

Scholarship Tracking System with Mobile Notification

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Abstract: The Cagayan State University at Lal-lo (CSUL) offers various scholarship programs with the support of its stakeholders. Among the campus offices, the Office of Student Development and Welfare (OSDW) plays a vital role in managing student scholarship records. To streamline operations, the Scholarship Tracking System with Mobile Notification was developed, enabling the OSDW Coordinator to efficiently manage scholarship data, generate reports, and deliver critical updates to students via SMS. This study focused on the design, development, and evaluation of the system, using the ISO/IEC 25010 model to assess key quality attributes, including functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. The research employed both descriptive and developmental methods to ensure a comprehensive evaluation and documentation of the system's capabilities. Based on the survey, the participants evaluated the developed system as "highly acceptable" in terms of the different criteria of ISO/IEC 25010. Thus, utilizing the system enables the OSDW coordinator to send notifications to scholars in an effective and convenient way. Moreover, the developed system would ensure better processes and services in the OSDW that would greatly benefit both the OSDW Coordinator and the students of CSUL.

Keywords: hybrid system, ISO 25010, SMS, scholarship tracking system, SMS API

1. INTRODUCTION

The Internet has been widely used to effectively disseminate information to everyone around the globe. Online platforms such as Instagram, Twitter, Facebook, and other social media became very effective for urgent announcements to millions of people. These platforms can reach all the target recipients of certain information in just a short period when they are connected to the internet. Moreover, most of the platforms on the Internet nowadays include the use of Short Message Service (SMS) to notify their end users directly on their cellular phones so they can receive those notifications even without an Internet connection.

The Cagayan State University of Lal-Lo (CSUL) has already established its WIFI connection, which is now currently utilized by teachers in reaching their students in this no-face-to-face norm of conducting classes and in maintaining and managing their classes in the Learning Environment Network System (LENS), which is their primary platform to deliver learning resources in an asynchronous manner. On the other hand, the cost and difficulties of having a good WiFi connection on the part of students hinder them from having an internet connection every day. Students can only go online twice a week to download and complete LENS activities and submit their weekly output. Therefore, the use of the internet, particularly social media platforms, in disseminating information, especially on urgent and important announcements, to students is not that effective. This is one of the reasons why SMS-based systems remain the choice of many organizations for communication since they are very simple and effective, personal, download-free, can operate without an internet connection, and can send information to all cellular phones that are SMS-enabled (Deyto, 2021). Aside from the reliability of SMS messaging, texts are quick and cost-effective, and results can be very quickly analyzed. It is efficient, simple to set up and use, and has an almost immediate impact on responses (commbox.com). The Office of the Student Development and Welfare (OSDW) of CSUL is one of the offices that manages the smooth flow of operations on the campus. It is the office that manages all the records that pertain to scholarships and their student beneficiaries. The said office has only one staff member who is also a part of the teaching



force of CSUL. Considering the records of all the scholarships offered on the campus, it is difficult on the part of the OSDW Coordinator to manage the data and records of all the different scholarships every semester, to provide timely and reliable updates and reports, and to communicate with the scholars about urgent and important announcements.

To eliminate these problems and to help the OSDW Coordinator of the Campus, the researchers thought of developing the Scholarship Tracking System with Mobile Notification to be used by the OSDW Coordinator in managing all the scholarship records, as well as in providing reliable, accurate, and timely reports. Moreover, this system facilitates a better process of sending notifications. Scholars can surely receive timely notifications from the OSDW Coordinator as long as they possess an SMS-enabled cellular phone with the minimum required signal to receive a message.

2. OBJECTIVES OF THE STUDY

The general objective of the study was to develop a system to be used by the OSDW coordinator in managing scholarship records called “Scholarship Tracking System with Mobile Notification”.

Specifically, the study aimed to:

1. provide an alternative and convenient way to inform scholars of updates via SMS;
2. provide a database to serve as a storage system for all OSDW reports;
3. provide a prompt and reliable method for generating scholarship reports;
4. evaluate the level of acceptance of the developed system based on ISO 25010 Software Quality Standards in terms of:
 - a. Functional Suitability;
 - b. Performance Efficiency;
 - c. Compatibility;
 - d. Usability;
 - e. Reliability;
 - f. Security;
 - g. Maintainability;
 - h. Portability.

3. CONCEPTUAL MODEL

This diagram presents the needed data and how they were processed in the conduct of the study.

