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Students' Attendance Monitoring System with SMS Notification

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ABSTRACT

Students' attendance in a university is commonly being monitored by lecturers and the Academic Affairs Division (AAD) as it may help to identify students' problems at an early stage. This project aims to monitor the students who have the possibility to be absent from classes for more than the permissible percentage. Thus, the purpose of this research is to develop a students' attendance monitoring system with Short Message Services (SMS) notification or also known as SAMS. This system helps the AAD to manage the absenteeism report from lecturers and it automatically sends the information through SMS notification to the parents and the students themselves. The system has been developed using the Waterfall Model methodology that consists of five phases which are analysis, design, implementation, testing, and documentation. The results from the usability testing show that SAMS can help lecturers to monitor students' absenteeism more easily and efficiently. Furthermore, the integration of the system with SMS is very useful as it can directly notify the parents regarding their children's attendance problem.

Keywords: *students' attendance monitoring, SMS notification*

INTRODUCTION

Recording the attendance is an important task for lecturers in the university in order to monitor absenteeism in the classroom. Attendance monitoring is recognized as an important element in supporting both students' retention and performance. It is an effective way of identifying any problems at an early stage and can offer students appropriate support.

Students' attendance has a positive relationship with academic achievement (Yahya & Anwar, 2013). Attendance in class is important for all students to succeed in education and to ensure that they do not fall behind in their education. Absenteeism in the university can cause them to lose their reputation as well as resulting in poor learning on the part of the students (Patel et al., 2012).

Generally, an absence is marked as an excuse if it is due to a student's illness, death of a family member or any emergency cases that are supported by necessary evidence. Thus, any unexcused absence is considered truancy. If the student's attendance is less than a certain percentage (for instance, 80%) of the total contact hours in that semester, the student can be barred from taking the final examination.

The current practice at Universiti Teknologi MARA, Perlis Branch, when the absenteeism reaches or exceeds the permissible percentage, lecturers should send a paper-based report to the AAD. Then, the students will be called through a letter for an interview session to decide whether they will be barred or not from taking the final examination for that subject.

Hence, an efficient attendance monitoring system should be implemented to record and manage students' absenteeism. Therefore, this project aims to monitor the students who have the possibility to be absent exceeding the permissible percentage using a web-based system and SMS notification.

This system helps the AAD to manage the absenteeism report from lecturers and it automatically sends the information through SMS notification to the parents and the students themselves. When parents are notified of the matter, they can take the appropriate action and can solve the problem at an early stage. It is important as the parents can notice and investigate their child's problems and can help to find the solution to the problem.

RELATED WORKS

There is much research that have been done on students' attendance in universities but this section explains three main related works to this study. Table 1 shows a comparison between the previous research to gain more knowledge and information on this matter.

Table 1 Comparison of Related Works

Related Works	Web-based	SMS	Fingerprint	RFID
Student Attendance Management System Jacksi & Ibrahim (2018)	✓			✓
Fingerprint Based Student Attendance System with SMS Alert to Parents Kumar et al. (2015)		✓	✓	
Web-based Appointment System using SMS Technology: Usability Aspect Helmy et al. (2009)	✓	✓		

Jacksi and Ibrahim (2018) proposed a web-based application that is developed for daily students' attendance in departments within the university. This research also explains the use of a web-based system that can help in generating reports and evaluating the eligibility of attendance for the students. Besides, the system becomes more efficient at work and can save human and material resources.

In other research conducted by Kumar et al. (2015), the biometric field is used to identify an individual by using fingerprints. The fingerprint is used for the attendance system in many

institutions since the use of biometric technology is getting simpler to verify the time and attendance of the students and staff. GSM Modem was also being used in this research to automatically send SMS regarding the attendance information of the students to the parents.

Similarly, SMS application has been used to send a notification to a group of students in institutions as enlightened by Helmy et al., (2009). Moreover, this web-based application ensures that an appointment can be made by a student with a lecturer.

