

Mobile Learning Management System

by

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CERTIFICATION OF APPROVAL

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Approved by,

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UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work in my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MOHD SYAFIQ BIN MAHAYUDIN

ABSTRACT

Mobile technology can help to connect people with information faster despite of their location. The author decided to enhance the current Learning Management System by integrating mobility element into it. Mobile Learning Management System (MLMS) is designed to facilitate the communication between parents and teachers which is different from the existing Learning Management System that offered in the market. MLMS is a proposed solution to solve the problems faced by the school and parents as there is less communication between parents and teachers, parents have limited updates regarding their children's academic performance and also time and distance barrier hinder parents to involve actively in their children's schooling. This is due to the mobility and functionality of MLMS that provide two ways communication between parents and teachers. Apart from that, this system provides parents with examination records, attendance records and also disciplines records of their children. The objective of this project is to create a Mobile Learning Management System that can facilitate two ways communication between parents and teachers. The application been developed using Rapid Application Development methodology. Android has been chosen as the mobile platform to optimize the capability of the Android technology and to leverage on its market potential.

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CHAPTER 1

INTRODUCTION

The author will provide the overview of this project throughout this chapter. This project focuses on the usage of Mobile Learning Management System to facilitate the two ways communication between parents and teachers and help parents to monitor their children's academic performance.

1.1 Background

The potential importance of creating effective parent– school partnerships is made clear by studies that have shown strong linkages between parent involvement in their children's education and student academic achievement (Epstein & Sanders, 2000; Fan & Chen, 2001; Henderson & Berla, 1994; Henderson & Mapp, 2002). Students whose families are more knowledgeable, supportive, and involved in their education perform better academically and exhibit more positive attitudes toward school, have higher expectations, and exhibit more positive behaviours (Clark, 1983 cited in Henderson and Berla; Epstein, 1992). But for boarding school, parent's involvements are limited. Based on the survey done to a group of parents who's sent their children to boarding school, the main barriers or constrains are distance and time.

Malaysia Ministry of Education had introduced a browser based teaching-learning materials for certain subject such as Bahasa Melayu, English, Science and Mathematics to be used by primary and secondary schools in Malaysia through the "Smart School Campaign" which was launched by Malaysia Prime Minister on July 1997 and targeting to upgrade all 10,000 of primary and secondary school to become Smart School by the end of year (Rahman, n.d). After years of implementation and improvement, now the system is called Learning Management System or e-learning.

Thus, this project will facilitate parent involvement in their children's schooling and communicate with teachers. By using this Mobile Learning Management System that

being developed at the end of this project, it will eliminate parent's time and distance constrain of monitoring their children's academic performance.

1.2 Problem Statement

1.2.1 Less communication between parents and teachers.

The interaction between parents and teachers is limited due to some constrain such as time for example; working parents and distance especially for parents that send their children to boarding schools which situated far from their hometown. Based on the preliminary study that has been done in one of the boarding school which is Sekolah Tuanku Abdul Rahman, from scale 1 which is totally not agreed to 5 which is totally agreed; the mean result for active parent involvement in student's academic activity is 4.1282 which mean most of the student agreed that their parents were actively monitor their academic result. Despite of that, from the interview with several teachers, the result was totally different as the parents were rarely meeting the teachers to discuss about their children's academic performance because of the time and distance constraints.

1.2.2 Parents have limited updates on student's academic performance records.

Most parents did not have regular updates on their children's academic performances record such as test and examination result. Parents do not know any update on the progress of their children, their children's homework and even the academic performances (Nor, Jennifer, & Neo, 2001). Normally, most parents will come to discuss about their children's academic performance twice in five years time which mean when their children will seat for PMR in form 3 and SPM in form 5. Based on the interview with several teachers, the turn up rate is quite low as the parents is busy with their works and also the distance barrier as some of the parents stay very far from the school such as from the south part of Malaysia and some are from East Malaysia.

1.3 Objective & Scope of Study

There are three main objectives that need to be achieved by the end of this project which are:

1. To study and compare on existing Learning Management System platforms available based on their functionality.
2. To develop a Mobile Learning Management System Android application.
3. To conduct usability test on the prototype at selected parents whether the functionality meet the requirement based on the preliminary study that has been carried out.

The scopes of study include:

1. The field study will be conducted in boarding school in Ipoh which is Sekolah Tuanku Abdul Rahman which consist of around 600 students from form one until form five. They came from all of the states across Malaysia.
2. This study is to facilitate parents to monitor their children's academic performance by using Mobile Learning Management System application.
3. This study is to develop an android application to facilitate the two ways communication between parents and teachers regarding their children's academic performance.

1.4 Relevancy of the Project

The implementation of this School Learning Management System is relevant to parents because it can assist parents to communicate with teachers and receive latest test or examination result, discipline records and children's attendance records. This system can be access through internet and also android application which alert parents when teachers update the result and parents can communicate with teachers through the android application.

1.5 Feasibility of the Project within the Scope and Time Frame

The duration to conduct this project is 8 months. This timeline is adequate to run this project. This project is divided into two parts to ensure better progress of the project. The first 4 months would be to study usage of framework while the other 4 months solely on developing the Mobile Learning Management System application.

CHAPTER 2

LITERATURE REVIEW

2.1 Parental Involvement

Given this focus on effective parental involvement in their child's schooling, the question that emerges is “what can schools and teachers do to better facilitate and support effective parental involvement?” But, before we can address this question, we need to first define what we mean by parental engagement and involvement. A brief examination of the literature reveals that what is meant by parent involvement and how it is defined and operationalized varies considerably across studies (Fan & Chen, 2001; Jordan, Orozco, & Averett, 2002). Few authors offer a theoretical framework for operationalizing the critical elements of parent involvement in schooling and for developing greater specificity about which actions on the part of parents are most central to enhanced student adjustment and achievement. A notable exception is the framework for parent involvement developed by Epstein (1992, 1995). In her work, Epstein (1995) identifies six types of parent involvement related to schooling: (a) **monitoring**, (b) **communicating**, (c) volunteering, (d) learning at home, (e) decision making, and (f) collaborating with the community. Thus, this project will use the existing Learning Management System or e-learning that has been implemented by school to facilitate parents to monitor their children’s academic performance.

2.2 Government Initiative

The initiative of Malaysian Government to enhance the traditional education method by implementing the usage of ICT in learning through one of its ministry which is Ministry of Education has been started since 1997 where MySchoolNet was launched and followed by “Smart School Campaign”, Computing Tablet project and Computerization Program (Rahman, n.d). The Ministry of Education actually implement the usage of e-learning through all of these initiatives. E-learning here is defined as an interactive learning process for students where the learning contents that provided in the system can be accessible through internet and the system was focused on the learning content itself rather than the interaction among learners or between learners and tutors because such function was not supported through online (Paulsen, 2002).

2.3 Definition of Learning Management System

Learning Management System is a term that used to describe a system that being used by a certain organization; in this context which is school that provide access to its member such as students, teachers and administrators to an online learning platform (Paulsen, 2002). Learning Management System can also be defined as *software that helps to automate the administration of training events. The LMS registers users, tracks courses in a catalogue, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It usually doesn't include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources* (Leiserson, 2002). Learning Management System as an online learning platform will enrich the basic e-learning function and support it as one of its functionality such as providing user registration, user's profile, report to management, records data from users, and other tracking function can be develop by integrating e-learning with Learning Management System. Thus, features comparison between several Learning Management System platforms will be done before the implementation stage where the platform which has the most functionality and meet the user's requirement are most likely to be chosen (Govindasamy, 2002).

2.4 Component of Learning Management System

There are three main functions of Learning Management System which are the content management, system management and user management (Mekpiroon et al., 2008); Rifón et al., 2001).

2.4.1 Content Management

Content management is important as part of Learning Management System platform as it will be supporting and managing the learning content created by tutors or teachers.

a) Content Creation

Learning Management System does support the content creation whether it was created within the system or the content that is created outside the system and later on will be uploaded in the system (Shihkuan & Yueh, 2008). User can use SPAW as HTML editor as it is a web based in-browser editor which enabling teachers or administrator to replace a standard text area html control with full featured, fully customizable and also a multilingual web based editor (SPAW editor, n.d). For learning content that created outside the system, the Learning Management System should support several file extensions that normally used such as pdf files, words, presentation slides, zipped files and also video (Shihkuan & Yueh, 2008).

b) Quiz and Assignment

Apart from supporting learning content, Learning Management System also support the online quiz where a multiple choice question can be generated using the system (Darbhamulla & Lawhead, 2004).

c) Course Enrolment

Normally in schools, administrator will pre-register the course for all students as they were not allowed to add or drop some of their subjects like what higher institution's student can do. This function can be used as enrolment method for club or extracurricular activities.

2.5 Mobile Application

Mobile application is synonymous with our daily lives nowadays. Mobile application is software that runs on smart phones or mobile phones. It designed to educate, entertain or assist people in their daily life. According to mobiThinking (2011) about 77 percent of the world population are mobile subscribers. Over 110,000 mobile applications had been developed daily and more than 15 million consumers are using this application (Farago, 2011). This eventually shows the high demand of mobile applications nowadays.

Mobile application can created across a wide area of usage and functionality. One of the add-value of mobile application is it can provide interactivity and mobility which is absent in an existing system. Using mobile applications is more practical and convenient than using existing system for communication as it provides messaging and call function in order to facilitate the two ways communication between parents and teachers.

2.6 Android Operating Systems and Its Mobile Application Market Share

Android OS is open source software which is governed by The Android Open Source Project (AOSP) and is tasked with the maintenance and the future development of Android (Wikimedia Foundation, 2011). After the infamous Google Inc bought over Android Inc in 2005, the Android OS has grown rapidly to have helped a lot to the future of Smartphones (Business Week, 2010). Apparently, Android Operating System (OS) market share has surged over 56% leaving the closest competitor, Apple Inc with its iOS at 33% (Blodget, H. 2011). This is a proof that Android is going to have a huge amount of user leaving all of their competitors behind.

While Android is going to conquer the Smartphone market, it is seen as a smart move to use Android OS in developing mobile applications. The sales of its Smartphones already showed a good trend when Android Smartphone sales ousted iOS (Apple) Smartphones by 56.1% to only 22.9% (Gartner, 2012). This shows that the popularity of mobile applications are still with Android and even with the next half a decade of prediction, Android is still on top. Android on the other hand has a handful group of developers developing applications for Google Play, a market where each and every

application are uploaded and downloaded. Applications in Google Play now has reached 600,000 and counting which includes applications and games (Constine, J., 2012). At this Google Play, besides enabling end user to download cool applications and games, it also displays the comments, and details about the applications developers. Hence, a communication between developers and soon to-be developers can be established. The possibility of developing mobile application in Android environment is endless and since the developer's community is now growing extra fast, it is going to be more convenient and better sources of references.

CHAPTER 3

METHODOLOGY

In this chapter, the author will discuss phase-by-phase the development of the Mobile Learning Management System according to the phases in System Development Life Cycle (SDLC). There are several types of system development methodologies, and each methodology has different unique approach to implement the SDLC.