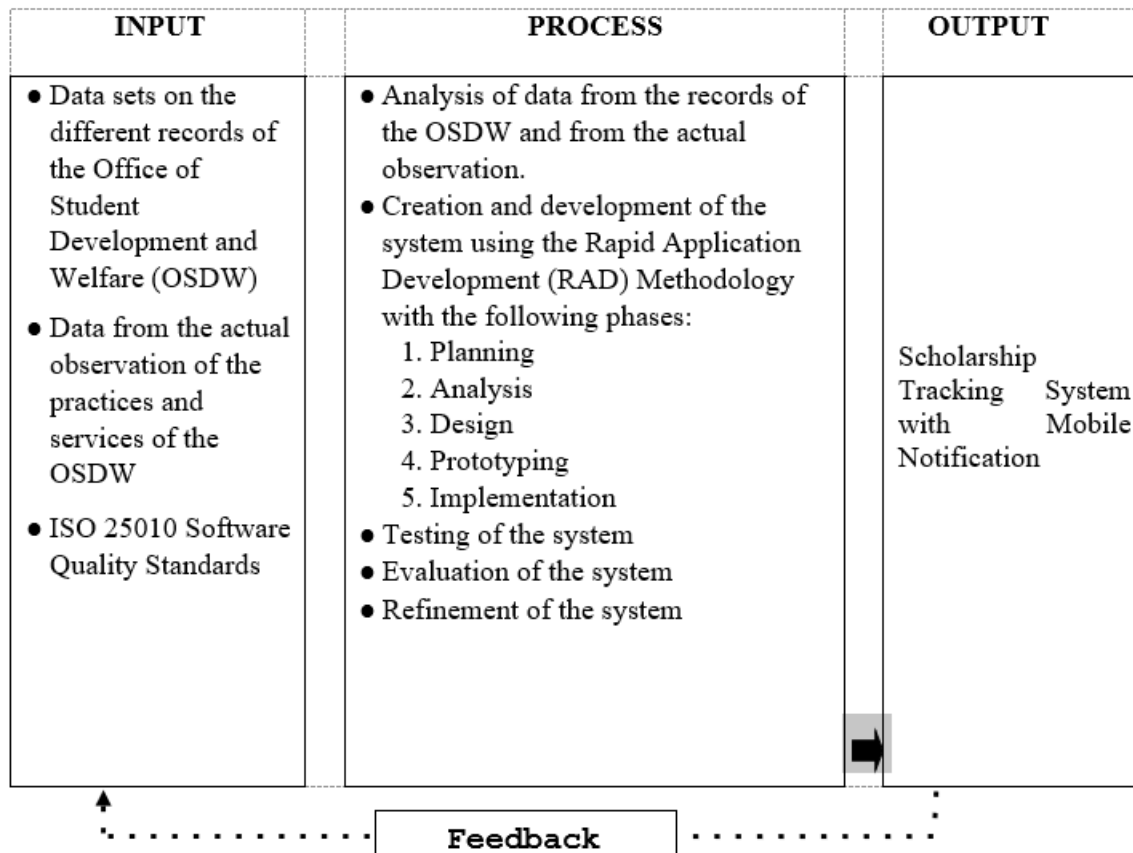


Figure 1. Conceptual Model

Figure 1 displays the three (3) stages: Input, the Process and the Output. The first box, which contains the input, refers to the sample reports that were created and submitted by the OSDW Coordinator as well as the data acquired from the actual observation of the processes and services in the OSDW. These inputs were recognized, evaluated, and analyzed by the researchers, and these served as their basis in developing the Scholarship Tracking System with Mobile Notification.

4. SIGNIFICANCE OF THE STUDY

The results of the study entitled "Scholarship Tracking System with Mobile Notification" is deemed beneficial to the OSDW coordinator of the campus as it would facilitate a better way of keeping and managing scholarship records. Moreover, the developed system would automatically produce the reports that are regularly submitted by the OSDW coordinator. The developed system would also provide the OSDW coordinator a convenient and effective way of sending notifications to the scholars. The results of the study are also beneficial to the students, as they would automatically receive important announcements, reminders, and other information about their scholarships directly to their cellphones.

5. SCOPE AND LIMITATION

The study focused on the design and development of the Scholarship Tracking System with Mobile notifications that can be used by the OSDW coordinator in keeping and managing scholarship records and submitted reports, generating reports, and sending notifications to a bulk number of scholars.

Most of the functionalities of this study, such as encoding and management of records, reports' generation, monitoring of scholarship records, and all other functionalities except the SMS Notification, can be used by the OSDW Coordinator even without an internet connection. However, when SMS notifications are sent to the scholars, the computer unit where the developed system is installed must be connected to the internet to communicate with the SMS API that will enable the developed system to successfully send notifications. In addition, this study would also allow the OSDW coordinator to send notifications either to a selected group of scholars, to all the scholars of a

particular semester, or to a particular scholar only. The study would also allow the OSDW Coordinator to directly print the formatted reports, export reports into Comma Separated Values (CSV), and import bulk records of students from a CSV file format.

Moreover, the study would allow the students to receive notifications from the OSDW coordinator on any type of cellular phone as long as it is SMS-enabled. The students would not be able to reply and send queries via SMS since the developed system does not have an autoreply feature to answer the common queries of students.

6. REVIEW OF RELATED LITERATURE

Local Studies

Design and Implementation of SMS-based Enhancements to a Community-based Health Information Management System

Sarmiento et al (2011) described in this study the potential uses of SMS technology enhancements in health in terms of addressing the information needs of a village health center, identifying which health unit services can be enhanced through the use of SMS technology and SMS-based applications, while also the determining the improvements in the delivery of health care services urban health centers using SMS. Health center staff were engaged from the initial design to the actual implementation of the SMS appointment reminder system since they were the ones who would be integrating the system in their everyday workflow. The system involved midwives enrolling pregnant patients in the maternal care program of the city for the SMS reminder system. Patients then received the appointment reminder a few days before their scheduled appointment for a pre-natal check-up. Overall response from the patients and health center end-users were positive, with patients mentioning the received SMS reminder message during their prenatal follow-up. Integration of the SMS appointment reminder system has been found to be most efficient at the post-consultation process where the patient receives information for her next follow-up.

