eSTEP: A web-based information management system for Davao Educational Benefit System Unit

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ABSTRACT

The Davao City Educational Benefit System Unit (EBSU) has initiated a scholarship program for under-privileged students with high intellectual capacities to have access to college or vocational education. In the advent of the mobility of the technology, the local government opted to extend the convenience of accessing their services through remotely accepting the grantee's application, fast-tracking of the requirements, monitoring of status, and generating pertinent reports anywhere and anytime. The system is utilizing the Agile model and various technical tools to run both in mobile and desktop environment efficiently. The results demonstrated the accessibility of Davao City scholarship program to distant areas, increased the number of applicants and hastened the process of selection and monitoring.

Keywords*: information technology; Educational Benefit System Unit; online scholarship application; Agile model; Davao City.*

INTRODUCTION

The local government of Davao believes that quality education is a right that must be enjoyed by all citizens and is contributory in the development, promotion of social justice, productivity, and economic prosperity of its people. Thus, the creation of Davao City Educational Benefit System Unit (EBSU) through Executive Order No. 27 series of 2011. The office is responsible for pursuing the mandate of the City government of Davao of advancing equal opportunity and fair access to education, especially for the poor, underprivileged, and vulnerable sectors of the society. The office is created to handle the existing educational assistance programs of the city government of Davao including the Scholarship on Tertiary Education Program (STEP), Financial Assistance Program for Lumads, Medical and Law Educational Assistance Program, Technical and Vocational Skills Training Program and Other Educational Assistance Projects.

According to EBSU Director Emilio D. Domingo Jr, in the last two years, their office received thousands of applications from students within Davao City area. With the growing number of applicants, the selection of possible grantees causes delays because they need to check and validate the requirements such as the exact address, the certification from DSWD, and the general average of the students. Some of the applicants were coming from remote barangay who have financial difficulties in coming back and forth to the city to fill-up and comply with the scholarship requirements. Then, one-by-one the admin has to notify the applicants who belong to the roster for submission of additional requirements.

In the advent of the mobility of the technology, the local government would like to extend the convenience of their services through remotely accepting the grantee's application to any of the aforementioned scholarship grants, fast-tracking of possible grantees based on the general average, its location and DSWD certification, generate reports on fees per semester and reports on the status of grantees and monitoring of grantees grades per courses enrolled.

The researchers developed a web-based information system that allows the applicants to remotely submit their application from any of the scholarship grants available in the local government and receive notification regarding the status of their application. The system also provides the admin an interface to select the list of applicants based on the submitted online application, approved the application and immediately send a notification to the applicants for its application status and for the list of requirements to be complied and submitted personally to the Scholarship office. Once the selection process is done, the system will send updates to the admin for the schedule of fees per semester and the submission of grades. The system will generate reports on the schedule of fees filtered by grantee, by school, by semester and by school year; list of all applicants; list of applicants per barangay; list of grantees per barangay; list of grantees who graduated; and the list of grantees who were not able to sustain the program in order to evaluate the reason and serves as the basis for the program improvement.

METHOD

Requirement Specification

- PHP Scripting Language

The researchers utilized this language to develop the web application interface both for user and admin to allow the authorized users to access the web application.

- Sublime Text Editor

The researchers used this cross-platform framework to code the PHP commands easier.

- Bootstrap, CSS, Glyphicons, and JavaScript

These tools are used to create an enhanced and more responsive design for the web the application. The Bootstrap tool is intended of the User Interface (UI) design to become responsive to different types of devices and browsers. The system is utilizing the CSS tool for designing the buttons, images and formatting the text. Glyphicons tool for the icons. The JavaScript is for providing pop-up notifications and animation.

- AJAX

The system is using this tool in updating the web pages, which provides a mechanism to update or alter a particular web page without reloading the page from time to time to achieve asynchronous web application.

- XAMPP Control Panel

A lightweight Apache software utilized by the researchers for the quick time constraints and ease in the configuration and building of the application developed in the PHP Language.

- Adobe Photoshop CS5

The system is using this tool to design the logo of the homepage, the icons of the different buttons, and to edit the images of the system design.

- MySQL Database

A storage software utilized by the researchers to manage the demographic profile of the EBSU applicants and grantees.

- SDK for SMS Notification

An API used to notify the applicants and grantees via email and SMS about the updates and announcement of the EBSU office.

Hardware Requirements

Table 1 shows the required specification of the hardware to run the system efficiently. The capacity serves as the recommended hardware.

