GAME FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) CHILDREN

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

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled

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DEDICATION

I would like to dedicate this thesis to those lecturers who didn't have any hesitation to provide me with precious advices, spiritual support, initiative, and practiced me with lots of practical concepts and application oriented elements along my study here in Universiti Teknikal Malaysia Melaka (UTeM). It is also my honor to appreciate and present this thesis to be continues used for further reference, whether by other students or research works. It will be grateful enough to be presented by UTeM.

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ABSTRACT

This project is developed to help Attention Deficit Hyperactive Disorder (ADHD) children who's having behavior and learning difficulties. The purpose of this project is to teach ADHD children about the sequence of number in mathematic. The idea of developing this project is because of there are many people treat ADHD children as a syndrome. Some parents even cannot identify their children having this kind of disease. There is less awareness among society to help and educate those ADHD children. It is found out that ADHD children having serious problem in learning mathematic. In addition, the multimedia product for ADHD children is less in the market. In consequence, this project is developed to attract ADHD children's attention to focus during the learning process. The additional number in game is beneficial to educate ADHD children to learn the sequence of mathematic. They can learn to complete a task so do organizational skill. ADHD children need made their choice to choose the way lead to treasure, this is to build up their decision making skill. Game is used to provide an edutainment function where ADHD children can learn mathematic and in the same time feel fun from the game. Waterfall model are being used as the project methodology for the game development process.

ABSTRAK

Projek ini dibangunkan untuk membantu kanak-kanak hiperaktif dalam proses pembelajaran. Tujuan projek ini dibangunkan adalah untuk mengajar kanak-kanak hiperaktif tentang pengaturan nombor 1- 10 dalam Matematik. Idea untuk membangunkan projek ini diperolehi apabila hasil dan kajian mendapati bahawa ramai orang menganggap bahawa kanak-kanak hiperaktif adalah cacat. Terdapat ibubapa yang tidak dapat mengenali bahawa anak mereka mempunyai masalah ini. Perhatian sosial kurang dalam membantu dan mengajar kanak-kanak hiperaktif tersebut. Dari perhatian, didapati bahawa kanak-kanak hiperaktif ini lemah dalam Matematik dan mengalami masalah yang agak teruk dalam subjek Matematik. Tambahan pula, kurangnya produk pembelajaran untuk kanak-kanak hiperaktif dipasaran. Oleh itu, projek ini dibangunkan untuk menarik perhatian kanak-kanak hiperaktif supaya mereka boleh fokus dalam proses pembelajaran. Nombor dari satu hingga sepuluh telah diaplikasikan di dalam permainan komputer supaya pengajaran kanak-kanak hiperaktif tentang susunan nombor lebih bermanfaat. Mereka dapat mempelajari bagaimana untuk menghabiskan tanggungjawab dan teknik untuk menyusun. Dalam permainan komputer ini, mereka perlu mencari jalan yang betul supaya dapat berjaya untuk mendapat harta lumayan. Ini adalah untuk mengajar mereka tentang teknik membuat keputusan.Permainan komputer ini adalah digunakan untuk memberi pendidikan matematik dan hiburan kepada kanak-kanak hiperaktif. Model Waterfall telah digunakan sebagai methodologi untuk pembangunan projek ini.

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LIST OF ABBREVIATIONS

ADHD	-	Attention Deficit Hyperactivity Disorder
2D	-	Second Dimension
3D	-	Third Dimension
LD	-	Learning Disability
CDC	-	Centers for Disease Control and Prevention
IMH	-	Institute of Mental Health
AMD	-	Advanced Micro Devices
FTMK	-	Fakulti Teknologi Maklumat dan Komunikasi
AJK	-	Ahli Jawatan Kuasa
GUI	-	Graphical User Interface
GIF	-	Graphics Interchange Format

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CHAPTER I

INTRODUCTION

1.1 Project Background

What is ADHD? ADHD stands for Attention Deficit Hyperactivity Disorder (ADHD). ADHD is a common behavioral disorder that affects an estimated 8 percent to 10 percent of school-age children. The behaviors of the children with ADHD are hyperactive, hard to pay attention, having difficulties in learning and reading, impatient and easily get bored. According to research conduct by Dr. R. Barkley (1998), a classroom with 30 students will have between 1 and 3 children with ADHD. Moreover, boys are about three times more likely than girls to be diagnosed with this disability. ADHD children need more care and attention from parents and teachers in education and daily life. In school, they do not stick with things until they are done and rush from one activity to another. At home, parents must guide these children to get assigned tasks completed. This condition happened because ADHD children are easily distracted and lost their interest in the things. So, it is hard to educate ADHD children by using proper education like other normal child.

Instead of order ADHD children to seat still or learning quietly in class, it is better to use game to convey the learning content. Picture pays a thousand of words. Graphic is very powerful for children especially they are in the age to explore the world. So, game can let them to control themselves and learn effectively. ADHD children are easily got bored if the game is not interesting. They like fantasy stories that will raise their curiosity such as "once upon a time....'. They will immerse in the

story and will ask "what the next?" and question similar. Start from the beginning of game development, a game is developed usually to entertain player and let the player fill up their leisure time. But with the evolution of the game development, game with edutainment has more purposes.

Apart from that, there is hard to find such a product in the market either 2D or 3D game. It is also hard to find animation or courseware for ADHD children. From the researches, ADHD is a learning disability that can be cure if the children get proper treatment. For example, researcher from University of Sydney (2008), Dr A. Campbell and PhD student K. Amon have discovered that an off-the-shelf computer game - in which the player wears bio-feedback sensors, and must use breathing and meditation techniques to advance through the levels - can markedly improve the stress and concentration levels of ADHD sufferers. This achievement shows that game can be a method to cure ADHD. Children are our leader in the future. It is important to focus about their needs and shows our concern for them.

