The Development And Assessment Of An Online Student Affairs System with Short Message Service

Cris Norman Patacsil Olipas

Abstract : This study was developed to provide a possible solution to the problems and difficulties encountered by the office of student affairs in a secondary high school in the Province of Nueva Ecija, Philippines. It covers the management and organization of student records and the effective delivery of information through Short Message Service (SMS) notification to students, parents, and guardians. This study utilized a developmental method of research and clustered-random sampling composed of Information Technology (IT) professionals, secondary high school students, and teachers. The system was developed following the phases of Software Development Life Cycle (SDLC) which include Planning, Analysis, Design and Coding, Testing, Implementation and Maintenance. A series of observations and interviews were done to identify the needed requirements. The results of data gathering procedures were the basis for the development of the system. The system was developed using Microsoft Visual Studio environment and MS VB.NET as the programming language. The database was constructed using MySQLYog environment and Structured Query Language (SQL). The developed system was assessed on the basis of its technical quality and quality of use. The technical quality was based on the International Organization for Standardization (ISO) 9126 standards which includes Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability while the quality of use was assessed based on three criteria which include relevance, feedback, and graphical user interface. The Online Student Affairs (OSAS) with Short Message Service (SMS) passed the assessment made, and was proven to be beneficial to the Office of the Students Affairs of a Secondary National High School.

Index Terms : Educational Application, Developmental Research, ISO9126, Online Student Affairs System, Short Message Service, SDLC, Violation Management System

1. INTRODUCTION

Every educational institution does not only provide excellent quality of education to its stakeholders but also different services that may help in shaping the characters of every student. The Office of Student Affairs is responsible in managing all the activities, school programs and events, monitoring of students' academic performance, and guidance services which includes the issues concerning students' behavior and discipline, and student delinquencies and violations. Large amount of data and information is being handled by every student affairs office in different educational institution. As a result, processing, organizing, storing, and managing these data becomes a complicated task. Typically, manual process of handling records is the common means to manage them. Different problems may occur due to the use of manual process for storing and organizing critical documentation in physical file folders. Problems concerning data security and alteration from unauthorized access and use may happen using the manual process of keeping files and records. There is an importance of integrating system to lessen the problems being encountered using manual system such as high cost which is being associated to paper-based filing system, lost and missing documents, sharing of essential data for delivering services, security issues, storage problem and slow access of retrieving needed information.An Information System specifically designed to cater to the needs of the Office of Student Affairs is a computer-based information system which primarily focuses on collecting, processing, storing, retrieving, producing, and disseminating relevant information. Such system will provide solutions to existing problems encountered in the office of Student Affairs. Typically, in the beginning of every school year, students are required to fill-up registration forms. These forms are kept in a filing cabinet for future purposes. Unfortunately, this paper-based filing system has its disadvantages. Forms that are kept in a filing cabinet is prone to unauthorized access and use, misplacements, and alteration as well as damages because these files are exposed in dust and in the changing room environment and temperature. Also, the retrieval of needed files and records can be a complicated task and the monitoring and dissemination of information can be a challenging job as well. The researcher of this study believes that when problems occur, so are the solutions. To solve the problems encountered in the office of student affairs of a public secondary high school, the development of an Online Student Affairs System (OSAS) with Short Message Service (SMS) was proposed. The Online Student Affairs System (OSAS) with Short Message Service (SMS) covers the core activities of the Office of Student Affairs and provides solutions to existing problems in order to uplift the quality of services being rendered by the an educational institution.

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1.1 Research Problems

This study aimed to develop and assess an Online Student Affairs System (OSAS) with Short Message Service (SMS).