Table 1. Hardware Specification of the web-based application

Hardware	Capacity
Processor	Intel Core i5 and up
Random Access Memory (RAM)	4 GB and up
Hard Disk	500 GB and up

Conceptual Framework

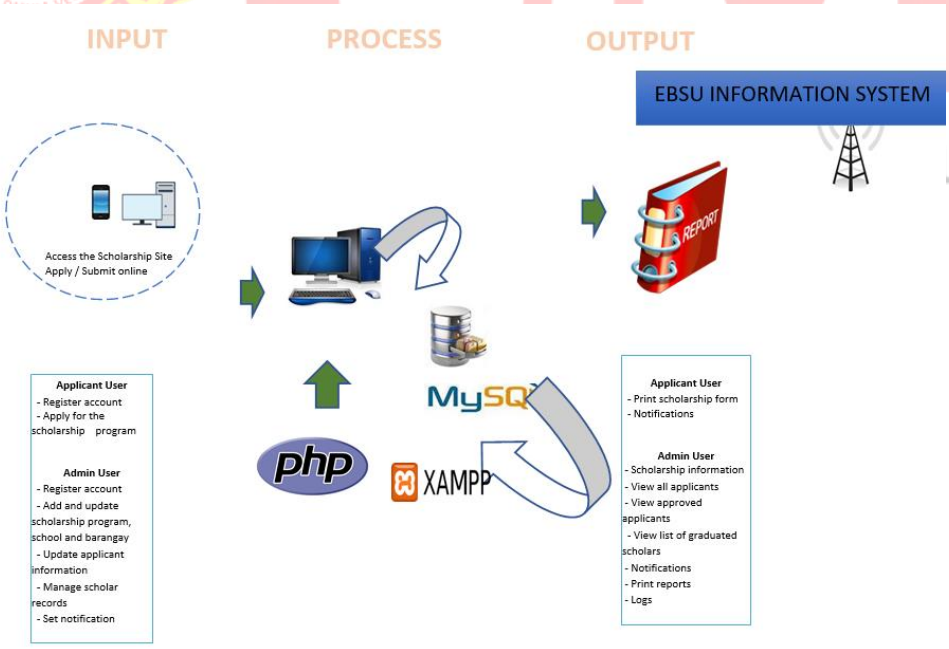

Figure 1. Conceptual Framework

Figure 1 shows the Input-Process-Output of the web-based management information system. The system is developed using the PHP Scripting Language, Sublime Text Editor for more comfortable and cozy

coding and Ajax tool for updating the parts of the web page. The system design is created using Adobe Photoshop CS5, Bootstrap, CSS, glyphicons, and JavaScript to have a more responsive design.

The applicants can remotely access the application using either a mobile device or a desktop PC connected to the Internet. The system provides interface for the registration of both the applicant and the admin and allows the applicant to submit the mandatory initial requirements for validation. Once the registration and submission of essential documents is done, the input data are processed utilizing the MySQL database as data storage. The application is built in XAMPP Apache software to create and transition the local host to a live local web server for testing and deploying the application. The admin can notify the users about the status of their application by sending an SMS. In sending the notifications to the applications, the researchers utilized the SDK tool, an API responsible for transmitting the messages through Simple Mail Transfer Protocol (SMTP) as stated in the study of El Stohy, el Ghetany & el Gharib (2016) that notifications assist the users, especially within a web application to transmit information in a minute through a server. The statement was proved by (Medley, n.d.) about web notifications data on the web can be easily invoked anytime and anywhere.

Based on the study conducted by the authors Iqbal, Omar, and Yasin, (2019) stated that the outcome of Agile software development revealed that it provides additional insights into dynamic teamwork and serves as a model for quantitative and qualitative analysis. The agile approach has grown dramatically over the traditional methods in software development because it focuses more on the efficient development, faster evaluation, quantifiable system progress, and continuous delivery that able to satisfy the customer aspirations (Jain, Sharma & Ahuja, 2019).

The researchers have utilized the Waterfall model in achieving the success of the study from the data gathering to system deployment. The Agile Scrum was used in the development of the application in an incremental and iterative method, especially during the testing phase to ensure that the application provides functionality as required by the EBSU office.

Systems Development Life Cycle

Figure 2 shows the method taken during the conduct of the study from the analysis of the problem up to deployment. The analysis phase includes the conduct of gathering data to determine the requirements of the applications in terms of the type of application they wanted and the users who are using the application.

