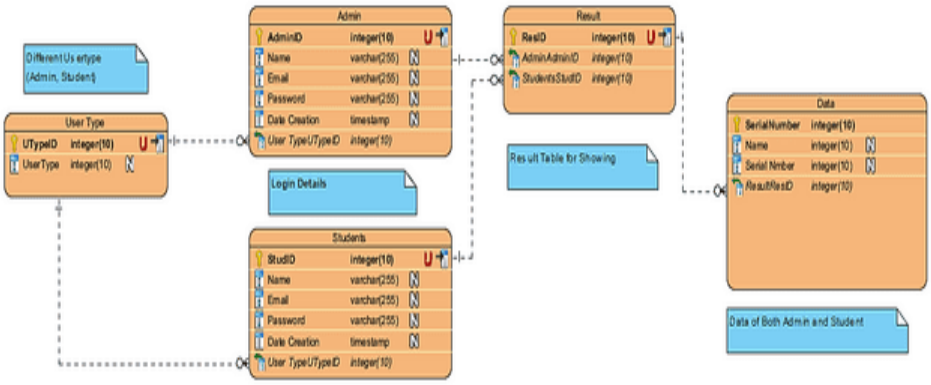

Fig 3. Entity Relationship Diagram for Home Page Contents

The relationships between the entity sets recorded in a database are depicted in an entity-relationship diagram (ERD). Figure 3 shows the ERD for the contents of the homepage, showing attributes of two users and how the data were stored and connected to each entity.

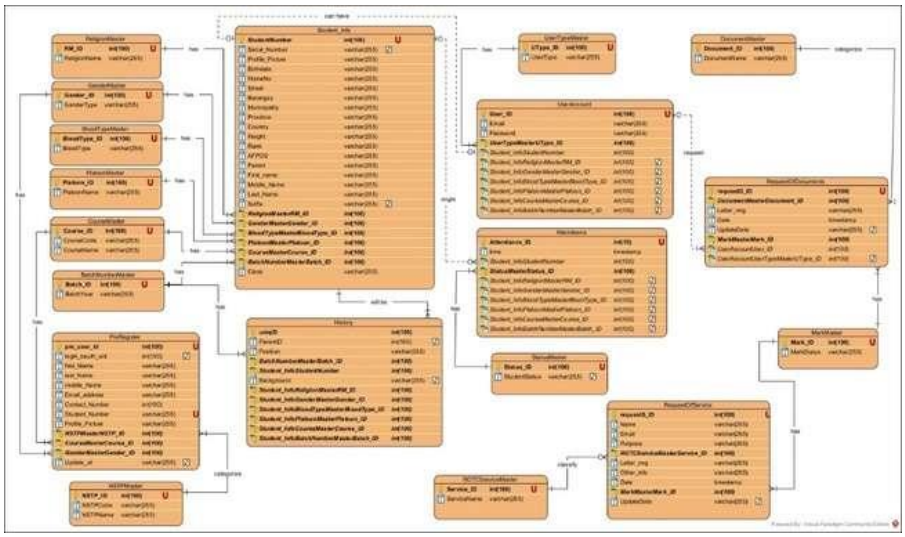

Fig 4. Entity Relationship Diagram for System's Functions

Figure 4 shows that when inputting and retrieving data from the database, two tables in system's ERD are essential for the system to function: the admin and the user. The user and admin tables are linked, and the admin is always aware about the user's activities in the portal.

Tools used in the Development

Hardware. Table 1 shows tangible materials that are used in the development of web portal. It includes the classification and specification of each.

Table 1. Materials used to develop the web portal.

HARDWARE	CLASSIFICATION	SPECIFICATION
Laptop	Random Access Memory (RAM)	8.00 GB
	System Type	64-bit operating system
	Processor	Intel(R) Core(TM) i7-8565U CPU @ 1.80GHz 1.99 GHz
	Graphics Processing Unit (GPU)	Intel® UHD Graphics for 8th Generation Intel®

Software. This part indicates the software used in the development of the web portal. It includes software tools used for the front end and the back end.

- **Data Mining Tools.** Google Sheets is used to organize data.
- **Programming Language.** Researchers used HTML and CSS as their programming language.
- **Scripting Language.** Java and JQuery are the scripting language that is used.
- **DBMS.** The database software that is used is MySQL Database.
- **Framework.** For faster development, the researchers will use PHP Framework Codeigniter.

Evaluation

Table 2. Table in interpreting the results of the user evaluation with 5 criteria.

RANGE VALUE	VERBAL INTERPREATION
4.50 – 5.00	Highly Acceptable
3.50 – 4.49	Acceptable
2.50 – 3.49	Moderately Acceptable
1.50 – 2.49	Fairly Acceptable
0.00 – 1.49	Not Acceptable

Scale to be Used in the Evaluation. The web portal will be evaluated based on *Likert Scale* devised to interpret the composite means. The users also used a scale to determine the usability and functionality of the system, where each parameter was detailed more specifically in the questionnaire for a better understanding of the use evaluator.

