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Scholarship Grant Management Information System with SMS Notification

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ABSTRACT:

Many educational institutions now have technologies and information systems in order to manage students' information, which includes their scholarships. Scholarships should ideally be awarded to qualified students. The COVID-19 pandemic has wreaked havoc around the world. The lockdown has had an impact on the education sector. All the transactions have been affected. Thus, students are affected by this situation, especially by the subsidy, they will be received. As a result of this study, a Scholarship Grant Management Information System was developed integrating a short message service (SMS) notification to improve the current process of informing and management of data in scholarship programs. The main objective of the developed system is to provide a simple method for managing student scholarship data and improving the efficiency and effectiveness of existing services.

Keywords: Scholarship Management, Information System, SMS Notification

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1. INTRODUCTION

Today the global education system has become a competition within the institutions for the attention of prospective students in order to increase the number of successful admissions. Due to advances in computer technology and faster internet facilities, it is much easier for schools and colleges to reach out to more and more students and to encourage them for admissions and other related activities [1]. Advanced models are now being used by institutions to analyze access, and manage enormous amounts of data. Such data in the technical education system can be further classified as admission, evaluation, and scholarship data.

Education for many is one of the ways to escape from poverty. Luckily, there are many institutions and government agencies that offer scholarship programs and other forms of financial aid to Filipino students. These programs provide an opportunity for qualified students to earn a degree and become valuable assets or contributing members of society [2]. Many educational institutions now have technologies and information systems in place to manage students' information, including their scholarships. With increasing demands, consistent changes in policies and guidelines, and ineffective management of scholarship grants, there is a need to manage and control students' scholarship information. Purchasing an additional information system would not be a cost-effective solution for institutions that already have an information system that includes scholarship management modules. Similarly, some institutions could not afford to implement a new information system for their organization. Documentation and record control should be in place to manage student scholarship grants effectively and efficiently.

Scholarships are a form of grant in the form of money given to students to be used for tuition fees and other costs [3]. For higher-level education, there are several types of scholarships offered, namely: (1) scholarships given to students who have increased learning achievement, and (2) scholarships given to underprivileged students [4]. By this, one of the functional units in the institution to handle this scholarship program is the Office of Student Affairs and Services. With its wide scope of services and limited manpower, the office faces a challenges such as difficulty in managing the student’s data in applying for scholarship grants, difficulty in disseminating information to scholars and grantees, difficulty in processing voluminous data, and redundancy of information. Thus, the researcher developed a management information system that would primarily manage student’s scholarships and grants with the integration of SMS notification.

With this requirement, integration of these functionalities would greatly improve the transaction flow in managing students' scholarships and grants [5]. This study is geared towards the development of a Scholarship Grant Management Information System with SMS notification that will be designed in managing scholarship programs and easily disseminating of information to the scholarship grantees with the use SMS features for communication. Also this study, would evaluate the level of usability in terms of learnability and operability, level of functionality in terms of suitability, accurateness and security and level of performance efficiency in terms of time behavior and resource utilization of the developed system.

1.1. Conceptual Framework

The conceptual framework is used to examine the state of things (variables or ideas) and their interactions in order to gain complete knowledge of a phenomenon [6]. This paper was based on the concept of the Input-Process-Output (IPO) Model. Input-process-output (I-P-O) is a structured methodology for capturing and visualizing all of the inputs, outputs, and process steps that are required to transform inputs into outputs [7]. The procedure started with inputs, software development as the process, and the evaluation of the results as the output.

This study conceptualized and developed a Scholarship Grant Management Information System with SMS Notification comprising of input phase, the process, and output phase. The inputs were the complete information and contact number of the students as well as the OSAS information. The process involves various modules that would perform the transactional processes. These are encapsulated in the Scholarship Grant Management Information System with SMS Notification. The output of the study includes the assessment of the system as to the level of usability, functionality, and performance efficiency. Figure 1 shows the conceptual framework of the study.

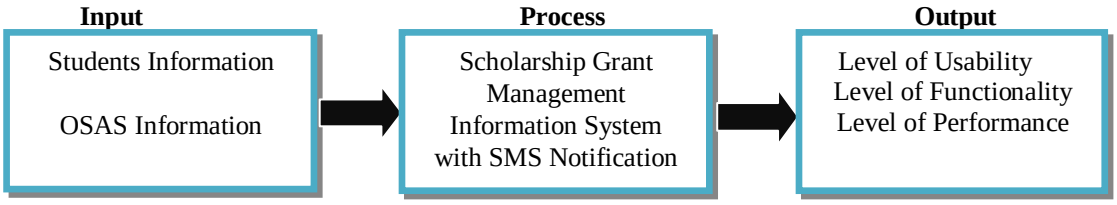

Figure 1. Conceptual Framework of the Study

2. METHODOLOGY

The methodology used in this study was discussed in this chapter. It includes the research design, software development model, data flow diagram, network topology and statistical treatment.