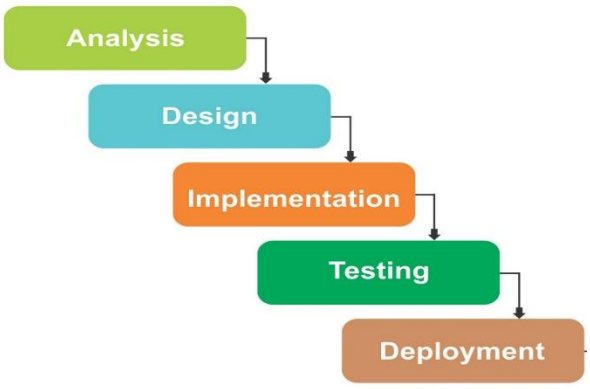

Figure 2. Waterfall Model

The researchers have utilized various tools in developing the application. During the development and testing, the researchers employed the iterative method along with the Agile Scrum. The following sprints are followed to achieve the web-based application:

Sprint 1: Database Structure for the different scholarship grants available
Sprint 2: Data Entry Module for Web Application
Sprint 3: User and Admin Account Modules
Sprint 4: Integration of Applicant and the Admin Module
Sprint 5: Selection and Approval of Scholarship applicants
Sprint 6: Generation of all pertinent Reports
Sprint 7: Test the system to the different web browsers both on mobile and desktop PC, hardware specifications and bandwidth testing

Figure 3 is the cycle followed by the researchers in achieving the six (6) sprints. The sprints 1 through 3 are based on the incremental method while the sprints from 5 to 6 follow the iterative method where it checks and validates the completion of the web-based system.

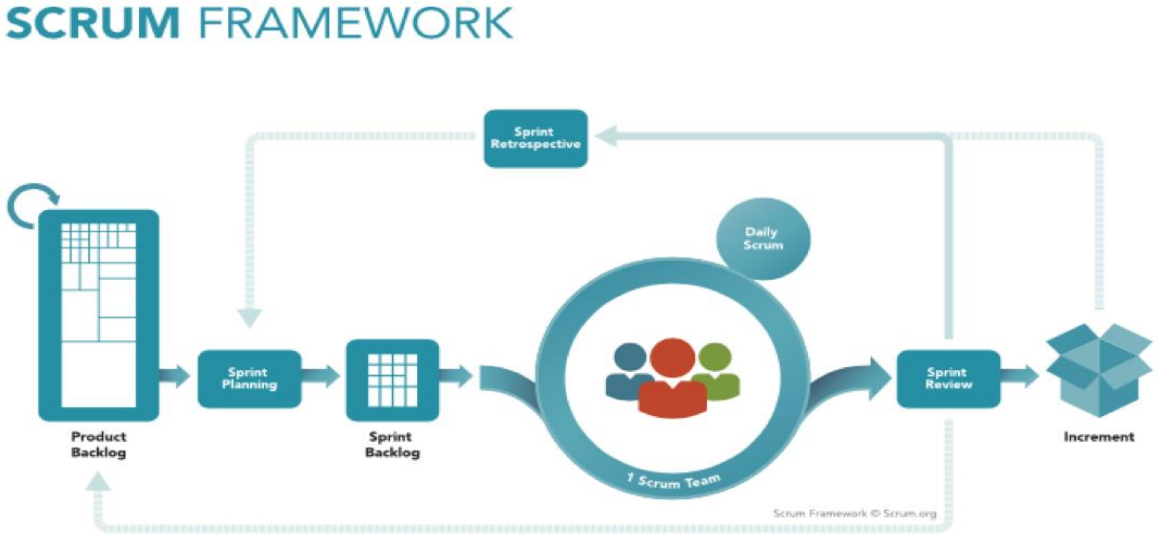

Figure 3. Research Method

The system was composed of admin and user controls. The admin is the authorized personnel of EBSU office to access and use the web-based system to monitor and generate reports. The users are the registered applicants of EBSU scholarship programs and the unregistered or visitors of the EBSU system for viewing of information about the programs offered.

Figure 4 shows the processes and relationship between the prospect applicants and the assigned administrator from EBSU office to use the web application. The figure above signifies the relationship between the entities, particularly the EBSU administrator and the applicants.

