

DEVELOPMENT OF E-OUTING SYSTEM (EOS) USING ADAPTED PROTOTYPE MODEL

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Abstract

The application of automated systems is widely used in information management process in this era. This paper observes on the application of automated system in managing information by using a case study. The case study has been conducted at Sekolah Menengah Sains Dungun (SMSD), specifically within their hostel management system. The school management currently use manual process in order to collect and record information on outing. E-Outing System (EOS) is proposed to facilitate the school outing record management. EOS is developed using adapted Prototype Model that includes requirement gathering phase, quick design phase, prototype development phase, user evaluation phase, refining prototype and engineer product phase. Based on the final product, user acceptance test is conducted where the result showed that the system enables the school management to improve their management process. Respondents are mostly satisfied with user interface as it scores the highest mean with 4.33 (SD=0.61) out of 5. Overall result concludes that EOS improves the current process.

Keywords: *record management system; prototype model; e-outing System; EOS;*

1.0 INTRODUCTION

Nowadays, World Wide Web has become widely used for communication purposes. It has become one of the major channels of information (Doaa, Abeer, & Hesham, 2011) that allows access throughout the whole world. Web-Based Application (WBA) is distributed in larger area and becoming an interesting field. WBA refers to any database that is accessed over a network connection using HTTP (Cartensen & Vogelsang, 2001). It is applied in e-commerce, information publishing, communication, and for other purposes of information and communication (Vogelsang, 2003).

WBA has been used to cater information management process where the application of WBA allows for the conversion of information system from manual to computerized process. Computerized information systems have justified its benefits in helping organization reduces the space required to store the data and reduction of costs due to more efficient time management (Azza, 2017). One of the types of information system is record management system. Record management system as defined in ISO (2001) is an information system which captures, manages and provides access to records through time. Thus it allows users to manage records and reduce paperwork over time.

In this paper, this concept will be applied to a case study or outing record management for Sekolah Menengah Sains Dungun (SMSD).

The rest of this paper is organized as follows. Discussion on background study is done in Section 2 where the topic will be divided into two areas, the information management system and comparison on similar systems. Section 3 discusses on adapted prototype model that is selected to as methodology used in order to implement EOS. Brief explanation based on each phase in the model is explained. The next section focused on result found on the efficiency of EOS based on user feedback. Last section concluded this paper.

2.0 BACKGROUND STUDY

WBA enables information management for organization by making it easily accessible. Implementing record system as WBA increases its usability. According to Cho (2009), record management system is defined as a management system used to direct and control an organization with regard to records. Example of record management activities are the organizational structure, planning activities, maintaining and improving record keeping policy and etc. Incredible volume of record and variety of formats requires an organization to manage it effectively (Porter, 2006).

Services provided by record management system are applicable to any organization and its knowledge workers. Record management ensures the rapid availability of the information where and when it is needed. Besides, it also helps free flow of record through an organization (Makhura, 2005). In addition, by allowing only authorized operations and actions against them, record management systems can secure records properly (Porter, 2006).

Various implementations of record management system can be seen in many fields for numerous purposes. As for managing outing record, several systems have been reviewed and summarized. Table 1 concludes the reviews.

Table 1 Record Management System for Handling Outing

Similar system	Kolej Matrikulasi Perak Outing System	SchoolSpeak System	k-Kedatangan UniMap	System Pengurusan Sekolah (SPS) Lite
Purpose	This system is used to control students outing activities	This system is used to record and report students' attendance	This system is used to record attendance of students and staffs in Universiti Malaysia Perlis (UniMap)	This system is used to manage school, teachers and students
Method of implementation	Use device to collect data - Each student has ID card in order to collect their data during outing.	Use online system - User needs to access the website to record and report the attendance.	Use device and online system - Use fingerprint scanner to collect data and to retrieve the reports user needs to access the online system.	Android system application - Homeroom teachers need to install the application in their mobile phone.

