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A Short Message Service (SMS) Based Inquiry System

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Abstract

The arduous tasks of the registrars cause them to overlook undergraduates that inquires in their office – may it be subject deficiencies or requirements. In this study, the researchers developed a software application that can automatically cater inquiries of a student's status if they have any impending deficiency, and to be able to message students about the precise time of the document's completion that they have requested. The evaluation result is calculated using Cronbach's Alpha, which displays a value of 0.9053, equivalent to excellent. The α is determined with the use of the calculated mean of functional sustainability (4.03), reliability (3.88), performance efficiency (3.80), usability (4.03), and security (3.82). The result shows that the system is operational and possesses a quick response that highly benefits the students and the registrar's office.

Keywords: Deficiency; Short Message Service; Registrar; Inquiry.

1. Introduction

Universities are one of the main backbones of our society. It is observed that registrar's office is a vital part of the said institution because handling personal information and academic performance of students in the school are the essential tasks of a school's registrar. According to [1] Bureau of Labor Management, as cited in Campus Explorer (2021), Registrars are the custodians of students' records.

They register students, record grades, prepare student transcripts, evaluate academic papers, plan, and implement commencement, oversee the preparation of school catalogs and schedules of classes, and analyze enrollment and demographic statistics. In short, all the administrative work in school is done through the registrar's office.

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However, because of the numerous tasks handed unto them, they tend to overlook student's deficiency in their evaluation. In addition, there is a lack of information on the usual requirements concerning specific documents they desire to inquire about. Furthermore, students are not precisely notified about the completion of their requested files from the registrar's office that is ready for retrieval, which causes them to waste time and effort if they personally look into it.

Therefore, this research aims to develop a software application that can assist the undergraduates and the registrar's office to optimize one's time of both ends. This system will also minimize oblivious complications in the future evaluation of the students**.**

1.1. Scope and Limitation

This study focuses solely on creating a stand-alone system for the registrar and the undergraduate students. It will provide an automated reply to their inquiry regarding their deficiency in their grades in terms of failed subjects and incomplete subjects from the registrar's office using SMS. Another scope of this study is to provide an SMS notification to the students who have a transaction/requested file in the registrar's office if it's ready for reclamation. This study also covers the automated reply to students' inquiries about the requirements for a specific document they want to request.

This study limits itself as a software application only and won't be deployed on the internet. This system is also a stand-alone system and will not relate to any other working system of a school. This study is also limited with deficient grades and requirements of documents only. Hence, anything not mentioned above is not part of the scope of our system.

2. Related Literatures and Studies

According to their study entitled [2] "SMS Based Grade Inquiry System for Holy Trinity College of General Santos City", since most people own a phone, SMS's availability and low cost are its main benefits. Several service providers offer mobile services around the world, including SMS. Most of the time, sending an SMS has a low upfront cost, and the majority of service providers don't charge more to receive them. Customers can send and receive an infinite number of SMS messages when service providers grant them a specified number of free SMS each month.

SMS works on all phones, no matter what kind of phone you have or who your phone company is. This is different from other messaging apps, which only work on certain phones. Sending and receiving text messages is usually very cheap. Most phone companies offer unlimited text messaging plans for a fixed monthly fee. Even if you don't have an unlimited plan, sending individual text messages is usually very cheap.

Students are increasingly using their cell phones to navigate a variety of communication delivery modes. In this context entitled [3] "Thx 4 the msg: Assessing the Impact of Texting on Student Engagement and Persistence", It has been determined that texting is a form of communication that has the ability to help advisers provide important information in a way that students are more likely to read. As student obligations increase and college

requirements become more complex, maintaining effective communication between advisors and students has become a significant challenge. Conventional methods such as face-to-face meetings, phone conversations, or emails often fall short due to limited time and high student-to-advisor ratios. However, with the widespread use of cell phones among students, texting has surfaced as a potential solution to these communication hurdles. Texting enables advisors to convey crucial information in a manner that students are more likely to engage with. This approach is in line with the theory of behavioral economics, which propose that nudging can influence behavior by modifying the presentation of choices. Thus, it is anticipated that academic advisers should encourage their advisees by sending quick texts to them in order to reduce informational complexity and improve student success by changing the context in which students are given options.