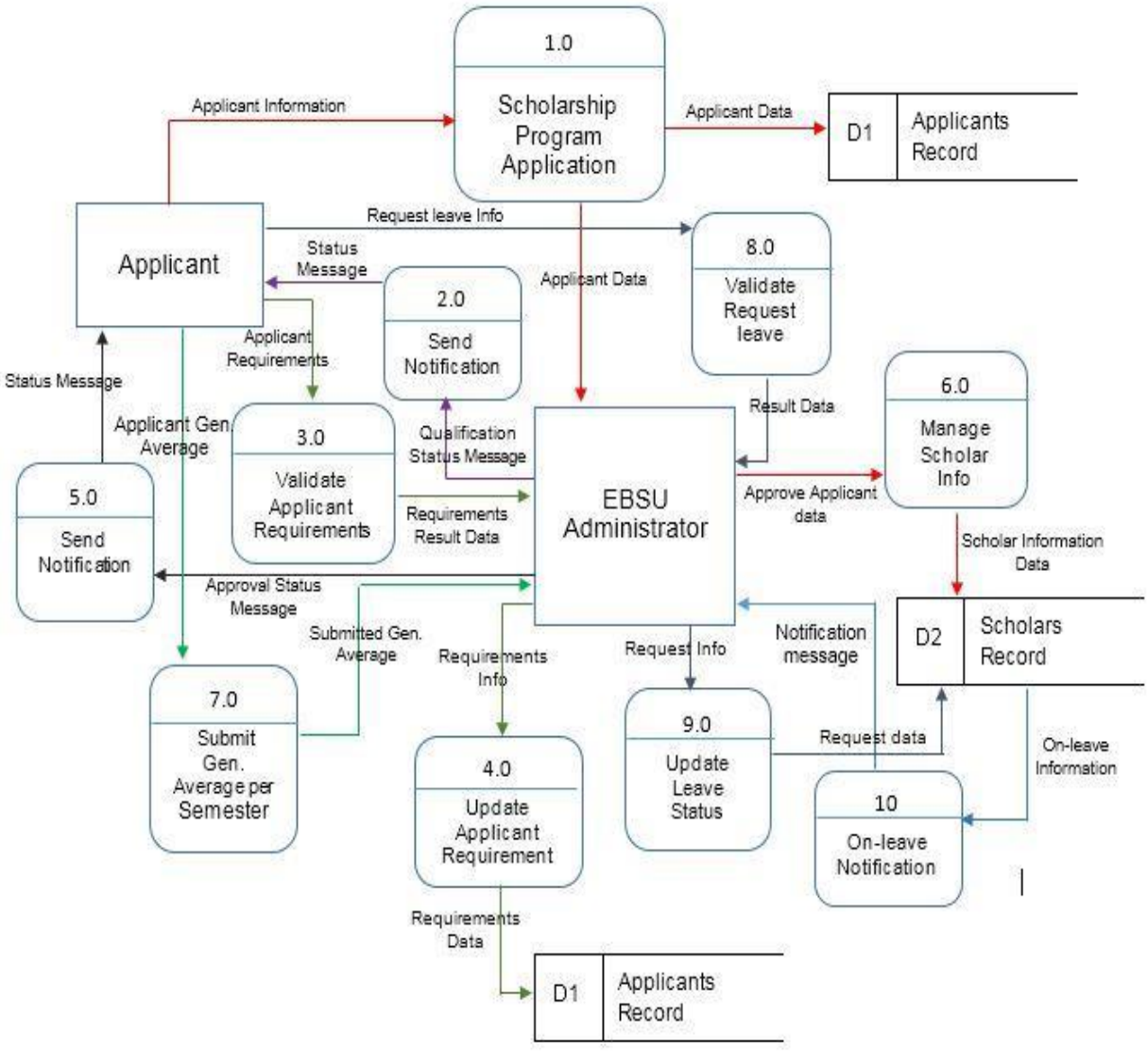

Figure 4. Research Design

RESULTS

The functional and integration testing of the application from the user modules to the admin modules were conducted to test the validation of the inputs, buttons, and links of the application through test cases. The researchers also test the efficiency of the application by hosting it in the ICT department domain name to check the compatibility in terms of browser, hardware and digital bandwidth requirements, and mobile web browser capability.

Table 2 shows the test case for browser testing uvarious browsers available in the desktop PC along with the hardware specs. The results siwere determined that the web system in terms of its graphics resolution is with high quality and capacitive to various screen sizes.