A Web-Based Student Support Services System Integrating Short Message Service Application Programming Interface

Vera and Comendador (2016) concluded in their study that utilizing a web-based system with integrated SMS is as an alternative to the university's existing media of communication that would enable the system users to avail of an effective and convenient manner of getting information from the university anytime. The manner of disseminating would become speedy, timely, and appropriate. Furthermore, using the system in an academe would result to paperless capturing, speedy recording and filing of students' records; standardized format of academic-related forms, timely dissemination and receipt of academic-related information through SMS; and production of accurate reports.

SMS Technology as Disaster Warning And Alert System As Perceived By Selected Constituents Of Davao Del Norte

Suaybagoio (2016) found out in his study that the SMS Technology as Disaster Warning and Alert System is well received by the constituents of Davao Del Norte believing that it can strengthen disaster and emergency preparedness. Participants also believe that the alert messages sent to them through Short Message Service or SMS in this study, come from the authority of the Provincial Disaster Risk Reduction and Management Council (PDRRMC) of Davao Del Norte. The alert messages are delivered on time and contain appropriate message or information that give them updates about the current condition of the weather and on what to do in case of emergency situations.

Virtual Learning Platform with Short Message Service (SMS) Notification

Flores (2018) concluded in his study that the utilization of SMS API helped in the development of an effective SMS text notification embedded in the developed virtual learning platform which was published online.

Foreign Studies

SMS-Based Event Notification System

Olaleye et al (2013), cited in their study that short message service (SMS) technology is one of the most stable and most widely used mobile communication methods after phone calls. Most students of tertiary institutions carry mobile phones which is capable of receiving short messages as a means of event notification. In principle, text message can be used either as a one-way communication to provide the user information such as reminder, alert, etc, or as a two-way communication that enables the user to send and receive information (such as question and answer). Event notification (through SMS) is a well-known way of notifying users about an event scheduled to take effect within a

particular period in an institution. Moreover, Mobile text messages are an excellent aid for communication when there is a need to submit information also at long distances or without well working communication system or infrastructure, or when the people cannot physically meet the staff that is concerned, provided that the cost of the text message is very low and it is available to practically everyone.

Web-Based Appointment System using Short Message Service Technology: Usability Aspect

Wahab et al (2016) cited in their study that in current situation, almost everyone can afford for a mobile phone, because it is relatively cheap. In addition, the hand phone itself contain various capabilities with the most basic functions include such as call, SMS, Multimedia Message Services (MMS), calculator, calendar, and games. In addition to the standard voice function of a mobile phone, current mobile phones may support many additional services, and accessories, such as email, packet switching for access to the Internet, Bluetooth and infrared, camera with video recorder and MP3 player, radio and Global Positioning System (GPS). Among all functions of a mobile phone, SMS is a very popular service throughout the world. It involves transmission of alphanumeric messages between two parties which enables the communication between a mobile subscribers and external systems such as paging, electronic mail and voice-mail systems. In fact, it is expected be the most attractive and effective service for future commercial use.

SMS-Based Content Alert: A Digital Library Web-Based System Using SMS Technology

Osman (2017) stressed in his study that many organizations used web-based system that can be integrated with SMS technology because most people often used mobile phone that gives convenience to the users who are familiar with SMS technology. Moreover, he found that system using web-based and SMS technology is convenient, economic and reliable method of notification.

The Need for a More Efficient User Notification System in Using Social Networks as Ubiquitous Learning Platforms

Michi and Donmes (2017) concluded that the “SMS” technology used in their study has the affordance of providing clear notifications to each cellular phone user, assuming that this relatively old technology is almost unused for other purposes in the modern world. Considering the technical aspect of notification delivery in the ubiquitous context, notifications that are as powerful as SMS can be displayed only by native smartphone apps via their powerful feature of “push-notifications”. Most Social Networking Services have highly popular native applications, but considering modern Learning Management Systems, one could not help but notice that most of these are applications can run only in Web browsers, which unfortunately render them unable to provide push notifications. There is always the option of using email-based push-notifications, but this could perhaps share the same fate with push notifications that are delivered by social network services: failing to go above the attention threshold of the recipient. This implies that future LMS designers might want to come up with native mobile application versions of their systems or at least complement their existing Web applications with SMS functionality, in order to provide for ubiquity in learning.

SMS Based Notification System for Identifying the Faulty Equipment of Blast Furnace

Agrawal et al (2017) cited in their study that the SMS-based system was developed for monitoring the faulty equipment and is implemented in blast furnace area. They concluded that the SMS-based system guides the concerned person about the equipment’s failure immediately when a fault is identified, therefore it reduces the cycle time of identification of faulty equipment. Moreover, they concluded that the developed system has reduced the number of faulty equipment.

Utilization of Short Message Services (SMS) for Library Notification System

Khanim and Ahmed (2018) found out in this study that quite a large number (i.e. 58%) concur that integrating SMS in the proposed notification system would facilitate to resolve the problem of notifying students on overdue books, arrival of new books and operating schedule more efficiently. Participants were receptive towards implementing a supporting platform that can improve library notification service in University of Malaya library via mobile technology by utilizing a SMS-based notification system as evaluation of the prototype indicates a positive reaction from the participants.