Specifically, this study sought to describe the following:

1. Development of the OSAS based on the following phases of the System Development Life Cycle(SDLC):
    a. Planning;
    b. Analysis;
    c. Design and Coding;
    d. Testing;
    e. Implementation; and

   f. Maintenance
2. Assessment of the technical quality of the OSAS by IT professionals based on ISO 9126 standards:
   a. Functionality;
   b. Reliability;
   c. Usability;
   d. Efficiency;
   e. Maintainability; and
   f. Portability
3. Assessment on the quality of use of the system by student affairs personnel, high school teachers, and high school students based on:
   a. Relevance;
   b. Feedback;
   c. Graphical User Interface

2. METHODOLOGY

The developmental method of research was used in developing the Online Student Affairs System (OSAS) with Short Message Service (SMS). [1], developmental research is the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet the criteria of internal consistency and effectiveness. A total number of seventy respondents composed of 40 high school students, 20 high school teachers including student affairs office staff, and 10 IT professionals participated in this study.

2.1 The Research Instrument

Two sets of questionnaires were used to assess the developed OSAS. The IT Professionals assessed the technical quality of the OSAS. The content validity of the instrument was based from the ISO 9126 Quality Standard for software development. This was tried out before its actual use to some IT professionals. The high school teachers, high school students, and Student Affairs Office staff used another set of questionnaire and they assessed the quality of use of the OSAS in terms of relevance, feedback, and graphical user interface. The items in the questionnaire were answered by a five-point scale with this description: 5 - excellent, 4 -very good, 3 – good, 2 - fair, 1 – poor.

The instruments were administered to the respondents after the Online Student Affairs System (OSAS) with Short Message Service (SMS) was developed.

2.2 Procedure of the Study

The study underwent two phases: development and assessment. The development phase was based on the System Development Life Cycle (SDLC). SDLC has five phases, namely: Planning, Analysis, Design and Coding, Implementation, and Maintenance. On the other hand, in the assessment phase, the Online Student Affairs System (OSAS) with Short Message Service (SMS) was subjected to the assessment of the IT Professionals, Student Affairs Office Staff, High School Teachers, and High School Students. In the assessment of the OSAS, the researcher demonstrated how to use it to the IT professionals, Student Affairs Office staff, high school teachers, and high school students.

The comments, suggestions, and recommendations that were given by the respondents were considered in the improvement of the Online Student Affairs System (OSAS) with Short Message Service (SMS). The assessment of the OSAS given by the respondents were analyzed and interpreted using a rubric as scoring guide. The mean rating given by the respondents was the basis in giving the qualitative rating of the developed system. High mean rating on the quality characteristics implied positive quality; while low mean rating implied negative or poor characteristics.

The rubric that was used to assess the OSAS is shown in Table 1.

***Table 1**. Online Student Affairs System (OSAS) with Short Message Service (SMS) Rubric*

Numerical Rating	Qualitative Rating
4.20 – 5.00	Excellent
3.40 – 4.19	Very Good
2.60 – 3.39	Good
1.80 – 2.59	Fair
1.0 – 1.79	Poor

3. RESULTS AND DISCUSSIONS

3.1 The Development of the Online Student Affairs System (OSAS) with Short Message Service (SMS) based on the phases of the System Development Life Cycle(SDLC) The development of the OSAS went through the phases of the SDLC as described belowPlanning PhaseThe primary objective of this phase was to create a solid plan for the construction of the developed system. It included the process of identifying how the system was developed, its scope, and how it worked. In this phase, the researcher conducted a series of observations and interviews in order to come up with a plan on how the developed system should conform to the processes being performed and how it would solve the problems being encountered by the Office of Student Affairs. Also, a Gantt chart of the SDLC activities was made to guide the researcher on the construction of the developed system.

Analysis Phase

The analysis phase of the SDLC involved the process of gathering, understanding, and documenting business requirements. The goal of this phase is to collect business requirements that were necessary in the development of the OSAS. The researcher created different process diagrams to fully understand and analyze the important activities and processes involved in the developed system. A process diagram graphically represented the processes that capture, manipulate, store and distribute information between a system and its environment. A data flow diagram (DFD) illustrated the movement of information between external entities and the processes and data stores within the system. Fig. 1 presents the context diagram of the OSAS while Fig. 2 shows the data flow for level 1 of the Data Flow Diagram. A use-case scenario diagram presented the activities and its relationship to every external entity in the system. Fig. 3 shows the Use-Case actors and scenarios for the developed OSAS.

