

DESIGN AND DEVELOPMENT OF ELECTRONIC SCHOOL ACCOUNTING INFORMATION SYSTEM WITH SMS NOTIFICATION (eSAIS-SMS)

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ABSTRACT

The main purpose of this study was to provide an efficient mechanism in reminding the parents of the pupils enrolled at Estancia Seventh Day Adventist Elementary School with regards to the billing of their monthly tuition. As such, schedules of fees as well as other important information were distributed through the use of SMS technology. Specifically, this paper sought to design and develop the Electronic School Accounting Information System with SMS Notification (eSAIS-SMS) and evaluate its levels of functionality, usability and performance as perceived by the target users. A total of 164 respondents participated in the study to include five experts, two employees of the school and the 157 parents of the pupils enrolled at the said school for SY 2019-2020. The data were gathered through a survey questionnaire that primarily solicited feedbacks from respondents using the ISO/IEC 9126 Model. Descriptive research design was employed to describe the observations of the respondents based on the set objectives. Findings of the study revealed that the functionality of the system product, the level of usability as well as its performance were all described as “Very Good”. These findings suggested that respondents were impressed by the response time and throughput processes of the developed system. It was able to provide real-time information through automatic response feedback using SMS with utmost precision.

KEYWORDS: Accounting System, SMS Notification, RAD

1. INTRODUCTION

Accounting is the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of financial character, and interpreting the results thereof [1]. The rising advancements in information technology have dramatically improved accounting systems and transformed economic life. Almost all organization makes use of accounting techniques to efficiently manage their financial resources.

In schools, like the Estancia Seventh Day Adventists Elementary School (ESDAES) in the Municipality of Estancia, Iloilo province, simple accounting processes are employed such as recording of payments made by parents and summarizing them to easily monitor transactions. However, as the school is becoming crowded with the increased number of enrolment there are perceived issues in the preparation of students financial account documents. Such perceived issues may include the delay in the preparation of statement of accounts, non-transmittal or loss of statement of accounts or even inaccuracy in the recording of facts.

These are legitimate issues may can create possible conflicts between the parents and the school.

It can be worth noting that tuition fees are the lifeblood of any privately-owned academic institution. The amounts collected therein are used to augment the various expenses that the schools need to spend in their business operations. Failure to inform the payees is tantamount to failure in the collection of their dues. It is therefore imperative that an efficient and effective billing system has to be adopted to address the need.

On the other hand, the Short Messaging Service (SMS) is a text messaging service component of phone, Web, or mobile communication systems [2]. It uses standardized communications protocols to allow fixed line or mobile phone devices to exchange short text messages. It is popular around the world, across age groups and cultures, because it is simple, concise, and compatible with every mobile device. Surveys report about 400 million text messages are sent by Filipinos every day [3].

It is in this context that this paper sought to design and develop a web-based management information system that combined accounting processes with SMS technology to be known as the Electronic School Accounting System with SMS Notification (eSAIS-SMS). It further aimed to determine the level of usability of the proposed system as perceived by the identified user groups and evaluate the performance of the proposed system in terms of functionality, reliability and efficiency of the information as viewed by its users.

2. RELATED WORKS

In [4], they developed an information system dubbed as MoBEBIS to address some common issues related to the manual electricity billing process such as using a manual process on meter reading, amount calculation, and billing customer and so on. Furthermore, another confronting issue was the interaction between customers and the Electricity Board being found to be very poor thus it took much longer to respond to customer queries. Their proposed system has come up with solutions which address these problems. Apparently, the proposed minimized the burdens of the Meter reader as well as the Electricity Board which in turn made them more efficient. The Meter readers' day to day works becomes less tiresome because most of the manual processes and calculations were done automatedly by the system. Meter readings can easily be collected with high degree of accuracy.