7. MATERIALS AND METHODS

A. Research Design

The study utilized the descriptive survey and developmental method of research to describe the features and functionalities of the system and to describe the evaluation of the participants' level of acceptance of the developed system in terms of the different criteria of ISO 25010 Software Quality Standards.

The researchers also utilized the Rapid Application Development (RAD) prototyping methodology in developing the Scholarship Tracking System with Mobile Notification.

Software Development

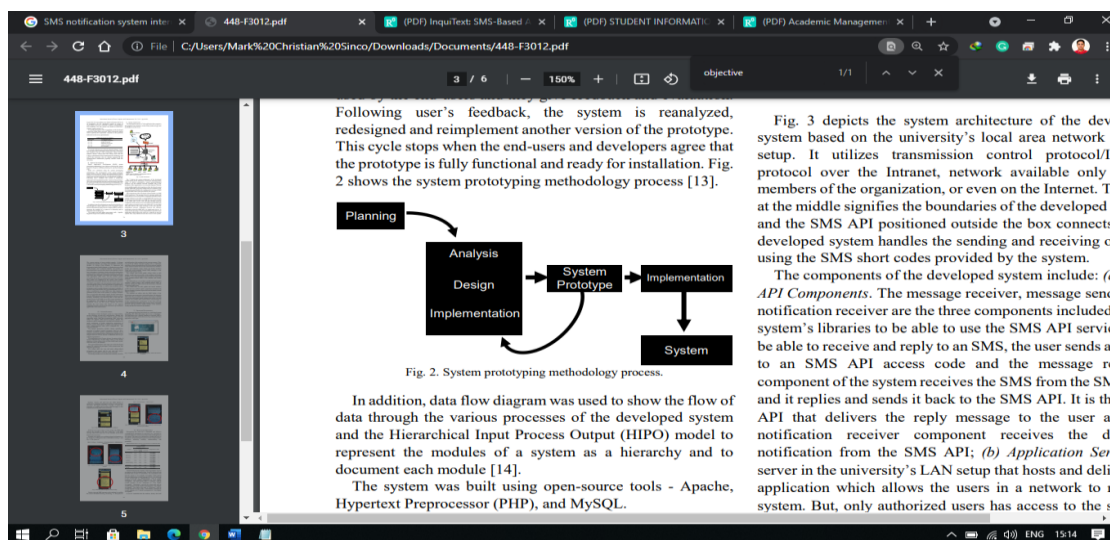


Figure 2. System Prototyping Methodology Process

The development of the Scholarship Tracking System with Notification was guided by the Rapid Application Development (RAD) system prototyping methodology because it requires minimum planning for rapid prototyping and permits changing of requirements at any stage of application development (*Idesis, 2020*). RAD was conducted using the system prototyping methodology. The process began when the researchers started to plan the possible functionalities and features of the system. In this stage, the researchers drafted the Hierarchical Input Process Output (HIPO) diagram to represent the modules of a system as a hierarchy and to document each module.

After the researchers had planned all the needed details to develop the system, they analyzed the flow of operations in the OSDW; they also analyzed the documents and reports handled and managed by the OSDW coordinator; and they also analyzed the possible flow of processes in the system to be developed. In this stage, the researchers created a data flow diagram to show the flow of data in the system. The development of the system prototype began after the analysis, and the design and implementation phases are concurrently being performed based on the planned functions and flow of processes in the earlier stages. The developed prototype was handed to the OSDW Coordinator for testing, and she gave feedback and recommendations on the prototype. Following the feedback and recommendations of the OSDW coordinator, the system was reanalyzed, redesign, and reimplemented by the researchers. This cycle stopped when the OSDW coordinator and researchers agreed that the prototype given is already fully functional and ready for installation. The system was built using open-source tools: Apache, Hypertext Preprocessor (PHP), and MySQL.

B. PARTICIPANTS OF THE STUDY

In order to obtain the desired information, the researchers gathered data from the participants who were chosen purposively. Participants were the IT experts employed in the CSUL, the OSDW coordinator and students. The participants evaluated the level of acceptance of the developed system in terms of the different criteria of ISO 25010 Software Quality Standards. Total enumeration was utilized as the sampling technique of the study.

C. Instrumentation

The instrument used in this study was a modified questionnaire lifted from the study of Cantos et al. (2015). In the said questionnaire, the participants were asked to determine their assessment on the level of acceptance of the

developed system in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability criteria of the ISO 25010 Software Quality Standard.

D. Data Gathering Procedure

In order to obtain accurate data from the participants of the study, the researchers conducted a pilot test on the developed system in the Office of the OSDW Coordinator. During the pilot testing of the developed system, the researchers floated the questionnaire to the participants and asked them to assess the level of acceptance of the developed system based on the different criteria of ISO 25010 Software Quality Standards.

E. Data Analysis

The data obtained by the researchers were tallied and organized for analysis and interpretation. The researchers used the following statistical tools:

1. Weighted Mean. This was utilized to measure the evaluation of the participant's level of acceptance on the Scholarship Tracking System with Mobile Notification in terms of the different criteria of ISO 25010.
2. Likert Scale. This scale was used to get the point scales and descriptive equivalents of the participants' responses.

Table 1. Scale used for interpreting the participants' level of acceptance on the developed system based on the different criteria of ISO25010 Software Quality Standards.