1.2 Problem Statement

Nowadays, there is no such a 3D game for ADHD children. According to the report of Diagnosed Attention Deficit Hyperactivity Disorder and Learning Disability, United States, 2004-2006, that focuses on 23,051 children from 6 – 17 years of age in United States. About 5% of the children had ADHD without Learning Disability (LD), 5% had LD without ADHD and 4% had both conditions. So, ADHD children are having difficulties in learning and pay attention in class. It is hard for ADHD children to seat properly in class or completes a task. But, ADHD children are always curious and energetic to the environment. They like to explore new things and environment although they will easily get bored with the things they interest. Besides that, it is also need to aware that ADHD children will immersive in the gameplay if they are interested. Limited time for the gameplay is important to prevent them from stick with the game but not doing other activities. ADHD children

are impatient, if they facing difficulties or failure in complete the game, they will get annoying and quit the game. In this critical time, parents or teacher will be their guidance.

Therefore, it is hard to teach them by using words or speech but game is an effective way for them. The reason why game is effective to ADHD children is because of their characteristic that likes to explore. In the meanwhile, attractive graphics, sound effect and gameplay can be used to educate them more effective compare with boring class in school. The scientists at the University of Wollongong in Australia believe that playing the computer games will help the children with ADHD improve their basic cognitive skills including memory and attention span, and will also heighten the skills of the children without ADHD, including learning and comprehension skills after conducting a study that requires children between the ages of seven and fourteen to play two computer games for just fifteen minutes a day for four weeks. This study prove that the improve ADHD children's memory and attention span.

1.3 Objective

The project objectives are:

i. To study and synthesize the use of a 3D game for educate ADHD children.
ii. To identify the potential of requirement of 3D games for the ADHD children who have the behavior of hyperactive to seat still and learn mathematic.
iii. To develop a potential prototype of 3D game for children with ADHD.
iv. To identify the effectiveness of 3D game for ADHD children.

1.4 Scope

The module to be developed is a 3D game that uses interactive media to educate ADHD children besides let them having fun while playing the game. ADHD is more like a syndrome than a disorder because there will have many learning difficulties that accompany ADHD children. ADHD children are hard to pay attention to certain task. So, the game will attract the attention of the ADHD children and will encourage them to complete their task in order to get the treasure of the game. ADHD children are hyperactive where they are hard to seat still. By using attractive creatures and environment in the sea such as fish, coral and octopus, it is aim to immerse them into the water world. ADHD children are curious about the world where they can find out environment in the sea and learn from the action and complete the task. Simple maze in the game can teach them to think in order to complete the game.

The target user for this 3D game is children from five years old to ten years old. According to a new report released by the Centers for Disease Control and Prevention (CDC) in year 2004 to year 2006, there are approximately 4.5 million elementary school-aged children between 5 years old to 17 years old in the world have been diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD). This report shows that ADHD is getting serious among children. With the game, it can help ADHD children to pay attention to the task and learn education value in the game.

This project will produce a stand-alone 3D game that will give an educational and entertain values for ADHD children by combining multimedia element such as text, graphic and sound. Game engine that will be used in developing game for ADHD children is Panda3D that is a framework for 3D rendering and game development for Python and C++ programs. The reason Panda3D is being chosen because it is Open Source and free for any purpose. In Panda3D, developer can use

either using Python or C++ as their game development language. Meanwhile, Python are used in this game.

1.5 Project Significance

The game development will help the children with ADHD from five years old to ten years old in pay attention on task given and having fun from the gameplay. Besides that, ADHD children with difficulties in learning Mathematic will benefit from the game. They will learn simple mathematic numbers in the game.

With the attractive environment of sea, they can explore the game and learn things in interesting way. Meanwhile, it is an effective way to help them in learning how to seat still as most of the ADHD children are hyperactive and sometimes they cannot control themselves. This is a win win situation where the ADHD children can benefit from the game and their parents or teachers also can educate ADHD children easier through the game.

1.6 Conclusion

In conclusion, the game development are develop in order to help ADHD children with hyperactive and having difficulties in learning especially in mathematics. It is hoped that through this game, ADHD children can achieve edutainment that combine fun and learning. With the 3D graphical environment and interesting gameplay created by using Autodesk Maya, it can fulfill the curiosity of them.

In the next chapter of the literature review and project methodology, there will explain the details of the methodology using in develop the game. Besides that, there is also comparison between the existing game with the game that are going to be developed in order to produce a game that are really helpful based on the characteristics of ADHD children. There will also state the entire software and hardware requirement in order to get the game development a success.

CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

Literature reviews are being conducted in order to make sure that the game developed is really beneficial and useful for our target user. Literature reviews are important in terms of giving the developer a handy guide to a particular topic before start the development phase. Besides that, literature review used to give an overview of the product to be developed. In the development of game, reviews are being conducted mainly on how the gameplay can help ADHD children in their behavior and having fun from that. The review must base on the characteristic of the children between five years old to ten years old. There are limitations that need to be aware especially these children are having syndrome.

By conducting this review, developer can integrate the behavior of ADHD children in gameplay design. Besides that, it gives a whole picture about the gameplay and the methodology to be used. According to Dissertation Creation, a methodology is a system of organizing principles underlying an area of study. Methodology is a form of standardization or framework that allows things to be compared on a like-for-like basis, and allows findings to be replicated so as to validate them. Methodology also ensures that findings are as true to reality as they can be within a given school of thought. Therefore, it is important to conduct a