Several research pointed out that the use of SMS notification has many advantages. Even when the network is busy for hours, SMS still can get through (Jaiswal, 2011). It also allows many messages to be sent automatically which can reduce the costs as compared to a telephone call (Joy, 2017). SMS can also be used to send auto-generated security code in online banking transactions (Lemzy, 2017). All these evidence support the reliability of SMS notification.

Based on the previous works that have been studied, the integration of the web-based system with SMS notification shows the best solution as it can easily and quickly send a notification to the user. Additionally, SMS notification also benefits the user where they do not rely on the Internet connection to receive the notification.

SYSTEM DEVELOPMENT

This project is developed using the Waterfall Model that consists of five phases namely Analysis, Design, Implementation, Testing, and Documentation as depicted in Figure 1. This model is not overlapping the stages which means that each stage should have been completed before starting the next one (Bassil, 2015). Furthermore, it can be used to improve project management by dividing a complex task into manageable sections.

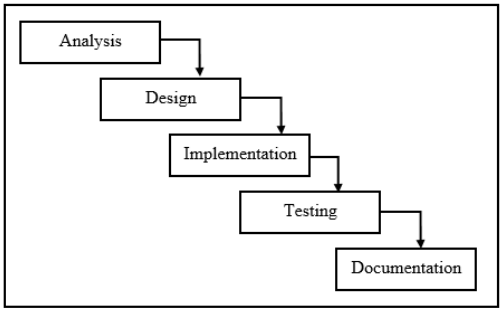


Figure 1 The Waterfall Model (Bassil, 2015)

Before the system is developed, the researcher has conducted several interview sessions with the AAD staff to understand and analyze the current situation in managing the absenteeism among students. Based on the information, the flowchart, the data flow diagram (DFD) and the entity-relationship diagram (ERD) were constructed to model the system design.

The system has been successfully developed using PHP language and PHPMyAdmin as the web-based database management tool. To integrate the web-based system with SMS notification,

OneWaySMS service was used as the SMS gateway to send the notification to parents about the warning letter given to the students.

This system helps the lecturers to manage tasks easily by keying in the students' absenteeism data throughout the semester. The available features in the system are shown in Figure 2.

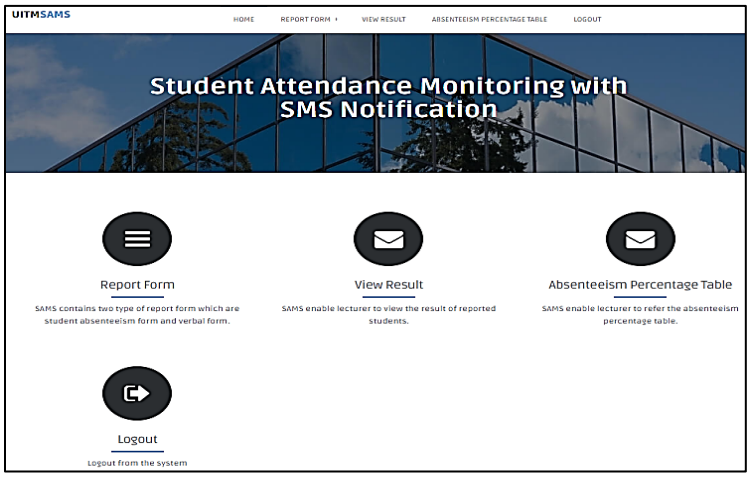


Figure 2 Available Features in SAMS

The lecturer can report the absenteeism by fills in the form as shown in Figure 3 to record the number of absent hours of a student. The record can be updated from time to time to get the latest percentage of absenteeism. When the percentage exceeds the permissible level, then the system will produce a warning letter and send an SMS notification to the student and the parents.