User Interface				
URL	http://kolejkmkp.jimdo.com/kolej-kediaman/ retrieved: 2016	https://www.schoolspeak.com/CompanyV4/default.aspx retrieved: 2016	http://attendance.unimap.edu.my/v4.3/fg_login.asp retrieved: 2016	https://sps1.moe.gov.my/ retrieved: 2016

Sekolah Menengah Sains Dungun (SMSD) was built in 1st May 1982. SMSD is a boarding school located at Jalan Paka, Dungun, Terengganu. The school has around 450 students that come from various states in Malaysia. Students are accommodated in 4 hostels provided by the school. At the beginning of the year, student will get 100 merits' point each and if students disobey any stated rules, merit will be deducted. This deduction process is called demerit.

Outing process is described as follows. Students are allowed to go for outing once in a fortnight. The school's rules have stated that students outing activities must be done in rotation according to gender. For example, female students will go for outing in the first week. The boys on the other hand will get their opportunity to go out a week after that. Before going out, usually a night before students go for outing, head of each hostel need to collect all the outing cards and submit to the warden at night. The warden will write down the time that the student should return back to the school. After warden drop the signature on the cards, the cards are then passed to the security staff.

Once the students return to school from their outing activities, students need to take their card from the security staff. They need to write down their return time to the hostels. For the students who return late to the hostel, students will not be able to take their card from the security staff. The cards will be passed to the warden so that warden able to key in their name into merit record. This is because students' merit will be deducted if the students unable to return to school on the expected time. The business process for the outing activities can be viewed in Figure 1.

To assist the management of students outing record, E-Outing System (EOS) is proposed. EOS enables the students to fill up outing form via online and allow wardens to manage students' outing record information. The system will facilitate the students as well as administrative staff in handling the outing process. In other words, this system will reduce the time taken for students' outing management.

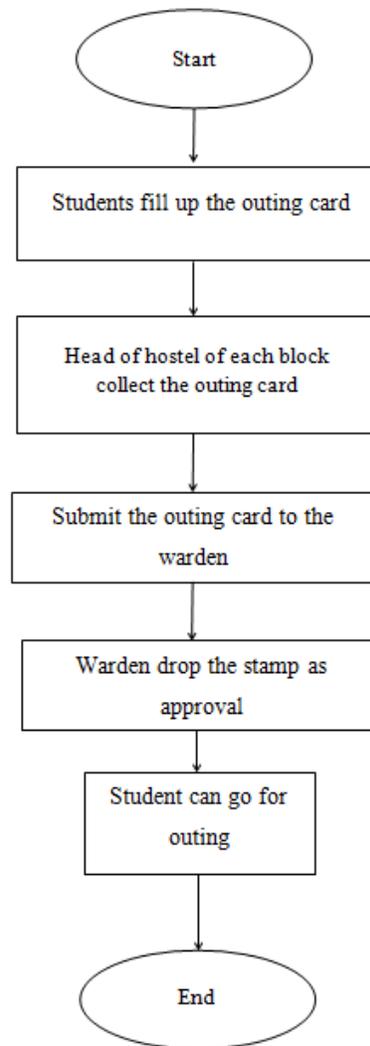


Figure 1 Outing Business Process

3.0 METHODOLOGY

Methodology is used to develop the proposed system where in this case selected methodology is adopted from the Prototype Model. This involves building components of proposed system that display main functionalities of the system. These prototypes are then delivered to end users to be tested and evaluated. Users are involved throughout the software development process thus allowing user to get better understanding of the proposed system. Prototype model consists of the following phases; Requirement Gathering, Quick Design, Building Prototype, User Evaluation, Refining Prototype and Engineer Product. This is shown in Figure 2 where the process began with requirement gathering phase and ended when the system is delivered.