Scale	Range	Descriptive Interpretation
5	4.20 - 5.00	Very Highly Acceptable
4	3.40 - 4.19	Highly Acceptable
3	2.60 - 3.39	Moderately Acceptable
2	1.80 - 2.59	Slightly Acceptable
1	1.00 - 1.79	Not Acceptable

System Architecture

The study was designed using a 3-tier application that comprises the graphical user interface, the system's logic and the database.

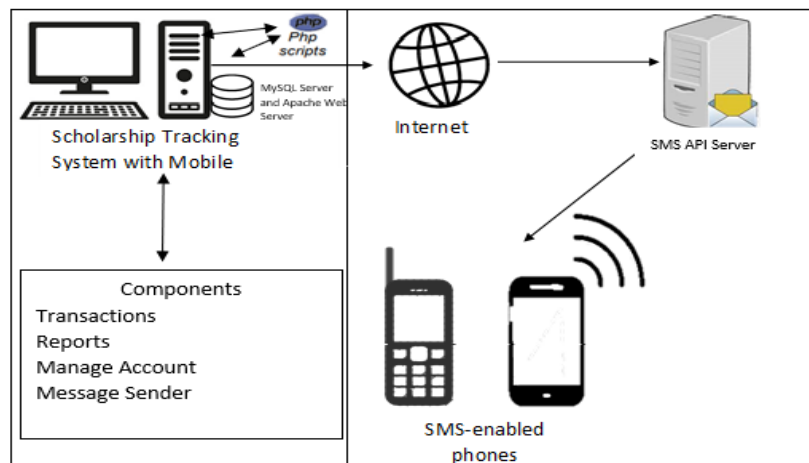


Figure 3. System Architecture

Fig. 3 depicts the system architecture of the developed system. The box that encloses the Computer Unit where the Scholarship Tracking System is being installed signifies the boundaries of the developed system and the SMS API. The components of the developed system include (a) *Xampp Server*. It consists mainly of Apache Web

Server and MariaDB Database, which were used to deploy the developed system offline on the OSDW coordinator's computer. The PHP script was used in developing the system since it is one of the scripts that the XAMPP server can interpret. The developed system has 3 main modules, which are the Transactions, Reports, and Manage Account. The Transaction module consists of the different operations that the OSDW Coordinator usually performs in managing scholarship records. The Reports Module is where the reports to be exported, downloaded, or printed can be displayed. It is also in this module where the CP number of the scholars can be viewed and where the OSDW Coordinator can select a group of scholars or a particular scholar to receive notification; *(b) Internet*.

While the developed system can be used offline to manage scholarship data and records and to produce reports, it has to be connected to the internet whenever the OSDW Coordinator wishes to send notifications to the scholars. The internet is needed for the developed system to access the SMS API to be able to send notifications to the scholars; *(c) SMS API Server*. The SMS API is a well-defined software interface that enables the PHP scripts in the developed system to send short messages via an SMS gateway. The process starts with the computer unit where the developed system is installed and where the OSDW coordinator manages the scholarship records of the campus. The OSDW Coordinator can manage records, produce reports, and store data in the system even if it is not connected to the internet. Upon the approval of a scholarship application, the OSDW enters the data of qualified scholars, such as their personal information, including their CP numbers, and the scholarships' information in the system. When notifications need to be sent to the scholars, the OSDW coordinator should connect the computer unit where the system is being installed to the Internet. The OSDW coordinator will then select the group of scholars to receive the notification and create the notification to be sent. The notification will be sent via the SMS server to the cellular phones of all the students who belong to the selected group of scholars. The system can send notifications to all the scholars on the campus, to a selected group of scholars, or to a particular scholar depending on the option selected by the OSDW Coordinator.

8. SYSTEM FEATURES

The features of the developed system are: login facility, encoding of scholars information, managing records of scholarships offered on the campus, uploading of OSDW reports for future use, monitoring of existing scholarships of scholars, broadcasting SMS to a bulk number of recipients or to a single recipient, bulk import and export of scholars' data from and into a Comma Separated Value (CSV) formatted file, graphical representation of the number of beneficiaries on the different scholarship programs, uploading of important OSDW reports, and report generation.

The reports that can be generated in the developed system are the regular reports that are being submitted by the OSDW Coordinator in the Management Information System (MIS) Office and in the Gender and Development (GAD) Office. These reports can be printed directly from the system since they are already formatted based on the given examples of reports. They can also be exported into a CSV file so the OSDW Coordinator can still edit the data in the reports. The collection of reports (in any file format) that has been uploaded by the OSDW Coordinator in the developed system is also generated so that the OSDW Coordinator can just download the files whenever she needs them.

The OSDW coordinator, as the administrator of the developed system, can manage the user account of the developed system. She can also set the current semester and school year so that they will be displayed as the default value whenever she enters a new record for the current semester. She can also edit and delete records, as well as add information about a newly offered scholarship so that it will be included in the options of scholarship whenever a new record of scholar will be entered in the system.

The students can receive all the notifications that will be sent by the OSDW Coordinator via the developed system as long as their cellular phones have the minimum signal requirement to receive messages, regardless of whether they possess keypad phones or smartphones.

9. PROTOTYPE DEVELOPMENT

The prototype has been developed as a web-based system integrating the SMS-API. The application uses a XAMPP server with a MySQL database as the backend and Apache as the web server. The application uses PHP script as its front-end.



