Developing a Mobile Notification System for Al Buraimi University College Students

Ghalia ALFarsi [1], and **Maryam ALSinani** [1]
galfarsi@buc.edu.om; mjuma14@gmail.com

[1] Information Technology Department, Al Buraimi University College, Al Buraimi, Oman

Abstract. In today's world, one of the most common applications in mobile technology is the short message service (SMS). Due to its importance, this research is mainly concerned with a mobile notification tool based on SMS aiming to improve the mixed learning method for undergraduate distance learners. Accordingly, this tool adds a great impact on reducing the challenges that students may face in learning and assists them to achieve their learning outcomes. The main objective of the developed tool is to facilitate the communication between the students and their instructors through the notification utility. This works through a mobile operating system linked to a website via a mobile application. Findings indicate that SMS has a positive impact on students' perceptions where it improves their learning performance during the interaction process. All students' groups showed interest in receiving the educational content via SMS.

Keywords: *SMS, Short Message Service, Java, Website.*

1. Introduction

Private and public institutions of higher education are widely spread across the Sultanate of Oman. It was not limited to a specific area or to the capital (Muscat). All these institutions are highly independent of any party that may help in promoting their education. In line with the fast development of information technology, institutions are not limited to only one tool that its primary objective is to provide high-quality educational atmosphere. Accordingly, the outputs help in instilling an educational understanding, student's quality, and development. Institutions of higher education entered the world of technology and made use of it in the field of education for enhancing the students' learning performance. Based on this, new technologies are currently facilitating the learning delivery through the use of mobile devices. One of these technologies is Mobile Learning (M-learning). M-learning has become one of the most attractive technologies by students and educators for its featured capabilities in the education process (Al-Emran & Shaalan, 2015a; Al-Emran & Shaalan, 2015b). A recent study by Al-Emran et al. (2016) showed that 99 % of the university students at two neighbouring countries (Oman and UAE) own mobile devices.

The primary goal of the present study is to develop a mobile notification application for students. The application is used to notify the students about the updated news between the student and his/her professor in a situation where the professor has to send a text message to all his students from the main website using his/her personal computer. Once the direct message is sent, the students get the notification simultaneously. This tool is highly dependent on the mobile phones not on the email, that is, the student does not need to check his email regularly. The application sends a notification to the student about the latest updates such as quizzes new timing, assignment recent changes in the deadlines, and class cancellation due to urgent circumstances. This tool is highly effective as the student gets an immediate notification of the modification independent from any normal means such as e-mail. This technique speeds up the process of teaching in two different directions. First, it helps the professor in preserving the time needed to send the message. Second, it has one-to-one communication method between the teacher and the student as the teacher is able to receive a direct notification that the message has been delivered and read. In this respect, Bahader (2011) stated that educational systems empower the students' capabilities and support the teachers in promoting distance learning. Reimers and Stewart (2009) reported that SMS facilitates lectures' delivery. M-learning adds more value to the educational

process as it increases the learning flexibility, develops the educational behavior, and uses mobile technology on anywhere anytime basis (Lim et al., 2011).

The application flexibility is based on the fact that all students are familiar with receiving SMSs. This procedure is consistent with the university philosophy of democratizing education. That is, education will be accessible to all regardless of time, place, age, and social economic background. Due to the high penetration rate of mobile phone subscriptions, this method seems to be the most immediate one to highlight mobile devices usage among BUC distance learners. The increasing number of technology users leveraged their acceptance of m-learning. The developed application strengthens the relationship between students and teachers through the application of "BUC Notifications" for smartphones. The application is activated when the students register their course codes in each semester, then the teacher can send alerts in the form of "text", "image", or "exercises" to all registered students with the same course code.This application is useful in speeding the process of receiving notifications by all students as soon as the teacher sends the alerts. In order to evaluate the developed application, 60 students from BUC filled a questionnaire survey.

2. Literature Review

Mobile learning has become an increasingly important field in the higher education (Al-Emran & Shaalan, 2015a; Al-Emran & Shaalan, 2015b; Al-Emran et al., 2016; Al-Emran & Malik, 2016; Al-Emran & Shaalan, 2017). Bahader (2011) declared that mobile learning systems positively increase students' incentive and educational stages than the traditional educational techniques and have more optimistic property to individualize the education in order to support teachers and students in distance learning procedures. Lim et al. (2011) stated that these systems influence students' motivations and learning levels more positively than the conventional learning methods. As per Jiménez (2005), the developed system informed all the students about events related to the courses they study in one semester by sending messages to students' phones. H.K.S et al. (2012) suggested an open-source of mobile-based SMS that can send notifications easily on the LMS Model. At first, a database is hooked on the model that includes passwords and usernames for the access to progression. The authentic client can send text messages from the mobile phone with the availability of internet connection.