In [5], he conducted a study that aimed to develop a fully customized Student Information and Accounting System (SIAS) of Cagayan State University – Lasam Campus, in Northern Luzon. The system would facilitate the enrollment and accounting process and to cater the needs of all the clients and the staff in the delivery of frontline services. The SIAS operates in multiple computer units over the network having a centralized database for data storage and retrieval. The overall functionality of the SIAS increased the efficiency of the frontline service providers since most of the processes are computerized and automated. The result of

the survey along with quality of services, accuracy of records and reports, and timeliness reveals that SIAS is significant and effective instrument in the delivery of frontline services.

In [6], he developed the School Event Notification Through SMS (SENT SMS) which is an information system for students, teachers, and parents aimed to provide first-hand information from the school into recipients' registered mobile phones. With the use of SMS Notification, students were notified with the upcoming events of the school, changes in schedule of events, and suspension of classes due to bad weather. Teachers were also notified for schedule of meetings, emergency meetings, and deadlines of requirements. Parents will also be informed about the school activities and be aware of the activities of their children in school. Based on the testing and evaluation of the system product, the result implied that the overall usefulness of the system is very effective, that is, it is highly functional, highly reliable, highly usable, highly efficient, highly maintainable and highly portable.

3. METHODOLOGY

3.1 System Development Life Cycle

The study employed the Rapid Application Development (RAD) model as the software development life cycle for the software development activities. The RAD model is based on prototyping and iterative development [7]. The process of writing the software itself involves the planning required for developing the product. It focuses on gathering customer requirements through workshops or focus groups, early testing of the prototypes by the customer using iterative concept, reuse of the existing prototypes, continuous integration and rapid delivery. It further uses minimal planning in favor of rapid prototyping. A prototype is a working model that is functionally equivalent to a component of the product [8].

The RAD model is consist of four phases namely requirements planning phase, user design phase, rapid construction phase and cutover phase [9]. At each phase, the researcher performs specific activities leading to the phase's deliverable. Since the RAD model heavily relies on the involvement of the users, the deliverables are presented to them to further refine the final product. Figure 1 shows the RAD model.

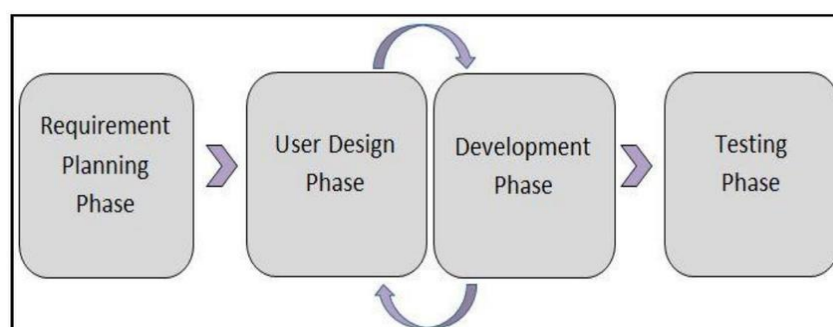


Figure 1. The Rapid Application Development Model.

3.2 Application Architecture Model

The application architectural model defines the proposed layouts for the core functions of the system product. The layout depicted the hierarchy of major logical components comprising the proposed system. The logical grouping of components into separate layers or tiers communicated with each other and with other clients and applications. Tiers were concerned with the physical distribution of components and functionality on separate servers, computers, networks, and remote locations. In this study, the N-tier architecture was employed. The N-Tier is a Client-Server architecture combined with the layered architecture [10]. There were three tiers included in the design. These were the presentation tier, application logic tier, and the database tier.

The presentation or GUI tier component implemented the functionalities required to allow users to interact with the application. The developed system implemented two user interfaces which were the web-based interface intended for the use of the system operators and the SMS-based interface for use of the parents as clients. The application logic tier implemented the core functionalities of the system. Under this tier were the various modules and sub-modules that performed the actual automated functions of the developed system. The database tier implemented the processes involving the data manipulation and management of records used by the developed system. It provided access to data that were hosted within the boundaries of the system, and data exposed by other back-end systems. This was implemented using the MySQL database server to handle actual database, tables, and records. Figure 2 shows the application architecture model of the proposed system.