2.1. Research Design

The techniques for collecting, analyzing, interpreting, and reporting data in research investigations are referred to as research designs. It's the overarching strategy for connecting conceptual research concerns to relevant empirical research. In other words, the study design specifies how the required data will be collected and analyzed, as well as how all of this will be used to answer the research question [8].

Developmental and descriptive research designs were used in this study. The systematic study of creating, producing, and assessing instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness has been classified as developmental research, as opposed to simple instructional development [9].

Descriptive research is defined as large-scale, quantitative research that aims to "elucidate" a hypothesis (short of being able to confirm it). A descriptive finding could complement an insight gained from a more in-depth, open-ended approach in exploratory research. An organization can determine whether a concept is held by a few people and is irrelevant, or whether it is widespread and should be implemented. Credibility is established via descriptive research. However, the description cannot "prove" anything is true or false; with that level of assurance, an experiment is required [10].

2.2. Software Development Life Cycle

The Software Development Life Cycle (SDLC) is a software industry method for designing, developing, and testing high-quality software [11]. The study employed the Rapid Application Development Model (RAD), a

development model that prioritizes rapid prototyping and quick feedback over long drawn-out development and testing cycles. With rapid application development, developers can make multiple iterations and updates to software quickly without starting from scratch each time. This helps ensure that the final outcome is more quality-focused and is in alignment with the end-user's requirements [12]. Prototypes are used in the RAD model as a working model that is integrated into the final product [13]. Prototyping and iterative development are required. The planning required for building the product is included in the process of writing the program. A prototype is an essentially equivalent functioning model of a product component [14]. Figure 2 shows the rapid application development model.

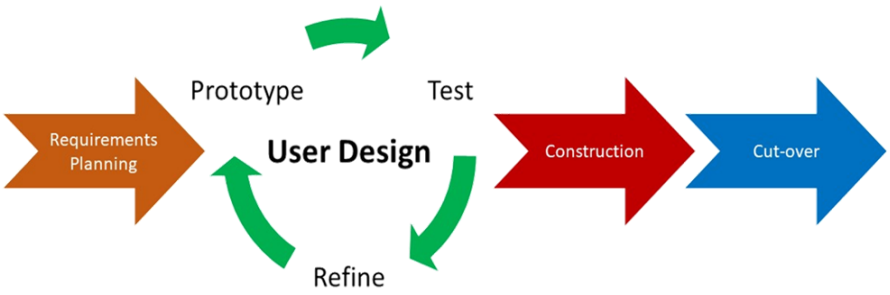

Figure 2. The RAD Model

2.3. Process Model

The researcher used a context DFD to depict its logical design in this paper. DFDs are graphical diagrams used to specify, develop, and visualize a system's model. In a graphical view, DFD is used to define the requirements [15]. Figure 3 depicting the context data flow diagram of the developed system.

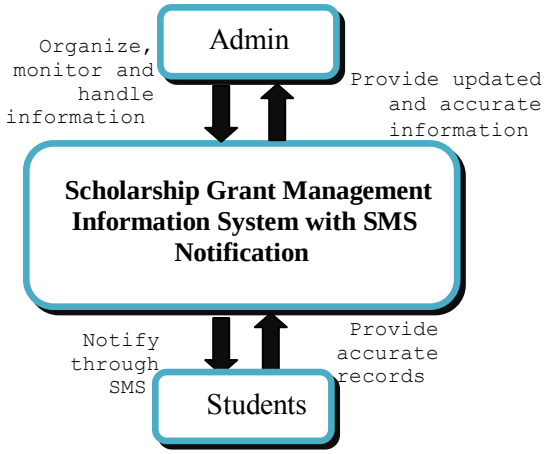

Figure 3. The Context Data Flow Diagram.

2.4. Logical Architecture Design

The logical architecture is defined as the organization of the subsystems, software classes, and layers that make the complete logical system. The components are placed randomly in the system; that is why it is called logical architecture. The logical architecture is considered the basic architecture for the system covering all the basic details regarding the system and includes complete information about the system. The logical architecture is decomposed into the different tier that helps to design the logical architecture diagram. The tiers include in the logical architecture are client tier, access tier, presentation tier, business service tier, and data tier. These all components help to design the complete logical architecture for any type of system [16]. N-tier architecture were employed in this study. N-tier is also called multi-tier architecture because the software is engineered to have the processing, data management, and presentation functions physically and logically separated [17]. Figure 4 shows the logical architecture of the developed system.