Respondents to the Evaluation. The evaluators will be fifteen (15) staffs of the Reserve Officer Training Course (ROTC) Unit, fifteen (15) ROTC advance cadet officers, seventy (70) ROTC students and ten (10) experts of the Department of Computer Studies of TAU

The locale that has been chosen for this study is Tarlac Agricultural University (TAU). The researchers focused only on the ROTC Unit under the National Training Service Program (NSTP) of office for the user evaluation and Department of Computer Studies of TAU for the expert evaluation

3. Result and Discussion

Web Portal of Tarlac Agricultural University ROTC Unit

The Web Portal of Tarlac Agricultural University ROTC Unit is designed with a guest and user interface which includes the following features; requesting of documents and services, FAQs, chatbot for inquiries, pre-registration and attendance form. The difference is that, the users can log in into the system and check their historical data. In addition, only the users can request the documents.

The admin interface of the system has the ability to store, view, add, edit and delete any data that the admin wants to do. Only the admin can download all the documents that is requested by the user. Moreover, it can also accept or reject the requested services by the user.

User Requirements

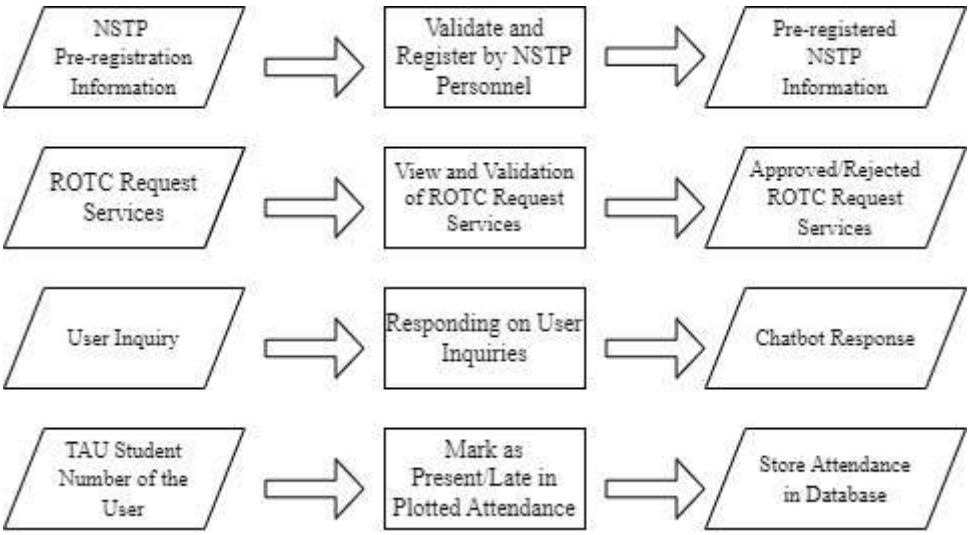

Fig 5. Guest Input Process Output

Figure 4 shows the guest users' input, process and output. The guest users can pre-register, request services and ask for inquiry, and all of the data will be stored in the system's database. The students will have their attendance in the guest page and it will be verified via database.

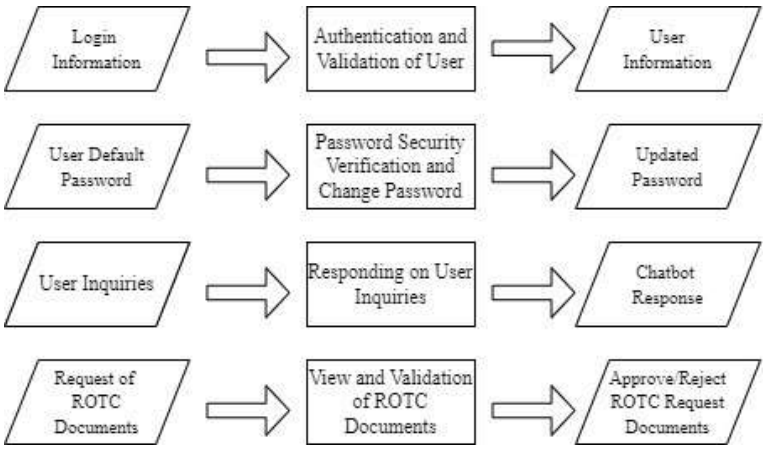

Fig 6. User Input Process Output

The input-output-process of figure 5 shows that the users can create an account by entering the necessary data and will be confirmed by the admin. The user can change their password by using the edit password button. They can also ask for question using the chatbot function, and the chatbot will be the one to answer the user's inquiries. Unlike for the guess, users have the function to request both ROTC services and documents, which will be approve or rejected by the admin.

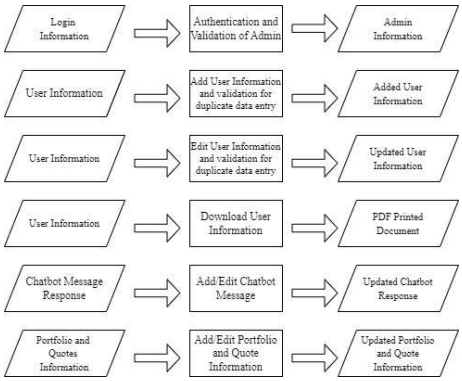

Fig 7. Admin Input Process Output

It is shown in the figure six (6) that the admin can also log in to the system and the data will be stored in the systems' database. The admin has the capability to add and edit the information of all the system's user. Only the admin can download all the necessary documents that is needed by the TAU-Admission and Registration Services (ARS) and TAU-NSTP offices and also the requested documents by the users. In addition to that, admin manages the responses of chatbot, the past and present activities and the messages of the selected alumni of ROTC.