According to the research entitled [4] “Systemic Change in Education: A Road Map”, computer-based simulations will be ideal instruments for replicating the real-world, authentic tasks and for maximizing active involvement and creation of learning. Technology will play essential roles in teaching, assessment, and tracking learner development.

It can be used to record data from students that includes their progress, scores, and attendance to help teachers monitor students' development. Automated tasks can help to reduce the effort and time for subjective grading and be more efficient and consistent when evaluating. To further illustrate the things that would require teachers to assess students' capabilities and adjust accordingly, data gathered from the technology can be applied in real-time to understand the teaching methods they would take in order to maximize the efficiency of learning.

We use the term notification to refer to a visual cue, based on the article entitled [5] “Instant messaging and interruption: influence of task type on performance”, an aural signal, or haptic alert, produced by a service or application that communicates information to a user outside of her current focus of attention is described in the Proceedings of the Annual Conference of the Human Factors and Ergonomics Society of Australia (OZCHI). Notifications can have practical advantages such facilitating nearly instantaneous communication.

In general, notifications are an excellent method to keep up with what's going on with your devices and in the world around you. Through notification, real-time information on significant events can be delivered to you. This means that even when you're not actively using your devices, you can always keep up to date on what's occurring. This can be useful for organizing your schedule and keeping up with your tasks. By making it simpler for consumers to stay informed and manage their time, notifications may enhance the user experience. In their study entitled [6] “The need for a more efficient user notification system in using social networks as ubiquitous learning platforms”, when compared to social network notifications, the SMS was predicted to be more effective at getting the recipient's attention. It was also predicted that including students with mobile phones that don't fall under the "Smartphone" category could increase participation rates (i.e. 199 phones that are incapable of connecting to mobile data networks).

Using SMS could mean including not only the students who can successfully connect to the Web with their Smartphones, but also students who may have a mobile phone but for one reason or the other may not have Web connectivity over such expensive devices.

3. Design Architecture

This section shows the design architecture of our study and comprises of application architecture diagram and evaluation that discuss the interpretation of Likert Scale and Cronbach's Alpha along with the different formula used.

3.1. Application Architecture Diagram

The Figure 2 shows the relation and process that happens in the system.

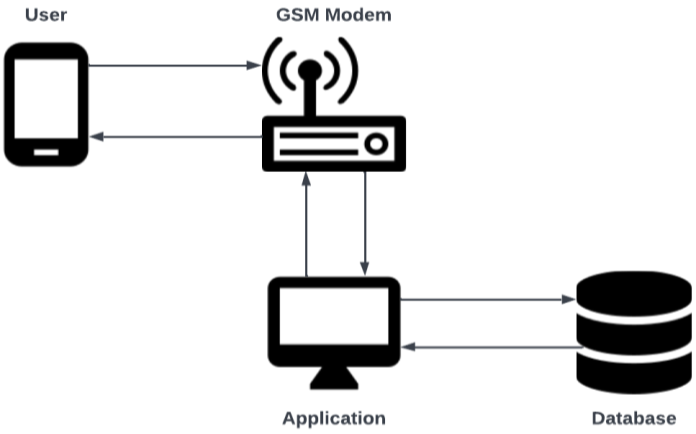

Figure 1: System Architecture Diagram.

This diagram explains that the user can inquire about a subject deficiency using a specific keyword and the student's number. It will go through the GSM modem processing, and then the application will now receive the user inquiry. The message received will now be saved in the database and decoded, then find the information that the user inputted. Once done with the receiving process, the application will now be able to have the inquiry that the user needs. It will now go through the GSM modem again with the requested inquiry that the user demand. Lastly, the users will now have the information they inquired about from the beginning, whether they have a subject deficiency. The diagram also shows other functionalities that the application can provide. The first one is creating and deleting new information that can also be displayed in the application. And lastly, the application can also send a message or an announcement using the application to a valid mobile number.