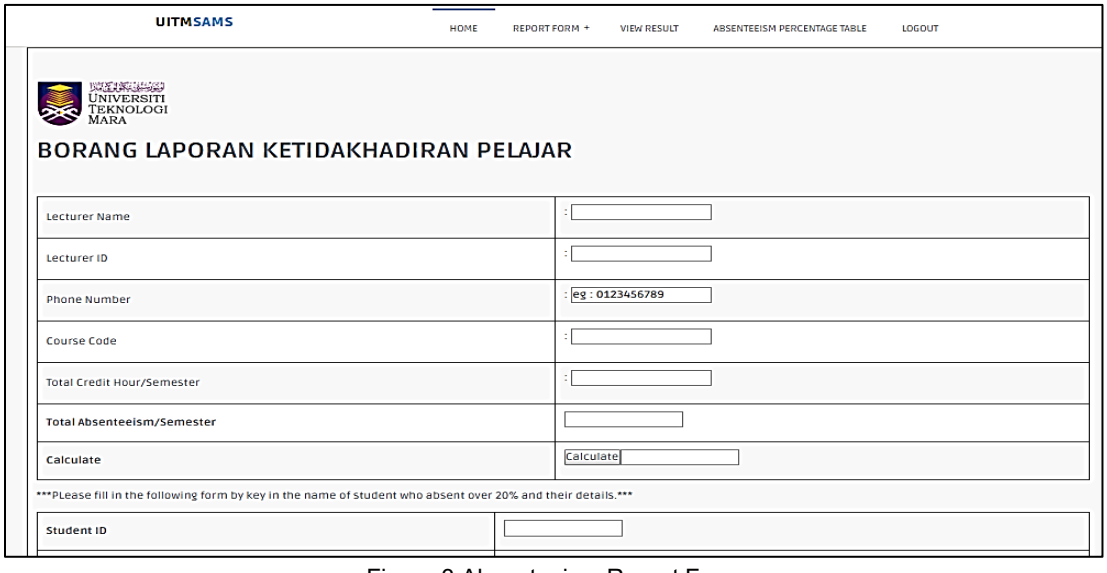
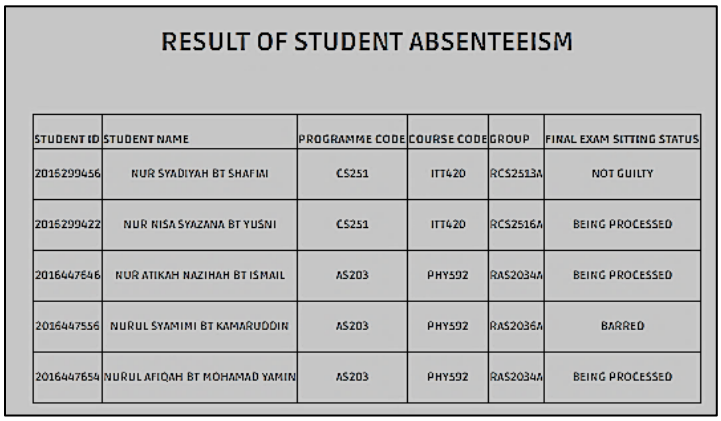


Figure 3 Absenteeism Report Form

The lecturer may view the status of the reported students to check whether they have been barred from the examination, not guilty or being processed. Figure 4 shows the result of students' absenteeism.



RESULT OF STUDENT ABSENTEEISM

STUDENT ID	STUDENT NAME	PROGRAMME CODE	COURSE CODE	GROUP	FINAL EXAM SITTING STATUS
2016299456	NUR SYADIYAH BT SHAFIAI	CS251	ITT420	RCS2513A	NOT GUILTY
2016299422	NUR NISA SYAZANA BT YUSNI	CS251	ITT420	RCS2516A	BEING PROCESSED
2016447646	NUR ATIKAH NAZIHAH BT ISMAIL	AS203	PHY592	RAS2034A	BEING PROCESSED
2016447556	NURUL SYAMIMI BT KAMARUDDIN	AS203	PHY592	RAS2036A	BARRED
2016447654	NURUL AFIQAH BT MOHAMAD YAMIN	AS203	PHY592	RAS2034A	BEING PROCESSED

Figure 4 Result of the Students' Absenteeism

The SMS provider that has been used in this system is OneWaySMS provider since it provides a faster and reliable way for single or bulk SMS with a reasonable price as compared to other providers in Malaysia.