3.1 System Development Methodology

The author decides to develop this application using Rapid Application Development (RAD) model. This RAD model is a model for software process. This model is being selected because it uses iterative prototyping and suitable for resource constraints project (Mortimer, 1995). Figure 3.1 show the RAD model that been used to implement the SDLC. Besides that, it uses minimal planning and analysis and focus more on prototyping.

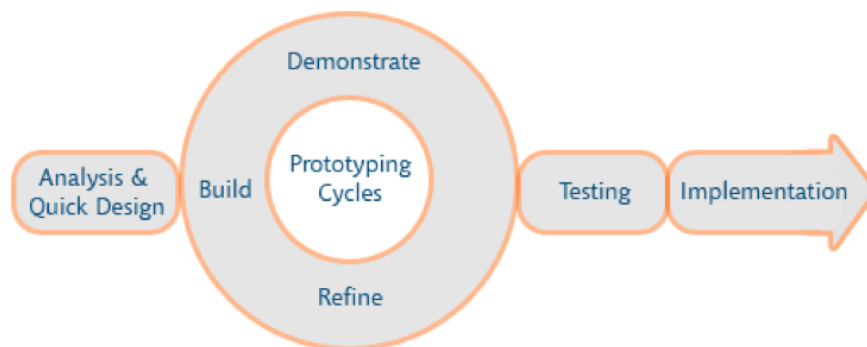


Figure 3.1 Rapid Application Development (RAD) Model (Martin, 1991)

This model is more effective to be implement compare to the other SDLC model because it is designed for tight time-scale project development. The author only has two (2) semesters to accomplish this project and this is one of the reasons why the author chooses to use RAD model. RAD model is more applicable than Waterfall model because the author can continuously work with the prototyping until it meets

the user needs. This is important because the prototyping of the application usually change from time to time according to the users requirements. However, not all the phases in SDLC are included due to time constraints. Therefore, this chapter will only include six (6) phases of the RAD model, which are planning, analysis, design, prototyping cycle, testing and implementation.

3.2 Planning and Data Gathering Phase

The first phase of the project development is the planning and data gathering phase. This phase is important since it define all information that is required to ensure the development of the project successful. The following are the steps that been carried out by the author during this phase:

- The author redefined the topic for this project. The background study, problem statement, objectives, scope of the application and existing research paper that related to this project are identified and documented.
- Decide tools that required for the development of the application.
- Implement the Gantt chart to plan the project scheduling and time allocation for each necessary task. Gantt chart of the project is attached in Appendix. Appendix 1 shows the Gantt chart for the whole project development.
- The method that been used to gather data that required for is interviews and the data collected need to be analyzed.

3.3 Analysis Phase

After the planning phase is completed, the author proceeds to the second phase of the project development, which is analysis phase. This phase is important because result of the analyzed data will determine whether the application meets the user requirements or not. During this phase, the author analyzed all the data and requirements collected during planning phase. The following are the steps taken during the analysis phase:

- The author conducted a survey on parents and interviews some of the teachers to gather the information regarding the current situation. The result of the survey will be discussed in chapter 4.

- The author analyzed the best method to overcome problems faced by parents using research paper.
- The author produce a flowchart that describes the flow of the application based on the result of the survey.
- The author develops an understanding of the user's activities and how the users interact with the application.

3.4 Design Phase

During design phase, the author needs to design the graphical user interface, the conceptual, physical design as well as the system architecture of the application. All the designs are important for the development of the system. These designs are based on the result of the data analysis.

3.4.1 Graphical User Interface

Before the author can start with the programming part, the author needs to have a developed and tested paper-based graphical user interface design (Sommerville, 2004). In order to come with a developed and tested designs, the author need produce paper-based design prototype based on the data analyzed. After that, the paper based design needs to be evaluated by the users. The author has to collect all the information regarding the users' response towards the interface.

After getting all the feedback from the users about the user interface, the author started to design the real working interface and icons using Adobe Photoshop. The graphical user interface design will be discussed in details in chapter 4.

3.4.2 Conceptual Design

The author has to design the Use Case diagram, which consists of system functionalities and flow chart of the application in order to produce conceptual design. This conceptual design includes the functionality of the application and the sequences of Mobile Learning Management System activities. Package diagram is used to show the data model of the application, which includes the logical relationships between package diagrams. Besides

that, flow chart shows the process of the system. The author use Microsoft Visio software to constructs these diagrams. The outcome of the results will be discussed in chapter 4.

3.4.3 Physical Design

The project will be developed using a personal computer that has the required software. In order to design the graphical user interface and application's icons, author needs Adobe Photoshop software. For the development, author is using MIT App Inventor. It also needs an Android emulator, which an Android SDK has to be installed. Table 3.1 shows the specifications in developing the project:

Table 3.1 Development Environment Specifications

Tools	Specifications
Software	MIT App Inventor, Android SDK, Python SDK, Adobe Photoshop
Hardware	Personal Computer, Android Phone

3.4.4 System Architecture

Mobile Learning Management System is a stand-alone application, which integrated with 2 type of database. The first database is used by teachers to update the examination result, attendance record and also the discipline record. This database used python programming language and need Python SDK to be installed and hosted by Google App Engine. The second database used TinyDB function in App Inventor and used phone memory to store data. This database is used to store all the data that will be synchronized with the main database that being used by teachers. The reason why author used two type of database is that to ensure all the data will be store permanently in the application database and the data been stored can be retrieved whenever the user wish to continue using the application without the data connection with internet. Refer Figure 3.2 for the Mobile Learning Management System architecture.

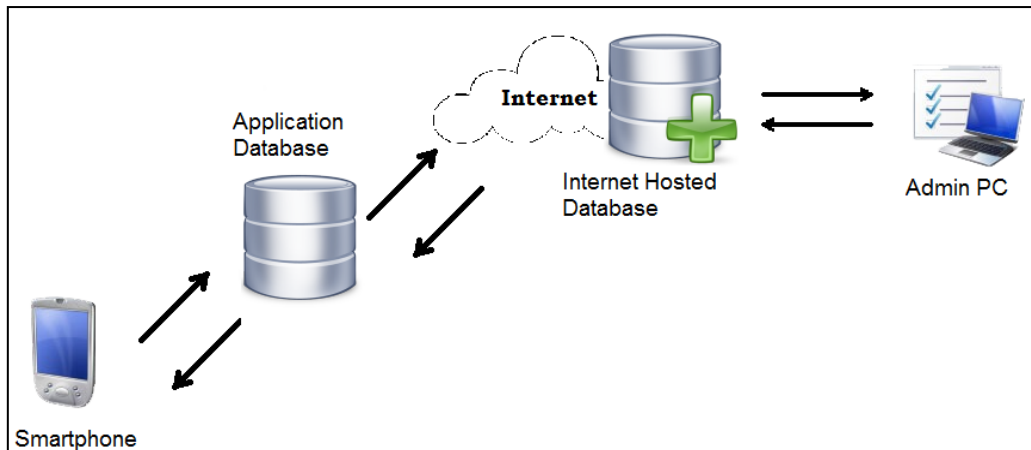


Figure 3.2 Mobile Learning Management System Architecture.

3.5 Prototyping Cycle Phase

After the conceptual and graphical user interface design completed, the author proceed to the next phase. The fourth phase for RAD model is prototyping cycles. During this phase, the author continuously refines, build and demonstrate the prototype until it meets the users need and satisfaction. The author needs to install all the software required such as Android SDK before the author can start to develop the prototype. The following are the steps carried out for prototyping cycle:

- The author needs to refine the prototype model that meets the user's requirement.
- The prototype has been built based on the conceptual and the graphical user interface design.
- The author create functioning graphical user interface for the prototype based on the design.
- The author use the block code in App Inventor to create all the functions based on the requirement.
- After the cycle of the prototype done, the author demonstrates the prototype to the users.

The five steps above will be repeated until the users satisfy with the developed prototype.

3.6 Testing Phase

After the author had developed a prototype that meets the user satisfaction, the author can start with testing of the prototype. The author selects several parents who have participated in the survey process before. Besides than testing the usability and functionality of the system, they also test the flow of the activities.

In order to test the functionalities and the integration of the application, the author had developed an integration test plan. For testing phase, the author conducted a post-implementation survey to evaluate the effectiveness of the prototype. The enhancement of the prototype will be taken into consideration based on the results gathered from testing phase. The result of the post-implementation survey and integration test plan will be discussed in Chapter 4.

3.7 Implementation Phase

The final phase for project development is implementation phase. During this phase, the author can start to implement the complete application before the application can be delivered to the users. The complete application is the enhancement of the prototype based on the feedback gathered during testing phase.

Most of the time allocated for this project development is devoted to implementation phase. A big part of this phase is related to the technical works such as complete the block code and debugging the real working system. The result during the implementation phase will be discussed in details in Chapter 4.

CHAPTER 4

RESULT AND DISCUSSION

After the system development life cycle had been completed, the author manages to gather all the results of the project development. This chapter will be divided into two parts; part one consist of discussion about the results from the survey conducted, the proposed solution, the UML diagram, the functionalities of the application, the sequences of the application activities, basic navigation procedure and part two will discuss about the project development, integration test plan and post-implementation survey.

4.1 Survey Result

A survey has been conducted among a group of parents who sent their children to Sekolah Tuanku Abdul Rahman, Ipoh. The method of this study is through questionnaire distribution. The objective of this study is to get the understanding on the current method of parent getting the update of their children's academic performance and about their involvement in their children's schooling. The survey form was divided into 4 sections and each of the section has been explained to them before they answer the survey. Around 40 parents answer the survey.

Section A: Children's Information.

Sekolah Tuanku Abdul Rahman (STAR) is one of the Sekolah Berasrama Penuh (SBP) that offer only science stream to its student. Apart from that, this school only takes male student as its student. From the analysis, parents that took the survey have children school in STAR ranging from 13 years old to 17 years old.