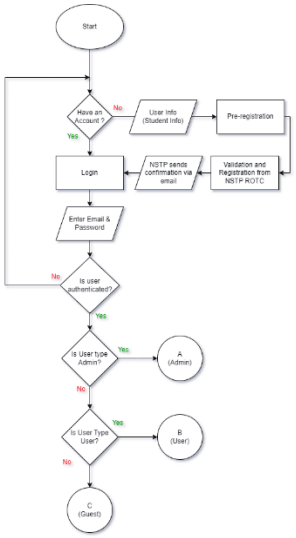

Fig 8. Flowchart for Log-in

Figure 8 shows the flowchart for log in interface, the simplest step-by-step process or sequence of the web-based system when used. The flowchart represents the log in process of the users. It shows that if the user does not have an account, they will go through process in order to confirm if the user is an admin, end-user, or a guest user only.

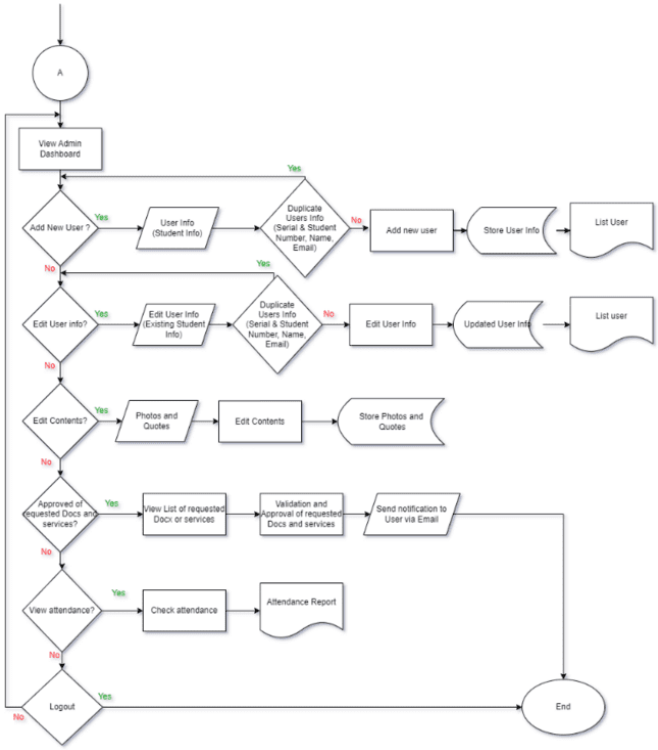

Fig 9. Flowchart for Admin Account

Figure 9 shows the continuation of figure 8. It shows that if the user is verified as an admin, it will show all the functionalities of the system. From adding of user, to editing the contents of the system, to approval of the requested services and document, and the viewing of the attendance. The admin can also generate the reports of the mentioned functionalities.

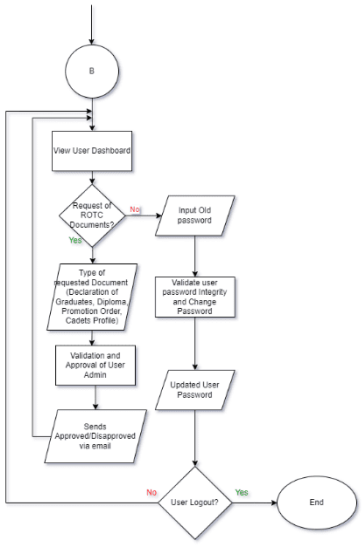

Fig 10. Flowchart for End-user Account

Figure 10 shows the flowchart for the end-users. Unlike the admin account, the end-users only have limited functionalities. End-users can see their personal information; they can also update their passwords.

Furthermore, the end-users can request both ROTC services and documents and the admin will send email if the request is approved or rejected.

