

BORANG PENGESAHAN STATUS TESIS*

JUDUL: MOBILE LEARNING : SUPER PACMATH GAME

SESI PENGAJIAN: 1 - 2007/2008

Saya NUR MAZNI BINTI ABD RAZAK

mengaku membenarkan tesis (PSM) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik UNIVERSITI TEKNIKAL MALAYSIA, MELAKA.
2. Perpustakaan fakulti Teknologi Maklumat dan komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan untuk membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (/)

_____ SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

_____ TERHAD

(Mengandungi maklumat terhad yang telah di tentukan oleh organisasi/badan di mana penyelidikan dijalankan)

_____/_____/_____ TIDAK TERHAD

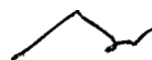
Tandatangan Penulis:

Tandatangan Penyelia:



(Nur Mazni Binti Abd Razak)

Alamat Tetap: No 284, Lorong 10,
Perumahan Awam 4,
36000 Teluk Intan,
Perak.



DR. SAZILAH BT. SALAM

Pensyarah

Fakulti Teknologi Maklumat dan Komunikasi
Universiti Teknikal Malaysia Melaka

(Dr. Sazilah Binti Salam)

Tarikh: 23 / 6 / 08

CATATAN: **Tesis dimaksudkan sebagai Laporan Projek Sarjana Muda (PSM)
** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.

MOBILE LEARNING : SUPER PACMATH GAME

NUR MAZNI BT ABD RAZAK

This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Interactive Media)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2008

DEDICATIONS

Special dedicated to my beloved parents, family
and my supportive friends...

ACKNOWLEDGEMENT

First of all, Alhamdulillah and very thankful to lord of Allah's blesses for the successful completion of my PSM and all the hard time throughout the semester. I would like to express with my deepest gratitude to myself, because of all effort that I had give in this PSM and to both of my parents, who support me from behind and comforted me when I am depressed.

My sincere thanks to Dr. Sazilah Bt Salam because of her willingness to be my supervisor for PSM and give such a brilliant advises. May Allah reward her with His choices blessing.

Warmness thanks to all my friends especially to Mohammad Redzuan B Tajuddin, Nor Hafizah Bt Zulkiilee and Sharini Dei Bt Iskandar Shah Samy who always give me supports and critics of my products. Thanks also for all who are helping me direct or indirectly. Thank you so much for all their kindness and encouragement.

Finally, I hope that all my efforts during PSM will gain my ability to maintain a good performance, both in EQ and IQ because there is no speed limit in pursuit of excellence.

ABSTRACT

Super PacMath Game for Kids (from 7 to 9 years old) is a mobile game that developed especially for kids. This game presents about learning the basic of Mathematics which are addition and subtraction. The main purpose of this game is to give some mathematics problem instead using a game. These students may play and at the same time, they will learn as what people called edutainment game. Students really interested to learn in interesting way, as plat game but not in a continuous lecture. It is develop in 2D cartooning environment and divided into 3 levels that presents easy, medium and high. In each level, there are three stages. In the first stage, the questions will about addition. For the second stage, the questions are about subtraction and for the third stage, the questions are in random. Before the player play a game, they will be given an instruction on how to play a game. It is like a training that is suitable for kids to learn more about the flow of the game. While they playing the game, they will be serve with a background music which is to avoid players to feel bored while playing. If player of game choose to give up, they automatically terminated from the game and this goes in the same way as others.

ABSTRAK

Super PacMath Game for Kids (from 7 to 9 years old) ialah permainan mobil yang dibina khas untuk kanak-kanak terutamanya pelajar-pelajar sekolah rendah. Permainan ini adalah mengenai asas dalam Matematik iaitu penambahan dan penolakan. Tujuan utama permainan ini adalah untuk memberikan masalah matematik kepada pelajar dengan menggunakan permainan. Pelajar-pelajar dapat bermain dan dalam masa yang sama, mereka dapat belajar. Pelajar sangat berminat untuk belajar dalam keadaan yang menarik bukan hanya pembelajaran di dalam kelas. Permainan ini dibina di dalam persekitaran 2D dan dibahagikan kepada 3 bahagian yang mewakili mudah, pertengahan dan sukar. Di setiap bahagian, terdapat 3 peringkat. Di dalam peringkat pertama, semua soalan adalah mengenai penambahan. Di dalam peringkat kedua, semua soalan adalah mengenai penolakan dan untuk peringkat ketiga, soalan akan dipaparkan secara rawak iaitu operasi penambahan dan penolakan. Sebelum mereka memulakan permainan, arahan untuk bermain akan dipaparkan. Ia adalah seperti latihan awal untuk member pengenal tentang tahap permainan. Semasa mereka bermain, mereka akan dihidangkan dengan muzik latarbelakang supaya pemain tidak merasa bosan semasa bermain. Jika mereka menyerah kalah, mereka boleh memilih butang *exit* dan permainan akan terus ditamatkan dan begitu juga sebaliknya.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	i
	DEDICATION	ii
	ACKNOWLEDGEMENTS	iii
	ABSTRACT	iv
	ABSTRAK	v
	TABLE OF CONTENTS	vi
	LIST OF TABLES	xi
	LIST OF FIGURES	xiii
	LIST OF ABBREVIATIONS	xv
CHAPTER 1	INTRODUCTION	
	1.1 Project Background	1
	1.2 Problem Statement	2
	1.3 Objectives	2
	1.4 Scopes	3
	1.5 Project Significance	4
	1.6 Expected Output	5
	1.7 Conclusion	6
CHAPTER II	LITERATURE REVIEW AND PROJECT METODOLOGY	
	2.1 Introduction	7
	2.2 Domain	8
	2.2.1 E-Learning vs M-Learning	8