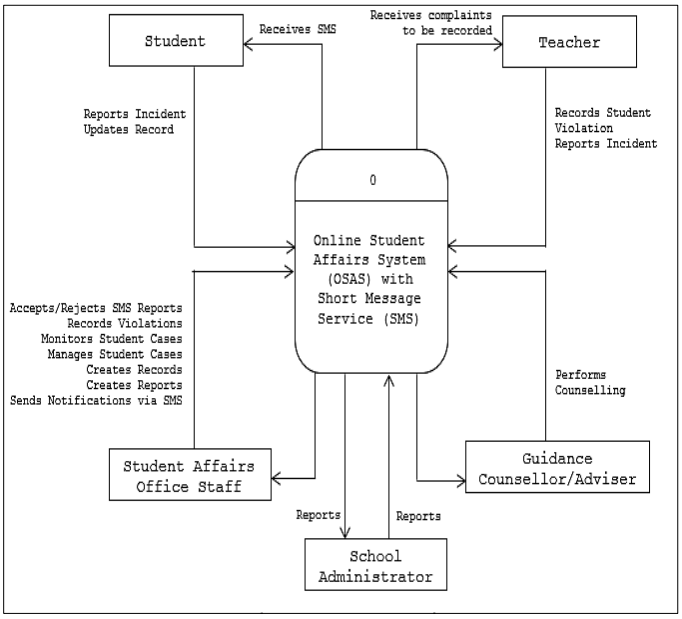

Fig. 1: *Context Diagram*

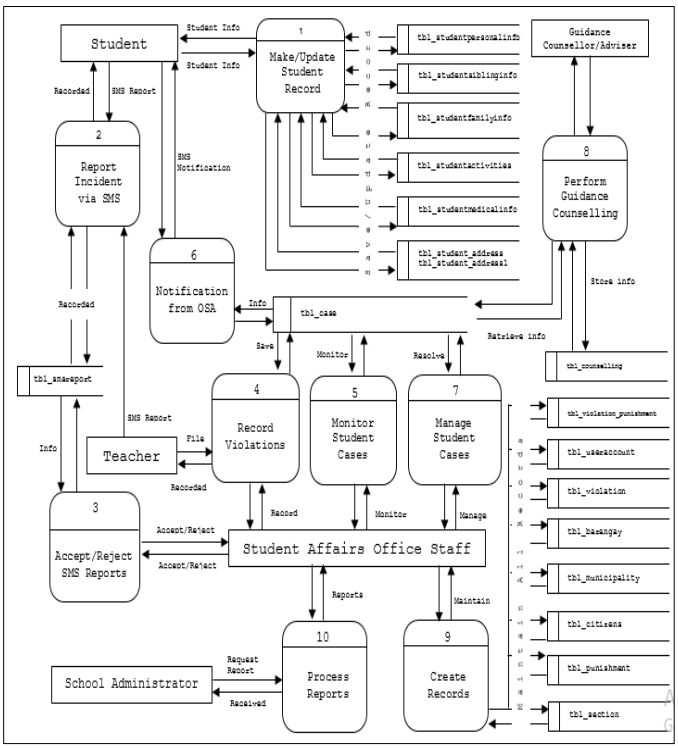

Fig. 2: *Level 1 of DFD*

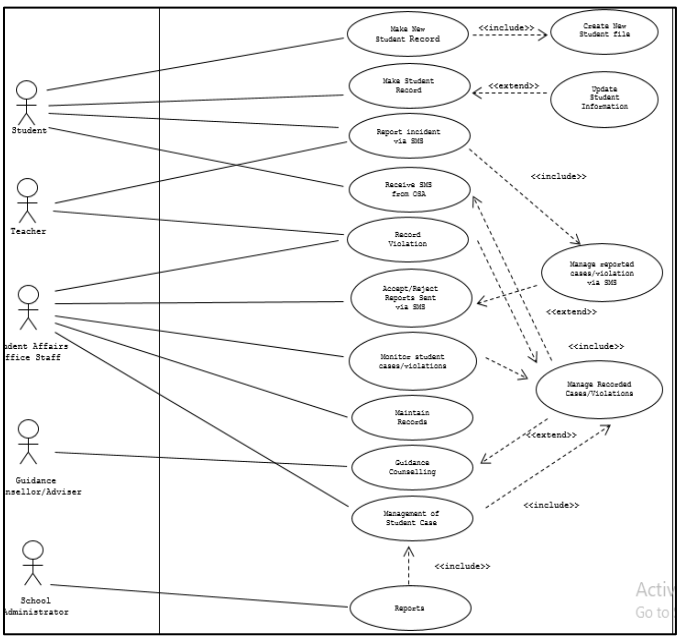

Fig. 3: *Use-Case Diagram of OSAS*

Design Phase

The primary goal of this phase of SDLC is to create a technical blueprint on how the developed system worked. In this phase, the researcher focused on the development of the design of the OSAS which included the graphical user interface (GUI) and the database design. Using different design tools, the researcher was able to construct a user interface that was appropriate for the developed system. Fig. 4 presents the GUI of the OSAS used to monitor the filed violations of the students. Fig. 5 presents the student information form used to record the students' data. Fig. 6 is the student violation filing form used to record the violations committed by students, while Fig. 7 presents the form used for sending notification to parents, students, and guardians regarding filed violations and school announcements.