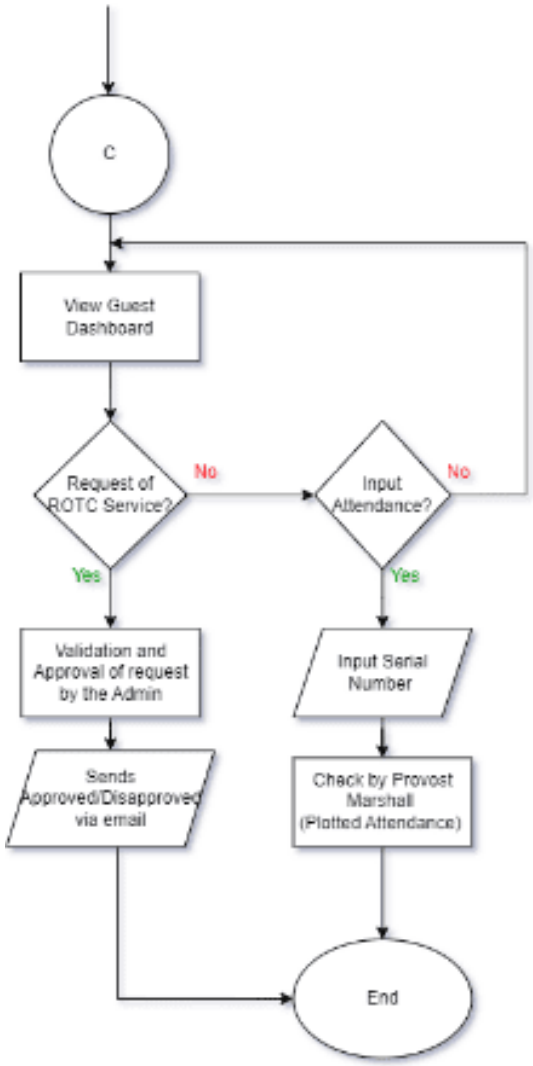

Fig 11. Flowchart for Guest

Figure 11 shows the last part of the flowchart, which is for the guest users. Guest users can access the attendance form for ROTC training day, but not all users can access the attendance, only the validated students of ROTC can be recorded in the attendance. For the public use, users can ask queries via chatbot, check announcements, and pre-register. In addition to that, guest users can request ROTC services and will be validated by the admin. Moreover, they can also check it the homepage the activities, total enrollees, and FAQs about ROTC program

Hardware and Software Requirements

The ROTC web portal can be accessible to any laptop/desktop devices and browser. In addition to that, users can use any operating system to use the web portal.

Evaluation Results

The web portal will be evaluated by the end users and IT experts based on the ISO 9126 standards. These criteria are applied for the end-users and experts to explore and understand the system's content.

Table 3. Evaluation of Users on Software Usability.

A. USABILITY	AVERAGE	DESCRIPTIVE RATING
A.1 Pages are easily to navigate.	4.42	Acceptable
A.2 It is easy to learn to use the system	4.66	Highly Acceptable
A.3 Transactions are quick and easy	4.45	Acceptable
A.4 The system gives an error message and clearly told how to fix it	4.78	Highly Acceptable
A.5 Whenever a mistake is made, the user can recover easily and quickly.	4.78	Highly Acceptable
A.6 The system has a very minimalist and user-friendly design that is pleasing to the eyes.	4.69	Highly Acceptable
Section Mean	**4.63**	**Highly Acceptable**

Table 3 indicates that users rated the usability of the system as highly acceptable and acceptable, resulting as highly acceptable in terms of usability, with a mean of 4.63.

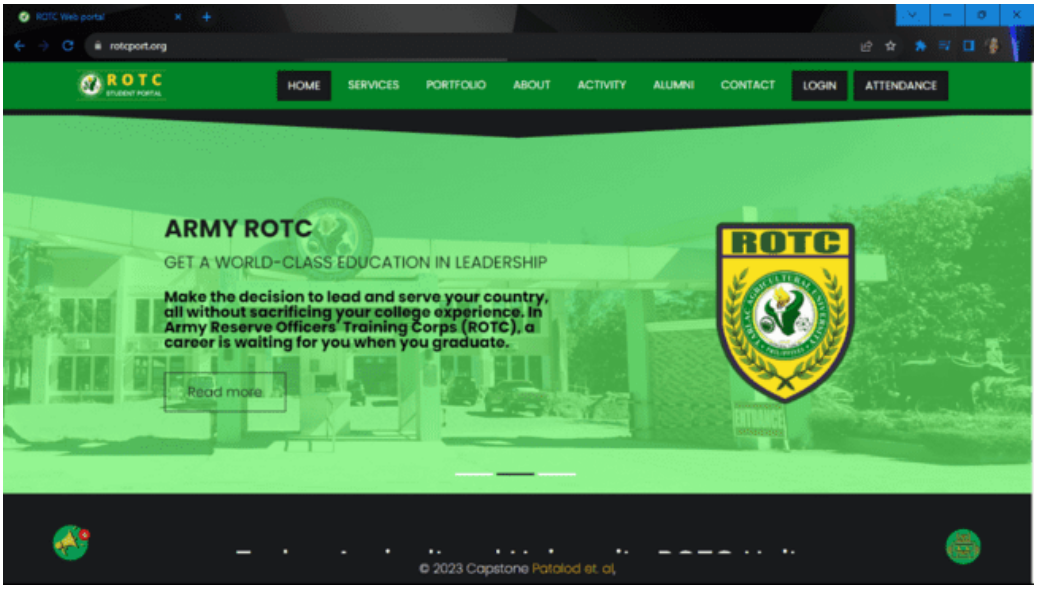

Fig 12. Home Page

Figure 12 shows the home page of the system for guest users with the navigation bar showing where users can find all the necessary buttons of the system.

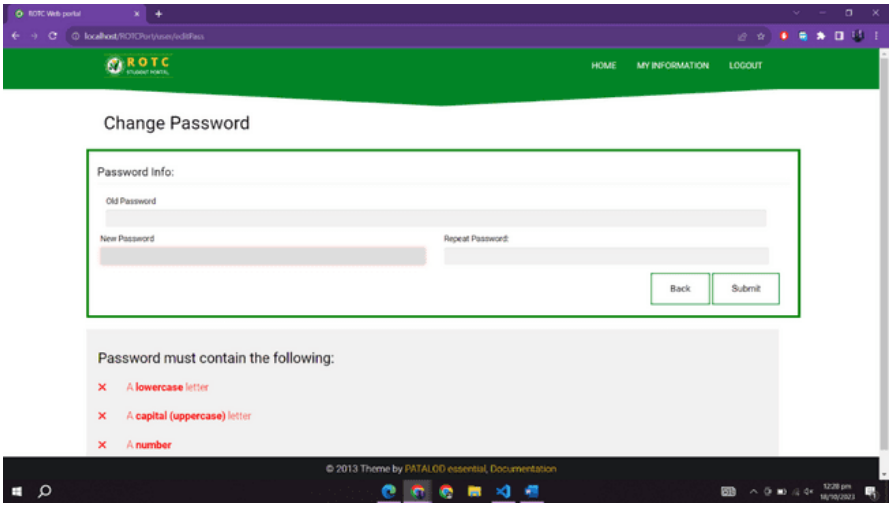

Fig 13. Change Password Interface

In figure 13, the system will give an error message if in the form if the user does not meet the required contents.