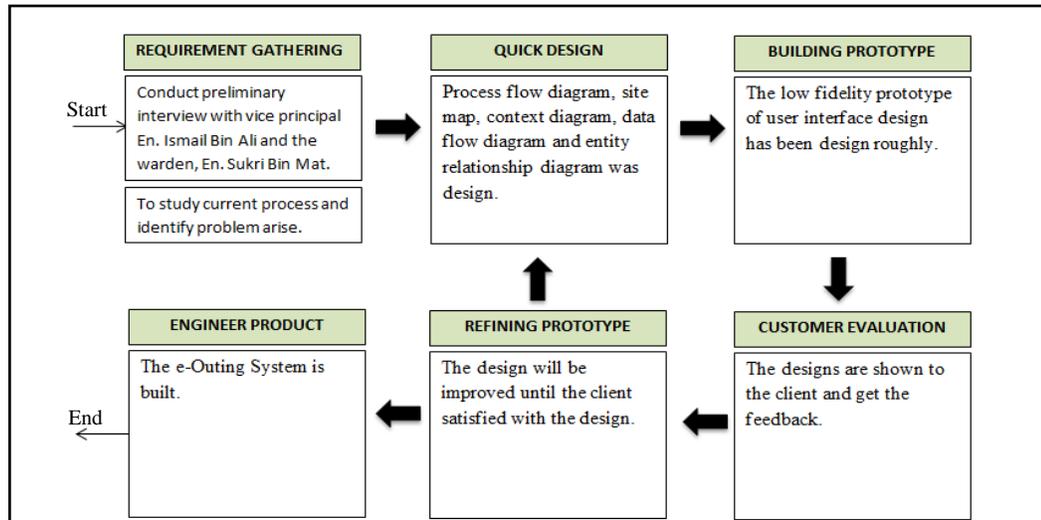


Figure 2 Prototype Model

The first phase conducted is Requirement Gathering. A preliminary study regarding outing management process at SMSD was done. The purpose was to identify current situation and problem arise when using current system. Output that resulted from the study shows that warden has to manage students outing card manually. The current process required a lot of time to complete. Warden needs to write down signature on each student's card. In order to gather the information, an early interview was conducted with the Vice Principal of the school Encik Ismail Bin Ali and the warden of the hostel Encik Sukri Bin Mat. The flow of current outing management process was discussed during the session. Thus, problems were also identified when they use the current manual system.

Once the first phase is completed, the process is moved to the next phase, the quick design phase. Quick Design is the process where requirements from the previous phase are transformed into designs. The specification of e-outing system is assembled in this phase such as how the system functions, who will use it and how users are going to use the system. The outcomes from this phase are Process Flow Diagram, Context Diagram, Data Flow Diagram (DFD) and Entity Relationship Diagram. Each of the process in the system is transformed into related diagrams to get better understanding about the process and show the relationship between the users and the system functionalities.

Before the actual version of e-outing system is fully developed, a low fidelity prototype system is produced in Building Prototype phase. The purpose of building the prototype is to get feedback from the users which are the warden of the hostel, security staff and students. The prototype has undergone improvement in terms of functionalities and interface where appropriate according to the comments and feedbacks gathered. In this phase, the prototype design that is previously built has been improved. All unnecessary designs have been removed and any value added features requested by the users of SMSD has been added in the new version of the prototype. The process of testing and getting feedbacks was done in several cycles. These phases were continued until the users and developer reached to a mutual understanding with the design and then the actual system development process began.

4.0 RESULTS

4.1 E-Outing System

E-Outing System is an online application where the users need to login before access to the system. As the first user which is student, they need to fill up the online outing form before going out from the school. The purpose is to get approval from the warden to go for outing activity. Figure 3 shows the login page to access the system.



The screenshot shows a web browser window displaying the login page for SEKOLAH MENENGAH SAINS DUNGUN. The page has a blue header with the school's logo on the left and the text 'SEKOLAH MENENGAH SAINS DUNGUN' and 'JALAN PAKA, DUNGUN' on the right. Below the header is a white login form with a blue border. The form contains the following elements:

- A label: 'ID Pengguna (ID Pelajar/ ID Staf / Kad Pengenalan)'
- An input field containing the example text: 'e: 2013345678 / A1201 / 660909-01-8876'
- A label: 'Kata Laluan'
- An empty input field for the password.
- A 'Log Masuk' button.

Figure 3 Login Page

Figure 4 shows the form that students need to complete before outing. Students need to choose the date and time when they want to go out. After that, they need to choose the purpose for outing activity whether weekly outing, co-curriculum activity or emergency.