Table 2. Browser Testing

Browser	Hardware Devices	Expected Output	Actual Result
Desktop Browser Google Chrome v.71, Mozilla Firefox v.64, Microsoft Edge v.38, Internet Explorer.11, Opera v.58	Core i5 CPU, 2GB RAM Quad-core CPU, 4GB & 2GB RAM Xeon CPU,2GB RAM	ngDisplays the full features of the application in good quality and intact.	Successfully displays the application's full features of, graphics were intact and with a high-quality resolution
Mobile Browser Google Chrome v.71 UC Browser(mobile) v.12, Safari v.11 (mobile)	Cherry Mobile Flare 5: 6.0 Marshmallow, 1.3GHz Octa-core, 3GB RAM/16GB internal storage Cherry Mobile Flare J2s: 6.0 Marshmallow, 1.3GHz Quad-core, 1GB Myphone 32 5.0 Lollipop 1.4GHz octa-core, 2GB iPhone 5: iOS 10.3.3, 1.3GHz Dual-core, 1GB RAM Oppo A37: 5.1 Lollipop, 1.2GHz Quad-core, 2GB RAM	Displays the full features of the application in good quality, intact, and adapt screen sizes.	Successfully displays the application's full features, graphics were intact and with a high-quality resolution. The layout of the application responds to the various screen sizes and orientation.

Table 3 shows the test case for digital bandwidth testing, which shows the response time of the system when accessed through a wireless and wired connection in a different area with symmetric DSL and asymmetric DSL type of connection. The results showed that the system does not need a highly reliable internet bandwidth to access the web-based system.

Table 3. Digital Bandwidth Testing

Bandwidth		Respond Time
Downstream	**Upstream**	
21.34 Mbps	4.28 Mbps Wireless	148 ms
2.33 Mbps	1.71 Mbps Wireless	283 ms
34.43 Mbps	53.18 Mbps Wireless	128 ms
0.85Mbps	0.80 Mbps Wired	211 ms
92.43 Mbps	91.98 Mbps. Wired	26 ms

Figure 5 shows the interface of the application intended for the user or visitors within Davao City or outside. This figure provides the prospect applicants to view the announcements, scholarships, and information about EBSU personnel and offered programs. Also, it allows them to log-in to access the application showing the various scholarship program offered by the EBSU office. The registered users were able to click and access the scholarship grants, which considered as the applicant of the program. Only the registered users are allowed to access the program. If a non-registered user would like to access each of the programs in Figure 9, the user will be redirected to the registration module. The following programs show the detailed information the applicants should supply and the initial requirements to submit to be enlisted in the grantees.

To access the information systems' details and submit an online application to any of the scholarship grants:

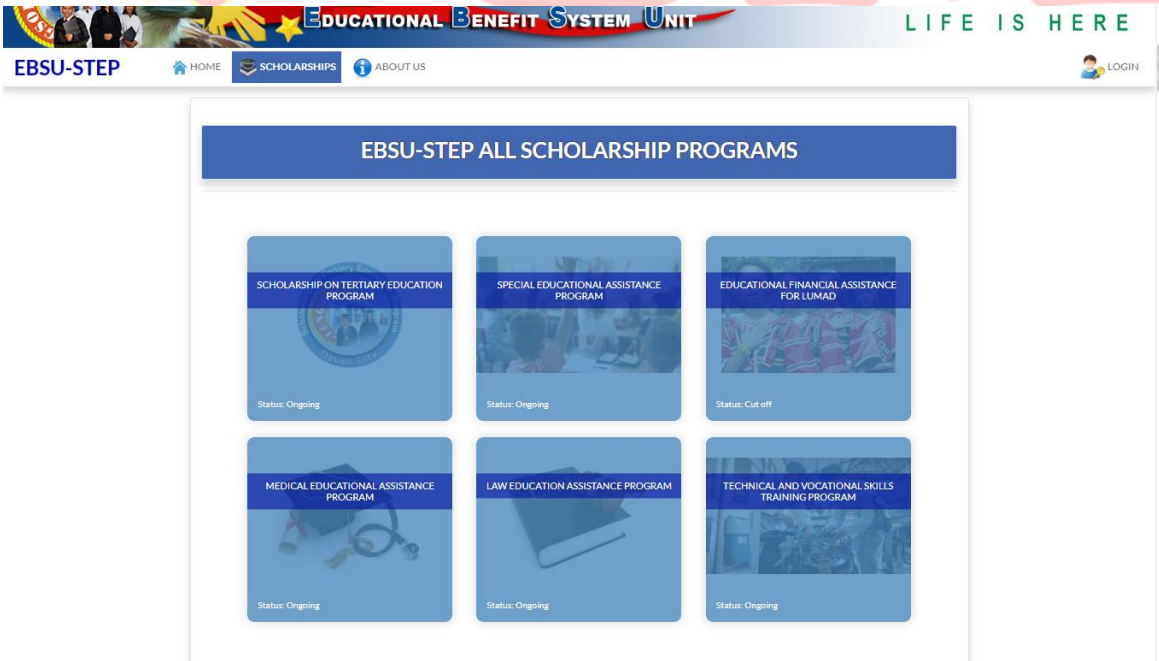

Figure 5. Scholarship Module

To select among the applicants, the possible grantees in each of the scholarship grants based on the set qualification.

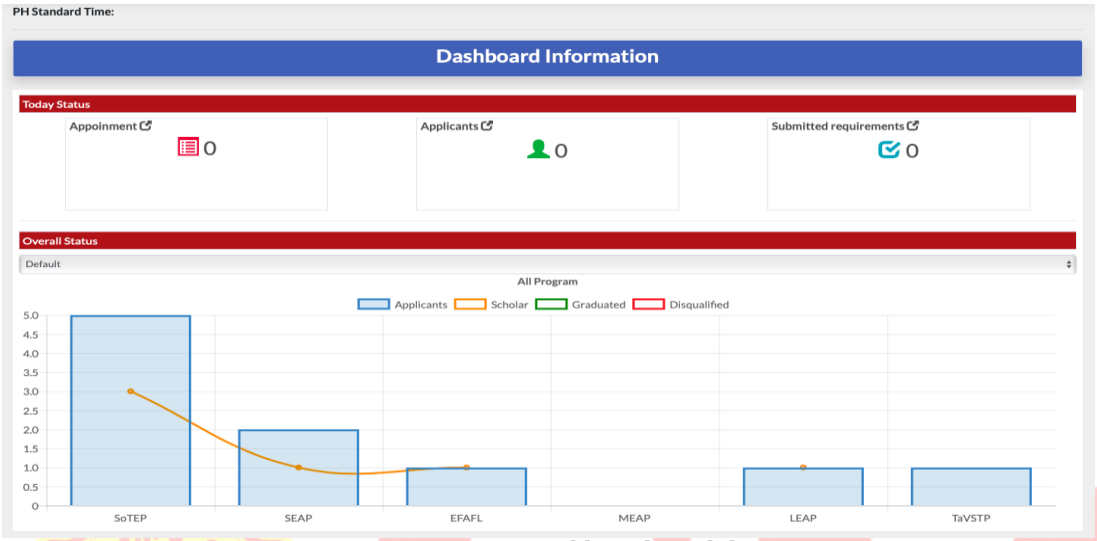

Figure 6. Dashboard Module

Figure 6 shows the Dashboard of the EBSU admin where they can view the number of applicants with an appointment, applicants who applied for a specific scholarship program, and applicants who submitted their requirements online.