Fig. 4 shows the home page after a user logs in. It shows the graphical representation of the number of scholars in the different scholarship programs offered on the campus. It can also display the graphs by scholarship type (university, government, or private).

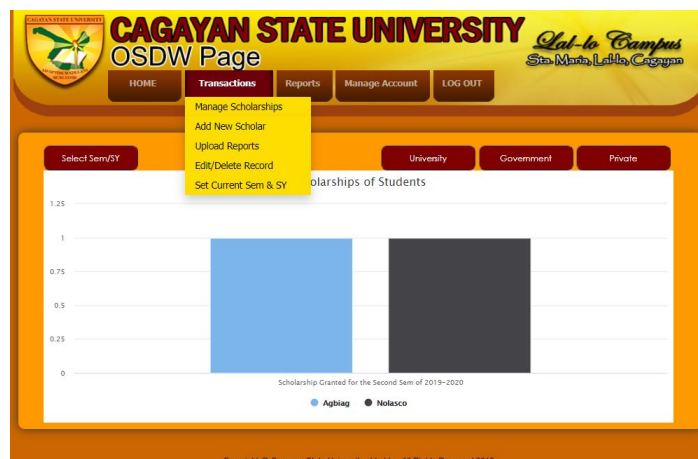


Fig. 5 shows the Transaction tab, which consists of sub-buttons such as Manage Scholarships, Add New Scholar, Upload Reports, Edit/Delete Records, and Set Sem and School Year.

No	Scholarship	Type	Category	Funded By	Add Scholarship
1	Nolasco	Local Government	Non-Merit	Capitol	☐
2	Agbiag	Government	Non-Merit	AgbiagPartylist	☐
3	Pantawid Pamilyang Pilipino	Government	Non-Merit	LGU	☐
4	Athletic	University	Non-Merit	University	☐
5	Academic	University	Merit	University	☐
6	Teacher	Private	Merit	CSULFEA	☐
7	Agatep	Local Government	Non-Merit	LGU	☐
8	Mamba	Local Government	Merit	Gov. Mamba	☐
9	Sinco Lucky	Local Government	Merit	LGU_Lal-ao	☐

Fig. 6 shows the page to add, edit, and delete information about the scholarship program in the system.

CAGAYAN STATE UNIVERSITY
OSDW Page

HOME Transactions Reports Manage Account LOG OUT

Add Scholar Record Add records from file

Semester: School Year: Student ID:

Second Sem 2019-2020 00-00000

New Scholarship Surname, Name, MI

Address CP#

--Select Scholarship-- Gender

--Select College-- --Select Program-- Year

Save

Fig. 7 shows the page to add a new record of scholars in the system.

CAGAYAN STATE UNIVERSITY
OSDW Page

HOME Transactions Reports Manage Account LOG OUT

OSDW Upload Report Form

Semester: School Year: Form No:

First Sem 2019-2020 --Please Select--

Choose Files No file chosen Upload

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Fig. 8 shows the page to upload or store documents and reports of the OSDW Coordinator.

CAGAYAN STATE UNIVERSITY
OSDW Page

HOME Transactions Reports Manage Account LOG OUT

Edit/Delete Record

Second Sem 2019-2020 Name

CAGAYAN STATE UNIVERSITY
OSDW Page

HOME Transactions Reports Manage Account LOG OUT

Name	Course	Year	Type of Scholarship	FundedBy	Category	College	Address
Sinco, Vicky A.	BSIT	1	Local Government	Capitol	Non-Merit	CICS	Sta. Maria, Lal-lo, Cagayan

Fig. 9 shows the page to Edit and Delete information of scholars



Fig. 10 shows the page to set the current semester and school year.

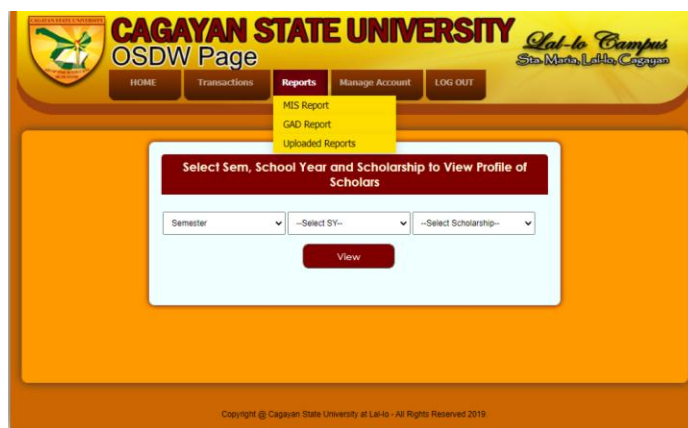


Fig. 11 shows the sub-menus under the Reports Tab, which are the MIS Report, GAD Report, and List of Uploaded Reports.



Fig. 12 shows the sample reports to the MIS Office that can be printed directly or exported to a CSV file.

Name	Contact Number
Sinco, Mark Christian	09361246331
Sinco, Vicky A.	09972870021

Fig. 13 shows the page to notify the selected group of scholars or a particular scholar.



