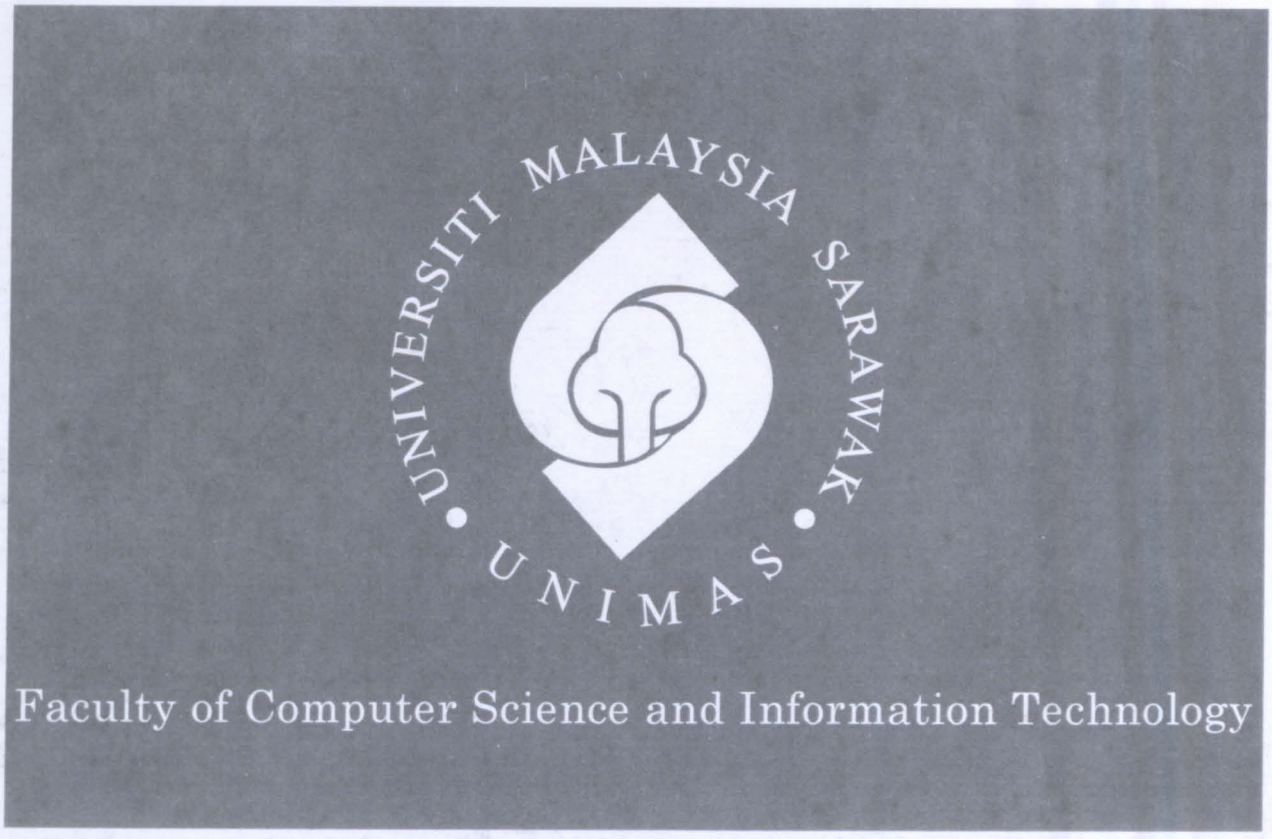

MALAY MATHEMATICAL GAME FOR PRIMARY STUDENTS

Chong Hui Hui

Bachelor of Computer Science with Honours
(Multimedia Computing)
2015

MALAY MATHEM *IMARY STUDENTS*

CHONG HUI HUI

This project is submitted in partial fulfillment of the
requirements for the degree of
Bachelor of Computer Science and Information Technology

Faculty of Computer Science and Information Technology
UNIVERSITI MALAYSIA SARAWAK
2015

MALAY MATHEMATICAL GAME FOR PRIMARY STUDENTS

CHONG HUI HUI

Projek ini merupakan salah satu keperluan untuk
Ijazah Sarjana Muda Sains Komputer dan Teknologi Maklumat

Fakulti Sains Komputer dan Teknologi Maklumat
UNIVERSITI MALAYSIA SARAWAK
2015

DECLARATION

I hereby declare that this project is my original work. I have not copied from any other student's work or from any other sources except where due reference or acknowledgement is not made explicitly in the text, nor has any part had been written for me by another person.