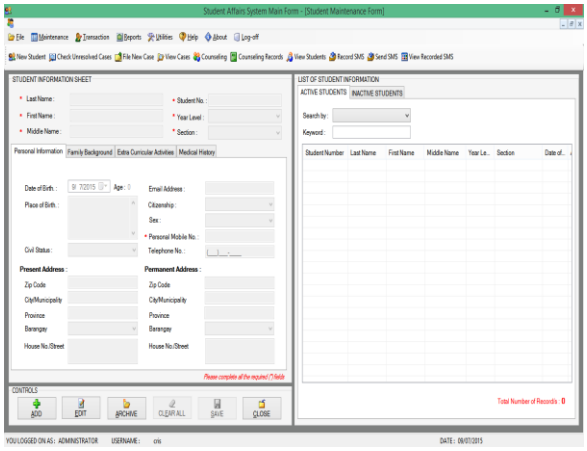

Fig. 4: *Monitoring Form for Filed Violations*

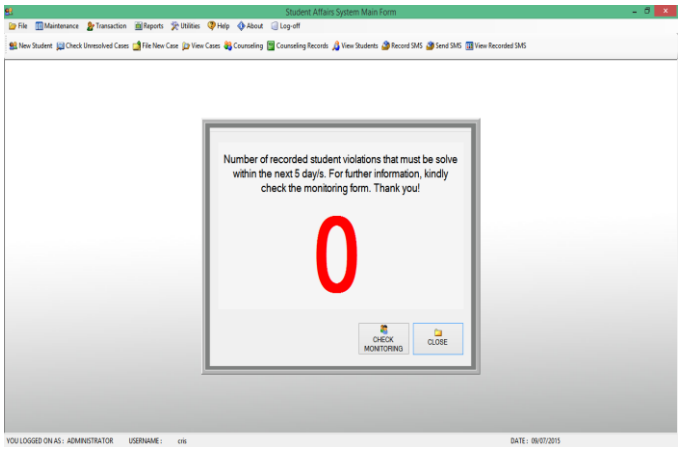

Fig. 5: *Student Information Form*

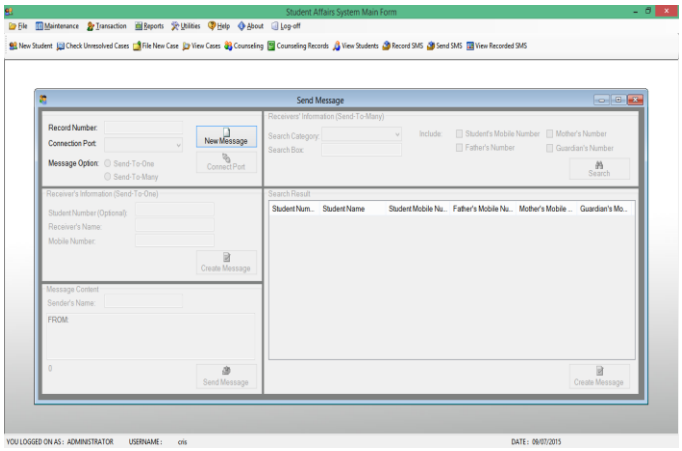

Fig. 6: *Student Violation Filing Form*

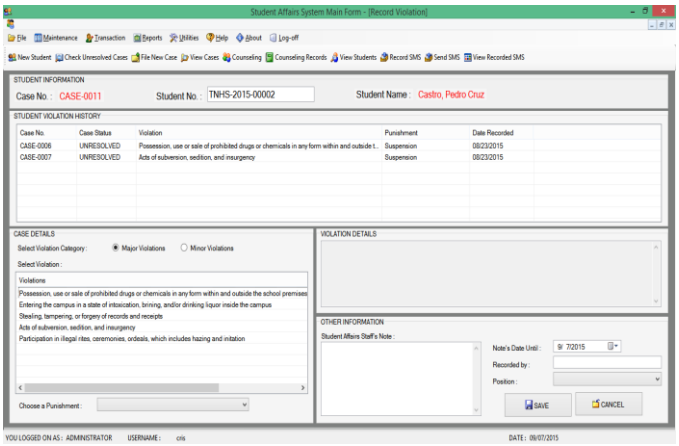

Figure 7: *SMS Notification Form*

Fig. 7: *Entity-Relationship Diagram*

The design of the database was also essential to the success of the developed OSAS. Database Normalization and Entity-Relationship Diagrams played a vital role in supporting the system. A well-designed database can increase the productivity and quality of a system