2.2.2 General and Generic Architecture of M-Learning	10
2.2.3 Introduction to Mobile Games	13
2.2.4 Metaphor of Mobile Games	14
2.2.5 Mathematics and Education	16
2.2.6 Round Numbers	17
2.3 Existing System	18
2.3.1 Review on Existing System	18
2.3.1.1 Math Attack	19
2.3.1.2 Quiz Show	20
2.3.1.3 Who Want To Be Millionaire	21
2.3.2 Review on Existing Techniques	22
2.3.3 Comparison of Existing System	24
2.4 Project Methodology	25
2.4.1 Instructional Design	27
2.4.1.1 Educational Goals	27
2.4.1.2 Course Map/Flow Chart	29
2.4.1.3 Detailed Course Content	30
2.4.1.4 Test Questions	31
2.4.1.5 Metaphor	35
2.5 Project Requirement	36
2.5.1 Software Requirement	36
2.5.2 Hardware Requirement	37
2.6 Project Schedule and Milestone	38
2.7 Conclusion	41

CHAPTER III

ANALYSIS

3.1 Current Scenario Analysis	42
3.1.1 Scenario 1	43
3.1.2 Scenario 2	45
3.2 Requirement Analysis	47

3.2.1 Project Requirement	47
3.2.1.1 Need Analysis	47
3.2.1.2 User Analysis	48
3.2.1.3 Technical Analysis	49
3.2.1.4 Resources Analysis	51
3.2.1.5 Requirement Gathering	52
3.2.2 Software Requirement	67
3.2.3 Hardware Requirement	69
3.2.4 Other Requirement	71
3.3 Project Schedule and Milestone	72
3.4 Conclusion	73

CHAPTER IV

DESIGN

4.1 Introduction	74
4.2 System Architecture	75
4.3 Preliminary Design	76
4.3.1 Storyboard Design	77
4.4 User Interface Design	84
4.4.1 Navigation Design	85
4.4.2 Input Design	85
4.4.3 Output Design	86
4.4.3.1 Texts	86
4.4.3.2 Background Music	86
4.4.3.3 Animation	86
4.5 Conclusion	87

CHAPTER V

IMPLEMENTATION

5.1 Introduction	88
5.2 Media Creation	89
5.2.1 Production of Texts	89
5.2.2 Production of Graphics	91

5.2.3 Production of Audio	93
5.2.4 Production of Animation	95
5.3 Media Integration	96
5.3.1 Graphic Integration	97
5.3.2 Sound Integration	97
5.3.3 Flash Integration	97
5.3.4 Overall Integration	98
5.4 Product Configuration Management	98
5.4.1 Configuration Environment Setup	99
5.4.2 Version Control Procedure	100
5.5 Implementation Status	102
5.6 Conclusion	103

CHAPTER VI

TESTING AND EVALUATION

6.1 Introduction	104
6.2 Test Plan	105
6.2.1 Test User	105
6.2.2 Test Environment	106
6.2.3 Test Schedule	108
6.2.3 Test Strategy	108
6.3 Test Implementation	109
6.3.1 Test Description	109
6.3.2 Test Data	110
6.3.3 Test Results And Analysis	113
6.3.4 Analysis Testing	115
6.4 Conclusion	116

CHAPTER VII	PROJECT CONCLUSION	
	7.1 Observation on Weaknesses and Strength	117
	7.2 Propositions of Improvement	119
	7.3 Contribution	120
	7.4 Conclusion	120
	REFERENCES	116
	BIBLIOGRAPHY	118