Some studies were conducted in the Gulf region for measuring students' attitudes towards M-learning, while none of these studies have developed an application that could benefit the higher education environments in these countries. Our attempt is to develop a mobile notification system for Al Buraimi University College students for the purpose of enhancing their learning performance.

3. Methodology

As per (Figure 1), the researchers adopted ADDIE model including analysis, design, developments, implementation and evaluation.
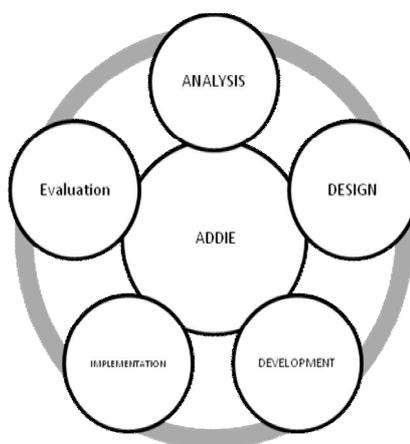

Figure1. ADDIE Model.

A survey was conducted, followed by the design stage, the DFD (Data Flow Diagram) and the other elementary steps in the ADDIE model.

3.1. Analysis

Due to the widespread use of mobile technology, implementing the short message application helps students to develop their learning habits. This application is used through the students' mobile phones instead of the emails as they are usually ignored by them. The questionnaire survey is the main implemented methodology. It was distributed to a selected group of students studying COMP100, BCGE006, and COMP490 in the IT Department of BUC. The researchers conducted a pre-test survey before implementing the application and a post-test after the implementation. The pre-test survey deals with the use of traditional tools such as email, Whatsapp, Facebook, and Instagram, but the latter is a survey about the BUC notifications. Results are illustrated below along with the statistical analyses based on the SPSS (a software package used for statistical analysis). Results of the pre-test survey revealed that students are willing to check their email box regularly, and they are in favor of the new flexible and direct application as shown in Table 1.

		Q1	Q2	Q4	Q5
N	Valid	60	60	60	60
	Missing	1	1	1	1
Mean		2.4000	2.4833	1.8333	2.2000
Std. Error of Mean		.08957	.09355	.07579	.12073
Median		3.0000	3.0000	2.0000	3.0000
Mode		3.00	3.00	2.00	3.00
Std. Deviation		.69380	.72467	.58705	.93519
Variance		.481	.525	.345	.875
Range		2.00	2.00	2.00	2.00
Minimum		1.00	1.00	1.00	1.00
Maximum		3.00	3.00	3.00	3.00
Percentiles	25	2.0000	2.0000	1.0000	1.0000
	50	3.0000	3.0000	2.0000	3.0000
	75	3.0000	3.0000	2.0000	3.0000

Table1. Questionnaire results for questions (1, 2, 4, and 5).

		Q3	Q7	Q8
N	Valid	60	60	60
	Missing	1	1	1
Mean		1.5667	1.1500	1.2500
Std. Error of Mean		.06451	.04649	.05637
Median		2.0000	1.0000	1.0000
Mode		2.00	1.00	1.00
Std. Deviation		.49972	.36008	.43667
Variance		.250	.130	.191
Range		1.00	1.00	1.00
Minimum		1.00	1.00	1.00
Maximum		2.00	2.00	2.00
Percentiles	25	1.0000	1.0000	1.0000
	50	2.0000	1.0000	1.0000
	75	2.0000	1.0000	1.7500

Table 2. Questionnaire results for questions (3, 7, and 8).

The new application development started after collecting and analyzing the first survey results. This application supports the students' learning process and increases their knowledge and communication with teachers. The second phase is required as it deals with the application design.

3.2. Design

Based on the results obtained from both the analysis phase and survey, a new application is designed to develop a supportive environment that helps to facilitate the learning process. DFD is used for application design as shown in (Figure 2).
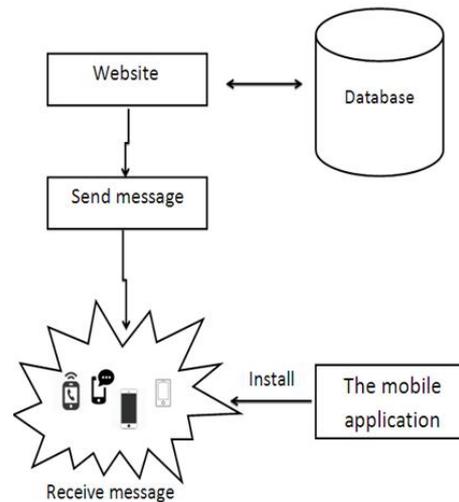
Figure 2. Data Flow Diagram.