(CHONG HUI HUI) 2015

UNIVERSITI MALAYSIA SARAWAK

THESIS STATUS ENDORSEMENT FORM

TITLE MALAY MATHEMATICAL GAME FOR PRIMARY STUDENTS

ACADEMIC SESSION: 2014/2015

CHONG HUI HUI
(CAPITAL LETTERS)

hereby agree that this Thesis* shall be kept at the Centre for Academic Information Services, Universiti Malaysia Sarawak, subject to the following terms and conditions:

1. The Thesis is solely owned by Universiti Malaysia Sarawak
2. The Centre for Academic Information Services is given full rights to produce copies for educational purposes only
3. The Centre for Academic Information Services is given full rights to do digitization in order to develop local content database
4. The Centre for Academic Information Services is given full rights to produce copies of this Thesis as part of its exchange item program between Higher Learning Institutions [or for the purpose of interlibrary loan between HLI]
5. ** Please tick (√)

☐	CONFIDENTIAL	(Contains classified information bounded by the OFFICIAL SECRETS ACT 1972)
☐	RESTRICTED	(Contains restricted information as dictated by the body or organization where the research was conducted)
☑	UNRESTRICTED	

(CHONG HUI HUI)

Permanent Address

PL 21, JALAN STAMPIN TENGAH,
LORONG 5B1, 93350, KUCHING
SARAWAK

Date: 7/7/2015

Validated by

(MADAM CHIU PO CHAN)

Date: 7/7/2015

Note * Thesis refers to PhD, Master, and Bachelor Degree
** For Confidential or Restricted materials, please attach relevant documents from relevant organizations / authorities

ACKOWLEDGEMENT

This thesis is to fulfil the partial requirement of Degree in Computer Science (Multimedia Computing), Faculty of Computer Science and Information Technology, UNIMAS.

I would like to thank supervisor Madam Chiu Po Chan for her guide throughout the project period. I will also like to appreciate all lectures in Faculty of Computer Science and Information Technology for the knowledge that pass to me throughout the four years of my studies.

I will like to appreciate Mr. Michael, Sekolah Kebangsaan Paya Mebi teacher for the attention and time in the time of interview and his wonderful ideas which help me in the mathematics game development.

Lastly, thanks to my entire course mate and friends that always help me when I in trouble.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Games can be a very productive way of reaching students who cannot respond top conventional teaching method. Learning activities can be successful through playing game. Mathematics is a challenging subject for all ranges of people, especially for the primary student who are the new to learn the mathematics skills. They have to deep understanding of basic mathematics skills to solve the problem-solving questions. They need to have a very strong basic mathematics skill in order to go to the next level of mathematics skill. In this project, a Malay mathematical game is proposed for the Malay-educated primary students in order to attract the primary students to get interested in learning mathematics. This application can contribute benefit for students to train their mathematics skills. An attractive interface is designed to make the application more attractive and interesting. There are different types of gameplay to let the users decide whether they can play alone or play among their friends. In order to fulfil the user requirements for this application, testing and evaluation are done with the 15 primary students and three teachers from Sekolah Kebangsaan Paya Mebi. Based on the testing and evaluation result, the majority of the users satisfied with the interface design and the functionality of the Malay mathematical game.