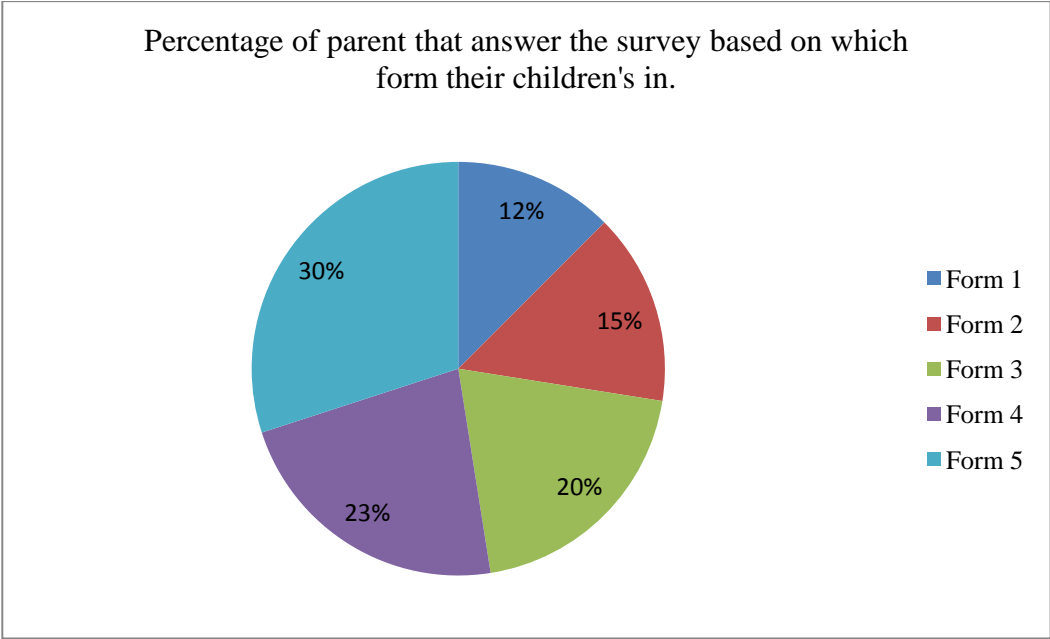


Figure 4.1 Percentage of parent that has children in STAR

Section B: Parent’s Mobile Device Information

This section is to get the data on the type of mobile device that been use by parents. Most of the mobile device that been use by parents supported 2G/3G, WiFi and Bluetooth as its wireless connection. Below are the charts that represent the brand and type of mobile device operating system (OS) being used by parents:

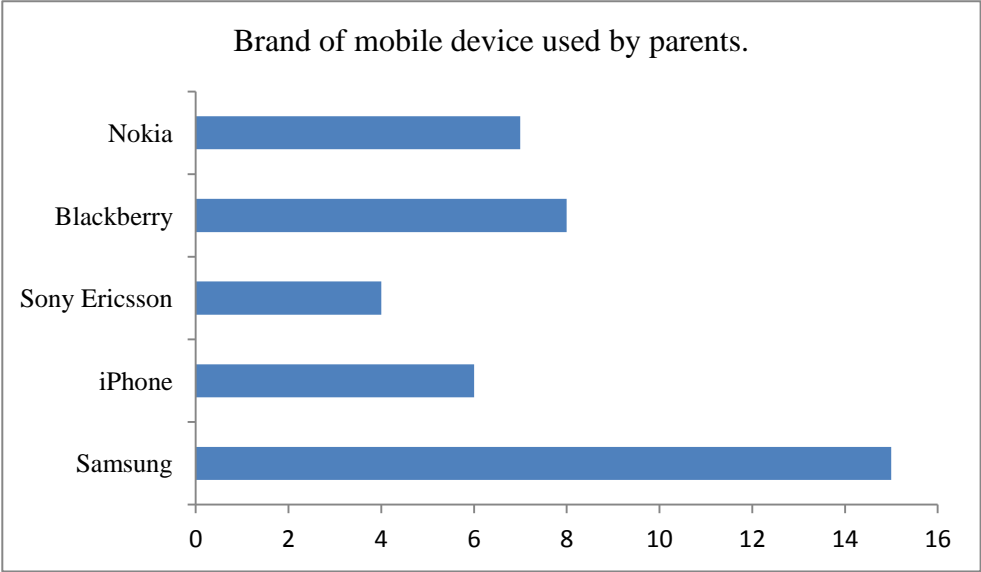


Figure 4.2 Brand of mobile device used by parent.

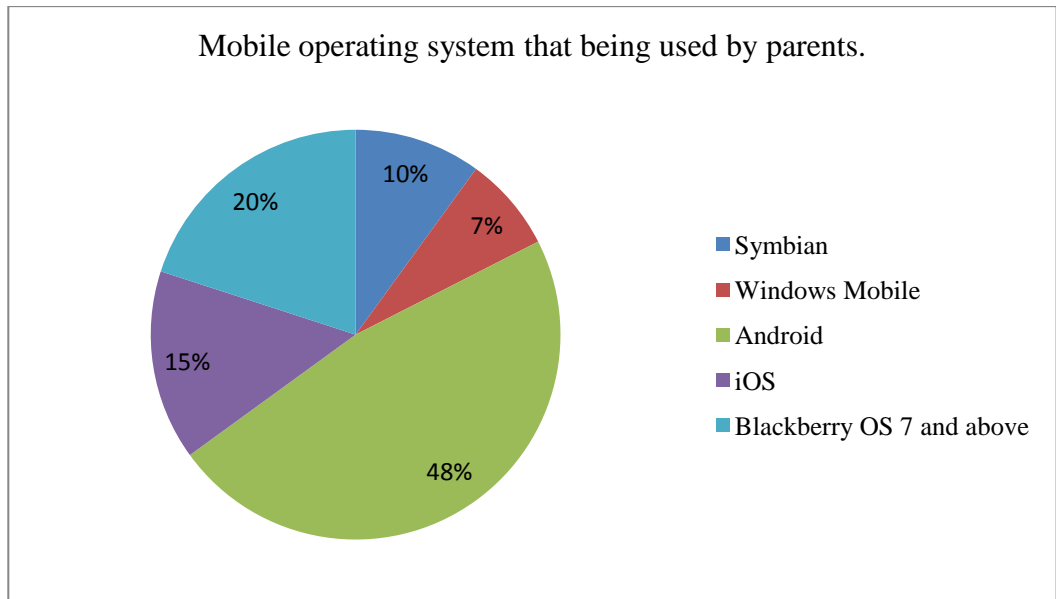


Figure 4.3 Percentage of operating system used by parents.

Section C: Current Method of Receiving Children’s Academic Updates.

This section is to get the data on the current method that being used by parent to receive their children’s academic result and updates. Based on the given explanation, there are five produced statements that have been asked in the questionnaire. The statements include:

1. I want to receive regular update of my children’s academic result.
2. Current method hinders me from getting regular update.
3. I don’t really have time to frequently go to school to meet class teacher face-to-face.
4. I want to actively participate in my children’s academic but there is time constrain from doing that.
5. I want to actively participate in my children’s academic but there is distance constrain from doing that.

The respondents need to rate the statements using the Likert scale of 1 to 5 (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). The mean score of each question has been calculated.

Table 4.1 below shows the result of the Section C survey.

Table 4.1 Result of the Section C Survey

1.	I want to receive regular update of my children's academic result	4.1282
2.	Current method hinders me from getting regular update.	3.4513
3.	I don't really have time to frequently go to school to meet class teacher face-to-face.	4.5615
4.	I want to actively participate in my children's academic but there is time constrain from doing that.	4.4218
5.	I want to actively participate in my children's academic but there is distance constrain from doing that.	4.3520

Section D: MOBILE LEARNING MANAGEMENT SYSTEM (MLMS)

This section is to get the parent opinion and idea about the system that will be developed. Based on the given explanations before parents answer the survey, there are five produced statements that have been asked in the questionnaire. The statements include:

1. I am very familiar with mobile phones applications.
2. MLMS will give me more benefits as compared to the current use of getting updates of my children's academic result.
3. MLMS will give me more positive outcomes rather than negative outcomes.
4. MLMS will give the opportunity for me to get involve in my children's studies (observe the academic performance and communicate with teachers and school management).
5. I am willing to use the MLMS to monitor my children's academic performance.

The respondents need to rate the statements using the Likert scale of 1 to 5 (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). The mean score of each question has been calculated.

Table 4.2 below shows the result of the Section D survey.

Table 4.2 Result of the Section D Survey

1.	I am very familiar with mobile phones applications.	4.1282
2.	MLMS will give me more benefits as compared to the current use of getting updates of my children's academic result.	4.8513
3.	MLMS will give me more positive outcomes rather than negative outcomes.	4.4615
4.	MLMS will give the opportunity for me to get involve in my children's studies (observe the academic performance and communicate with teachers and school management).	4.8718
5.	I am willing to use the MLMS to monitor my children's academic performance.	4.3540

Based on the result of the survey done, it shows that parents are fully support the development of the Mobile Learning Management System and willing to use it after it is fully developed.

4.2 Use Case Diagram

Refer Figure 4.4 for the use case diagram of the Mobile Learning Management System. There are lots of changes and discussions that have been done by the author before the author can successfully produce a correct diagram with all the application functionalities.

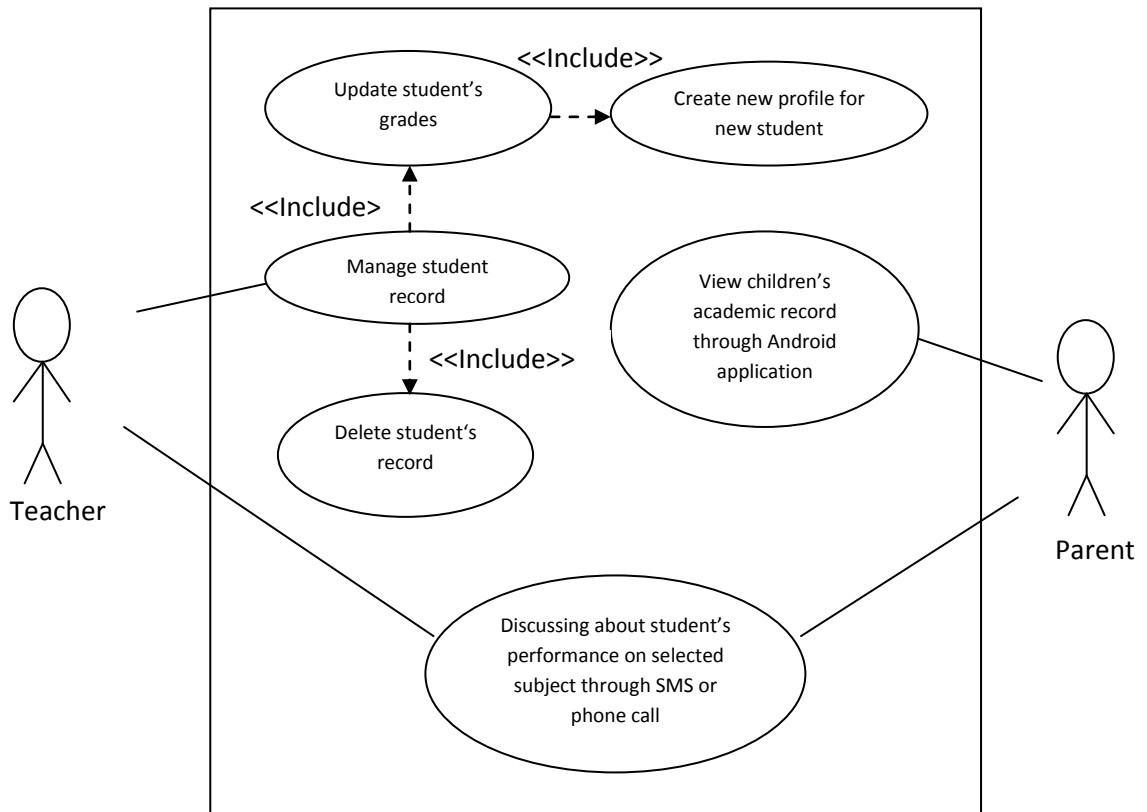


Figure 4.4 Use Case Diagram for Mobile Learning Management System.

4.3 Functionalities of Mobile Learning Management System

For the development of the Mobile Learning Management System, the author decides to develop an application that can provide two ways communication between parents and teachers and also act as monitoring tool of their children's academic performance.

This application utilizes the existing calling and messaging function of the Smartphone by integrating it within the application without user need to enter phone number. All of the phone number of involved teachers such as class teachers, discipline teacher and all of the subject teachers will be stored in this application database. Users just need to click one button to call any teachers according to the subject taught, class teacher or discipline teacher. Same goes to messaging function, users just need to write message in the text box provided and it will be send to related teacher. Therefore, this function will help to solve the communication problem as it provides the channel of two ways communication between parents and teachers.