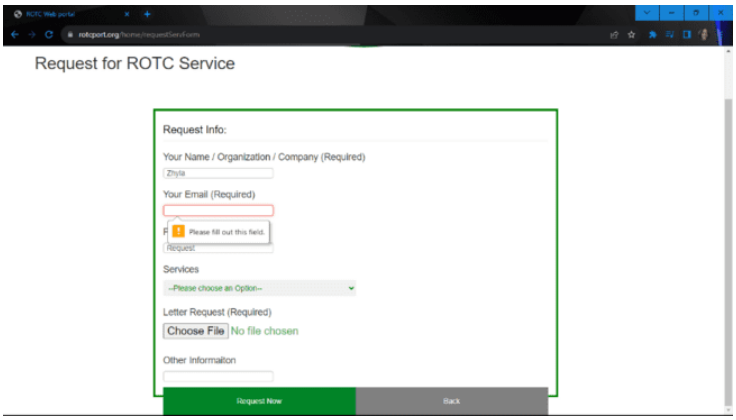

Fig 14. Request ROTC Services

Figure 14 shows that if the user does not input data in a particular field of the form, the system will notify the user that it is need to fill out the specific field.

Table 4. Evaluation of Users on Software Functionality.

B. FUNCTIONALITY	AVERAGE	DESCRIPTIVE RATING
B.1 The web portal helps the user in summarizing the records for each data.	4.82	Highly Acceptable
B.2 The information (such as chatbot and request message) provided with the system is clear.	4.11	Acceptable
B.3 The system is able to show the correct records of each user accurately.	4.81	Highly Acceptable
Section Mean	**4.58**	**Highly Acceptable**

Table 4 shows that users assessed the system's functionality as highly acceptable and acceptable, with a mean of 4.58 indicating that it is highly acceptable in terms of functionality.

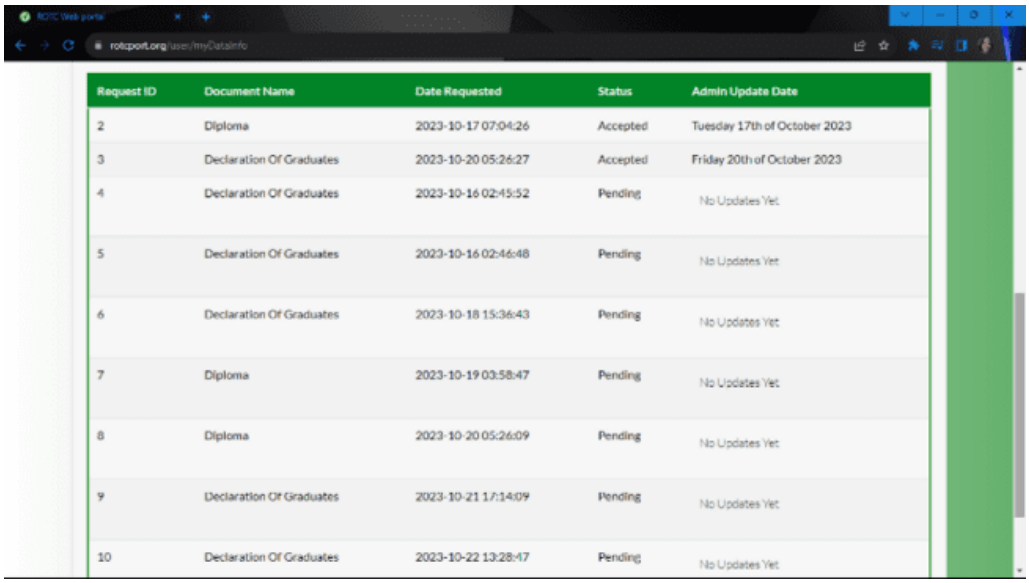

Fig 15. List of Requested Documents of the User

It is shown in figure 15 the recorded list of all of the requested documents made by the user.

Table 5. Evaluation of Users on Software Efficiency.

C. EFFICIENCY	AVERAGE	DESCRIPTIVE RATING
C.1 The system responds easily right after every transaction you make	4.51	Acceptable
C.2 The system can be accessed on any devices	4.83	Highly Acceptable
C.3 The system runs smoothly on any web browsers	4.23	Acceptable
Section Mean	**4.52**	**Highly Acceptable**

Table 5 shows that users determined the system's efficiency as highly acceptable and acceptable, resulting in an efficiency rating of highly acceptable with a mean of 4.52.