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	Comparison of Existing Systems	24
Table 2.2	Test questions for each level and stage of the game	32
Table 2.3	PSM I project schedule	38
Table 2.4	PSM II project schedule	40
Table 3.2.1(a)	Gender of Respondents	53
Table 3.2.1(b)	Race of Respondents	54
Table 3.2.1(c)	User group of Respondents	55
Table 3.2.1(d)	Usage of mobile phone	56
Table 3.2.1(e)	Existing Teaching Aid in Mathematics	58
Table 3.2.1(f)	Definition of mobile learning	60
Table 3.2.1(g)	Usage of mobile phone for learning purposes	61
Table 3.2.1(h)	Opinion to encourage student or children to use mobile courseware	63
Table 3.2.1(i)	Opinion mobile learning courseware can help the students or children in learning mathematics	64
Table 3.2.1(j)	Opinion mobile learning courseware as an additional tool in learning mathematics	66
Table 3.2	Example of mobile phones with supported Flash Lite Technology	69
Table 4.1	List of Soft keys and its' Functions	85
Table 5.1	Type of texts, format and description	90
Table 5.2	Graphic format and description	92
Table 5.3	Project's sound file and file size	94
Table 5.4	Type of animation use in the courseware	96
Table 5.5	Software configuration	99
Table 5.6	Overall duration Schedule	102

Table 6.1	Minimum hardware requirement for testing	107
Table 6.2	Testing Schedule	108
Table 6.3	Testing navigation button for main menu	110
Table 6.4	Testing “How To Play” module	110
Table 6.5	Testing “Menu” module	111
Table 6.6	Testing a “Easy” module	111
Table 6.7	Testing an “Medium” module	112
Table 6.8	Testing a “Hard” module	112
Table 6.9	User’s action and result	113
Table 6.10	Results of User Acceptance Tests	114

LIST OF FIGURES

DIAGRAM	TITLE	PAGE
Figure 2.1	The Subsets for Flexible Learning (T.H Brown, 2003)	9
Figure 2.2	General and Generic m-learning Architecture	11
Figure 2.3	The M-learning design framework	15
Figure 2.4	Math Attack screenshot	19
Figure 2.5	Quiz Show screenshot	20
Figure 2.6	Who Want To Be Millionaire screenshot	21
Figure 2.7	ADDIE Methodology	25
Figure 2.8	The Flowchart of PacMath Game	29
Figure 3.1	AAA Math	43
Figure 3.2	The generic flow of representation AAA Math	44
Figure 3.3	Math Worm	45
Figure 3.4	The generic flow of representation for Math Worm	46
Figure 3.2.1(a)	Gender of Respondents	53
Figure 3.2.1(b)	Race of Respondents	54
Figure 3.2.1(c)	User group of Respondents	55
Figure 3.2.1(d)	Usage of mobile phone for Yes, regularly frequency	56
Figure 3.2.1(e)	Usage of mobile phone for No frequency	57
Figure 3.2.1(f)	Existing Teaching Aid in Mathematics	58
Figure 3.2.1(g)	Usage of mobile phone for Yes, sometime frequency	59
Figure 3.2.1(h)	Definition of mobile learning	60
Figure 3.2.1(i)	Usage of mobile phone for learning purposes	62
Figure 3.2.1(j)	Opinion to encourage student or children to use mobile courseware	63

Figure 3.2.1(k)	Opinion mobile learning courseware can help the students or children in learning mathematics	65
Figure 3.2.1(l)	Opinion mobile learning courseware as an additional tool in learning mathematics	66
Figure 4.1	Flow of the PacMath Mobile Game	75
Figure 4.2	Storyboard for montage	78
Figure 4.3	Storyboard for main menu	79
Figure 4.4	Storyboard for Level module	80
Figure 4.5	Storyboard for Game module	81
Figure 4.6	Storyboard for Questions module	82
Figure 4.7	Storyboard for Top Score module	83
Figure 5.1	Examples of graphics in this courseware	91
Figure 5.2	Adobe Audition 1.0 sound editing	95
Figure 6.11	User Acceptance	115
Figure 6.12	Results of User Acceptance	116

LIST OF ABBREVIATIONS

TITLE	ABBREVIATIONS
TV	Television
CD-ROM	Compact Disk Read Only Memory
MMS	Multimedia Messages System
ADDIE	Analyze, Design, Develop, Implement, Evaluate
PSM	Projek Sarjana Muda
GBL	Game Based Learning
HTML	HyperText Markup Language
PDA	Personal Digital Assistant
LMS	Leaning Management System
GPS	Global Positioning System
WLAN	Wireless Local Area Network

CHAPTER 1

INTRODUCTION

1.1 Project Background

Nowadays, mobile devices like mobile phone is more likely as needed more than accessories. It has a multiple uses as calling, play music or even play games. Games are a central element because games are fun especially for kids or definitely for students. Students are loved to have fun and ease to attract to an interesting thing among them.

“Whether the game format is educational, sponsor born or just plain wacky, the bottom line is that game must be fun (Matthew David, 2003).”