For monitoring purposes, parents can view their children's examination records, discipline records and also attendance records by using this application. All of the record will be stored within the application database and will be synchronized with school's database when the Smartphone is connected to the internet. The reason of having two type of database is that it enables user to use this application in offline mode; without data connection to internet, and also online mode; with data connection to the internet. This provides convenience to users as they do not need to always be connected to the internet and can view all of the records anywhere and anytime they want.

4.4 Basic Navigation Procedure

Every time the user starts this application, the first screen that will be seen is the Login of the application. Parents need to insert username and password that has been provided by the school. Refer Figure 4.5 for the navigation of activities for this application. On the Main Menu screen, there are four buttons, which are “Examination Result”, “Attendance Record”, “Discipline Record” and “Contact Teacher” that link to their own page. The “Examination Result” button will navigate the user to the examination records of their children sorted by subjects or examinations. The records can be viewed in both data and graphical view. The “Attendance Record” button will navigate user to their children attendance records where it will be updated by class teacher. Parents can straight away call class teacher using call button provided in that page to discuss about the attendance. The “Discipline Records” button will navigate user to their children’s discipline record and same as “Attendance Record” page, parents can call discipline teacher using call button provided. Lastly, the “Contact Teacher” button link to page that has several buttons according to the subjects taken by the students, which enable the parents to contact subject teachers of their children. Each subject button will navigate user to a specific page which shows the teachers details and parents can call that particular teacher using call button provided or leave a message in the text box provided in that page also.

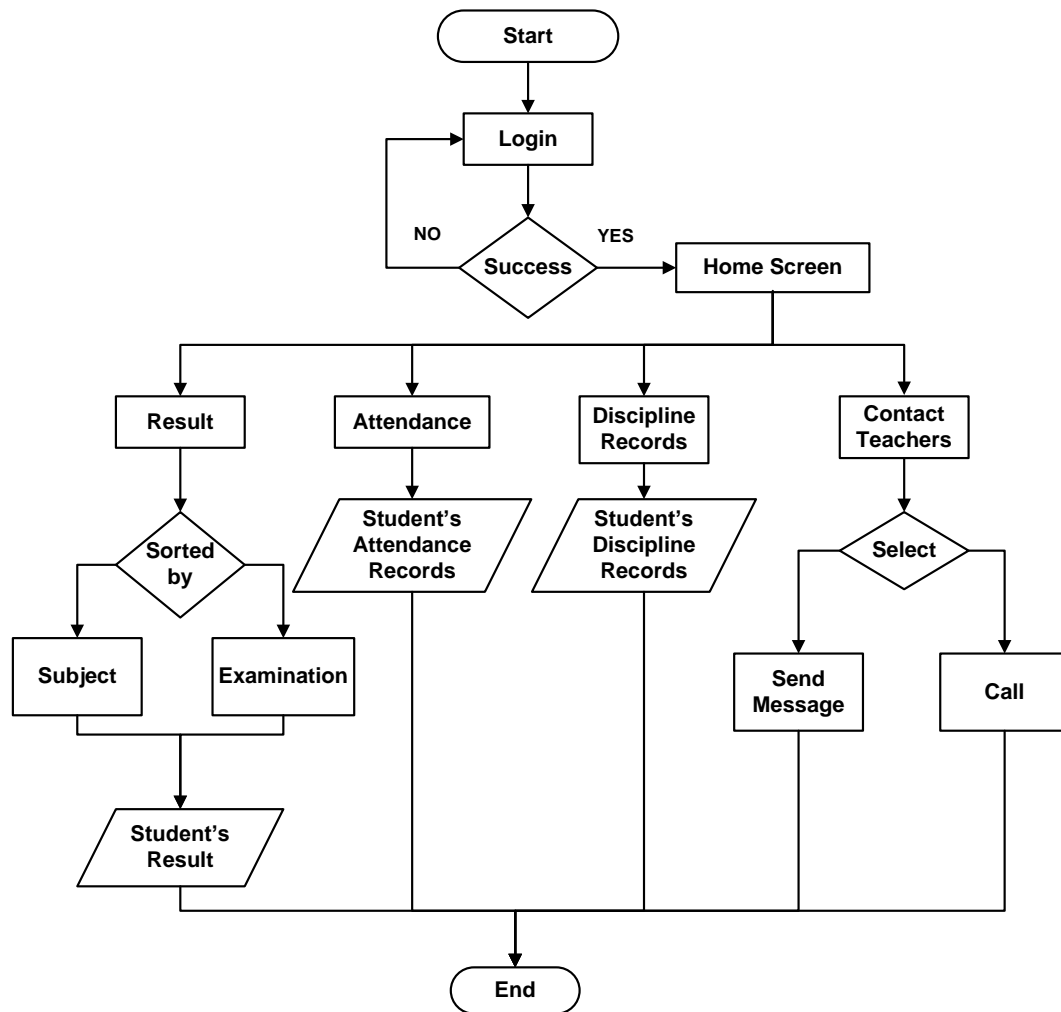


Figure 4.5 Navigation Mobile Learning Management System.

4.5 User Interface Prototype

The process of designing and developing the graphical user interfaces for this Mobile Learning Management System involve end-users. It is difficult for the author or the user to design and develop the suitable user interface abstractly because it is hard to explain exactly what the user want. By having a physical prototype, it is easier to identify the most suitable user interface prototype to be integrated with the application functionality.

The first stage of designing the prototype is by having the paper-based design user interface which is the most efficient method to start a prototype development. For each screen, the author included a description of the functionality carried by the

particular screen and the layout design, which comprises of the text view, button and other layout elements that is necessary.

During the second stage, the author can start to develop the prototype based on the user interface design that had been discussed before. At this stage, the author able to present the real working prototype to the user and the author can constantly enhance the user interface prototype until it meets the user satisfaction.

The following are the details of the prototype design:

- **Screen Layout Design**

The parents will use this application, so the interface should be more professional. There is fewer buttons to click in order to execute certain function in order to provide convenience to parents. Apart from that, the data will be showed in graphical view and also in numbers.

- **Colour**

The application is design based on three colours, which are grey, black and white. The author decides to use these colours because the combination of these colours can produce an application that is suitable for all range of ages.

- **Graphical Design**

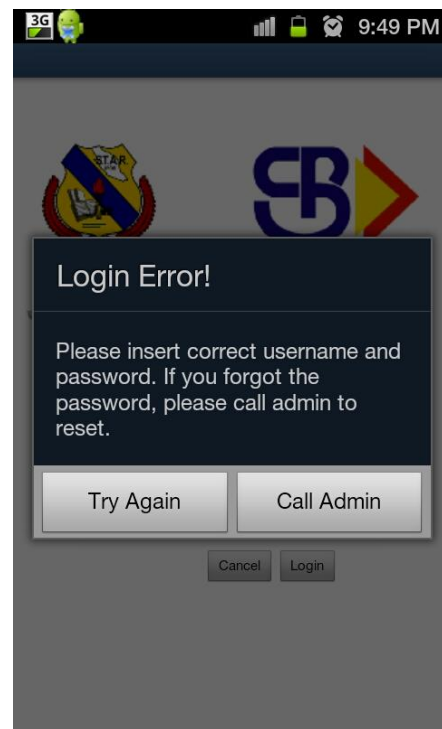
This application is not necessarily need lots of graphical design since the aim of this application is to facilitate the two ways communication between parents and teachers and a monitoring tool for parents. The working area only consists of text view, graphical view and buttons to make the application simpler and easier to be used.

4.6 Project Development

In this part, the author will discuss the results of the developed Mobile Learning Management System application.



a) Login Screen



b) Error Dialog

Figure 4.6 Login screen of Mobile Learning Management System

User will be redirected to login screen when the click at the Mobile Learning Management System's icon. User need to key in username and password that has been provided by the school. If they forgot the password, they can straight call the admin to reset the password as shown in figure 4.6.

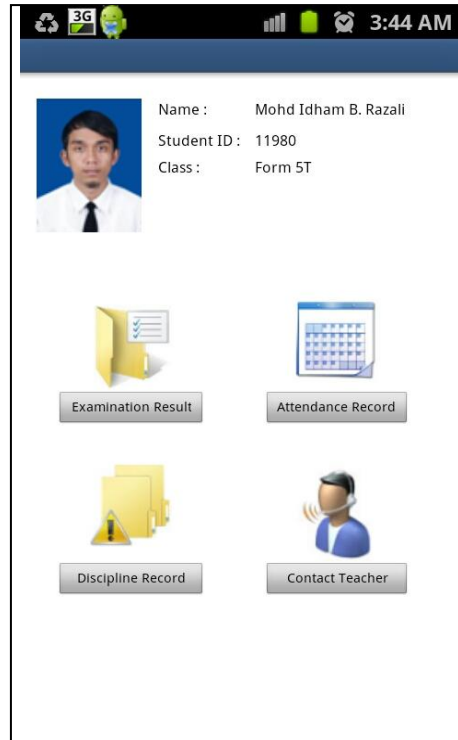
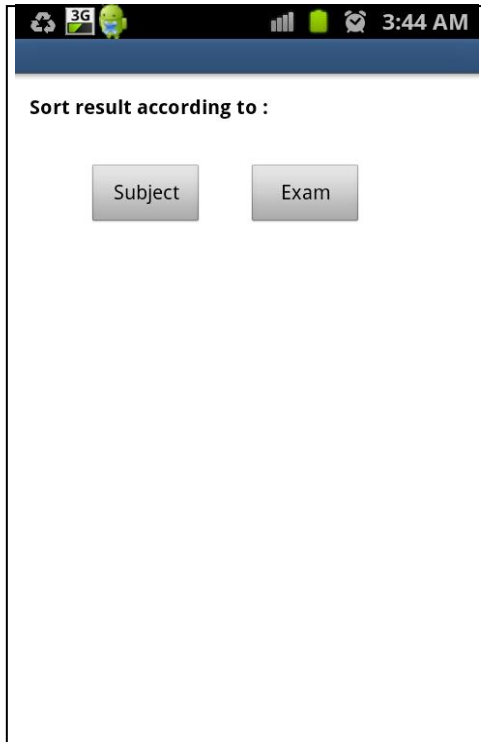


Figure 4.7 Home Screen

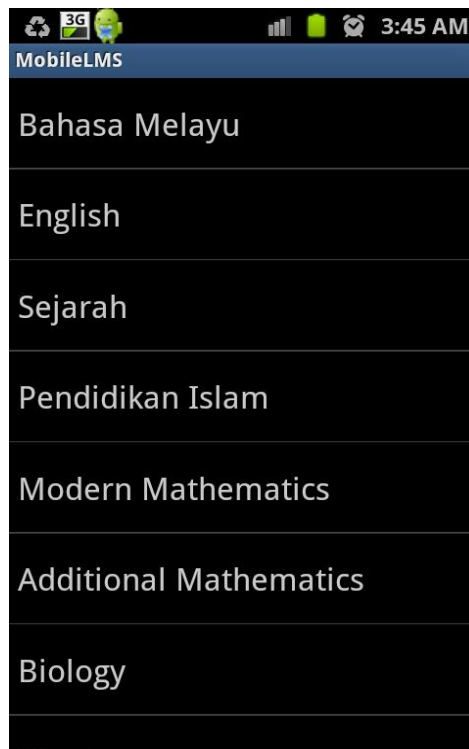
After user has successfully logged in into the application, they will be redirected to the Home Screen. At the Home Screen, there will be picture and personal information of user's children and four main buttons. There are "Examination Result" button, "Attendance Record" button, "Discipline Record" button and "Contact Teacher" button. User has the option to select any of the buttons that they desired.



a) Examination Result page



b) Result sorted by examination



c) Result sorted by subjects

Figure 4.8 Examination Result Page

Figure 4.8 shows the Examination Result page when user click “Examination Result” button in Home Screen. User can select to view their children’s result sorted by examination or sorted by subjects. Refer figure 4.9 to view the result according to examination and also subjects and also will be showed in graphical view.