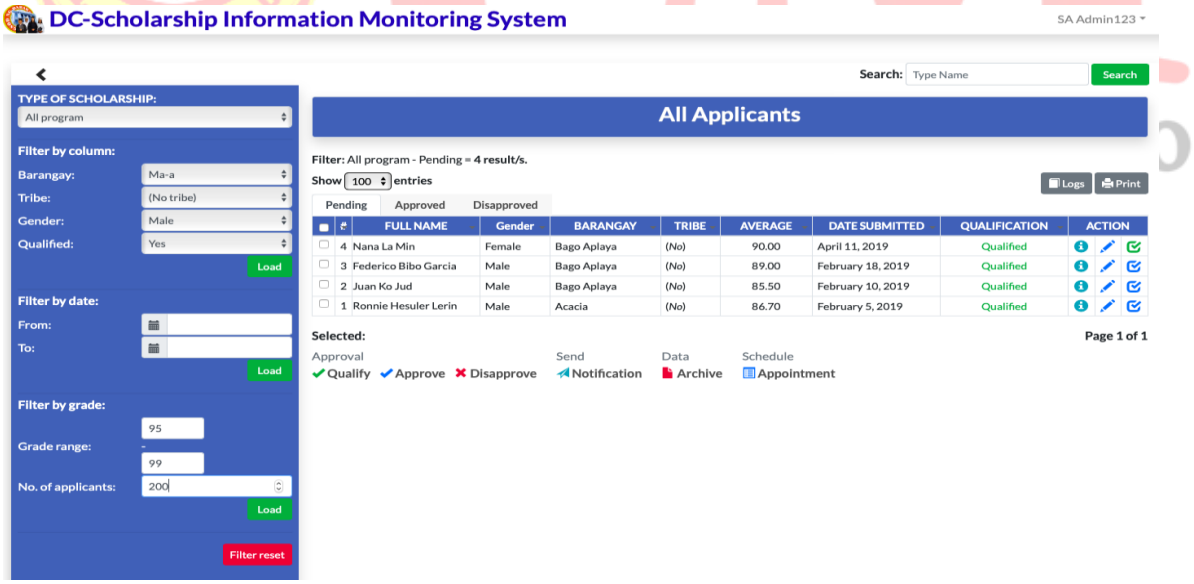

Figure 7 shows the list of applicants who applied for the scholarship program and its status, whether it is still pending, approved, or disapproved. This interface is used to filter the number of applicants according to the need in a particular school year and according to the average grade requirement set per scholarship program. Also, the EBSU office utilized this interface to check the number of applicants in a particular

Barangay, whether per Barangay in Davao City is represented with applicants and to determine which among the Barangays have numerous applicants and have qualified applicants.

Figure 8 shows the module where the admin can manage the current list of the scholarship program. This module allows them to update the requirement or content and to add more scholarship program if there are available. To monitor the schedule of fees, submission of grades per semester, and duration of on-leave grantees:

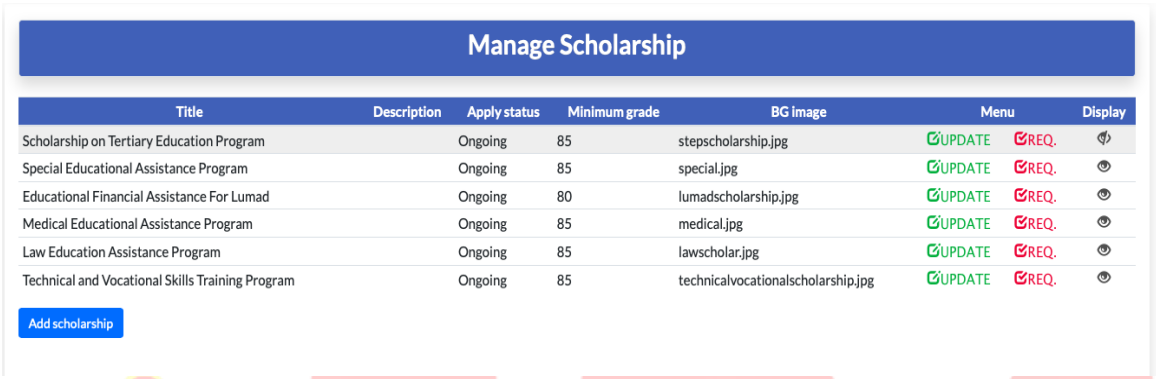

Figure 8. Manage Scholarship Module

Figure 9 shows the record of the grantees. This module allows the admin to check and monitor the schedule of fees and submission of grades per semester of all grantees.