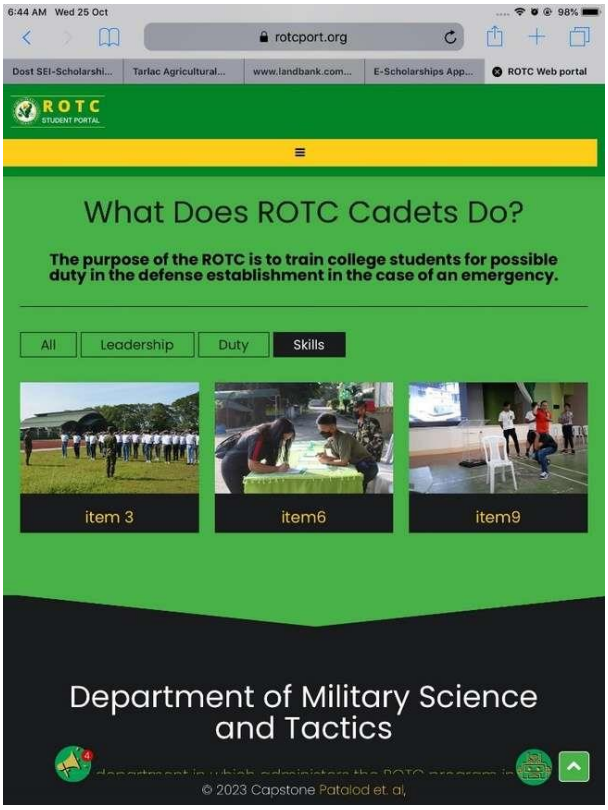

Fig 16. System's Home Page using iPad Mini

It is shown in figure 16 the home page of the system using an iPad Mini device, indicating that the system can be accessed on any devices.

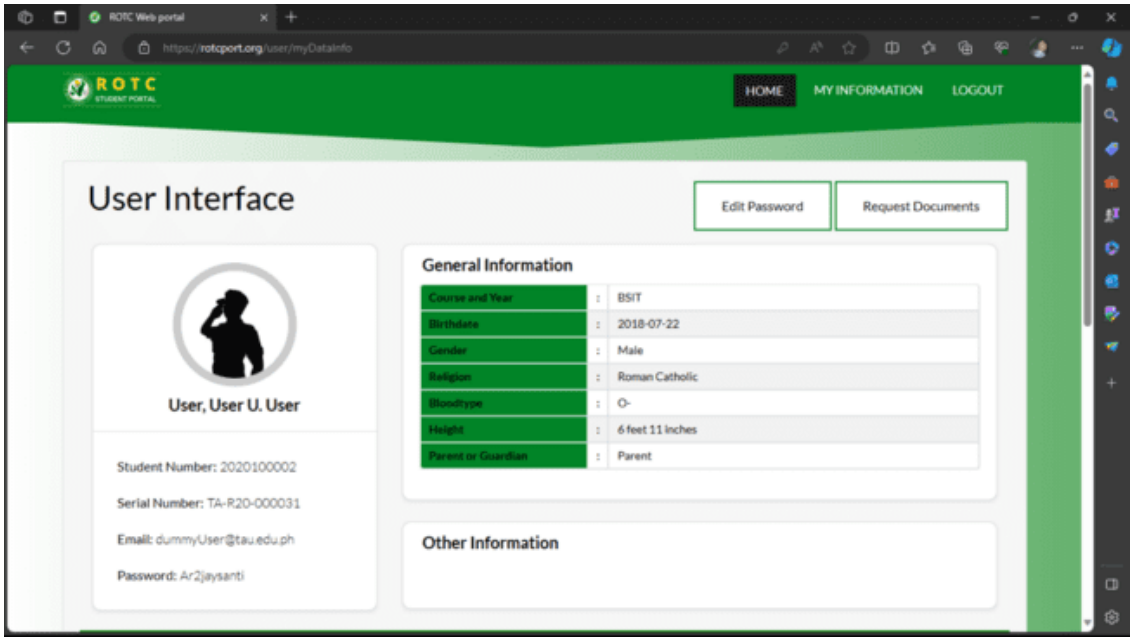

Fig 17. End-User Interface using Different Browser

Figure 17 depicts the user interface using Microsoft 365 Copilot Browser, demonstrating that the system may be used with any web browser.

Table 6. Evaluation of IT Experts on Software Functionality.

D. FUNCTIONALITY	AVERAGE	DESCRIPTIVE RATING
D.1 The system uses words that can be understood easily and has buttons that you can easily know what it does.	4.60	Highly Acceptable
D.2 The system can be easily learned by all of the users due to its user-friendly interface	4.60	Highly Acceptable
D.3 The system is capable to run all of its capabilities into full use.	4.40	Acceptable
D.4 The system has a very minimalist and user-friendly design that is pleasing to the eyes.	4.50	Highly Acceptable
D.5 The list of data in the tables is well organized.	4.50	Highly Acceptable
Section Mean	**4.52**	**Highly Acceptable**

Table 6 indicates that users rated the functionality of the system as highly acceptable and acceptable, resulting as highly acceptable in terms of functionality, with a mean of 4.52.