Ujian Selaras 1		
Subject	Marks	Grade
Bahasa Melayu	94	A
English	75	B
Sejarah	63	C
Pendidikan Islam	80	A
Modern Mathematics	95	A
Additional Mathematics	60	C
Physics	70	B
Biology	82	A
Chemistry	75	B

Modern Mathematics		
Examination	Marks	Grade
Ujian Selaras 1	95	A
Peperiksaan Pertengahan Tahun	90	A
Ujian Selaras 2	50	C
Peperiksaan Akhir Tahun	-	-

Graphical View

Ujian Selaras 1	95%
Peperiksaan Pertengahan Tahun	90%
Ujian Selaras 2	50%
Peperiksaan Akhir Tahun	N/A

a) Result sorted according to examination.

b) Result sorted according to subject.

Figure 4.9 Result sorted by examination and subject

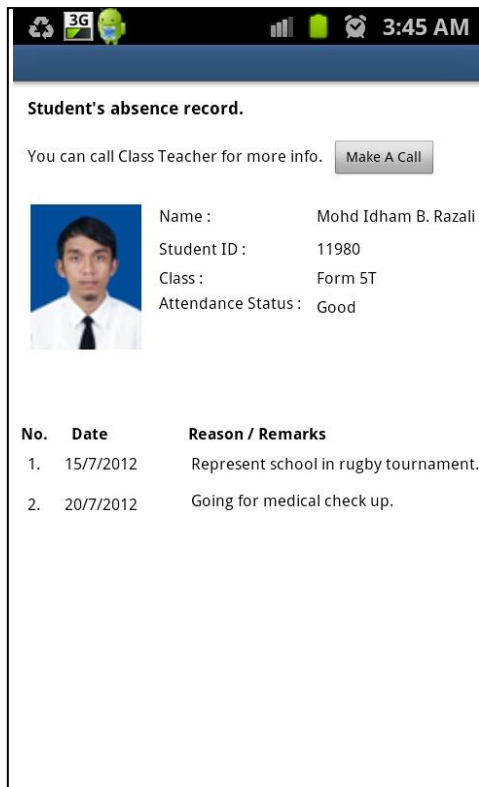


Figure 4.10 Student Attendance Record page.

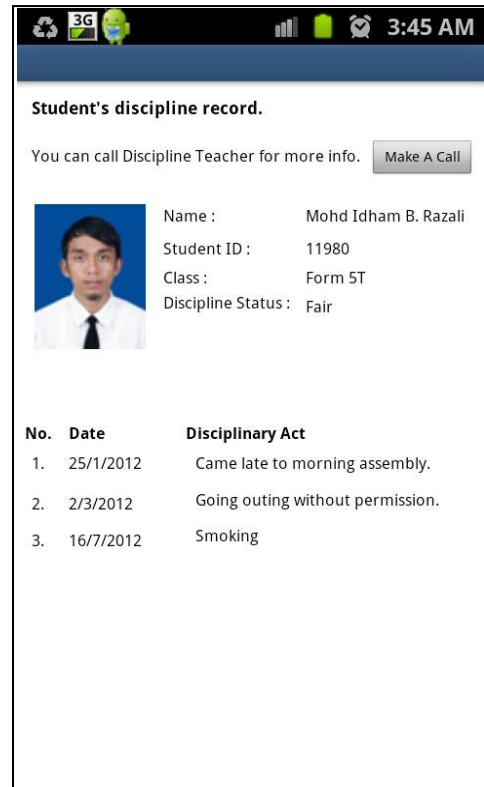
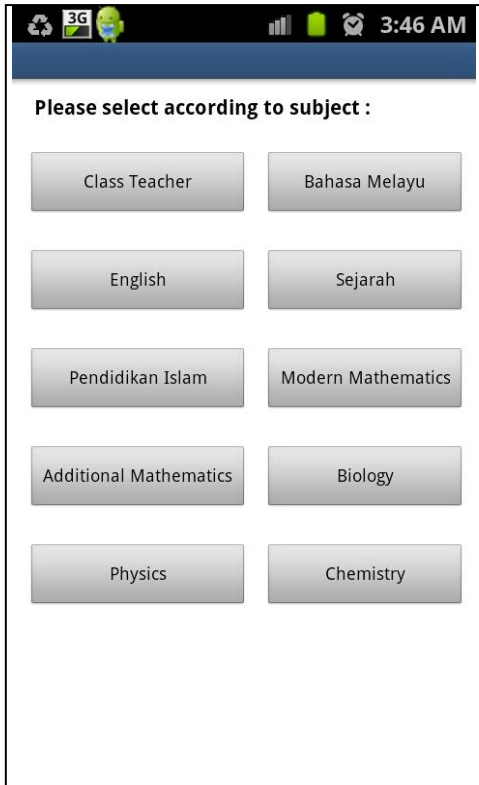
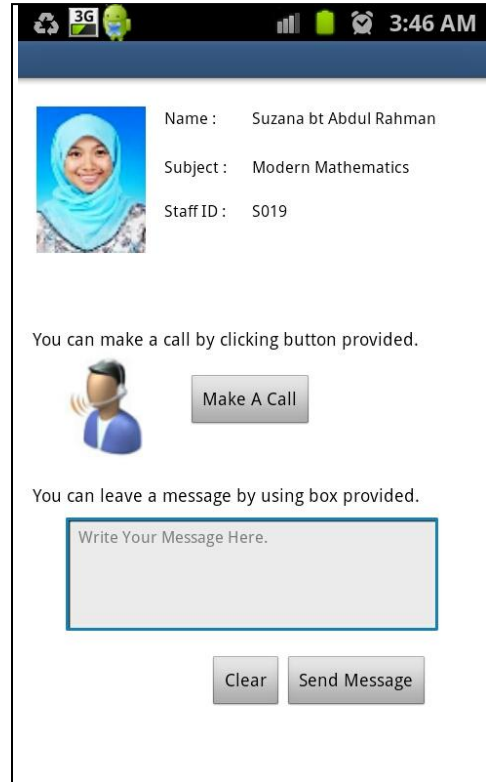


Figure 4.11 Student Discipline Record page.

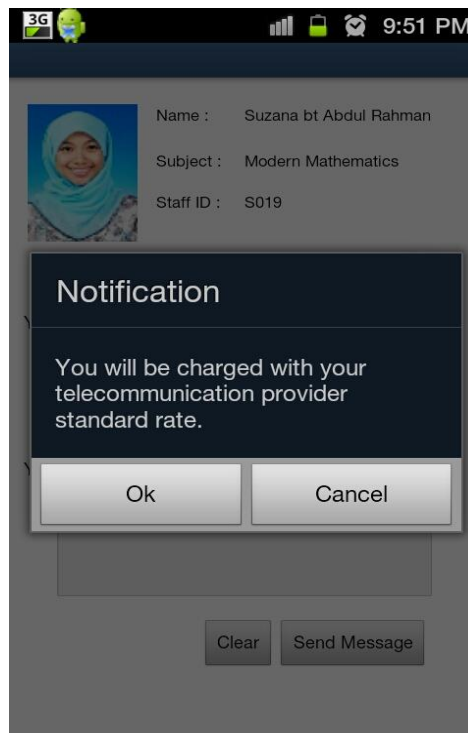
When parents click “Attendance Record” button, they will be redirected to the page in figure 4.10 where all of their children’s attendance record will be showed and parents can call class teacher straight away using the call button provided. Same goes when parents click “Discipline Record” button where parents will be redirected to the page in figure 4.11 where all of their children’s discipline record will be showed and parents can straight away call discipline teacher to discuss about their children disciplinary act.



a) Select Subject page



b) Contact Teacher according to subject page.



c) Notification Dialog.

Figure 4.12 Contact Teacher page

Figure 4.12 shows the pages that parents will be redirected when they click “Contact Teacher” button. First, parent will be asked to choose which subject teacher that they want to contact and they will be redirected to that particular teacher’s page where the details of that subject teacher will be shown. Parents can choose to call that teacher by using call button provided or they can just simply leave a message that will be sent via short messaging service (SMS) to that particular subject teacher’s phone. When parents click on the call button in any pages inside this application, a notification dialog will be popped up to inform parents that the service will be charged with standard rate of their own telecommunication provider. This is to inform parents that this application will not provide them with free call and messaging function.

4.7 Mobile Learning Management System Integration Test Plan

Below is the table that show the result of Mobile Learning Management System integration test plan that has been done.

Table 4.3 Integration Test Plan Result

No.	Test Case Name	Test Procedure	Pre-condition	Expected Result	Reference to Detailed Document	Results
1.	User_Login_Button	Click on “Login” Button	User need to insert correct username and password.	Direct user to home page if username and password match.	User Module	Pass
2.	User_Cancel_Button	Click on “Cancel” Button	None	Clear username and password text box.	User Module	Pass
3.	User_ExaminationResult_Button	Click on “Examination Result” Button	None	Direct user to Result Option page.	User Module	Pass
4.	User_ExaminationResult-Subject_Button	Click on “Subject” Button	None	Show subject list page.	User Module	Pass
5.	User_ExaminationResult-Subject-ListItem_Button	Click on Subject List Item	None	Show exam result sorted by subject.	User Module	Pass
6.	User_ExaminationResult-Exam_Button	Click on “Exam” Button	None	Show examination list page.	User Module	Pass
7.	User_ExaminationResult-Exam-ListItem_Button	Click on Exam List Item	None	Show exam result sorted by examination	User Module	Pass
8.	User_AttendanceRecord_Button	Click on “Attendance Record” Button	None	Show student’s attendance record page.	User Module	Pass

9.	User_AttendanceRecord- Call_Button	Click on “Call” Button	None	Call class teacher	User Module	Pass
10.	User_DisciplineRecord_ Button	Click on “Discipline Record” Button	None	Show student’s discipline record page.	User Module	Pass
11.	User_DisciplineRecord- Call_Button	Click on “Call” Button	None	Call discipline teacher.	User Module	Pass
12.	User_ContactTeacher_ Button	Click on “Contact Teacher” Button	None	Show list of subject.	User Module	Pass
13.	User_ContactTeacher- Subject_Button	Click on Subject List Item	None	Show teacher’s detail according to selected subject.	User Module	Pass
14.	User_ContactTeacher- Subject-Call_Button	Click on “Call” Button	None	Call selected subject teacher.	User Module	Pass
15.	User_ContactTeacher- Subject-Clear_Button	Click on “Clear” Button	None	Clear text in message text box.	User Module	Pass
16.	User_ContactTeacher- Subject- SendMessage_Button	Click on “Send Message” Button	User need to write message in text box provided.	Send message if user writes text in text box and prompt error message if it is empty.	User Module	Pass

4.8 Post Implementation Survey

The author had conducted a survey for the Mobile Learning Management System (MLMS) prototype in order to evaluate the effectiveness of the prototype. This survey consist of ten (10) rating questions to evaluate the user-friendliness, informatively and usability of the prototype and one (1) open-answer question for improvement of the prototype. Refer Appendix 3 for the survey form. It had been done to a group of target parents who answered the preliminary survey and involved in prototyping testing.