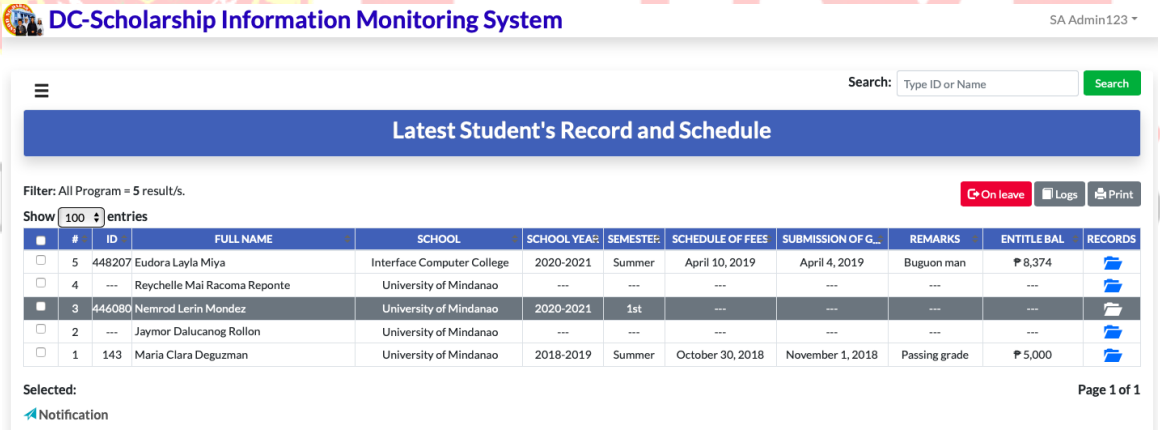

Figure 9. Student's Record and Schedule Module

Figure 10 shows the report that filters the status of grantees and the school the grantees are currently attended. The report can generate the list of graduated grantees in a particular program or have received disqualification to continue the program due to a failing grade or lapse of the leave application. The admin can generate reports filtered by the type of scholarship, gender, school, school year, semester, schedule of fees, submission of grades, and list of grantees who've able to submit their grades as scheduled. These reports can be printed or viewed on the screen.

To generate reports on schedule of fees filtered by grantee, by schools, by semester and by school year; list of all applicants; list of applicants per barangay; list of grantees per barangay; list of grantees who graduated; list of grantees who are on-leave; and list of grantees who were not able to sustain:

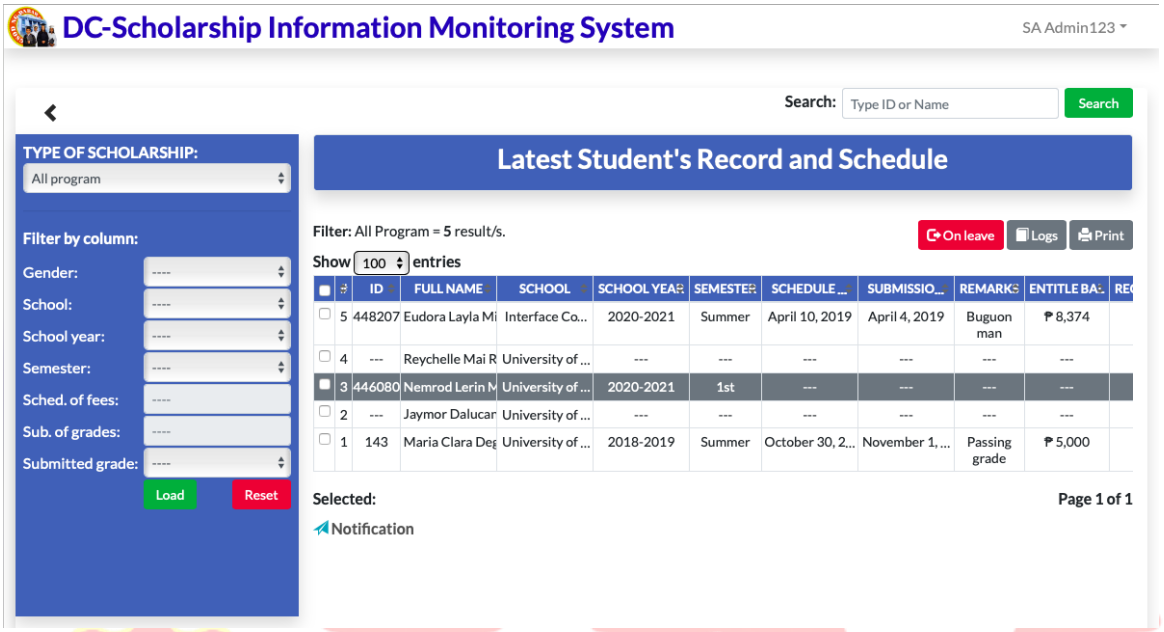

Figure 10. Generate Reports for Graduated / Disqualified

CONCLUSION

The web-based system is providing the convenience of the users and the EBSU personnel in accessing the scholarship programs offered by the Davao City EBSU office anytime and anywhere thru the domain name using their mobile devices or desktop PC. The registered users were able to submit the initial requirements online for the selection process and receive notifications via email or text if enlisted for the next process.

The admin can monitor the fees, submission of grades, and leave status for updates and announcements. Also, they can generate reports for the schedule of fees filtered by grantee, by schools, by semester and by school year; list of all applicants; list of applicants per barangay; list of grantees per barangay; list of grantees who graduated; list of grantees who are on-leave; and list of grantees who were not able to sustain the program.

RECOMMENDATIONS

The researchers recommend utilizing a computer system with higher specifications in terms of hardware to cater more records of applicants and grantees. Also, in the future, it is recommended to implement it in a cross-platform application to be accessible using the different mobile platforms of the applicants, grantees, and EBSU personnel while they are outside of their vicinity.

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