ABSTRAK

Permainan boleh menjadi satu alat yang sangat produktif untuk mengajar murid yang tidak boleh bertindak balas atas kaedah pengajaran konvensional. Aktiviti pembelajaran boleh berjaya melalui permainan bermain. Matematik adalah satu subjek yang mencabar bagi semua julat orang, terutama bagi pelajar sekolah rendah yang baru untuk mempelajari matematik. Pelajar perlu memahami kemahiran matematik untuk menyelesaikan soalan penyelesaian masalah. Pelajar perlu mempunyai kemahiran matematik asas yang sangat kuat untuk pergi ke peringkat seterusnya kemahiran matematik. Dalam projek ini, permainan matematik asas dalam Bahasa Melayu dicipta untuk pelajar sekolah rendah yang berpendidikan dalam Bahasa Melayu bagi menarik perhatian dan minat pelajar sekolah rendah dalam pembelajari matematik. Permainan in dapat memberi manfaat kepada pelajar untuk melatih kemahiran matematik mereka. Grafik rekeaan yang menarik akan direka bagi menambah daya tarikan aplikasi ini. Selain itu, terdapat pelbagai jenis permainan untuk pengguna membuat keputusan sama ada mereka boleh bermain bersendirian atau bermain di kalangan rakan-rakan mereka. Untuk memastikan aplikasi matematik ini dapat memenuhi keperluan pengguna , ujian dan penilaian telah dijalankan dengan 15 pelajar sekolah rendah dan tiga orang guru dari Sekolah Kebangsaan Paya Mebi. Berdasarkan keputusan ujian dan penilaian, majoriti pengguna berpuas hati dengan grafik rekaan dan fungsi dalam permainan matematik Melayu ini.

CHAPTER 1

1.1 Introduction

Games can be a very productive way of reaching students who cannot respond top conventional teaching method. Learning activities can be successful through playing game. But, how should a teacher justify the use of the game during their mathematics lesson? What could be benefitical from games?. According to the Gaugh (1999) "A 'game 'needs to have two or more players, who take turns, each competing to achieve a 'wining' situation of some kind, each able to exercise some choice about how to move at any time through the playing. "

Mathematics is a challenging subject for all ranges of people, especially for the primary student who are the new to learn the mathematics skills. They have to deep understanding of basic mathematics skills to solve the problem-solving question. They need to have a very strong basic mathematics skill in order to go to the next level of mathematics skill.

Therefore, through playing the game, students can practice their mathematics skill and understanding the mathematics concept. Besides that, students also can develop their critical-thinking, problem-solving and other higher level skills. At the same times, students can learn and have fun during play. Simple and attractive interface will be designed to attract the attention of students and make the learning process more fun and enjoyable.

1.2 Problem Statement

Nowadays, there is a lot of mathematical games in the market. Mathematical games have been proven to increase student understanding and achievement in mathematics. (Holton et al.2001; Kamii& DeVries , 1980; Ortiz, 2003 and Peter, 1998). Through playing the games, it can offer the flexibility and interactive features that are not presented in paper form. Besides that, students can develop their critical-thinking, problem-solving and other higher level skills. At the same times, students can learn and have fun during play.

However, the mathematical games in the market mostly are English version while the Malay version is very limited. Non-English educated children are unable to understand the English version mathematical game. Besides that, the Malay version mathematical game's interface are not attractive and interesting. The gameplay in the game is very straight forward such as the Q&A. Compared to the English version mathematical game, the interface design and the gameplay are more attractive and varies choices.

Apart from that, teachers in school have to teach a lot of students and cannot guide them one by one. Students have to learn by their own in order to catch up the entire mathematics lesson. By the way, students have to face the solving problem and this may cause their fear of failure and error. More than that, the student may decrease their interest in learning mathematics. Compare to the formal activities, greater learning can occur through the game. The game allows more interaction between the children and the opportunities to test their problem solving skills.

1.3 Objectives

I. To develop a Malay mathematical game for primary students.

II. To design the user interface and questionnaires for Malay mathematical game.

III. To implement Malay mathematical game for primary students.

IV. To evaluate the suitability of the Malay mathematical game for primary students.

1.4 Scope

This project is designed for primary students from primary 1 to primary 3 in order to consolidate their mathematics skill and increase their interedestu in learning mathematics.