Below are the results of the survey:

1. The graphical user interface of this application is user friendly.

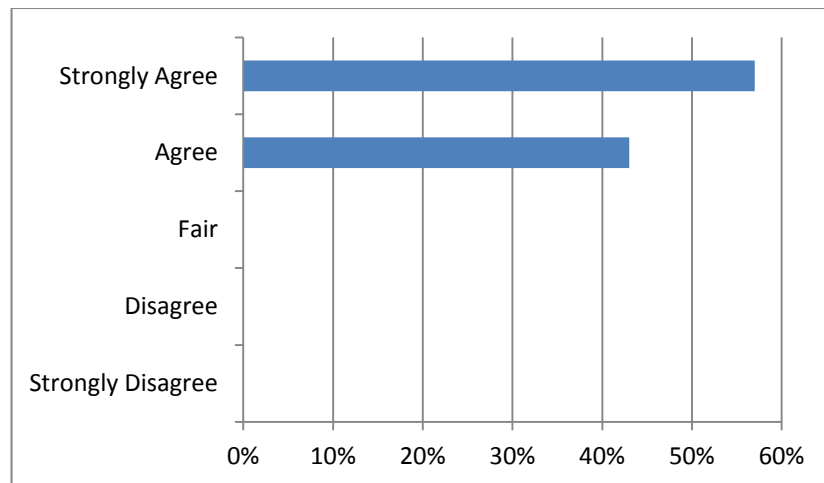


Figure 4.13 Question 1 survey result

2. It is easy and simple to navigate through MLMS application.

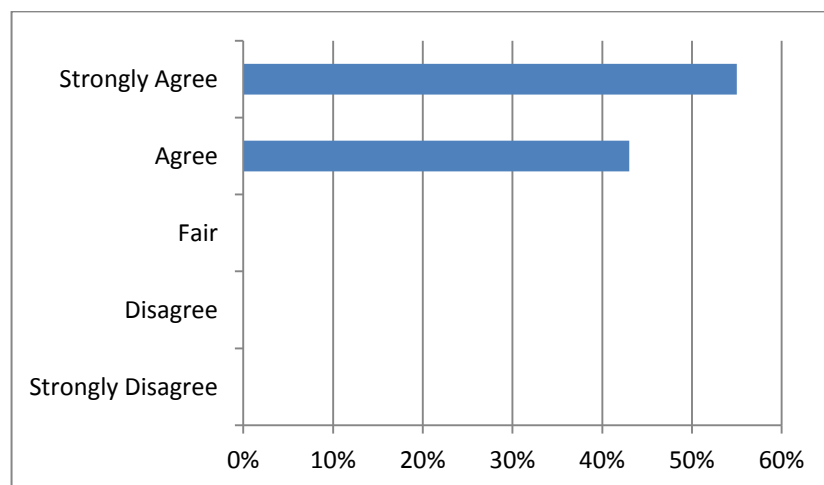


Figure 4.14 Question 2 survey result

3. MLMS application is simple and easy to use.

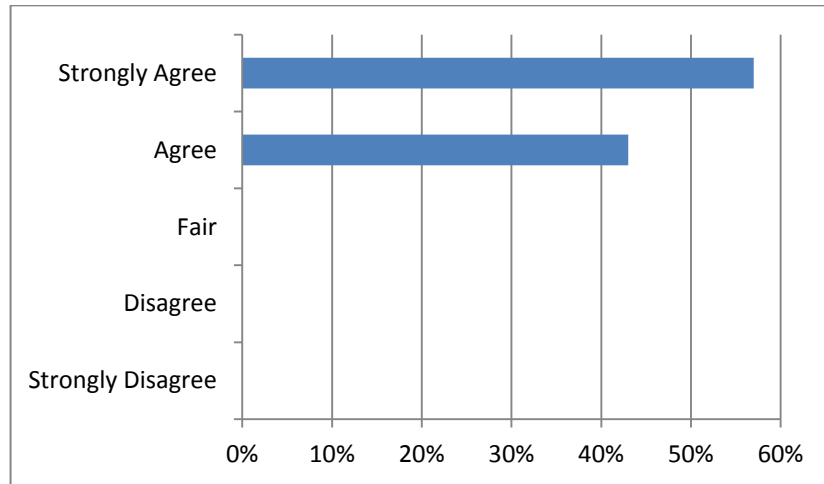


Figure 4.15 Question 3 survey result

4. MLMS application can help me check on my children's attendance.

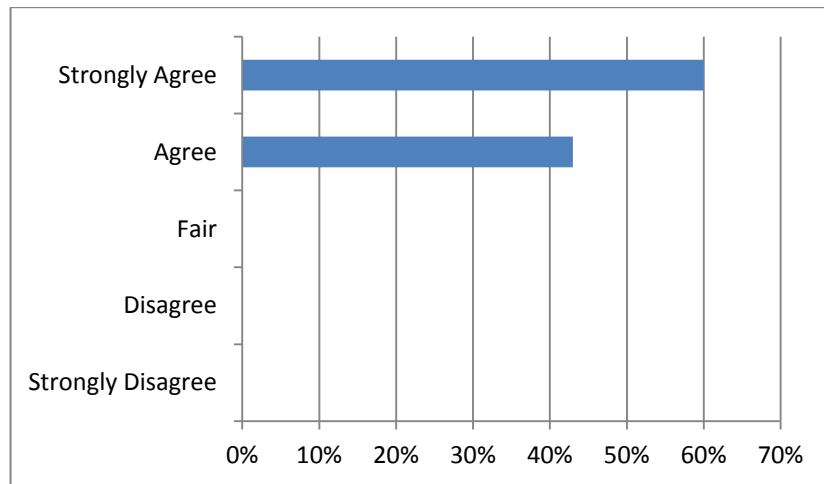


Figure 4.16 Question 4 survey result

5. MLMS application can help me check on my children's discipline record.

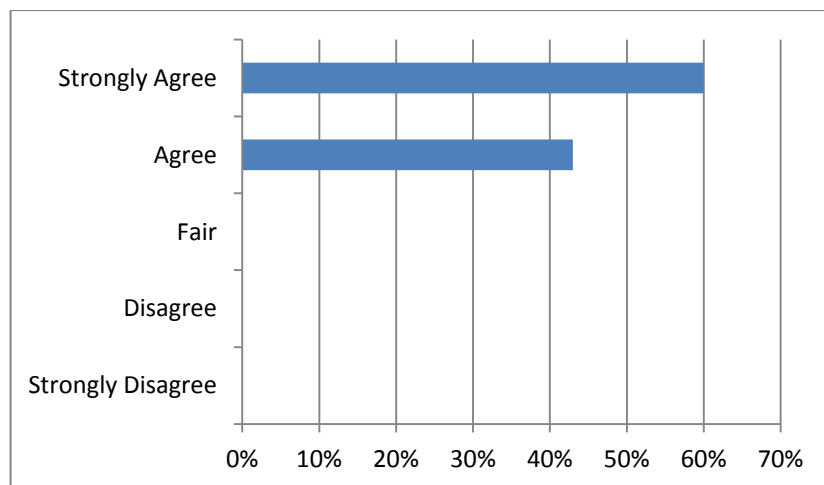


Figure 4.17 Question 5 survey result

6. MLMS application can help me to keep track of my children's examination result.

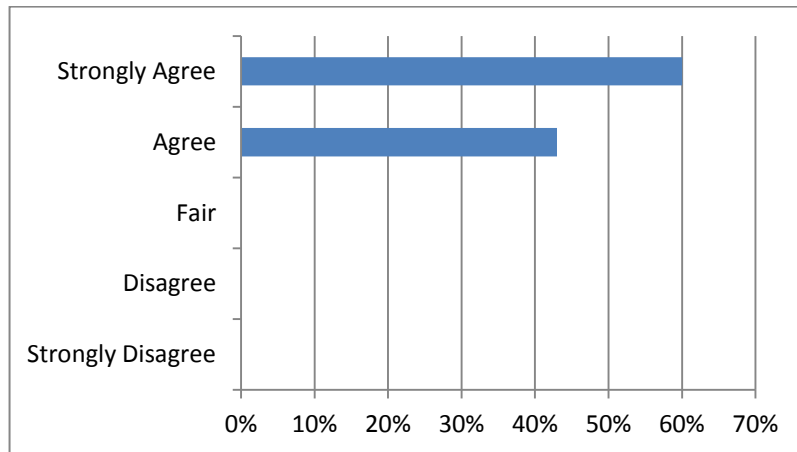


Figure 4.18 Question 6 survey result

7. Data shows by MLMS application are easy to read and understand.

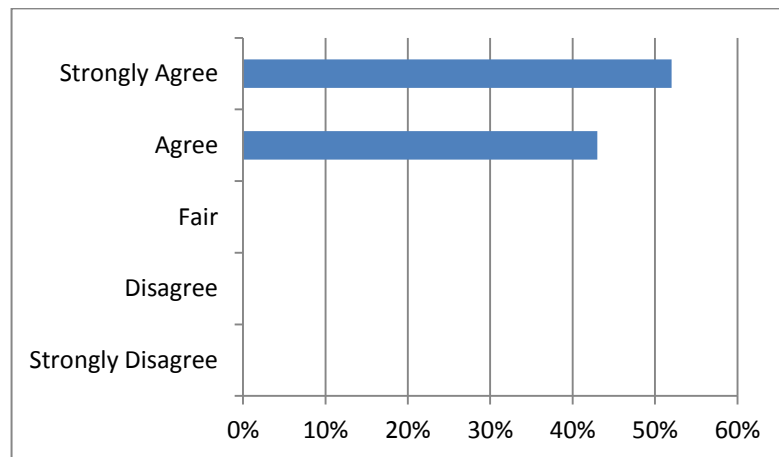


Figure 4.19 Question 7 survey result

8. MLMS provide convenience for me to communicate with teachers by calling and messaging function.

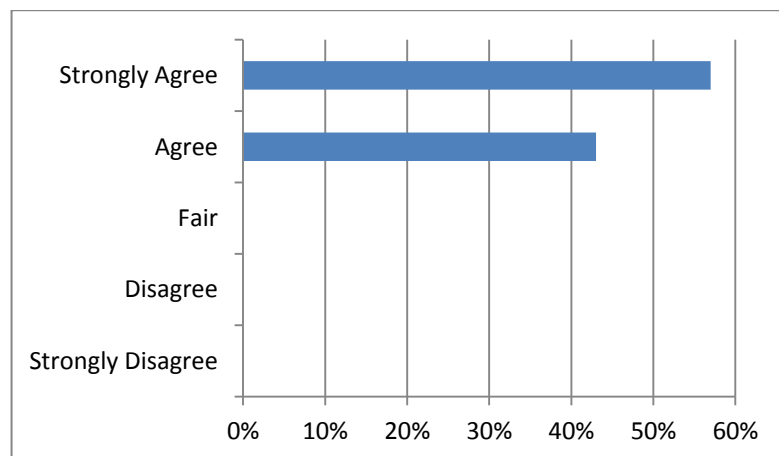


Figure 4.20 Question 8 survey result

9. Offline and online mode help me to access MLMS application with or without data connection to internet.

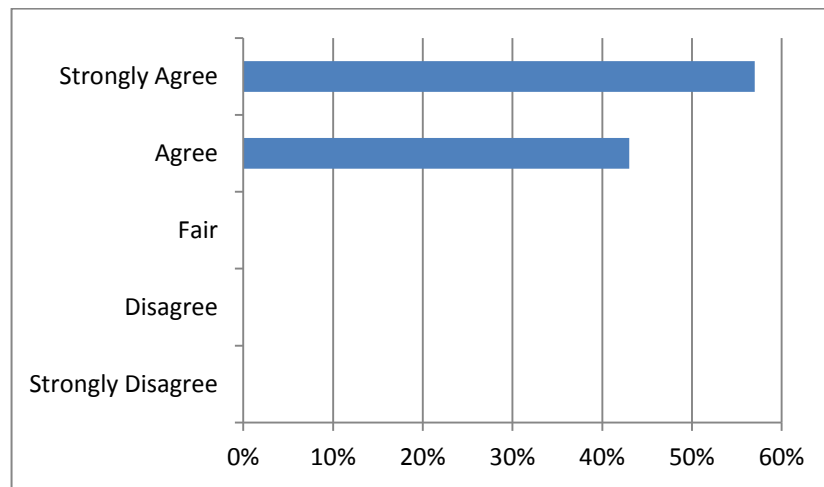


Figure 4.21 Question 9 survey result

In conclusion, the overall feedbacks from the respondents are positive and they strongly agree that this application is effective in providing them convenience way to communicate with teachers and monitor their children’s academic performance. There are some suggestions for improvement from the respondents. Among the improvements are; examination records can be downloaded into pdf file, provide video call option, include school calendar and reminder for important date.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In the nutshell, Mobile Learning Management System able to overcome problems faced by parents that been discussed previously in Chapter 1. The functionalities of this application fulfil the objectives of developing this application.

The author had successfully conducted a research on the best technology platform for this application and done several stages of survey on parents to get better view on the current problem faced by them. Analysis and design phase of the system also had been completed. The package diagram of the application and the flow chart of the Mobile Learning Management System activities had been design to get the clear picture of how the application works. This application undergoes few cycles of prototyping cycle phase before the author able to come out with the final prototype. A group of parents who sent their children to Sekolah Tuanku Abdul Rahman had tested the prototype during the testing phase and a survey had been conducted for improvement and recommendation.

This application is able to assist two ways communication between parents and teachers. It also provides a medium for parents to keep track of their children's academic performance apart from monitoring their attendance and discipline records. Therefore, this application is expected to increase the efficiency of the existing Learning Management System.

5.2 Recommendation and Future Work

The first recommendation for this application is to make the examination result downloadable into pdf file so that parents can print or store the examination result of their children in other storage media for their future references.

Apart from that, student should also have access to this Mobile Learning Management System application as currently this application just focus on parents and teachers only. This application will be further enhance with function that essential for students.

Currently, Mobile Learning Management System does not have the option for parents to have information and notification for important school's event so that they can plan earlier to take leave from work on that particular date of event that need their involvement. Mobile Learning Management System is a mobile application for Android platform, which means only smart phones, which embedded with Android OS can use this application. This application can be further enhanced to make it compatible with iOS and Symbian OS since these two mobile OS also have the high market share in Malaysia. However, the decision of making this system compatible with the other mobile OS will be based on the market demand on the application.

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Appendix 1: Gantt Chart

Phase	FYP I													FYP II												
	Weeks																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Planning	█	█	█	█	█	█																				
Topic selection	█	█																								
Project scheduling			█	█	█	█																				
2 Analysing							█	█	█	█	█	█														
Preliminary study						█	█																			
Determine focus								█	█																	
Identify problem and requirement										█	█	█														
3 Developing													█	█	█	█	█	█	█							
Process diagrams													█	█												
Developing interface															█	█										
Developing full prototype																█	█	█								
4 Implementation																				█	█	█	█	█		
installation																				█	█					
Usability test																					█	█				
Test result analysis																							█			

Appendix 2: Preliminary Survey



Objective:

The objective of this study is to get the information on current utilization of Internet (e-learning) in students' learning in this school. Besides, this study is also aims to get the opinions on the implementation of to-be developed system which helps parents to monitor their children's academic performance. This questionnaire form has four sections. Read the questions carefully and please answer all the questions.

SECTION A: CHILDREN'S INFORMATION

1. Gender:
 - Male
 - Female
2. Age: _____ years old.
3. Form:
 - 1 2 3
 - 4 5
4. Stream:
 - Science Engineering
 - Literature Others: _____
5. Type of school:
 - Daily school MRSM
 - SBP Vocational
 - Government Others: _____
 - Assistantship

SECTION B: MOBILE DEVICE INFORMATION

1. Brand and model of mobile phone (s) that you or your parents use:
 - Nokia: _____
 - Samsung: _____
 - Sony Ericsson: _____
 - iPhone: _____
 - Blackberry: _____
 - Motorola: _____
 - Other (s): _____
2. Screen Features:
 - Black & White Screen
 - Coloured Screen
 - Others: _____
3. Device Interaction:
 - Numbered keypad
 - QWERTY keypad
 - Touched screen