RESULTS AND DISCUSSION

The system is evaluated by conducting a usability test with real users to determine the easiness of the system and how users interact with the content. This testing was conducted on 14 students, two lecturers and two AAD staff from Universiti Teknologi MARA, Perlis Branch.

After the participants explored and tested SAMS, questionnaires were distributed to get their feedback on the system. The questionnaires consist of four sections which are General, Process, Navigation, and Interface Design. The response scales for the questionnaire is a five-point scale of agreement that uses anchors such as 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), 5 (Strongly Agree).

When conducting this testing, the respondents were required to use and explore the system and they needed to answer the questionnaires regarding the usability aspect of the system. Figure 5 shows the results from the usability testing.

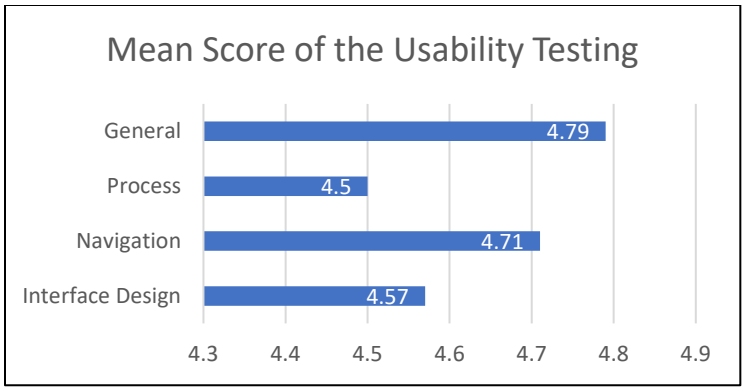


Figure 5 Mean Scores of the Usability Testing

The General section scores 4.79, which shows that most of the participants agreed that SAMS is useful and easy to use. This means that SAMS has the ability to help the lecturers in monitoring students' attendance effectively. For the Process aspect, the mean score is 4.5 because the participants agreed that SAMS assists them to manage students' attendance and absenteeism. Most of them agreed that they can view, edit, update, delete and send SMS notification easily within the system.

The mean score for the Navigation aspect is 4.71. Most of the participants agreed that the system has good navigation and the search, edit, delete, submit and calculate buttons are functioning well. While the Interface Design aspect scores the mean score of 4.57 for the consistency of the interface. This shows that in overall, the system design is consistent since it uses standard fonts, menu, colours, and buttons all over the system to avoid confusion.

CONCLUSION AND RECOMMENDATION

The results from Usability Testing show positive feedback from the participants. This research is significant for the lecturers and parents where the system can help the lecturers to monitor students' attendance by keying in the data of the absent students and when the absenteeism exceeds the allowable level, the lecturers will give warning letters to the students. The parents can also be notified about the students via SMS notification.

By having this system, it can help to detect a student's problem (if any) at an early stage so that the problem can be solved before the university takes actions on the problematic students.

However, there is a limitation in this system where the system cannot produce meaningful reports for the AAD staff, such as a report on students' absenteeism results by faculty or by the lecturer, report on students' absenteeism by course and many others.

The system can be enhanced by providing two-way SMS notification to allow the students/parents to respond to the SMS sent by the system. All in all, SAMS is a system that is useful for lecturers, students, and administrators in monitoring students' attendance.

ACKNOWLEDGEMENTS

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CONFLICT OF INTERESTS DECLARATION

The authors declare no conflict of interests regarding the publication of this article.

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