SEKOLAH MENENGAH SAINS DUNGUN
JALAN PAKA, DUNGUN

Selamat Datang Nurul Afina Binti Zulkifli

LAMAN UTAMA BORANG KELUAR REKOD KELUAR ASRAMA REKOD MERIT PROFIL KELUAR

Borang Keluar Pelajar

Id Pelajar : 2013971695
 Nama : Nurul Afina Binti Zulkifli
 Tarikh Keluar : dd/mm/yyyy
 Masa Keluar : --:--:--
 Tujuan : PILIH SATU
 Sila Nyatakan : [contoh Beli Barang Di Bandar]

Hantar Batal

2015 © Sistem Aplikasi E-Outing Sekolah Menengah Sains Dungun

Figure 4 Outing Form

Figure 5 shows the list of students’ outing record that the warden needs to approve. By clicking the ‘Tanda’ button, all records will be selected and warden can easily approve the entire list.

SEKOLAH MENENGAH SAINS DUNGUN
JALAN PAKA, DUNGUN

Selamat Datang AI201

LAMAN UTAMA SENARAI REKOD KELUAR REKOD ASRAMA REKOD MERIT PROFIL KELUAR

Senarai Rekod Keluar Pelajar

Tanda	Buang Tanda	Id	Nama	Tarikh	Masa	Tujuan	Status
<input type="checkbox"/>		2013898905	Ahmad Alif Hilmi Bin Ahmad Rozali	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses
<input type="checkbox"/>		2013671987	Adam Harris Bin Shamsuri	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses
<input type="checkbox"/>		2013599433	Alliyah Sofes Binti Mazlan	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses
<input type="checkbox"/>		2013548533	Nurul Husna Binti Abdullah	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses
<input type="checkbox"/>		2013971695	Nurul Afina Binti Zulkifli	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses
<input type="checkbox"/>		2013364085	Norarina Ezzati Binti Johan	2015-12-10	11:00:00	Aktiviti Minggu	Sedang Diproses

Kemaskini Status

2015 © Sistem Aplikasi E-Outing Sekolah Menengah Sains Dungun

Figure 5 Outing Request for Approval

EOS enables warden to generate multiple types of report. The reports are to facilitate warden to get detailed information of students’ outing activity. Figure 6 shows the report page that enables the wardens to select type of report to display from the drop down list. The system is able to generate daily report, monthly report and outing record by student’s name.

The screenshot shows the website for SEKOLAH MENENGAH SAINS DUNGUN. The header includes the school logo and name. Below the header is a navigation menu with options: LAMAN UTAMA, SENARAI REKOD KELUAR, REKOD ASRAMA, REKOD MERIT, PROFIL, and KELUAR. The main content area features a 'Laporan' section with a drop-down menu. The menu is open, showing options: --Silah Pilih Jenis Laporan--, --Silah Pilih Jenis Laporan--, Laporan Keluar Pelajar, Laporan Keluar Pelajar: Harian, Laporan Keluar Pelajar: Bulanan, Laporan Keluar Pelajar: Tahunan, Laporan Keluar Pelajar: Balik Lewat, and Laporan Keluar Pelajar: Mengikut Tujuan. The footer contains the text: 2015 © Sistem Aplikasi E-Outing Sekolah Menengah Sains Dungun.

Figure 6 Drop down List to Generate Report

Furthermore, EOS enables parents to view their children's outing activities via online. The parents sometimes need to call warden just to confirm whether their children are in the school. Figure 7 depicts example of children's outing report.

The screenshot shows the website for SEKOLAH MENENGAH SAINS DUNGUN. The header includes the school logo and name. Below the header is a navigation menu with options: LAMAN UTAMA, REKOD KELUAR ASRAMA, PROFIL, and KELUAR. The main content area features a search section with 'Bulan: Bulan', 'Tahun: Tahun', and a 'Cari' button. Below this is a table titled 'Rekod Keluar Masuk'. The table has four columns: Tarikh Keluar, Masa Masuk, Tujuan Keluar, and an unlabeled column. The first row of data shows: 1, 2015-12-10, 2015-12-10 19:00:26, and Aktiviti Mingguan. The footer contains the text: 2015 © Sistem Aplikasi E-Outing Sekolah Menengah Sains Dungun.