 - Others: _____
4. Supported wireless device (s):
 - 2G / 3G / 4G / 4.5 G
 - 802.11 (WiFi)
 - Bluetooth
 - GPRS
 - GSM
 - Others: _____
5. Mobile phone Operating System (OS):
 - Symbian
 - Windows Mobile
 - Android
 - iOS
 - Java
 - Others: _____

SECTION C: CURRENT METHOD of RECEIVING CHILDREN’S ACADEMIC RESULT

Parents need to receive their children’s academic result regularly in order to know whether their children are doing well or not in academic. Please rate (/) the questions below (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree).

- 1 I want to receive regular update of my children’s academic result. 1 2 3 4 5
- 2 Current method hinders me from getting regular update. 1 2 3 4 5
- 3 I don’t really have time to frequently go to school to meet class teacher face-to-face. 1 2 3 4 5
- 4 I want to actively participate in my children’s academic but there is time constrain from doing that. 1 2 3 4 5
- 5 I want to actively participate in my children’s academic but there is distance constrain from doing that. 1 2 3 4 5

6 What is the current method of getting update of your children’s academic result? Please choose (/) any of the followings:

- Through Postal Mail
- Email
- Face-to-Face with Class Teacher
- By Hand (children bring the result themselves during school holidays)
- Others: _____
- Others: _____

7 Please give your comments or opinions on the current method of getting your children’s academic results:

SECTION D: MOBILE LEARNING MANAGEMENT SYSTEM (MLMS)

Mobile Learning Management System (MLMS) utilize LMS as a monitoring system that can be used by parents to monitor their children’s academic performance by using web application and also mobile phone application. Besides, this to-be developed system is also can be customized by any schools based on requirements from a specific school which suit the school standards and procedures. Please rate (/) the questions below (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree).

- 1 I am very familiar with web application and mobile phones applications. 1 2 3 4 5
- 2 MLMS will give me more benefits as compared to the current use of getting updates of my children’s academic result. 1 2 3 4 5
- 3 MLMS will give me more positive outcomes rather than negative outcomes. 1 2 3 4 5
- 4 MLMS will give the opportunity for me to get involve in my children’s studies (observe the academic performance and communicate with teachers and school management). 1 2 3 4 5
- 5 I am willing to use the MLMS to monitor my children’s academic performance. 1 2 3 4 5
- 6 If this school wants to implement the MLMS, what are the important functions that need to be provided in the system? Please choose (/) any of the followings:
 - Test & Examination Result
 - Disciplinary Records
 - Academic Achievement Analysis
 - School Announcement
 - Academic Reports
 - Academic Calendar
 - Others: _____
 - Others: _____
 - Others: _____
- 7 Please give your comments or opinions on the to-be developed MLMS:
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____

- Thank You for Your Contributions -

Appendix 3: Post-implementation Survey

MOBILE LEARNING MANAGEMENT SYSTEM Prototype Testing

The purpose of this survey is to evaluate the effectiveness of the Mobile Learning Management System application in assisting two ways communication between parents and teachers and also as a monitoring tool for parents to monitor their children's academic performance.

Please rate (/) the questions below (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree).

Please state your gender.

- Male
- Female

Please state your age.

- 30-40
- 41-50
- 50-60
- 61 and above.

10. The graphical user interface of this application is user friendly.

- 1
- 2
- 3
- 4
- 5

11. It is easy and simple to navigate through MLMS application.

- 1
- 2
- 3
- 4
- 5

12. MLMS application is simple and easy to use.

- 1
- 2
- 3
- 4
- 5

13. MLMS application can help me check on my children's attendance.

- 1
- 2
- 3
- 4
- 5

14. MLMS application can help me check on my children's discipline record, if any.

- 1
- 2
- 3
- 4
- 5

15. MLMS application can help me to keep track of my children's examination result.

- 1 2 3 4 5

16. Data shows by MLMS application are easy to read and understand.

- 1 2 3 4 5

17. MLMS provide convenience for me to communicate with teachers by calling and messaging function.

- 1 2 3 4 5

18. Offline and online mode help me to access MLMS application with or without data connection to internet.

- 1 2 3 4 5

19. Please give your suggestion for improvement:

- Thank You for Your Contributions -

Appendix 4: Technical Report

Mobile Learning Management System

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ABSTRACT

Mobile Learning Management System (MLMS) is designed to facilitate the communication between parents and teachers which is different from the existing Learning Management System that offered in the market. MLMS is a proposed solution to solve the problems faced by the school and parents as there is less communication between parents and teachers, parents have limited updates regarding their children's academic performance and also time and distance barrier hinder parents to involve actively in their children's schooling. This is due to the mobility and functionality of MLMS that provide two ways communication between parents and teachers. Apart from that, this system provides parents with examination records, attendance records and also disciplines records of their children. The objective of this project is to create a Mobile Learning Management System that can facilitate two ways communication between parents and teachers. The application been developed using Rapid Application Development methodology. Android has been chosen as the mobile platform to optimize the capability of the Android technology and to leverage on its market potential.

Keywords: Mobile Learning Management System, Android, communication.

I. INTRODUCTION

The potential importance of creating effective parent– school partnerships is made clear by studies that have shown strong linkages between parent involvement in their children's education and student academic achievement [1] [2]. Students whose families are more knowledgeable, supportive, and involved in their education perform better academically and exhibit more positive attitudes toward school, have higher expectations, and exhibit more positive behaviors [1]. But for boarding school, parent's involvements are limited. Based on the survey done to a group of parents who's sent their children to boarding school, the main barriers or constrains are distance and time.