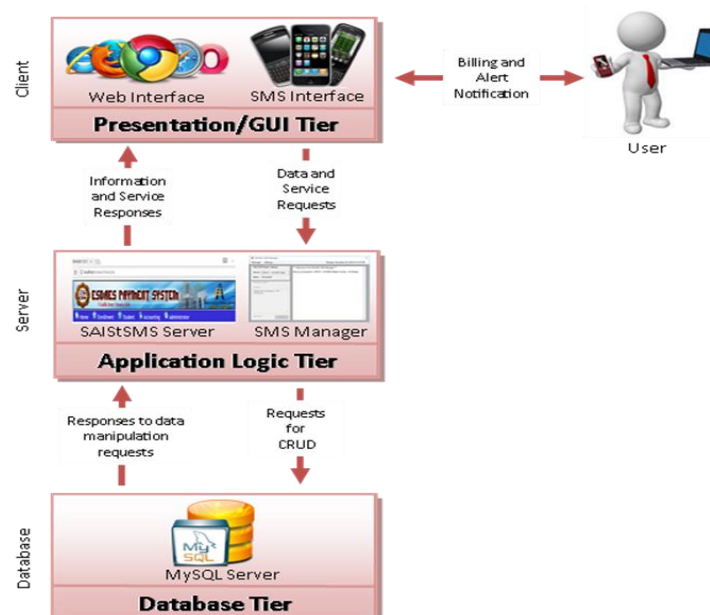


Figure 2. The Application Architectural Design for the Proposed System.

3.3 Physical Network Topology

The physical network topology visualizes the communication schemes of physical networks and its arrangement. The physical network topology depicted the placement of the components in the network. It showed the configuration of cables, computers, and other devices.

Since this system was implemented through SMS technology, it was developed to make use of the existing infrastructure of the telecommunication companies as the carrier of the SMS. A GSM-capable modem was attached to the server computer to facilitate receipt of SMS inquiry and sending of SMS notification to the clients. The parents who are the clients of the proposed system only need GSM-capable cellphones to inquire and/or receive SMS notifications. Figure 3 shows the physical network topology of the developed system.

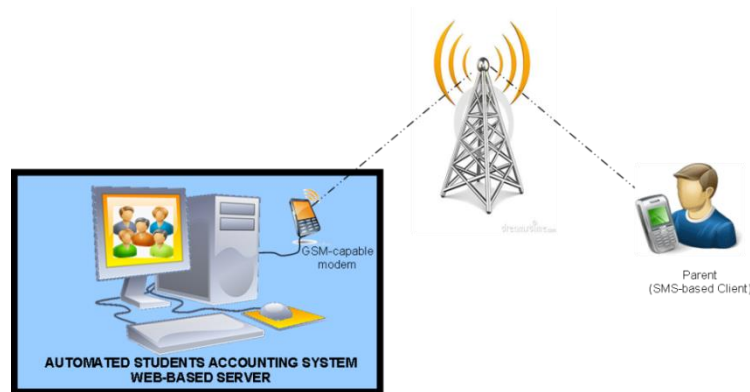


Figure 3. Physical Network Topology of the Proposed System.

3.4 Proposed System Prototype

The construction of the system prototype was based on standard web development techniques for efficient user interface design. Font colors, styles and sizes, as well as background colors and images and even whitespaces, were properly configured while taking into considerations of the users' profiles. The system prototype consisted of multiple files that were written using PHP5 scripting language for the Students Account module and Microsoft Visual Basic 2010 for the SMS module.

On a nutshell, the Students Account module is the main interface for the system operators in the processing of enrolment of students as well as for the payments of the financial obligations of the parents for their children enrolled at ESDAES. There were several web pages included under this module that performed the various functionalities. Figure 4 shows the screenshot of the Students Account module main page.