3.2. Evaluation

The SMS Based Inquiry System is evaluated using the ISO 25010 Standards. This is a quality model that is used to identify which quality characteristics will be utilized to evaluate a system. It is composed of eight different categories, but this study only uses categories which are the functional sustainability, performance efficiency, useability, and reliability. As stated by [7] Losby and Wetmore (2012), Likert Scale is often used to measure respondents' attitudes by asking the extent to which they agree or disagree with a particular question or statement. To measure the effectiveness and efficiency of the system, the researchers will use the Likert Scale as shown in the Table 1.

Table 1: Likert Scale.

Likert Scale	Interpretation	Weighted Mean	Verbal Interpretation
5	Strongly Agree	4.20 - 5.00	Fully Observed
4	Agree	3.40 – 4.19	Frequently Observed
3	Moderately Agree	2.60 – 3.39	Observed
2	Disagree	1.80 – 2.59	Partially Observed
1	Strongly Disagree	1.00 – 1.79	Not Observed

In conformity with ExamSoft [8], for an assessment to be considered reliable, it must exhibit consistent results. Deviations from data patterns and anomalous results or responses could be a sign that specific items on the test are misleading or unreliable. The researchers tested the reliability of the test using the Cronbach's Alpha as shown in Table 2. The data were tabulated using the SPSS for computation. The Cronbach's Alpha is used not only to test the consistency of each item in the test but also to eliminate items that may deem bias. According to [9] Cronbach (1951), α is found to be an appropriate index of equivalence and, except for very short tests, of the first-factor concentration in the test.

Table 2: Cronbach's Alpha Interpretation.

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

- Sample Variance

$$s^2 = \frac{\sum(xi - \bar{x})^2}{n-1} \qquad (1)$$

Where n is the number of items and $\sum(xi - \bar{x})^2$ is the sum of each squared deviation from the mean across all values. Then $\bar{x}$ is the mean of all the scores and xi is the difference of mean and individual score of respondents.

- Sample Standard Deviation

$$s = \sqrt{\frac{\sum(xi - \bar{x})^2}{n-1}} \qquad (2)$$

Where n is the number of items and $\sum(xi - \bar{x})^2$ is the sum of each squared deviation from the mean across all values. Then $\bar{x}$ is the mean of all the scores, xi is the difference of mean and individual score of respondents, and lastly $\sqrt{\frac{\sum(xi - \bar{x})^2}{n-1}}$ is the square root of variance to get the result of standard deviation.

- Cronbach's Alpha Coefficient

$$\alpha = \left(\frac{k}{k-1}\right)\left(\frac{s^2y - \sum s^2i}{s^2y}\right) \qquad (3)$$

Where k is the number of items, $\sum s^2i$ is the sum of the variances of each item, and lastly s^2y is the variance of the total column.

4. Result and Discussion

This section shows the result of the evaluated researcher-made questionnaire checklist based on ISO 25010, a standard for software product quality. The evaluation focuses on various aspects of the software application, and the results are summarized in tables for each quality characteristic. As seen in Table 3, the results were calculated using Cronbach's Alpha based on functional suitability, reliability, performance efficiency, and usability.

Table 3: Reliability of the Questionnaire.

Variable	No. Of Items	Mean	Variance	Standard Deviation	Cronbach's Alpha
Functional Suitability Reliability Performance Efficiency Usability Security	6	23.5935	33.2688	5.7679	0.9053

Table 3 assesses the reliability of the questionnaire. The researchers used Cronbach's Alpha, a measure of internal consistency, to evaluate the reliability. Cronbach's Alpha values were calculated for functional suitability, reliability, performance efficiency, usability, and security. All Cronbach's Alpha values were found to be greater than 0.7, indicating a high level of reliability in the questionnaire. It shows that the Cronbach's Alpha Coefficient of the tool including the domain and variables were greater than 0.7, This suggests that the questionnaire is consistent and can effectively solicit information from respondents. The table reveals that the questionnaire is accepted. Thus, it is consistent. The data shows that the six (6) items have a Cronbach's Alpha value of 0.9053. In order for the item to be valid, it has to have a value nearest to 1.

4.1. ISO 25010 Product Quality Characteristics

The tables below show the grand weighted mean of the five (5) Product Quality Characteristics of ISO 25010 that the researchers used to evaluate the developed system. It consists of functional sustainability, availability, performance efficiency, and useability.