Malaysia Ministry of Education had introduced a browser based teaching-learning materials for certain subject such as Bahasa Melayu, English, Science and Mathematics to be used by primary and secondary schools in Malaysia through the “Smart School Campaign” which was launched by Malaysia Prime Minister on July 1997 and targeting to upgrade all 10,000 of primary and secondary school to become Smart School by the end of

year [3]. After years of implementation and improvement, now the system is called Learning Management System or e-learning.

The development of this system is based on two problem statements which are 1) there is less communication between parents and teachers and 2) parents have limited update regarding their children's academic performance. The scopes of this project are 1) the field study will be conducted in boarding school in Ipoh which is Sekolah Tuanku Abdul Rahman which consist of around 600 students from form one until form five. They came from all of the states across Malaysia, 2) this study is to facilitate parents to monitor their children's academic performance by using Mobile Learning Management System application and 3) this study is to develop an android application to facilitate the two ways communication between parents and teachers regarding their children's academic performance.

II. LITERATURE REVIEW

Given this focus on effective parental involvement in their child's schooling, the question that emerges is "what can schools and teachers do to better facilitate and support effective parental involvement?" But, before we can address this question, we need to first define what we mean by parental engagement and involvement. A brief examination of the literature reveals that what is meant by parent involvement and how it is defined and operationalized varies considerably across studies [2] [4]. Few authors offer a theoretical framework for operationalizing the critical elements of parent involvement in schooling and for developing greater specificity about which actions on the part of parents are most central to

enhanced student adjustment and achievement. A notable exception is the framework for parent involvement developed by Epstein [1] [5]. In her work, Epstein [5] identifies six types of parent involvement related to schooling: (a) **monitoring**, (b) **communicating**, (c) volunteering, (d) learning at home, (e) decision making, and (f) collaborating with the community. Thus, this project will use the existing Learning Management System or e-learning that has been implemented by school to facilitate parents to monitor their children's academic performance.

The initiative of Malaysian Government to enhance the traditional education method by implementing the usage of ICT in learning through one of its ministry which is Ministry of Education has been started since 1997 where MySchoolNet was launched and followed by "Smart School Campaign", Computing Tablet project and Computerization Program [3]. The Ministry of Education actually implements the usage of e-learning through all of these initiatives. E-learning here is defined as an interactive learning process for students where the learning contents that provided in the system can be accessible through internet and the system was focused on the learning content itself rather than the interaction among learners or between learners and tutors because such function was not supported through online [6]. Learning Management System is a term that used to describe a system that being used by a certain organization; in this context which is school that provide access to its member such as students, teachers and administrators to an online learning platform [6].

Learning Management System can also be defined as *software that helps to automate the administration of training events. The LMS*

registers users, tracks courses in a catalogue, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It usually doesn't include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources [7].

Learning Management System as an online learning platform will enrich the basic e-learning function and support it as one of its functionality such as providing user registration, user's profile, report to management, records data from users, and other tracking function can be develop by integrating e-learning with Learning Management System. Thus, features comparison between several Learning Management System platforms will be done before the implementation stage where the platform which has the most functionality and meet the user's requirement are most likely to be chosen [8].

Mobile application is synonymous with our daily lives nowadays. Mobile application is software that runs on smart phones or mobile phones. It designed to educate, entertain or assist people in their daily life. About 77 percent of the world populations are mobile subscribers. Over 110,000 mobile applications had been developed daily and more than 15 million consumers are using this application [9]. This eventually shows the high demand of mobile applications nowadays.

Android OS is open source software which is governed by The Android Open Source Project (AOSP) and is tasked with the maintenance and the future development of Android [10]. After the infamous Google Inc bought over Android Inc in 2005, the Android OS has grown rapidly

to have helped a lot to the future of Smartphones [9]. Apparently, Android Operating System (OS) market share has surged over 56% leaving the closest competitor, Apple Inc with its iOS at 33% [11]. This is a proof that Android is going to have a huge amount of user leaving all of their competitors behind.

While Android is going to conquer the Smartphone market, it is seen as a smart move to use Android OS in developing mobile applications. The sales of its Smartphones already showing good trend when Android Smartphone sales ousted iOS (Apple) Smartphones by 56.1% to only 22.9%! [8]. This shows that the popularity of mobile applications are still with Android and even with the next half a decade of prediction, Android is still on top. Android on the other hand has a handful group of developers developing applications for Google Play, a market where each and every application are uploaded and downloaded. Applications in Google Play now has reached 600,000 and counting which includes applications and games [11]. At this Google Play, besides enabling end user to download cool applications and games, it also displays the comments, and details about the applications developers. Hence, a communication between developers and soon to-be developers can be established. The possibility of developing mobile application in Android environment is endless and since the developer's community is now growing extra fast, it is going to be more convenient and better sources of references.

Mobile application can created across a wide area of usage and functionality. One of the add-value of mobile application is it can provide interactivity and mobility which is

absent in an existing system. Using mobile applications is more practical and convenient than using existing system for communication as it provides messaging and call function in order to facilitate the two ways communication between parents and teachers.

III. METHODOLOGY

The author decides to develop this application using Rapid Application Development (RAD) model. This RAD model is a model for software process. This model is being selected because it uses iterative prototyping and suitable for resource constraints project. Figure 1 show the RAD model that been used to implement the SDLC. Besides that, it uses minimal planning and analysis and focus more on prototyping.

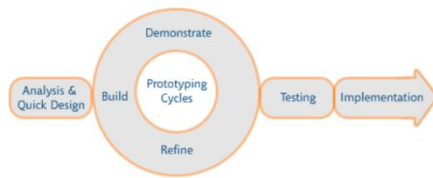


Figure 1 Rapid Application Development (RAD) Model

The very first phase in this system development is planning and data gathering phase. This phase is very important as it will determine many essential components of the system that will be developed. The steps that been carried out during this phase are redefined the topic for this project, decide the tools that required for the development of the system, implement the Gantt chart to plan the project scheduling and time allocation for each necessary task and decide the method that been used to gather data.

The second step in system development is the analysis phase. As the name suggests, analysis phase is the part where user requirements are being scrutinized in term of feasibilities and others. As the result of the analysis phase, the

author comes out with the designs for the system. It includes the design of the graphical user interface (GUI), the conceptual, and the system architecture of the system. The GUI of the system is purposely being made minimalistic as to give more time for the development of the system. However, every detail and property are properly labeled and be made user-friendly.

One of the most important diagrams that have to be produced by the author in order to ease the understanding of the audience on how the system is going to be developed is the flowcharts. Several flowcharts were produced at the beginning and as time goes by, they were all further improved in order to enhance the functionalities of the website. These flowcharts show the process flow of the system. It basically shows the data, processes and decisions involved. The database was also designed carefully to ensure the system and database is fully integrated in order to achieve the objective of this project.

Physical design refers to the nature of how the system is being developed. It encompasses the technology used, the software, the hardware and the database. Table 1 show the tool used in developing this project and figure 2 show the system architecture.

Table 1 Development Environment Specification

Tools	Specifications
Software	MIT App Inventor, Android SDK, Python SDK, Adobe Photoshop
Hardware	Personal Computer, Android Phone

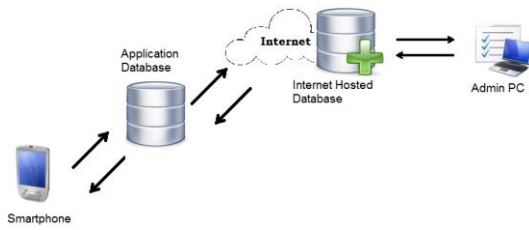


Figure 2 MLMS System's Architecture

IV. RESULTS AND DISCUSSION

Based on the user requirements gathered, the prototype has been developed and the functionalities of the system as follow:

For the development of the Mobile Learning Management System, the author decides to develop an application that can provide two ways communication between parents and teachers and also act as monitoring tool of their children's academic performance.

This application utilizes the existing calling and messaging function of the Smartphone by integrating it within the application without user need to enter phone number. All of the phone number of involved teachers such as class teachers, discipline teacher and all of the subject teachers will be stored in this application database. Users just need to click one button to call any teachers according to the subject taught, class teacher or discipline teacher. Same goes to messaging function, users just need to write message in the text box provided and it will be send to related teacher. Therefore, this function will help to solve the communication problem as it provides the channel of two ways communication between parents and teachers.

For monitoring purposes, parents can view their children's examination records, discipline records and also attendance records by using this application. All of the record will be stored within the application database and

will be synchronized with school's database when the Smartphone is connected to the internet. The reason of having two type of database is that it enables user to use this application in offline mode; without data connection to internet, and also online mode; with data connection to the internet. This provides convenience to users as they do not need to always be connected to the internet and can view all of the records anywhere and anytime they want. Figure 3 show the navigation flow of the Mobile Learning Management System.

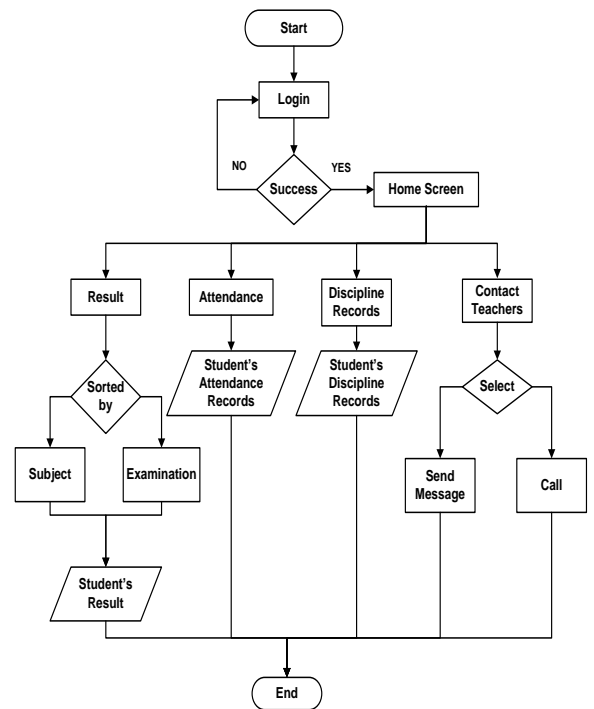


Figure 3 Navigation Flow of MLMS

V. CONCLUSION

The In the nutshell, Mobile Learning Management System able to overcome problems faced by parents that been discussed previously. The functionalities of this application fulfill the objectives of developing this application.

The author had successfully conducted a research on the best technology platform for

this application and done several stages of survey on parents to get better view on the current problem faced by them. Analysis and design phase of the system also had been completed. The package diagram of the application and the flow chart of the Mobile Learning Management System activities had been design to get the clear picture of how the application works. This application undergoes few cycles of prototyping cycle phase before the author able to come out with the final prototype. A group of parents who sent their children to Sekolah Tuanku Abdul Rahman had tested the prototype during the testing phase and a survey had been conducted for improvement and recommendation.

This application is able to assist two ways communication between parents and teachers. It also provides a medium for parents to keep track of their children's academic performance apart from monitoring their attendance and discipline records. Therefore, this application is expected to increase the efficiency of the existing Learning Management System.

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