

**DysMath: MULTIMEDIA COURSEWARE FOR LEARNING DISABILITY
DYSCALCULIA**

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of Computer Science (Media Interactive)**

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ADMISSION

I hereby declare that this project report entitled

**DysMath: MULTIMEDIA COURSEWARE FOR LEARNING
DISABILITY DYSCALCULIA**

is written by me and is my own effort and that no part has been plagiarized
without citations.

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DEDICATION

A special acknowledgement goes to my supervisor, lecturers and friends for their supports during the development of this thesis (PSM).

To my beloved family, friends and everyone for their love, inspiration and support, nothing can be done if not have trust in Allah S.W.T always and forever.

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ABSTRACT

DysMath is courseware developed specific to students' Year 2 is a type of learning disability involving math. This problem also known as Dyscalculia, it is a type of the disease that remains lifetime which happen cause by differently deep structure and brain function, nevertheless it could be overcome through several specific techniques. Therefore, this courseware created based on student dyscalculia behaviour where normal IQ has but difficult to remember something taught and weak imagination force. DysMath developed based on current syllabus that used at primary schools in Malaysia with the certain technique and method by using of multimedia technology. Amongst the methods used are technique mind mapping where remember number through color and animation that displayed. Hereby it can stimulate student memory and use the brain on the left side better. This courseware created by covered topic number 0 - 1000, multiplication and division. These topics are selected based on research and observation that have done where those dyscalculia have problem in write the number inversely. These students are also has difficulty to understand number sequence in hundred and thousand value as count on and count back. Besides that the other critical topic is multiplication and division where they difficult to imagine relationship between multiplication with addition and division with multiplication. So that, DysMath developed with giving clearly explanation concept multiplication and division in clearly to help them in better understanding and memory. Beside that, game module developed to attract student interest to use multimedia courseware. DysMath is not solution but as tool to help those have dyscalculia especially for children in primary school. Regarding to research that has been done, for those has learning disability it depends by themselves to overcome the problem and must important are support and assistance from family, member and all side include government and so on.

ABSTRAK

DysMath adalah perisian pembelajaran yang dibangunkan khusus untuk pelajar Tahun 2 yang mengalami masalah di dalam pembelajaran yang berkaitan dengan matematik. Masalah ini juga dikenali sebagai Dyscalculia, ia adalah sejenis penyakit yang kekal seumur hidup berkaitan dengan kelainan dalam struktur dan fungsi otak namun boleh diatasi melalui beberapa kaedah yang khusus. Oleh yang demikian, perisian pembelajaran ini dibina berdasarkan sifat-sifat semulajadi pelajar dyscalculia ini di mana mempunyai IQ yang normal tetapi sukar mengingati sesuatu yang diajar dan lemah daya imaginasi. DysMath dibangunkan berdasarkan silibus semasa yang digunakan di sekolah-sekolah di Malaysia dengan teknik dan kaedah yang tertentu serta penggunaan teknologi multimedia. Antara kaedah yang digunakan ialah teknik *mind mapping* di mana mengingati nombor melalui warna dan animasi yang dipaparkan. Dengan ini dapat merangsang daya ingatan pelajar dan menggunakan otak di sebelah kiri dengan lebih baik. Perisian pembelajaran ini dibangunkan dengan meliputi topik nombor 0 - 1000, darab dan bahagi. Topik-topik ini dipilih berdasarkan kajian dan pemerhatian yang dibuat terhadap pelajar dyscalculia di mana mereka mempunyai masalah dalam menulis nombor secara terbalik. Para pelajar ini juga sukar untuk memahami jujukan nombor menaik dan menurun dalam nilai ratus dan ribu. Antara topik lain yang kritikal ialah darab dan bahagi di mana mereka sukar untuk membayangkan hubungan darab dan tambah serta bahagi dan darab. Oleh yang demikian, DysMath ini dibangunkan dengan memberikan penerangan konsep darab dan bahagi dengan jelas untuk membantu meningkatkan pemahaman dan daya ingatan mereka. Selain daripada itu, modul permainan dibangunkan untuk menarik minat pelajar terhadap perisian pembelajaran ini. DysMath ini bukan satu keadah penyelesaian tetapi sebagai alat untuk membantu mereka dalam menangani penyakit ini. Menurut kajian seseorang yang menghadapi masalah di dalam pembelajaran ini bergantung kepada cara mereka sendiri untuk mengatasinya dan sokongan serta bantuan daripada ahli keluarga dan semua pihak amat diperlukan.

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CHAPTER I

INTRODUCTION

1.1 Project Background

The word of dyscalculia is a combination from prefix “*dys*” comes from Greek means “*badly*”. “*Calculia*” comes from Latin “*calcularre*”, which means “*to count*”. Therefore, means of word dyscalculia is “*counting badly*”. The term of dyscalculia or mathematical disorder is a type of learning disability involving math. They are normal person that have normal language that can read and write but poor in math skills such as to difference, remember the number and mathematical signs.