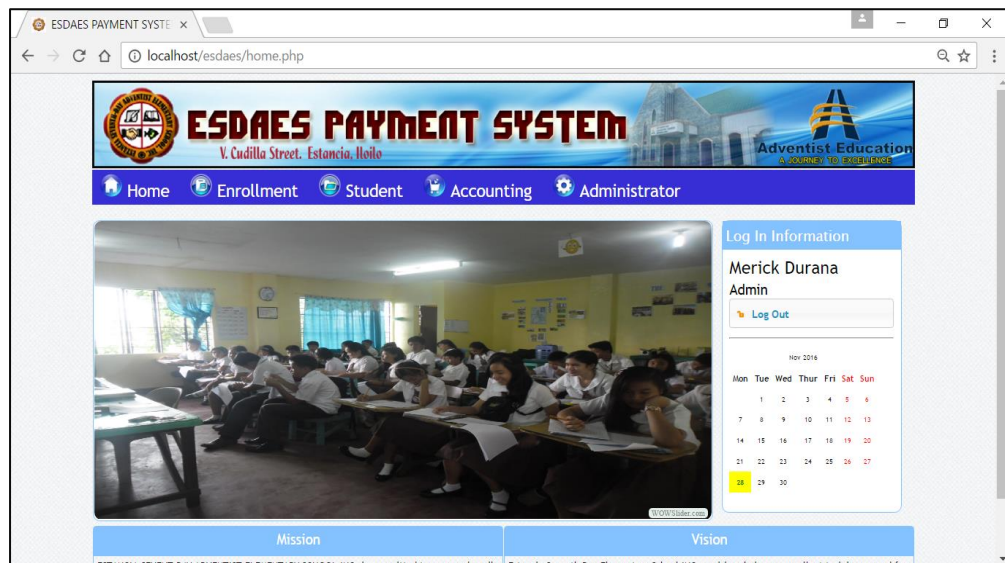


Figure 4. The Students Account Module Main Interface.

On the other hand, the SMS Manager module is a system facility that allowed the system operators to send SMS notifications such as electronic billing statements and alerts. This component also monitored any incoming SMS inquiries made by parents on their children's account balances and automatically replied with appropriate information. Figure 5 shows the main interface of the SMS Manager module.

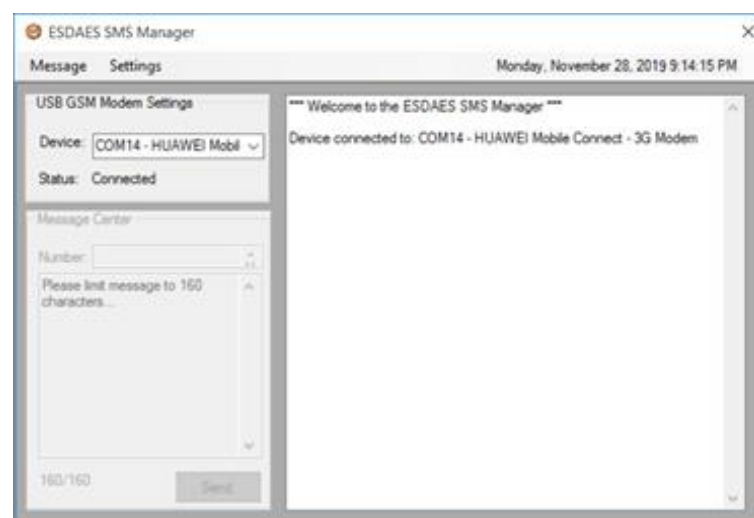


Figure 5. The SMS Manager of the Developed System.

Figure 6 shows the actual electronic billing statement in a form of an SMS text message forwarded to the registered mobile phone numbers of the parents.

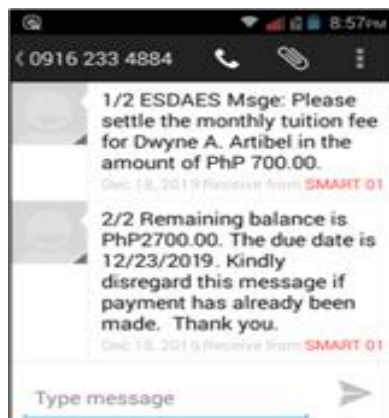


Figure 6. Actual Screenshot of an SMS Billing Notification of the Developed System.