Fig. 14 SMS sent to scholars with Keypad phones



Fig. 15 SMS sent to scholars with smart phones

A)Functional Suitability Criteria		
Completeness 1) The system has all the features and functionalities required by the user.	4.00	HA
Correctness 2) The system produces accurate reports	4.20	VHA
Appropriateness 3) The system facilitates the processes of managing records and producing reports.	4.10	HA
Overall Weighted Mean	4.10	HA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of functional suitability. As shown in the table, the mean evaluation of participants ranges from 4.00 to 4.20. The item, “The system produces accurate reports,” was rated as highest by the participants. On the other hand, the item that was rated lowest is “The system has all the features and functionalities required by the users,” with a descriptive interpretation of “Highly Acceptable.”.

Furthermore, the table reflects that the overall weighted mean of 4.10 suggests that generally, the developed system is “highly acceptable” in terms of functional suitability.

Table 3. The participants’ level of acceptance on the developed system in terms of Performance Efficiency

Attributes	Mean	DI
B. Performance Efficiency		
Time Behavior The system executes processes and responds to users’ command in an expected amount of time	4.30	VHA
Resource Utilization 3)The system efficiently uses resources in providing reports.	4.10	HA
Capacity 4)The system can handle/process number or bulk of records of data.	4.20	VHA
Overall Weighted Mean	4.20	VHA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of performance efficiency. As gleaned from the table, the mean assessment of the participants ranges from 4.10 to 4.30. The item “The system executes processes and responds to users’ commands in an expected amount of time” was rated highest, while the item “The system efficiently uses resources in providing reports” was rated lowest by the participants. Furthermore, the table reflects that the overall weighted mean of 4.20 implies that normally, the developed system is “Very Highly Acceptable” in terms of performance efficiency.

Table 4. The participants’ level of acceptance on the developed system in terms of Compatibility.

Attributes	Mean	DI
C. Compatibility Criteria		
Co-existence 1.) The system shares common environment with other system without damaging effect	3.50	HA
Interoperability 2.) The system can exchange information with other system and can use the information that has been exchanged	4.10	HA
Overall Weighted Mean	3.80	HA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of compatibility. As shown in the table, the mean assessment of the

participants ranges from 3.50 to 4.10. The item “The system can exchange information with other systems and can use the information that has been exchanged” was rated as the highest, and conversely, the item that was rated the lowest by participants was “The system shares a common environment with other systems without damaging effect,” with a descriptive interpretation of “Highly Acceptable.” Furthermore, the overall weighted mean of 3.80 indicates that generally, the developed system is “Highly Acceptable” in terms of compatibility.

Table 5. The participants’ level of acceptance on the developed system in terms of Usability.

Attributes	Mean	DI
D)Usability Criteria		
Learnability 1) The system can be used even if the user does not have any technical experience	4.30	VHA
User Error Protection 2) The system guides and informs the users on invalid entries.	4.10	HA
Operability 3) Navigation on the system is easy and simple	4.30	VHA
Appropriateness Recognizability 4) The system is helpful and appropriate to the management of records in the OSDW	4.30	VHA
User Interface Aesthetic 5) The system has a pleasing and satisfying interface	4.20	VHA
Accessibility 6) The system can be used by whoever will be appointed as OSDW Coordinator.	4.20	VHA
Overall weighted Mean	4.23	VHA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of usability. As shown on the table, the mean assessment of the participants ranges from 4.10 to 4.30. The items “The system can be used even if the users do not have any technical experience,” “Navigation on the system is easy and simple,” and “The system is helpful and appropriate to the management of records in the OSDW” were rated highest by the participants. In contrast, the item “The system guides and informs the users on invalid entries” was rated as the lowest. Furthermore, the table reveals that the overall weighted mean of 4.23 by the participants signifies that generally, the developed system is “Very Highly Acceptable” in terms of the usability.

Table 6. The participants’ level of acceptance on the developed system in terms of Reliability.

Attributes	Mean	DI
E)Reliability Criteria		
Availability 1) The OSDW can use the system whenever she needs it.	4.20	VHA
Maturity 2) The system is stable and runs smoothly without interruption	4.30	VHA
Recoverability 3) The system can recover from failure and can resume to operations	4.10	HA
Fault Tolerance 4) The system operation is not affected by a hardware or software fault	3.80	HA
Overall Weighted Mean	4.10	HA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of reliability. As reflected in the table, the mean evaluation of the participants ranges from 3.80 to 4.30. The item “The system is stable and runs smoothly without interruption” was rated highest by the participants.

On the other hand, the item that was rated lowest by the participants is “The system operation is not affected by a hardware or software fault.” Furthermore, the table reflects that the overall weighted mean of 4.10 implies that generally, the developed system is “Highly Acceptable” in terms of reliability.

Table 7. The participants’ level of acceptance on the developed system in terms of Security

Attributes	Mean	DI
F)Security Criteria		

Confidentiality 1) The system ensures that the data entered into the system remains confidential and exclusive only for the OSDW coordinator.	4.30	VHA
Integrity 2) The system protects the integrity of data by not allowing unauthorized users to alter data it handles.	4.30	VHA
Non-repudiation 3) The system gives feedback whether an action/event have taken place or not.	4.40	VHA
Accountability 4) The system can trace the actions of the user.	4.20	VHA
Authenticity 5) The system can validate the authenticity of user's accounts and the reports it produced.	4.10	HA
Overall Weighted Mean	4.26	VHA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of reliability. As reflected in the table, the mean evaluation of the participants ranges from 3.80 to 4.30. The item "The system is stable and runs smoothly without interruption" was rated highest by the participants. On the other hand, the item that was rated lowest by the participants is "The system operation is not affected by a hardware or software fault." Furthermore, the table reflects that the overall weighted mean of 4.10 implies that generally, the developed system is "Highly Acceptable" in terms of reliability.