	Tarikh Keluar	Masa Masuk	Tujuan Keluar
1	2015-12-10	2015-12-10 19:00:26	Aktiviti Mingguan

Figure 7 List of Children's Outing Report

4.2 Testing and Evaluation

EOS is developed to help the school management to manage outing process and produce report on students' outing. Testing phase is conducted in order to get the feedbacks from the users about the system. The system is shown to users and three experts to get their opinion about the design, usability and functionality of the system. The questionnaire is prepared to collect the data from the users.

4.2.1 Expert Evaluation

There are 3 expert users who had evaluated EOS. The experts have major knowledge in Information System, Knowledge Management and System Engineering. The experts also have experience in the development of web-based systems. Therefore, they are able to give comments and suggestion in order to improve the system's functionalities and user interface. The experts are asked to evaluate EOS from three aspects, ease of use, satisfaction and consistency. Using these experts feedbacks, EOS undergoes its second cycle of prototyping process. This paper includes feedback on ease of use context. This is shown in Table 2 where EOS was analyzed toward the level of ease of learning to operate the system. Besides, the difficulties level for users to do what they want in the system and the interaction between users and the system also were discussed.

Expert 1 suggested that student should be able to cancel their outing if they decided not to go for outing. This is because the warden is able to know the existence of the students in the school. In addition, lack of description in the table displayed has been commented by expert 1 and 3. For expert 2, she suggested to put the label or tooltip of cursor to ease user to direct them to the required information.

Table 2 Expert Evaluation on Perceived Ease of Use

SECTION A: PERCEIVED EASE OF USE	
1. Learning to operate the system is easy for me. 2. It is easy to get the system to do what I want it to do. 3. My interaction with the system is clear and understandable.	
Comment	Suggestion
<ul style="list-style-type: none"> - Student should be able to cancel outing activity (Expert 1). - Lack of description in the table displayed (Expert 1 & Expert 3). - Put label or tooltips of cursor to direct user to put the required information in login page (Expert 2). - Name of reports need some corrections (Expert 2). - Merit and demerit information need to revise (Expert 2). - Lack of guidance for student about outing time (Expert 3). 	<ul style="list-style-type: none"> - A short description beside outing form

4.2.2 User Evaluation

The second cycle of user evaluation was conducted using questionnaires that were distributed to the potential users. The questionnaires evolved on six aspects, perceived usefulness, perceived ease of use, efficiency, satisfaction, consistency and user interface. In order to conduct user evaluation, a set of questionnaire was distributed among 30 respondents. Before all the respondents answer the questionnaire, the system was demonstrated to them in order to help them to evaluate the system. The questionnaire contains six constructs and each construct contain six items that need to be assessed by the respondents. The questionnaire was divided into two sections where section A is about demographic profile and the six constructs in Section B.

In the demographic profile, the questions asked were about gender, age, and occupation. Next, the six constructs are perceived usefulness, perceived ease of use, efficiency, satisfaction, consistency and user

interface. The scale consists of five levels which demonstrate strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5.

Figure 8 illustrates the summary result in term of graph. The items contained in the graph are perceived usefulness (A), perceived ease of use (B), efficiency (C), satisfaction (D), consistency (E) and user interface (F). The mean for construct A is 4.16 with (SD= 0.66), construct B is 4.07 with (SD= 0.64), construct C is 4.17 with (SD= 0.78), construct D is 4.16 with (SD= 0.68), construct E is 4.09 with (SD= 0.64) and construct F is 4.08 with (SD= 0.66). Next, other information that can be interpreted from Figure 5 is the mean. It shows that the highest mean value is 4.17 for construct C with (SD = 0.78). The lowest mean is 4.07 for construct B with (SD = 0.64). The mean value proved that the system is easy to use, efficient in performing its designated task, able to fulfill users' satisfaction, consistent and has acceptable user interface. The standard deviation data are ranked in the range of 0.64 to 0.78. This result shows that the dispersion was not too big thus it implies that the system has met the target users' expectation in terms of delivering its functions.