Fig. 7 presents the Entity-Relationship Diagram of the OSAS. As shown in the figure, the database of the OSAS was composed of different entities interrelated with one another to support the entire Online Student Affairs System.

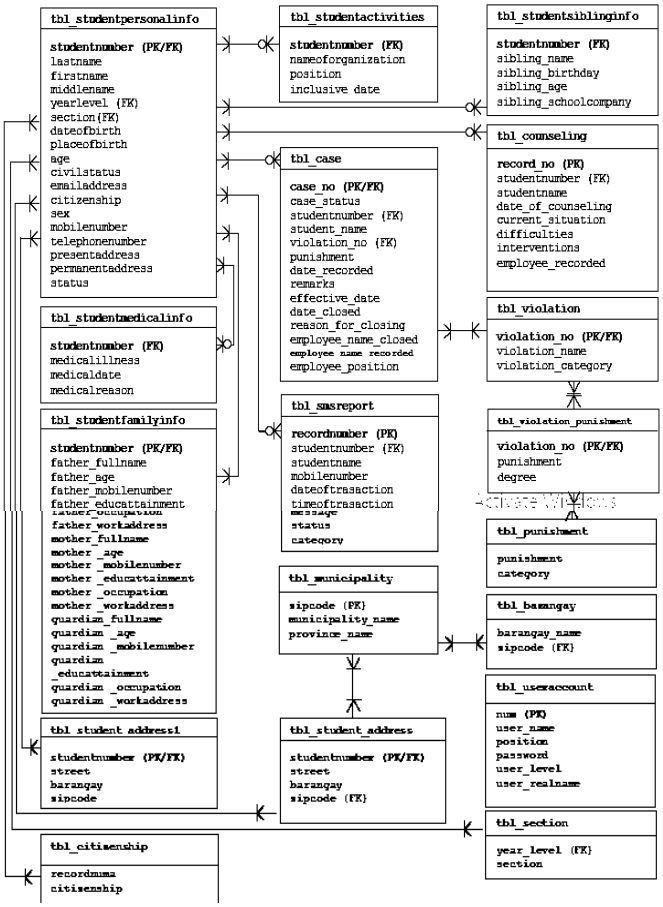

Fig. 8: *Database Normalization*

Coding and Testing Phase

The testing phase verified if the system worked and met all the requirements defined in the analysis phase. It is important that the coding phase and the testing phase went on simultaneously to identify possible errors and to solve it immediately. The researcher tested the system with different test conditions in a step-by-step manner to ensure that every module of the system worked and is error-free. Using detailed test conditions, the researcher was able to solve possible problems that might occur.