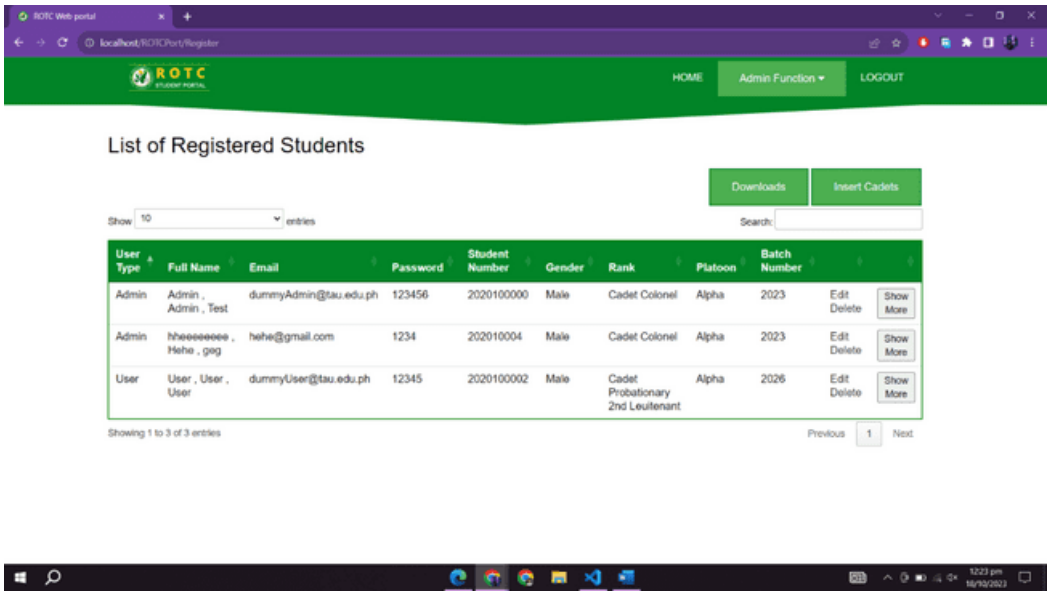

Fig 18. List of Registered Users

Figure shows one the of the admin function, which is the list of registered students under ROTC program. The admin has the capability to edit or delete the user. Furthermore, the filter for the dropdown list is categorized into View Requested Services, View Requested Documents, Attendance, List of Pre-Registered Students and Registered Students, Update Chabot; the admin can download all the recorded list by category.

Table 7. Evaluation of IT Experts on Software Reliability.

E. RELIABILITY	AVERAGE	DESCRIPTIVE RATING
E.1 The system reaches its full functionality upon first implementation and test by the expert	4.40	Acceptable
E.2 The system shows error messages instead of crashing due to incorrect inputs or events done by the user	4.60	Highly Acceptable
E.3 The system is able to recover your files and records if you saved the database properly	4.50	Highly Acceptable
Section Mean	**4.53**	**Highly Acceptable**

Table 7 indicates that experts rated the reliability of the system as highly acceptable and acceptable, resulting as highly acceptable in terms of reliability, with a mean of 4.53.

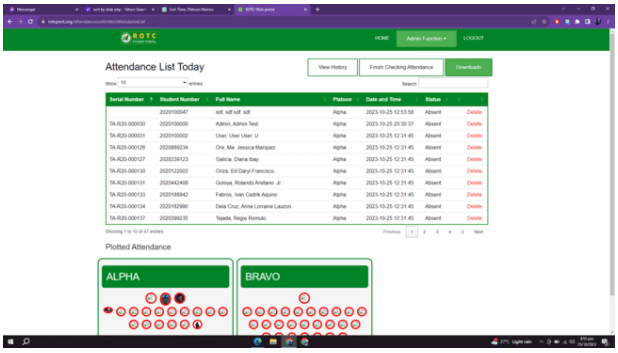

Fig 19. Plotted Attendance List

Figure 19 shows the full function plotted attendance list of the current day. Red color indicates that the cadets is absent, while green for present and gray for late.

Table 8. Evaluation of IT Experts on Software Maintainability.

E. MAINTAINABILITY	AVERAGE	DESCRIPTIVE RATING
E.1 The system can be easily maintained by the administrator or anyone the admin gave permission to	4.60	Highly Acceptable
E.2 The system can by iterated by the future developer by accessing the source code	4.60	Highly Acceptable
E.3 The system remains stable for a long period of time	4.50	Highly Acceptable
Section Mean	**4.57**	**Highly Acceptable**

According to Table 8, users assessed the system's usability as extremely acceptable and acceptable, resulting in a score of 4.57 in terms of usability.