National Center for Learning Disabilities (2006), dyscalculia can affect the people differently in school and throughout of life and no single form of math disability and difficulties vary from person to person that depends on the person’s development. There are different disability problem follow the level of aged. Dyscalculia might happen in early childhood problem to recognize, count and matching the numbers with amount. For school-age children have the problem to solving basic math problems using addition, subtraction, multiplication and division. Where else for teenagers and adults that has dyscalculia problem is to move on to more advanced application they need the proper vocabulary and a clear understanding of the words present.

Therefore this project is developed to help the person in school-age children that has dyscalculia. The project created a few modules such as learn the number and

mathematical signs, writing and pronunciation the number and the application of number. All the module will create in digital form meant it will generate as a courseware to help dyscalculia learning with Information Communication Technology (ICT) approach. According to Mohd Yusoff.M.Z (2002) multimedia technology have a good potential in education area because it will make the interesting and creative learning between teacher and student with the combination and interaction of multimedia elements.

This project also has developed exercises questions in each learn module to evaluate student understanding based on the teaching module. The learn module created by using real life concept for improve their memory to recognize and remember on what has been taught. Games module developed to make the student be more interesting to learn mathematics and as student attraction to use the courseware. Besides that, the purpose of games module is for stimulate student memory in mathematics skills.

This project also developed to make a research cause and effect of dyscalculia student. Research also covered behaviors and way of communication of dyscalculia student. These project totally not the solution for those has dyscalculia but it can be a tool to help they improve skills in mathematics.

1.2 Problem Statements

The dyscalculia children in school age got a few problems in their mathematic skills. The problem statement(s) are:

School-age children basically have a difficulty to solve basic math problem such as addition, subtraction, multiplication and division. They didn't know the real concept of multiplication and division because has difficulty with imagination. For example, multiplication is generating from grouping addition (e.g: $2 \times 3 = 2+2+2 = 6$). These same goes to division concept which is sharing by group and has related with multiplication (e.g: $6/3 = 3 \times 2 = 6$). So, for those have dyscalculia they have poor skills to relate and understand that concept in mathematics learning.

Then, family must detect their children early whether have dyscalculia or not because this disease will affect their social life in school or working place in future. They are needed more attention and support in learning because have the problem to remember the facts which relate to their memory furthermore they also have in attention problems that may be impulsive or unfocused then may miss directions for activities. This disease is permanent along the lifetime but it could be reduce depends on how to they overcome the problem.

There are a few coursewares for dyscalculia especially for primary school in Malaysia market. Majority the Mathematics courseware was created for normal student also known as prime class. Therefore, current product is not suitable to use by dyscalculia student because they need different approach and technique to overcome their problem. They have problem with memory storage so, the courseware may be having the special criteria to improve their memory such as teach in several of color or other technique is think applicable and relevant.

In currently trend, parent always busy with their works and do not much have time for the children to guide them in learning. This situation also will affect the bad

impact for children progress especially for those has dyscalculia which needs extra attention and guidance from their parents. Parent cannot expect the education in school only must have another initiative to teach them at home. To solve this problem the good tool is needed something that very useful can save parent time and good for their children learning.

1.3 Objective

In order to develop the project there are few objective to be achieved which are:

- i. To produce multimedia courseware for dyscalculia

Produce the learning material that based computerized specific for dyscalculia student. Make use of the combination of computer technology as learning tool with applies the multimedia elements such as animation and audio.

- ii. To create the module that helps dyscalculia to write, pronounce and recognize the number easily.

Create the module that specific for dyscalculia student to write the number in easy way assist by animation; pronounce the number assist by audio element in courseware and recognize and remember the number using a technique that support by multimedia elements. From that student can practice more to identify number that always they confused before such as number 21 and 12.

This technique will make student easy to recognize the number. Game module also was develop to make student familiar with number shape for overcome their problem that always confused to write the number in right way, from this it can help student to write the number in right way.

iii. To develop a module that assists that dyscalculia student to understand the concept of multiplication and division.

Make modules that assist the dyscalculia student to understand the concept multiplication and division. These two operational have more difficulty for dyscalculia student because they do not know in multiplication has addition and in division has multiplication. So, by using the multimedia element it will explain with real life concept.

iv. To create the module for help those dyscalculia to recognize the number and its application.

Create the module that will assist the dyscalculia to recognize the number and understand the number application in real world. Help them to know the number vocabulary such as smaller and greater amount, count on and count back. These dyscalculia students have problem to imagine something without show the true amount of that. So, to overcome the problem this module was creating to help them for understand what meant by smaller and greater amount and count on and count back.

1.4 Scope

This product is developed focus for student in primary school that has dyscalculia or mathematical disorder to help in their problem with learning disabilities in mathematics subject. This project also will aim for all students in year two with three topic covers is number and multiplication and division. The syllabus that use is follow by current syllabus that use in school.

This project is developed to help the dyscalculia student to learn mathematic in more effectiveness. This project developed to help they improve skills in mathematics but not to solve the problem in totally.

1.5 Project Significance

- To produce the multimedia courseware for dyscalculia student.