Implementation Phase

This phase of the SDLC enabled the researcher to present the developed system to the possible users of a public secondary high school's Office of Student Affairs. In this phase, the researcher discussed and explained every part of the OSAS to the Student Affairs Office staff, teachers, and students.

Maintenance Phase

This is the last phase of the SDLC wherein based on the feedback of the end-users of the system, modifications,

revisions, and some changes took place for the betterment of the OSAS

3.2 The Assessment on the technical quality of the OSAS by IT professionals based on ISO 9126 standards

The technical quality of the OSAS was assessed by IT Professionals in terms of Functionality, Reliability, Usability, Efficiency, Maintainability and Portability

***Table 2**: Functionality*

Descriptors of Functionality	Mean Rating	Verbal Description
Ability to maintain students' electronic records	4.00	Very Good
Ability to send and receive SMS to and from the parents and students about students' violations, announcements, and complaints	4.20	Excellent
Ability to record and monitor students' violations	4.20	Excellent
Grand Mean	4.13	Very Good

In general, the functionality of OSAS was rated very good as evidenced by the mean rating of 4.13. Specifically, the system's ability to maintain students' electronic records was rated "very good" (μ = 4.00). On the system's ability to send and receive SMS to and from the parents and students about students' violations, announcements, and complaints, the rating given was "excellent" (μ = 4.20). The ability of the system to record and monitor students' violations was rated "excellent" (μ = 4.00). These results imply that the IT Professionals confirmed that the OSAS meets its intended functions with very minimal modifications on its ability to maintain students' electronic records.

***Table 3:** Reliability*

Descriptors of Reliability	Mean Rating	Verbal Description
Capability to handle input errors	3.60	Very Good
Capability to back up and restore data	3.60	Very Good
Error-Free	3.40	Very Good
Grand Mean	3.53	Very Good

As shown in Table 3, the system's capability to handle input errors was rated "very good" (μ = 3.53). On the system's capability to back up and restore data, the rating given was also "very good" (μ = 3.60). The presence of no error feature of the system was also rated "very good" (μ = 3.40). In general, the reliability of the OSAS was rated "very good" as confirmed by the mean rating of 3.53. These results suggest that the developed system meets the quality standards of software. However, some rooms for improvement and minimal modifications can still be done as suggested by the IT professionals in terms of the system's ability to handle input errors and the process of backing-up and restoring data to make the developed system even better.

***Table 4:** Usability*

Descriptors of Usability	Mean Rating	Verbal Description
User-Friendly	4.00	Very Good
Easy to use	4.20	Excellent
Pleasing to the eyes of the user	4.00	Very Good
Grand Mean	4.07	Very Good

In general, the usability of the OSAS was rated "very good" as evidenced by the mean rating of 4.07. Specifically, the user-friendliness characteristic of the system was rated "very good" (μ = 4.00). The ability of the system to be used without much difficulty was rated "excellent" (μ = 4.20). On the systems' user interface, the given rating was "very good" (μ = 4.00). These results imply that the OSAS meets the quality standard in terms of usability with minimal modifications on the system's user interface to make it more pleasing and acceptable to the eyes of every user.

***Table 5:** Efficiency*

Descriptors of Efficiency	Mean Rating	Verbal Description
Ability to produce stored electronic data and information	4.00	Very Good
Ability to respond to user's requests	4.00	Very Good
Ability to withstand the duration of use in performing its functions	4.00	Very Good
Grand Mean	4.00	Very Good

As shown in Table 5, the system's ability to produce stored electronic data and information easily was rated "very good" (μ = 4.00), and the ability of the system to respond to user's requests easily was also rated "very good" (μ = 4.00). On the system's ability to withstand the duration of use in performing its function, the rating given was "very good" (μ = 4.00). In general, the efficiency of the OSAS was rated "very good" as confirmed by the mean rating of 4.00. The IT Professionals suggested that the efficiency of the system can still be improved by reducing the level of complexity of code in some forms. However, the results imply that the developed OSAS meets its intended functions with some minimal modifications.