1.5 Methodology

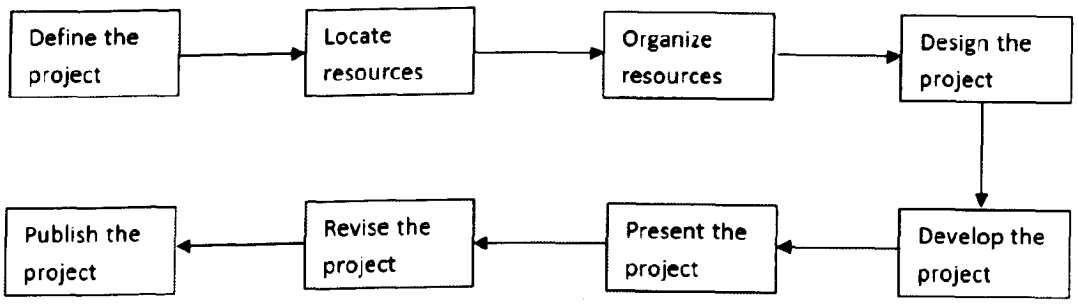

Figure 1.1: Multimedia Project Development Cycle Model of development for Mathematics game for Primary Students

A Multimedia Project Development Cycle has been chosen in developing the mathematical game. This methodology is chosen because it constitutes a set of clearly defined process integrated to support the predictable outcomes in development of games. Figure 1.0 shows the multimedia project development cycle model used for the project development. In this model, there are eight phases and they are, define the project, locate resources, organize resources, design the project, develop the project, present the project, revise the project and publish the project.

For the phase define the problem and objectives for this project are analyzed in detail. In order to fulfill the needs during the development phase, project analyzing is required. Based on the problem statement, the Malay mathematical game application is developed because of the limitation of the Malay language mathematical game application in the market. Moreover, the Malay mathematical game application is developed to increase students's interest in learning mathematics.

In the locate resources phase, game developer will find some related information for this project. The information is gathered through an interview with a teacher, Mr. Michael from Sekolah Kebangsaan Paya Mebi on 20 November 2014 from 10.00 to 11.00am.

In this phase, an interview is conducted in order to collect the information required for this project development process. A set of questionnaire will be prepared for the interview. Due to the target students are Malay-educated; therefore the entire questions in the questionnaire are using the Malay language. The result of the interview will be analyzed to identify the user requirement and the problem.

In the design phase, the decision for the software and hardware, people, data resources had to be made in the first place in order to design the prototype of the project, game functions and requirement description. The user interface of the Malay mathematical game application will be designed based on the result gather from the interview.

In the development phases, processes that need to get done are, creating the interface, writing code, editing code content and integrating the pieces into a program. The user interface is designed based on the information that collected from the interview.

As for the present the project phase, the game is implment whether it achieves the objectives and goal of the project. The functional testing is carried out to test whether the function is working properly as expected. This test is also to check whether the game is free from bugs. Any error or bug will be fixed in this phase.

In the phase, revise the project, the game will be continuously tested until it is out of the bug. An user evaluation will be carried out to evaluate the usability of the MateIQ game application and the responsiveness of the user interface in the perspective of the users. An evaluation session had been carried at Sekolah Kebangsaan Paya Mebi on 29 May 2015 from 9.00am until 11.00am and 15 target users had been randomly chosen. Besides that, there are three teachers participated in the evaluation session. Based on evaluation results, any changeable will be done in order to satisfy the user requirement.

Finally, in the last step of the development process, a copy of the game on CD-ROM will be released and presented to the examiner and supervisor.

1.6 Significant of Project

This project could contribute benefit for students to polish their mathematics skills and increase their interest in learning due to constant interaction between game players. Students can also build a positive attitude toward the mathematics through reducing the fear of failure and error.

1.7 Expected Outcome

This project is designed for students to practice their mathematics skills and increase their interest in learning mathematics. In this way, students could engaed in a mathematical challenge with their friends . Simple and attractive interface will be designed for the user friendly purpose.

1.8 Project Outline

There are five chapters of this final year project report. Chapter 1 introduces the whole idea of the project. Further, in this chapter will be introduce the problem statement, the objectives, the scope, the methodology used, the significance of the project and the project outcome.