3.3. Development

The development phase started by the use of appropriate programming tools containing Java codes, Oracle SQL (Structured Query Language) program and Android Studio software to program the application. The activation process requires inserting the material codes and storing them in the database "SQLlite" within the Android Studio program. If the student intends to delete that material, it will be removed from the database as well. All additions, deletions, and updates are linked to the website "pushbots". Then, the educators can send alerts to their students by accessing the same website "https://pushbots.com/." All educators can access the website through their emails. Students can directly install the application from the Google play store on their mobile devices.

3.4. Implementation

During this stage, the actual use of the developed application starts. While the process is executed, the same group of students is re-checked to collect their feedback concerning the application effectiveness through the second questionnaire. The figures below show some of the processing and implementation stages.

Figure 3: Adding courses code by students.

According to (Figure 3), students have added the courses comp100, comp112, math 152, comp006 and comp182. Educators who intend to send notifications to students can write the course code in order to identify the group "tag" by typing comp100, comp112 or any other code.
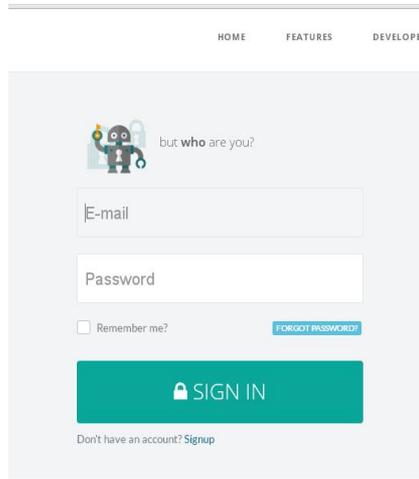
Figure 4: Login window.

After logging into the website "pushbots.com", educators click on "push" button so that the page appears as shown in (Figure 5).
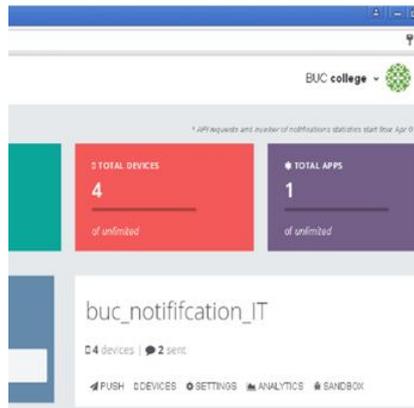
Figure 5: The "push" button.
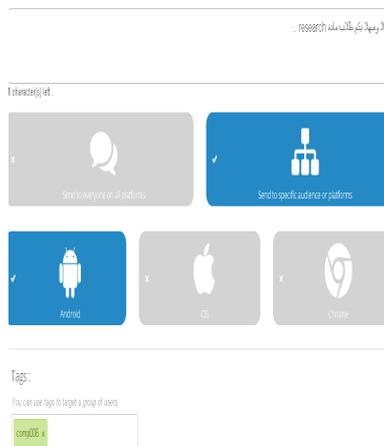
Figure 6: Sending messages to students.

Through (Figure 6), educators can send messages to their students. According to (Figure 7), it shows that the message has been sent from the BCGE006 course educator with a tag to all BCGE006 course students.
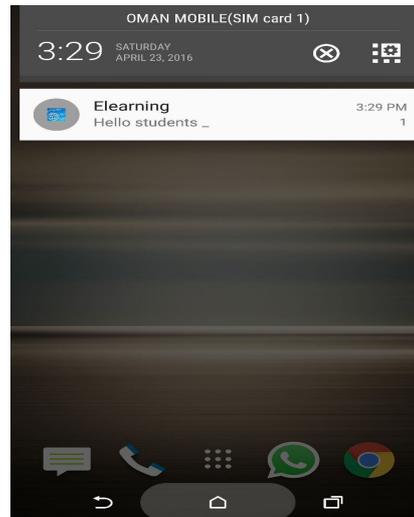

Figure 7: Receiving messages window.