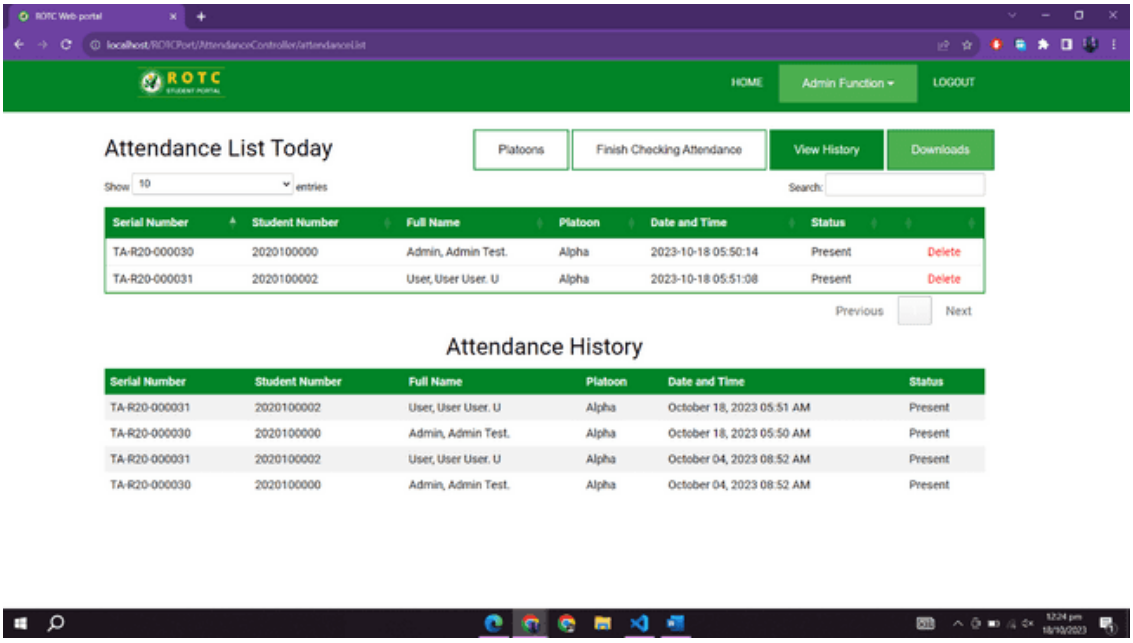

Fig 20. Attendance List

Figure 19 shows the attendance list of the current day where the cadets logged in attendance form, and it also shows the history of the attendances of the cadets.

Table 9. Evaluation of IT Experts on Software Portability.

F. PORTABILITY	AVERAGE	DESCRIPTIVE RATING
F.1 The system can adapt its GUI at any screen resolution	4.50	Highly Acceptable
F.2 The system can perform its capabilities on what the user wants to do without hassle	4.80	Highly Acceptable
F.3 The system is portable as it can be accessed through any media.	4.30	Acceptable
Section Mean	**4.53**	**Highly Acceptable**

Table 9 indicates that users rated the usability of the system as highly acceptable and acceptable, resulting as highly acceptable in terms of usability, with a mean of 4.53.

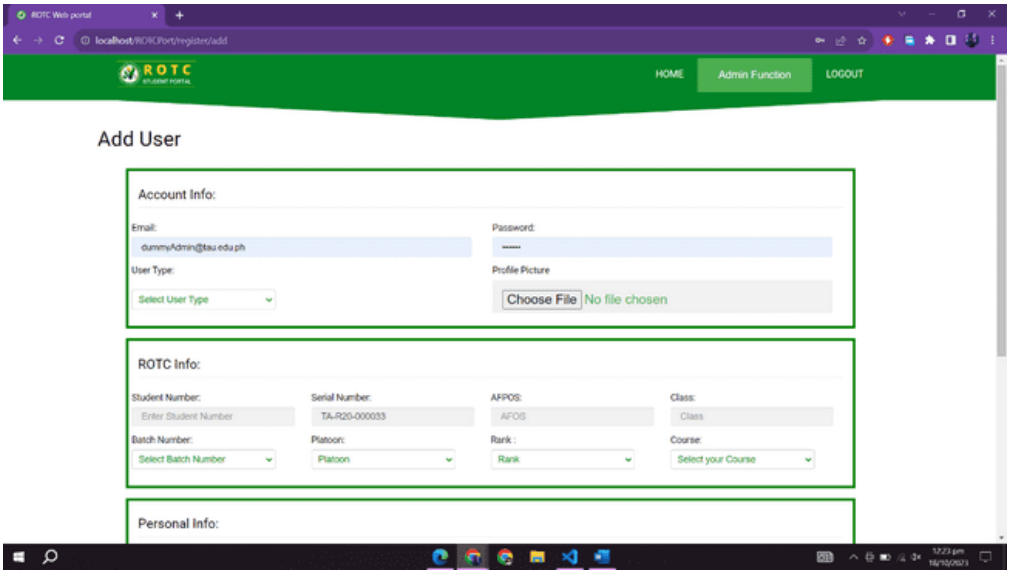

Fig 20. Adding of User

It is shown in figure 20 the form for adding of user. The admin can edit all the necessary data for the user.

4. Conclusions

The following are the conclusions of the study:

1. HTML, CSS, JavaScript, PHP, and MySQL can be use in developing a solution similar to Web Portal for Tarlac Agricultural University ROTC Unit.

2. End-users agreed that the Web Portal for Tarlac Agricultural University ROTC Unit was satisfactory with a grand mean of 4.56 indicating that the system is highly acceptable.

3. Experts approved that the Web Portal for Tarlac Agricultural University ROTC Unit is functioning well. Furthermore, the system is easy to use and the design for the user interface was highly acceptable. Therefore, the grand mean of 4.58 indicates that the system is High Acceptable.

4. The development of the web portal will considerably boost the ROTC's capacity to manage data and services efficiently. Users will benefit from quicker access to historical data, document requests, FAQs, and chatbot help. The admin interface improves data management, allowing ROTC administrators to efficiently supervise unit operations and offer needed documentation and services more quickly.

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