A project that will be developed is an interactive mobile game for students in range of 7 to 9 years old. This game is like an ordinary Pacman Game but it is about the Mathematics. The concept of the game is about learning the basic of Mathematics which is addition and subtraction. These students may play and at the same time as what people called edutainment game. Students really interested to learn in interesting way, as plat game but not in a continuous lecture.

1.2 Problem Statement

The problem that is addressed by this project is:

- ❖ **Students lack of exercise in Mathematics**

Mathematics is an important subject that must be taught from the early age. However, many students are lack of exercises that they must do to make them more understanding about Mathematics.

1.3 Objectives

The objective of this project is:

- ❖ **To develop a mobile Mathematics games**

Mobile Mathematics games can help students who are not interested and weak in Mathematics. This game can make students know the basic of Mathematics. It also can interact with the students and it is interesting too. It makes students become interested to learn more about Mathematics.

- ❖ **To integrate a Pacman game with the Mathematics quizzes**

The Pacman is not only a game but it will help student to solve questions on additions and subtractions.

1.4 Scopes

This interactive mobile game is developed especially for students in the range of 7 to 9 years old. This game is an edutainment game. Means, it is a game where kids can play and learn at the same time. For the time being, this game is a standalone game, means it only can be play by one player at one time.

The development of the game modules is divided into three sections. First of all, characters are developed to help the player in playing the game. Then, the main interface and each interface of the game stage is developed. Also, the theme color of the game is decided so that the interface can attract the player to stay and play the game continuously and repeatedly.

Secondly, the action scripts coding is executed. It covers the interactivity of the game as button, movement picture and so on. All of these interactions must work properly. Here is where the challenge begins because the action script of every stage of game will be different. This would take a longer time than designing the game interface.

The last module is the score calculation. The player's score for each stage must be added each time until they have finished the whole game. The game must able to detect either the player's score reach the top ten lists. If yes, they will input their name. The player's name and score will be displayed in the hall of fame.

1.5 Project Significance

This Super PacMath Games may bring many benefits to students. For students that are weak and not interested in Mathematics, this game can afford to improve their interest about the basic of Mathematics which is addition and subtraction operations. It allows students to know the beauty of Mathematics.

The students also can learn while they play the mobile game. This games are develop to teach the students what is the important of Mathematics and also at the same time, the students can learn how to improve and solve the entire Mathematics problem in a given time.

Overall, the Super PacMath Game (7 to 9 years old) is used to improve the Mathematics skills among students. In this game, it applies two basic operations in Mathematics. The operation is addition and subtraction. The difficulty levels in this game are easy, medium and hard. In the easy level, students will be given a range digit from 1 to 99. For the medium level, students must solve the problem in the range number of 1 to 999 and for the hard level, students must solve problem from 1 to 1000.

This game contains three stages. The students must solve the Mathematics problem so that they can go to the next level until the end. Students must be able to answer 7 and above so that they can go to the next level

In stage one, addition operation will be occur while in the stages two, subtraction operation will be occur. In the last stage which is stage three, the

random of addition and subtraction operations will occur. In this game, it keeps scores. If the player score is qualified in the top score lists, their score will be listed in the score list. After all, parents can check whether their children are good or weak in Mathematics. It will be shown when the parents look at the score list.

1.6 Expected Output

This application will be designed for the mobile devices such as hand phone and PDA's. The output for this application will increase the interest of students to learn the basic of Mathematics. This application has user-friendly interfaces that can attract the students to play this game and in the same time they will learn about the basic of Mathematics. It is the new way to learn Mathematics and students will not boring while learning Mathematics. Students are not bored playing this game because it is full with interactive media such as text, simple animation and audio.

1.7 Conclusion

As a conclusion, this introduction chapter has briefed on what kind of game is developed and explains what kids play and learn in every stages and every difficulties. Also, this game rings a new perspective of a mobile computer game to parents because parents always worried about their children, what they will do with their hand phones or any mobile devices. After this, parents would not worry about their children when their children always play with their hand phones.

This application can help students to learn and get interested in Mathematics. It is another alternative way for students to learn it everywhere and every time the like to play with it.

Lastly, on the next chapter, literature review which involve in searching, collecting, analyzing and drawing conclusion in finding the significance of the game. It also has lists all kind of requirements needed to develop this mobile game and a Gantt chart to show the work flow of the game.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Literature review are focusing on the others have written about the topic. It is a review the critical points of current knowledge from a body of text on a particular topic. The goal for literature review is to make readers to know all about the new current literature on a topic. It is also for a future research in the area.

In this chapter, it discusses about the comparison of existing system. This chapter also is used to analyze all about requirement analysis that had in this application. The requirement analyses are like need analysis, user analysis, technical analysis and resources analysis. Next, it will explain about software, hardware and other requirement that need in this application. The methodology that is used in this application is ADDIE. It guides the developer to develop the application in time followed the phase sequentially.