3.5. Evaluation

One of the basic findings of the post-questionnaire survey is that all the results are in favor of the developed application over the traditional services. 80% of the students prefer to use the BUC mobile-based notification system as shown in (Table 3). The results of the survey are illustrated and the statistical analysis is given based on the SPSS software. Analyses methods include the mean, median, mode and deviation. There are many types of averages in statistics and one of them is the "mean" and the "median" which are the mid value. The recurring values are called the "mode". Standard deviation is a statistical dimension of the dispersion of a set of data from its mean. The more spread the data is, the higher is the deviation. Standard deviation is calculated as the square root of the variance. The variance is the measure of the spreading set of data that points to their mean value. Variance is a mathematical prospect of the average squared divergences from the mean.

		Q1	Q2	Q3	Q4	Q5
N	Valid	10	10	10	10	10
	Missing	0	0	0	0	0
Mean		1.7000	1.7000	1.2000	2.7000	1.8000
Std. Error of Mean		.15275	.15275	.13333	.21344	.13333
Median		2.0000	2.0000	1.0000	3.0000	2.0000
Mode		2.00	2.00	1.00	3.00	2.00
Std. Deviation		.48305	.48305	.42164	.67495	.42164
Variance		.233	.233	.178	.456	.178
Range		1.00	1.00	1.00	2.00	1.00
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		2.00	2.00	2.00	3.00	2.00
Percentiles	25	1.0000	1.0000	1.0000	2.7500	1.7500
	50	2.0000	2.0000	1.0000	3.0000	2.0000
	75	2.0000	2.0000	1.2500	3.0000	2.0000

Table 3: Post-survey results.

4. Conclusion and Future Work

Based on the previous studies that deal with the implementation of mobile applications for assisting students to have the required notification about the courses' assignments, quizzes or any further issues (Sharma et al., 2015), the current study is conducted to assess the students during their learning courses by developing a more flexible communication procedure with their teachers. Results showed that the BUC notification system has been proved to be an effective application. Students highly recommended using

this application in the educational process due to its positive impact on supporting the learning process through the use of mobile devices for direct communication. This paper was conducted as a step to implement a new application system where the primary objective is to create one-to-one direct method of notification by sending an alert to students. The alert summarizes all the latest changes during the registered course. The alert is usually sent from the educator's computer through the website. The developed application guarantees that learners will have an immediate notification of the latest changes in the registered course in order to avoid any probable negative consequences. As a future work, we intend to add more functions into the system for better services that may enhance the learning-teaching process. Moreover, we are interested in examining the educators' acceptance toward the developed application after enhancing its functionalities.

References

Al-Emran, M., & Shaalan, K. (2015a, August). Learners and educators attitudes towards mobile learning in higher education: State of the art. In *Advances in Computing, Communications and Informatics (ICACCI), 2015 International Conference on* (pp. 907-913). IEEE.

Al-Emran, M., & Malik, S. I. (2016). The Impact of Google Apps at Work: Higher Educational Perspective. *International Journal of Interactive Mobile Technologies (iJIM)*, *10*(4), 85-88.

Al-Emran, M., & Shaalan, K. (2015b). Attitudes towards the use of mobile learning: a case study from the gulf region. *International Journal of Interactive Mobile Technologies (iJIM)*, *9*(3), 75-78.

Al-Emran, M., & Shaalan, K. (2017). Academics' Awareness Towards Mobile Learning in Oman. *Int. J. Com. Dig. Sys*, *6*(1).

Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior*, *56*, 93-102.

Bahader, D. (April 2011). THE USE OF SMS SUPPORT IN PROGRAMMING EDUCATION. *TOJET: The Turkish Online Journal of Educational Technology* , *10* (2), 268-273.

H.K.S, P., & R.G.N, M. (JAN 2012). Mobile Learning Enviroment with Short Message Service. *PNCTM, 1*, 95-99.

Investopedia.   (2016).   *Standard   Deviation*.   Retrieved   from   http://www.investopedia.com/terms/s/standarddeviation.asp#axzz1ZyGlP8Xd

Jiménez, M. L. (2005). Learning Messages Notification System to Mobile Devices. *Online Submission*, *2*(9), 68-71.

Lim, T., Fadzil, M., & Mansor, N. (2011). Mobile learning via SMS at Open University Malaysia: Equitable, effective, and sustainable. *The International Review of Research in Open and Distributed Learning*, *12*(2), 122-137.

Reimers, S., & Stewart, N. (2009). Using SMS text messaging for teaching and data collection in the behavioral sciences. *Behavior Research Methods*, *41*(3), 675-681.

Sharma, B., Jokhan, A., Kumar, R., Finiasi, R., Chand, S., & Rao, V. (2015). Use of Short Message Service for Learning and Student Support in the Pacific Region. *Handbook of Mobile Teaching and Learning*, 199-220.