Table 4: Grand Weighted Mean of Functional Suitability Result.

No.	Statements	Mean	Interpretation
1	The system has covered all the specified tasks and user objectives	4.03	Frequently Observed
GRAND WEIGHTED MEAN		4.03	Frequently Observed

- Summary of Functional Suitability Result

Table 4 shows that the only statement included obtained a total mean score of 4.03. This means that the respondents concur functional suitability is "Frequently Observed". It also means that the system where able to do its functionalities that will be useful to the user experience.

- Summary of Reliability Result

Table 5: Grand Weighted Mean of Reliability Result.

No.	Statements	Mean	Interpretation
1	The system is operational and accessible	3.88	Frequently Observed
GRAND WEIGHTED MEAN		3.88	Frequently Observed

Table 5 shows that the only statement included obtained a total mean score of 3.88. This means that the respondents concur that availability is "Frequently Observed". It also means that the system is running its features well and is easily accessible by the users.

- Summary of Performance Efficiency Result

Table 6: Grand Weighted Mean of Performance Efficiency Result.

No.	Statements	Mean	Interpretation
1	The system was able to have a fast response and minimal processing times while it was performing its functions	3.80	Frequently Observed
GRAND WEIGHTED MEAN		3.80	Frequently Observed

Table 6 shows that the only statement included obtained a total mean score of 3.80. This means that the respondents concur that performance efficiency is "Frequently Observed". It also means that the system is running smoothly and can send a message and reply to inquiries immediately.

- Summary of Usability Result

Table 7: Grand Weighted Mean of Usability Result.

No.	Statements	Mean	Interpretation
1	The system was able to satisfy the appropriate needs of the users.	3.94	Frequently Observed
2	The system's user interface is pleasing	4.13	Frequently Observed
GRAND WEIGHTED MEAN		4.03	Frequently Observed

Table 7 shows that statement number two obtained the highest mean of 4.13 and statement number one got 3.94.

The table shows that the total mean of both statements is 4.03. It means that the respondents have an interpretation of "Frequently Observed" in terms of Usability. It also means that the system were able to satisfy the users in terms of its needs and that the graphical user interface of the system is pleasing to their eyes.

- Summary of Usability Result

Table 8: Grand Weighted Mean of Security Result.

No.	Statements	Mean	Interpretation
1	The system was able to ensure that data is only accessible to those who have authorized access.	3.82	Frequently Observed
GRAND WEIGHTED MEAN		3.82	Frequently Observed

Table 8 shows that the only statement included obtained a total mean score of 3.82. This means that the respondents concur that security is "Frequently Observed". It also means that the system were able to provide security to the passwords that were stored in the systems' database. The tables illustrated above show the significance of the created software application by the researchers. It is deemed essential by the respondents, and it will have a substantial impact on both undergraduates and the registrar's office. It will minimize oblivious complications in future evaluation which can greatly help both ends. The evaluation found that the questionnaire was reliable, with Cronbach's Alpha values exceeding 0.7. The application performed well in terms of functional suitability, reliability, performance efficiency, usability, and security, with respondents frequently observing positive outcomes. The software was deemed essential and impactful, particularly for undergraduates and the registrar's office, by minimizing complications in future evaluations. In summary, the evaluation suggests that the software application is effective, reliable, and user-friendly, meeting the ISO 25010 quality standards.

5. Conclusions and Recommendations

The researchers were successful in presenting a noteworthy result by using ISO 25010 Product Quality Characteristics and obtaining an excellent interpretation of Cronbach's Alpha by assessing the reliability of the instrument used. The researchers were able to receive a value of 0.968 which is equivalent to excellent according to the Cronbach's Alpha interpretation. It denotes the significance of the constructed software application by the proponents towards students and the registrar's office.

In the future, generating a chatbot that can automatically answer frequently asked questions is highly encouraged. Also integrating the system into a web-based must be considered to broaden the scope of users. Lastly transitioning the single short message into Protocol Data Unit (PDU) Mode to increase the character limit in sending and receiving messages is also recommended.

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