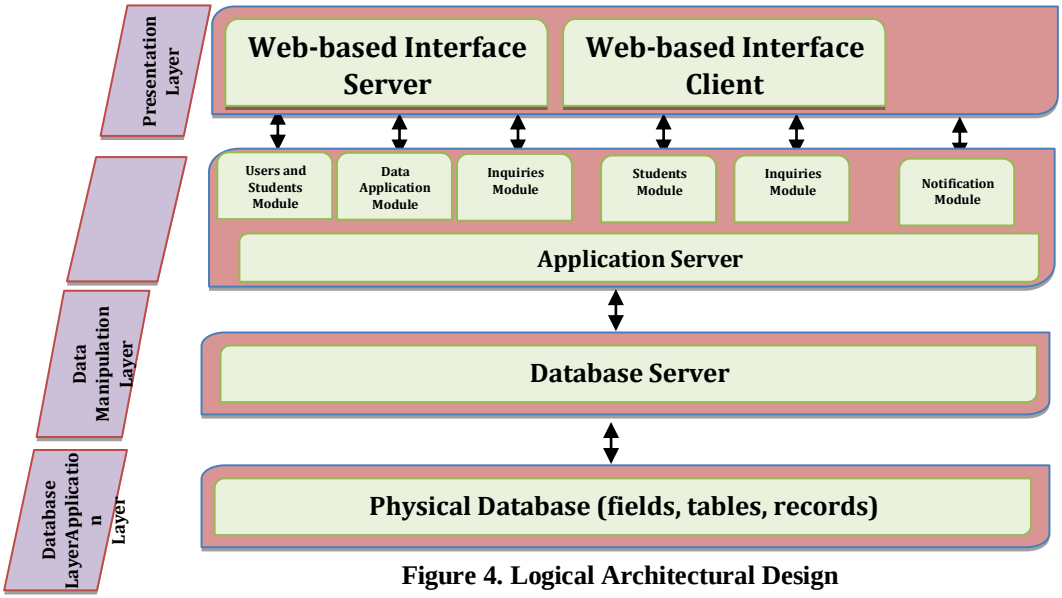

Figure 4. Logical Architectural Design

2.5. Physical Network Topology

In figure 5, this was presented the physical network of the system that visualized the communication schemes of the physical networks and its networks arrangement. Physical network topology illustrates the placement of each component in the network. It showed the outline of computer, cable and the other device. Since this system implemented an SMS notification, students must register into the system in order to them to notify and update with regards to the scholarship/subsidy they will be receiving. The transmitter which is the cell tower use to facilitate sending of SMS notification to the students.

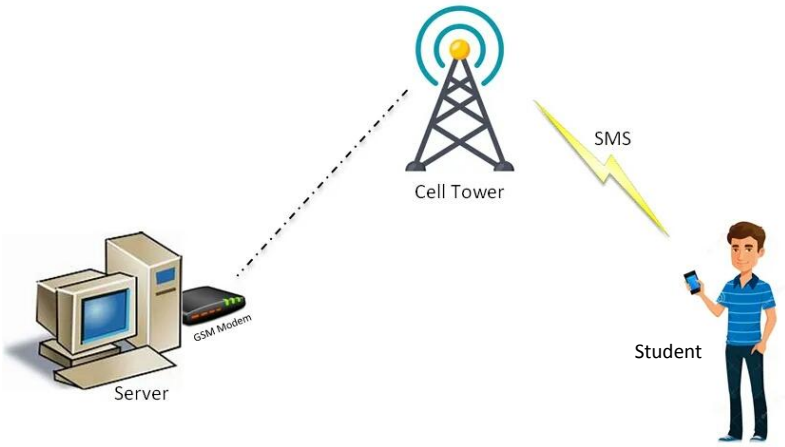

Figure 5. The Physical Network Topology

2.6. Testing and Evaluation

For the finalization of the developed system, the researcher requested the testers to evaluate the system in terms of it level of functional suitability, level of usability, and level of performance efficiency. A survey questionnaire was given to the evaluators to test the system's usability, functionality and performance efficiency. A 5-point Likert scale comprising of 1 as Poor and 5 as Very Good was used on the developed system prototype. To statistically compute whether the developed system passed the evaluation criteria, the Mean statistics was applied. The Mean is computed as:

$$\overline{X} = \frac{\Sigma X}{n}$$

Where $\bar{x}$ is the mean

$\sum x$ is the summation of individual raw scores
n is the number of the population

The obtained mean score was interpreted using the following verbal description:

Mean	Descriptive
4.21 – 5.00	Very Good
3.41 – 4.20	Good
2.61 – 3.40	Average
1.81 – 2.60	Fair
1.0 – 1.80	Poor

2.7. System Evaluators

As mentioned in previous sections, the system prototype is subjected to software evaluation. Testing the system prototype was an important part of the design and manufacturing process. Testing and evaluation, simply confirm that the product worked as planned, or if it needs refinement. The respondents who participated in the study were composed of fifty (50) respondents, forty-two (42) student grantees, three (3) OSAS personnel, and five (5) expert evaluators.