From the project, dyscalculia student aged below than twelve can get the benefit especially student in Year 2. This project is created to help them in difficulties of mathematic subject.

- To improve memory of dyscalculia student.

This project will be acted as the extra tool or material in teaching technique for those dyscalculia students. These student need vary of technique and approach to help them in mathematic. They are probably not a bad student sometime normal person think that dyscalculia student are stubborn because needed tell in many times to do something. Actually they have a problem cause by differently deep structure and brain function to memorize and manipulate the information that given.

- To help the dyscalculia student recognize and remember the number.

This project also might be used for dyscalculia student to recognize and remember the number in effectively. Help them to apply the concept number in real world and application of mathematic in life.

- To use the multimedia technology in learning concept for dyscalculia student.

This project also used the computerized system and it can give a chance to all student feel to use it. Usually, many coursewares are developed for normal student, to make it balance for this disability student they also should have a chance and opened their mind to computer technology specific in multimedia technology.

1.6 Expected Output

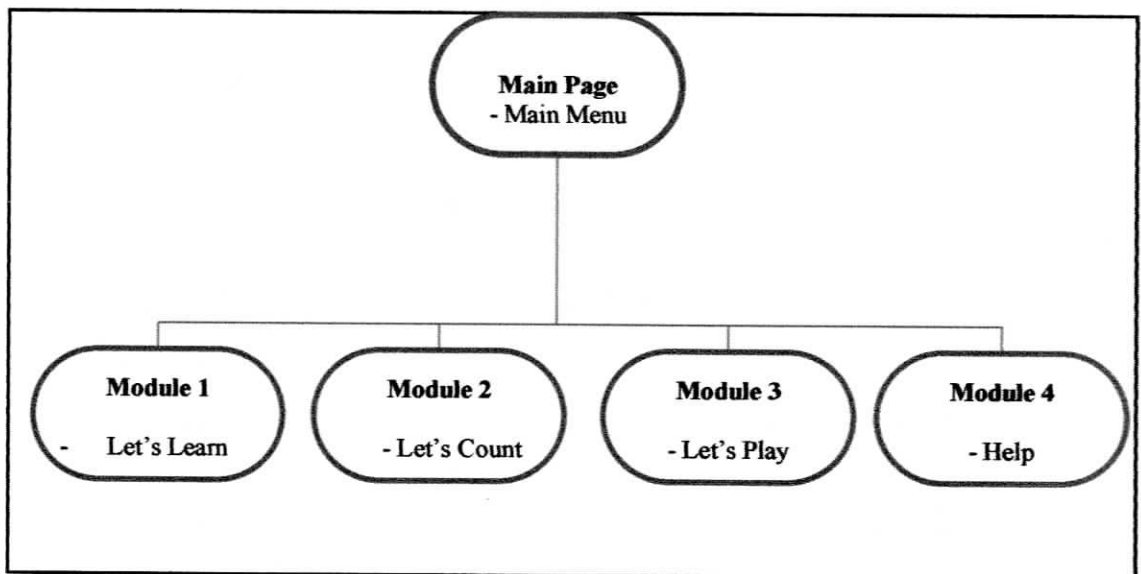


Figure 1.1: Diagram for expected output of the project

This figure illustrates the expected output from the project. The project consists of four main menu items that consist of learning numbers, counting using multiplication and division, games, and help for user manuals. Based on the figure, Module 1 is created to teach the numbers 0 – 1000 using multimedia elements such as animation. It teaches how to pronounce and write numbers in the proper way. Then students can learn how to count numbers and learn mathematical signs such as addition, division, and multiplication. The next module is created to make students enjoy learning mathematics and memorize what they have learned before. It will be presented in a game approach to attract students to memorize numbers much better. The help module is created as a guideline for users to use this courseware.

including addition and subtraction for them to recall back this topic. It because this courseware only covered topic number, multiplication and division which the critical part topic for student based on research that has been done.

This courseware also is delivered in compact disc (CD) format to user after complete all the development phase. So, user can use this courseware by play the CD using the computer.

1.7 Conclusion

Overall this chapter is explained the importance of project development for user. It was reveal the project background in detail, tell the importance of project and significant to user. It also covered project expected output and scope or borderline of project development. State the objectives of project development in detail and explain the module that will be creating. The next chapter will be review the literature that has been done to support the project title. Make a comparison of literature and explain the methodology that will be used in project development.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter is described in detail about the related literature that has been writing before to support the project title. In this chapter also, is explained the type and function of methodology that has used to develop the project. Describe the detail stages in methodology that has used. Beside that, this chapter also covered about the literature that related to project title. Review the statement that related as a guideline to project development and make the comparison of each literature. The literature is compared based on the technique, approach and methodology that used also opinion of author about the topic that has been research. Next, explained all the hardware and software that require developing the project and project schedule that described the flow of project development.

2.2 Definition of Learning Disability

Learning Disability (LD) is the problem related to nervous system disruption that effect to mental processing. LD indicator is the ability which is expected an individual and performance. For example, single individual IQ was in normal rank, however his achievement in one specific area may be below than normal.