***Table 6**: Maintainability*

Descriptors of Maintainability	Mean Rating	Verbal Description
Ability to trap, prompt, and inform the users if errors occur	3.80	Very Good
Ability to easily modified if necessary	4.20	Excellent
Ability to be tested easily	4.00	Very Good
Grand Mean	4.00	Very Good

In general, the maintainability of the OSAS was rated "very good" as confirmed by the mean rating of 4.00. Specifically, the system's ability to trap, prompt, and inform the users if errors occur was rated "very good" (μ = 3.80) while the system's ability to be easily modified if necessary was rated excellent (μ = 4.20). On the system's ability to be tested easily, the rating given was "very good" (μ = 4.00). These results imply that the OSAS meets its intended functions with minimal modifications to improve the maintainability feature of the system.

***Table 7:** Portability*

Descriptors of Portability	Mean Rating	Verbal Description
Ability to be executed in different platforms	3.60	Very Good
Ability to accommodate multiple users at the same time	3.80	Very Good
Ability to be used in different types of working environment	3.80	Very Good
Grand Mean	3.73	Very Good

As shown in Table 7, the system's capability to be executed in different platforms was rated "very good" (μ = 3.60) and its capability to accommodate multiple users at the same time was also rated "very good" (μ = 3.80). On the system's ability to be used in different types of working environment, the rating given was "very good" (μ = 3.80). In general, the portability of the OSAS was rated "very good" as evidenced by the mean rating of 3.73. These results imply that the system meets its intended functions with some modifications to improve its portability featuresSummary on the Assessment of Technical Quality based on the ISO 9126 Software Standards of the Online Student Affairs Office (OSAS) with Short Message Service (SMS) made by the IT Professionals.

Table 8: *Summary of Assessment of Technical Quality*

Software Characteristics	Mean Rating	Verbal Description
Functionality	4.13	Very Good
Reliability	3.53	Very Good
Usability	4.07	Very Good
Efficiency	4.00	Very Good
Maintainability	4.00	Very Good
Portability	3.73	Very Good
Grand Mean	4.13	Very Good

In general, the OSAS meets its intended functions based on the assessment made by the IT Professionals as evidenced by the over-all grand mean of 3.91. Specifically, the system's Functionality, Reliability, Usability, Efficiency, Maintainability and Portability were rated "very good". The IT professionals suggested that some minimal modifications could be done for the betterment of the developed system.

3.3 The Assessment on the quality of use of the system by High school teachers including student affairs officers and staff, and high school students

The assessment on the quality of use of the OSAS was assessed in terms of Relevance, Feedback, and Graphical User Interface.

Table 9*: Relevance*

Descriptors of Relevance	Mean Rating (Students)	Verbal Descrip-tion	Mean Rating (Teachers)	Verbal Descrip-tion
Ability to serve all the intended functions of the Office of Student Affairs	4.65	Excellent	4.60	Excellent
Ability to inform and notify the parents and students about violations, complaints, and announcements through SMS	4.53	Excellent	4.70	Excellent
Ability to manage electronic data efficiently	4.43	Excellent	4.45	Excellent
Grand Mean	4.53	Excellent	4.58	Excellent

In general, the relevance of the OSAS based on the assessment made by the students was rated "excellent" as evidenced by the mean rating of 4.53, while mean rating of 4.58 based on the assessment made by the teachers. Specifically, both students and teachers rated the ability of the system to serve all the intended functions of the Office of Student Affairs "excellent" (μ = 4.65 for students, μ = 4.60 for teachers) and the system's ability to inform and notify the parents and students about violations, complaints, and announcements through SMS was also rated "excellent" (μ = 4.53 for students, μ = 4.70 for teachers). On the system's ability to manage electronic data efficiently, the rating given was "excellent" (μ = 4.43 for students, μ = 4.45 for teachers). These results imply that the OSAS meets all its intended functions. In the assessment made by students and teachers, results show that the developed system achieved the level of quality of use expected by the respondents to be experienced and acquired from the system.