Table 8. The participants' level of acceptance on the developed system in terms of Maintainability.

Attributes	Mean	DI
G) Maintainability Criteria		
Modularity 1) Changes in a component of a particular module will not affect the other modules.	4.00	HA
Reusability 2) The functionalities and products of the system is useful to new and existing systems	4.20	VHA
Analyzability 3) The interconnection of the system's modules is easy to analyze and understand.	4.30	VHA
Modifiability 4) System modification can be easily done on the system.	4.30	VHA
Testability 5) The system can be tested easily	4.40	VHA
Over all Weighted Mean	4.24	VHA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of maintainability. As shown in the table, the mean evaluation of the participants ranges from 4.00 to 4.40. The item "The system can be tested easily" was rated as the highest, while the item that was rated the lowest by participants was "Changes in a component of a particular module will not affect the other modules." Furthermore, the table shows that the overall weighted mean evaluation of 4.24 correspondingly suggests that generally, the developed system is "Very Highly Acceptable" in terms of maintainability.

Table 9. The participants' level of acceptance on the developed system in terms of Portability

Attributes	N=10	
H) Portability Criteria	Mean	DI
Adaptability 1) The software can be adapted for different hardware and software or other usage environments	4.10	HA
Installability 2) The software is easy to install and implement	4.40	VHA
Replaceability 3) The software can replace the software product for the same purpose in the same environment.	4.10	HA
Over all Weighted Mean	4.20	VHA

The table above presents the evaluation of participants on the level of acceptance of the developed system to ISO 25010 Software Quality Standards in terms of portability. As reflected in the table, the mean assessment of the participants ranges from 4.10 to 4.40. The item “The software is easy to install and implement” was rated as the highest, while the items “The software can replace the software product for the same purpose in the same environment” and “The software can be adapted for different hardware and software or other usage environments” were rated as the lowest by the participants. The overall weighted mean of 4.20 suggests that the developed system is “Very Highly Acceptable” in terms of portability.

Table 10. Summary of the participants’ level of acceptance on the developed system in terms of the different criteria of ISO 25010 software quality standards.

NO	ATTRIBUTES	MEAN	QUALITATIVE DESCRIPTION
1	Functional Suitability	4.10	Highly Acceptable
2	Performance Efficiency	4.20	Very Highly Acceptable
3	Compatibility	3.80	Highly Acceptable
4	Usability	4.23	Very Highly Acceptable
5	Reliability	4.10	Highly Acceptable
6	Security	4.26-	Very Highly Acceptable
7	Maintainability	4.24-	Very Highly Acceptable
8	Portability	4.20	Very Highly Acceptable
	Over All Mean	4.14	Highly Acceptable

Table 10 presents the summary of the evaluation of participants on the level of acceptance of the developed system in terms of the different criteria of ISO 25010 Software Quality Standards. Of the eight (8) attributes, performance efficiency, usability, security, maintainability, and portability were equally evaluated by the participants as “Very Highly Acceptable,” while functional suitability, compatibility, and reliability were evaluated as “Highly Acceptable”. Furthermore, the attribute rated highest is security, having a weighted mean of 4.26, followed by maintainability with a weighted mean of 4.24. On the contrary, the attribute with the lowest weighted mean (3.80) is compatibility, which is characterized as “Highly Acceptable”.

Generally, the developed system was rated by the participants with an overall weighted mean of 4.14, which means that the developed system is “Highly Acceptable” in terms of the ISO 25010 software quality standards.

11. SUMMARY OF FINDINGS

After testing the developed system, it was revealed that the system can handle scholarship records that are being managed by the OSDW Coordinator. The developed system can also send notifications to a bulk number of recipients via SMS. It can also store and retrieve reports of OSDW coordinators and can produce prompt and reliable scholarship reports.

Moreover, after careful interpretation and analysis of data, the study also revealed that generally, the participants considered the developed system “Highly Acceptable” in terms of the ISO 25010 Software Quality Standards requirements.

12. CONCLUSIONS

Based on the findings, the researchers arrived at the following conclusions:

The proposed Scholarship Tracking System with Mobile Notification will certainly hasten and improve the services of the OSDW Office in managing and monitoring records and in effectively sending notifications to scholars. The developed system can also easily generate updated and accurate reports automatically. Moreover, the developed system would ensure better processes and services in the OSDW that would greatly benefit both the OSDW Coordinator and the students of CSUL.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are made:

1. The OSDW coordinator may consider the implementation of the developed Scholarship Tracking System with Mobile Notification to facilitate better processes and services in the Office of Student Development and Welfare.
2. The OSDW coordinator may collaborate with the researcher on the conduct of orientations on the use of the said system for the scholars before its deployment.
3. The administration may consider availing premium accounts of using SMS API to acquire their sender ID to be used in the implementation of the developed system and to be used in another study with the SMS feature.
4. Future researchers may conduct parallel studies and may consider the integration of an autoreply feature that would cater to possible queries of interested applicants to the Office of Student Development and Welfare.

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