Chapter 2 includes the reviews of existing application and analyzes the problem for the application games.

Chapter 3 includes of analysis and design for the game. In the analysis, the user requirement data will be recorded for design purpose. The design part includes the gameplay design and architecture design.

Chapter 4 includes of implementing the set of analysis and design toward the proposed game. Testing phase will be carried out with the selected end users. In the evaluation phase, the changeable will be done to strengthen in order to achieve the objectives and goal.

Chapter 5 will be summarily of the overall project. Further work will be described in chapter 5.

1.9 Conclusion

As a conclusion, the problem statement, objectives, significance of the project, methodology, scope and expected outcomes is briefly explained in this chapter. This chapter is to identify the problem and user requirement of the project.

CHAPTER 2

2.1 Introduction

In this chapter, some mathematical games that have been released in the market will be chosen as review. The reviewing of this game will help in a way to develop my project by providing me some basic idea and foundation of this project. An analysis and comparison of the game will guide me to have a better feature and design when developing my project.

In this review, we will be concerned with the following areas:

1. Technology use (either network-based, stand-alone, multimedia, hypermedia or any other combination)

2. Feature of the game (such as content layout, user interface, user navigation and level of control)

3. Area of focus (emphasized in mathematics subject inside the games)

4. Measure of the suitability of the game (emphasized of the gameplay)

2.2 Reviewing of Existing Mathematics Game

There are a large number of mathematical games in the market and mostly the game is in English language. However, the Malay version of mathematical game is too little in the market. Therefore, there are six mathematical games are selected for reviewing. There have two versions of the language are selected which are Malay version and English version. They are:

1. Math Bingo

2. Fresh Pick

3. Math Duel

4. Cerdas Matematika

5. Belajar Berhitung Angka Anak

6. Belajar Penambahan Matematika

All these games have differences in their design, features and area of focus and the technology used for their implementation.

2.2.1 Math Bingo

Figure 2.1: Interface of Math Bingo

The Figure 2.1 shows the screenshots of the Math Bingo game. This game had been ranked number 1 educational application for 3 weeks and also has the best featured by IPad App Books by Peter Meyers- O'REILLY. This game is basically for practice of combination math and the challenge level is also appropriate for a wide range of school-age children.

The features of this game include:

- 5 basic games: additional, subtraction, multiplication, division and mixed
- Different levels of difficulty: Easy, Medium and Hard
- Can Create up to 5 player profiles

The strength of the Math Bingo is the multiple difficulty level for each game type. For each difficulty, children can practice their math skills and also improve their performance. Children also can create challenges among their friend by answering the answer as fast as possible and the faster answering the question the higher score will be getting. For the highest score, a "bingo bugs" will be given as a reward in order to encourage the children to keep playing. In term of the suitability, the game allow the player to arrange their bingo match by answering the question. If the player is achive a bingo match, a reward will be give such as the Bingo bug bungee, math stack and math fling. This rewards will attract the player continue playing and in the same way player can develop their math skill in a entertaining way.

However, the weakness of this game is it only offers to practice. This game does not provide instruction and constructive feedback in order to help the understanding of math concept. Besides that, from the feedback of the user, state that the "bingo bugs" is a bit disgusting and their appearance is too bold and bright.

2.2.2 Fresh Pick

Figure 2.2: Interface of Fresh Pick

Fresh pick belongs to U.S Department of Education's Ready to Learn initiative. In this game, there are eight challenges that include some problem solving skill question to the test. Besides that, the mini game also provides the use self-leveling mechanics and characters-guide tutorial in order to provide a rich, individualized STEM learning experience. This game is either available online or standalone app.

The features of this game include:

- Target for kids age 6-8
- Combines video narratives with interactive challenges
- Covers math topics such as deductive reasoning, mapping, sorting and classifying
- Has self-leveling games that make the challenge specific to each user

The strength of fresh pick game is quality of interface design that can attract children keep playing. The differences of eight math-themes challenges can let the children choose and they would not easy to get bored. Besides that, each game has provided a tutorial and explanation in order to let the children understand how to play it. According to the Denise W, Fairview