Table 10: *Feedback*

Descriptors of Feedback	Mean Rating (Students)	Verbal Descrip-tion	Mean Rating (Teachers)	Verbal Descrip-tion
Ability to work effectively in processing and delivering information	4.40	Excellent	4.75	Excellent
Ability to provide solution in managing and handling information	4.15	Very Good	4.25	Excellent
Ability to be used easily	4.48	Excellent	4.20	Excellent
Grand Mean	4.34	Excellent	4.40	Excellent

As shown in Table 10, students and teachers rated the system's ability to work effectively in processing and delivery information "excellent" (μ = 4.40 for students, μ = 4.75 for teachers) while its ability to provide solution in managing and handling information was rated "very good" (μ = 4.15) by the students and "excellent" (μ = 4.25) by the teachers. On the system's capability to be used easily, the rating given was "excellent" by both students (μ = 4.48) and teachers (μ = 4.20). In general, the students and teachers rated the OSAS as "excellent" as confirmed by the mean rating of 4.34 and 4.00 respectively. These results imply that the system meets all its intended functions without modifications. Based from the feedback given by the students and teachers, the developed system was a good solution to solve the problems encountered related to managing the records of a student affairs office.

Table 11*: Graphical User Interface*

Descriptors of GUI	Mean Rating (Students)	Verbal Descrip-tion	Mean Rating (Teachers)	Verbal Descrip-tion
User Friendly	4.50	Excellent	4.75	Excellent
Easy to use	4.20	Excellent	4.25	Excellent
Pleasing to the eyes	4.33	Excellent	4.20	Excellent
Grand Mean	4.34	Excellent	4.40	Excellent

In general, the graphical user interface of the OSAS was assessed by the students and teachers, and it was rated "excellent" as evidenced by the mean rating of 4.34 and

4.40 respectively. Specifically, the user-friendliness characteristic of the system was rated "excellent" (μ = 4.50 for students, μ = 4.75 for teachers) and the ability to be used without much difficulty was also rated "excellent" (μ = 4.20 for students, μ = 4.25 for teachers). On the system's user interface feature, the given rating was "excellent" (μ = 4.33 for students, μ = 4.20 for teachers). These results imply that the OSAS meets the graphical user interface standards without modifications.

Table 12: *Summary on the Assessment on Quality of Use of Both Parents and Teachers*

Descriptors of Relevance	Mean Rating	Verbal Description
Relevance	4.55	Excellent
Feedback	4.37	Excellent
Graphical User Interface	4.36	Excellent
Over-All Grand Mean	4.42	Excellent

Overall, the OSAS' quality of use was rated "excellent" as evidenced by the mean rating of 4.42. Specifically, its relevance criteria was rated "excellent" (μ = 4.55), feedback criteria was rated "excellent" (μ = 4.37), and the graphical user interface criteria was rated "excellent" (μ = 4.36). These results imply that the developed OSAS meets the quality of use standards of software based on relevance, feedback, and graphical user interface.

4. CONCLUSIONS

Based on the findings, this study settles that the Online Student Affairs System (OSAS) with Short Message Service (SMS) can be developed using the System Development Life Cycle with the following phases: Planning, Analysis, Design and Coding, Testing, Implementation and Maintenance. The developed Online Student System (OSAS) with Short Message Service (SMS) passed the assessment on the technical qualities of software made by the IT Professionals and the quality of use made by the high school students, high school teachers, and Student Affairs Office staff. The developed OSAS was proven to be beneficial to a public secondary High School since it passed the assessment on the technical and quality of use.

5. RECOMMENDATIONS

The following recommendations were made based on the conclusions and findings of this study.

1. The Office of Student Affairs of a public secondary high school may utilize the developed Online Student Affairs System (OSAS) with Short Message Service (SMS) to provide solutions to the problems it encounters in monitoring students' records and to uplift the quality of service that they render to every stakeholder of the school by reducing the level of difficulty in managing students' records.
2. The school may consider the idea of training some personnel that will also support the Office of Student Affairs to cater the growing population of the school.
3. The future researchers may use the findings of this study to serve as their guide in conducting researches related to this study.

6. ACKNOWLEDGEMENT

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