4. DISCUSSION AND FINDINGS

4.1 Functionality of the System Product

The table below shows the result of the respondents' feedbacks on the functionality of the system product in terms of functional appropriateness, functional correctness, and functional completeness. In its delivery of billing notifications and inquiry responses to parents regarding students' accounts, the functional appropriateness ($M=4.51$), functional correctness ($M=4.36$) and functional completeness ($M=4.47$) were described as "Very Good".

These findings simply suggested that with the system product when implemented, the provision of billing notifications, as well as inquiry responses to parents, had a high level of functional suitability. Regular monthly billing notifications were received by parents through SMS. On the other hand, inquiry requests were provided with SMS responses almost instantly due to automatic response mechanism of the proposed system. As required by the users, one of their major concerns was that they should be able to receive prompt information regarding the financial obligations of their children with the school. This requirement was implemented through a series of functional modules in the proposed system. During the evaluation, most of the respondents cited that they were impressed by the manner for which the system was able to provide them with the information that they need at their most convenient time. The ESDAES personnel handling the system added that their works became easier and efficient with few clicks of the mouse. Table 1 shows the results.

Table 1 Respondents' Feedbacks on the Functionality of the System Product.

Implementation Indicators	Mean	Verbal Interpretation
a. functional appropriateness	4.51	Very Good
b. functional correctness	4.36	Very Good
c. functional completeness	4.47	Very Good

4.2 Level of Usability

Usability characteristic is the capability of the software product to be understood, learned, used and provides visual appeal, under specified conditions of usage. The level of usability of the proposed system was evaluated in terms of understandability, learnability and operability. The respondents' feedbacks for the level of usability in terms understandability (M=4.44), learnability (M=4.53) and operability (M=4.49) were all interpreted as "Very Good".

This finding connoted that the proposed system, when implemented, possessed a high level of usability whereby the users were able to easily understand it due to its simple yet highly performing functions. Since the system's interfaces were presented using graphical user interfaces (GUI), it can also be easily learned and subsequently operated even by someone with minimal computer knowledge. Moreover, since the developed system was using SMS, the parents can really use it. Table 2 shows the result.

Table 2 The Level of Usability of the System Product.

Implementation Indicators	Mean	Verbal Interpretation
a. understandability	4.44	Very Good
b. learnability	4.53	Very Good
c. operability	4.49	Very Good

4.3 Performance Evaluation of the System Product

The performance evaluation of the system product denotes the capability of the software product to provide desired implementation, relative to the amount of resources used, under stated conditions. The results showed that the performance of the proposed system in terms of time execution (M=4.41) and reliability (M= 4.44) were interpreted as "Very Good".

The findings suggested that upon evaluation of the performance of the system product, the respondents believed that the response time and throughput processes were impressive. The system was able to provide real-time information through automatic response feedback using SMS. It also provided the correct results with utmost precision and was able to facilitate accomplishment of specific tasks they wanted for the system to perform. On the other hand, in terms of the reliability of the developed system was concerned, the respondents agreed that it was always available, operational, accessible and responsive every time they would make inquiries as to the account balances of their children. Table 3 shows the performance evaluation of the system product.

Table 3 The Performance Evaluation of the System Product.

Implementation Indicators	Mean	Verbal Interpretation
a. time execution	4.41	Very Good
b. reliability	4.44	Very Good

5. CONCLUSION

In light of the findings of the study, the following conclusions were drawn:

The eSAIS-SMS was able to deliver billing notifications and inquiry responses to parents regarding student accounts with that were appropriate, correct and complete. It provided the users requirements and needs with a high level of functionality.

The eSAIS-SMS was able to provide an acceptable level of usability due to its simple interface design that is easy to learn and operate.

The performance of the eSAIS-SMS in terms of time execution and reliability of the information provided to clienteles was impressive. It has a high degree of response time and throughput processes in its provision of real-time information to users. It is reliable where respondents agreed that it is always available, operational, accessible and responsive whenever they need it.

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