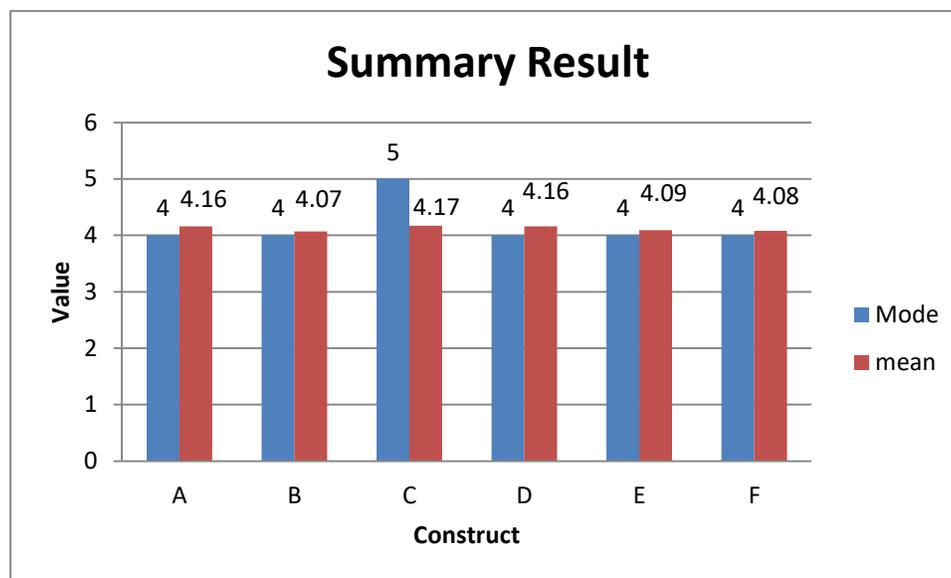


Figure 8 Summary Result

5.0 CONCLUSION

Record management system can be considered as an approach that allows users to manage records in a more systematic way. This paper outline the development process of E-Outing System that implemented record management system and developed using adopted prototype model. Two types of evaluations had been conducted where the first one is based on expert evaluations and the other one is based on user acceptance evaluation. Using the evaluation results, EOS is redesigned and redeveloped. Final result on user acceptance evaluation shows that EOS is rated highly in six aspects, perceived usefulness, perceived ease of use, efficiency, satisfaction, consistency and user interface with minimum mean score of 4. Thus it can be said that EOS has managed to improve the usability of record management system in Sekolah Menengah Sains Dungun.

References

- Azza, A.M. (2017). *An Empirical Study of MIS Impacts and Organizational Efforts on Improving Business Performance*. London : Taylor & Francis Group.
- Cartensen, P.H., & Vogelsang, L. (2001). Design of web-based information system - new challenges for systems development. Proceedings of the 9th European Conference on Information Systems (pp. 536-547).
- Combs, D. (2004). *Challenges in managing records in the 21st century*. United States of America.
- Doaa, N., Abeer, M., & Hesham, A.H. (2011). Web-Based Applications quality factors: A survey and a proposed conceptual model. *Egyptian Informatics Journal*, 12(3), 211-217.
- Kolej Kediaman KMPK, (n.d.). Retrieved from <http://kolejkmpk.jimdo.com/kolej-kediaman/>
- Makhura, M.M. (2005). The contribution of records management towards an organization's competitive performance (Doctoral dissertation). The University of Johannesburg, Johannesburg, South Africa.
- Porter, B. (2006). *Applying electronic records management in the document management environment: an integrated approach*. Retrieved from http://www.erms.com/Document_Management_Resources.htm
- Sistem Kedatangan UniMAP. (n.d.). Retrieved from http://attendance.unimap.edu.my/v4.3/fg_login.asp
- Sistem Pengurusan Sekolah. (n.d.). Retrieved from <https://sps1.moe.gov.my/>
- Web solution for elementary, middle and preschools. (n.d.). Retrieved from <https://www.schoolspeak.com/CompanyV4/default.aspx>