Table 1. Distribution of Respondents

Evaluators	No. of Evaluators
Students	**42**
OSAS Personnel	**3**
Expert Evaluators	**5**

3. RESULTS AND DISCUSSION

This chapter covers the presentation, analysis, and interpretation of data required to meet the defined objectives.

3.1. Level of Usability of the Developed System as Perceived by the End-Users in terms of Learnability and Operability

Table 2 presented the mean result of the respondents' feedback on the usability of the developed system in terms of suitability, operability and accessibility. The level of usability is the capability of the software product to be understood, learned, used and provides visual appeal, under specified conditions of usage [18]. Learnability is the degree to which specified users can use the product or system to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk, and satisfaction in a specified context of use [19]. Operability is the ability to keep an equipment, a system or a whole industrial installation in a safe and reliable functioning condition, according to pre-defined operational requirements [20].

The results shown below implied that the Scholarship Grant Management Information System with SMS Notification, its level of usability was computed with an overall mean of 4.73 being interpreted as "Very Good". In terms of learnability (M = 4.85) was verbally interpreted as "Very Good". For the operability, the computed mean score was (M = 4.60) verbally interpreted as "Very Good".

Table 2. Level of Usability of the Developed System as Perceived by the End-Users in terms of Learnability and Operability

Implementation Indicators	Mean	Verbal Interpretation
Level of Usability	**4.73**	**Very Good**
Learnability	**4.85**	**Very Good**
Operability	**4.60**	**Very Good**

Legend: 1.00 - 1.80 (Poor); 1.81 – 2.60 (Fair); 2.61 – 3.40 (Average); 3.41 – 4.20 (Good); 4.21 – 5.00 (Very Good)

3.2. Level of Functionality of the Developed System as Perceived by the End-Users in terms of Suitability, Accurateness and Security

Table 3 shows the mean result of the respondents' feedback on the usability of the developed system in terms of suitability, accurateness and security. The level of functionality is the software's capability to provide functions that meet the stated and implied need of users under specified usage conditions [18]. Suitability refers to the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions [19]. Accurateness is the level to which the result is expected [18]. Security is the degree to which a product or system protects information and data [19]. The results showed that the level of functionality of the Scholarship Grant Management Information System with SMS Notification was 4.96, interpreted as "Very Good". Suitability (M = 4.98), accurateness (M = 4.93) and security (M = 4.94) were all interpreted as "Very Good".

Table 3. Level of Functionality of the Developed System in Terms of Suitability, Accurateness and Security.

Implementation Indicators	Mean	Verbal Interpretation
Level of Functionality	**4.96**	**Very Good**
Suitability	**4.98**	**Very Good**
Accurateness	**4.93**	**Very Good**
Security	**4.94**	**Very Good**

Legend: 1.00 - 1.80 (Poor); 1.81 – 2.60 (Fair); 2.61 – 3.40 (Average); 3.41 – 4.20 (Good); 4.21 – 5.00 (Very Good)

3.3. Level of Performance Efficiency of the Developed System in terms of Time Behavior and Resource Utilization

Performance efficiency refers to the characteristics that represents the performance relative to the amount of resources used under stated conditions [19]. Time behavior is the degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements [18]. Resource utilization is the degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements [18].

Findings revealed that expert evaluators' feedback on the developed system's performance efficiency was rated with an overall mean of 4.80, interpreted as "Very Good". In terms of time behavior, it was 4. 78, interpreted as "Very Good", while resource utilization yielded a mean score of 4.82, verbally interpreted as "Very Good". Table 4 shows the level of performance efficiency as perceived by expert evaluators.

Table 4. Level of Performance Efficiency as Perceived by the Expert Evaluators in terms of Time Behaviour and Resource Utilization.

Implementation Indicators	Mean	Verbal Interpretation
Level of Performance	**4.80**	**Very Good**
Time Behavior	**4.78**	**Very Good**
Resource Utilization	**4.82**	**Very Good**

Legend: 1.00 - 1.80 (Poor); 1.81 – 2.60 (Fair); 2.61 – 3.40 (Average); 3.41 – 4.20 (Good); 4.21 – 5.00 (Very Good)

4. CONCLUSION

The design and development of the Scholarship Grant Management Information System with SMS Notification was successful and was able to manage the information efficiently and effectively including the scholarship module. Students using a dedicated computer for application resulted in a lesser time of application. Application approval and notifying students through SMS was efficient and faster. Therefore, with the positive responses from the evaluators, the researcher generally concluded that the developed system was accepted and efficient it greatly improve the efficiency in processing scholarship applications and grants.

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