DESIGN AND DEVELOPMENT OF 2D ANIMATION FOR YEAR 3 SCIENCE SUBJECTS WITH A GAME-BASED LEARNING APPROACH

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SUBJECTS WITH A GAME-BASED LEARNING APPROACH

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DESIGN AND DEVELOPMENT OF 2D ANIMATION FOR YEAR 3 SCIENCE
SUBJECTS WITH A GAME-BASED LEARNING APPROACH

AIMI KHALEEDA BINTI AZMI

This report is submitted in partial fulfillment of the requirements for the
Bachelor of [Computer Science (Software Development)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

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I hereby declare that this project report entitled

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SUPERVISOR   : _____ Date : 23 June 2021
                          (ASS. PROF. TS. DR. HJH. NORASIKEN BAKAR)

DEDICATION

This report is wholeheartedly dedicated to my beloved parents for being my source of inspiration, giving me endless guidance, always there whenever needed, and provide me financial support.

Not to forget my supervisor, Ass. Prof. Ts. Dr. Hjh. Norasiken Bakar helped me write this report by giving me feedback and great ideas for me to finish it.

Finally, my friends are always there to give me emotional support whenever I need them the most. They also helped me by providing brilliant ideas and solved problems that I was facing.

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ABSTRACT

"Rescue The Animals" is a computer game-based learning for third-year primary school students. This game focuses on the subtopic Animals in the year 3 Science subject. This game was designed in a flat design style for that simple look. The problem is that the learning material provided is unattractive, which leads students to lost interest in learning. Therefore, the main objective of this project is to evaluate the effectiveness of learning the subtopic Animals in the year 3 Science subject for third-year primary school students using this game-based learning. Few existing games are pretty similar to the one developed. However, the main difference between this game and the existing ones is that "Rescue The Animals" is more engaging and exciting. The methodology used for this project is the Prototyping Model. An end-product prototype was created with this model, then tested and refined based on user feedback until the final acceptable prototype was established. This game was developed with a laptop and a mouse. The software used was GDevelop to create the game, Adobe Illustrator to design the graphics, and Audacity to remove audio noise. Among the 5 multimedia elements, text, graphic, audio, and animation were implemented in this game. Alpha and Beta testing were performed during the user evaluation phase to see if the game meets the main objective. Alpha testing was conducted first to see if the game is qualified to be used by the target users. If the game is qualified, then the game can proceed to Beta testing. Based on the testing results, "Rescue The Animals" is an effective e-learning tool for teachers and students. Even though this game was qualified, some suggestions were given during Alpha testing to improve this game. The suggestions were to add more sound effects and a storyline to let the player what the game is about.

ABSTRAK

"Rescue The Animals" adalah pembelajaran berasaskan permainan komputer untuk pelajar sekolah rendah tahun tiga. Permainan ini berfokuskan kepada subtopik Haiwan dalam subjek Sains tahun 3. Permainan ini direka dalam 2D dengan gaya reka bentuk rata untuk penampilan yang sederhana. Masalahnya ialah bahan pembelajaran yang disediakan tidak menarik, yang menyebabkan pelajar hilang minat untuk belajar. Oleh itu, objektif utama projek ini adalah untuk menilai keberkesanan pembelajaran subtopik Haiwan dalam subjek Sains tahun 3 untuk pelajar sekolah rendah tahun tiga dengan menggunakan pembelajaran berasaskan permainan ini. Beberapa permainan yang wujud hampir sama dengan permainan yang dibangunkan ini. Namun, perbezaan utama antara permainan ini dan yang wujud ialah "Rescue The Animals" lebih menarik dan mengujakan. Metodologi yang digunakan untuk projek ini adalah Model Prototaip. Prototaip produk akhir dibuat dengan model ini, kemudian diuji dan diperhalusi berdasarkan maklum balas pengguna sehingga prototaip akhir yang dapat diterima dihasilkan. Permainan ini dibangunkan dengan menggunakan komputer riba dan tetikus. Perisian yang digunakan adalah GDevelop untuk membuat permainan ini, Adobe Illustrator untuk mereka grafik, dan Audacity untuk menghilangkan bunyi *noise* di audio. Di antara 5 elemen multimedia, teks, grafik, audio, dan animasi telah dilaksanakan dalam permainan ini. Pengujian Alpha dan Beta dilakukan semasa fasa penilaian pengguna untuk melihat adakah permainan memenuhi objektif utama. Ujian alpha dilakukan terlebih dahulu untuk melihat adakah permainan ini layak untuk digunakan oleh pengguna sasaran. Sekiranya permainan ini memenuhi syarat, maka permainan ini dapat dilanjutkan ke pengujian Beta. Berdasarkan keputusan daripada ujian, "Rescue The Animals" adalah alat e-pembelajaran yang berkesan untuk guru dan pelajar. Walaupun permainan ini memenuhi syarat, beberapa cadangan penambahbaikan telah diberikan semasa ujian Alpha. Cadangannya adalah untuk menambahkan lebih banyak kesan bunyi dan jalan cerita untuk membiarkan pemain memahami permainan ini.

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FYP	**-**	**Final Year Project**
SME	**-**	**Subject Matter Expert**
IT	**-**	**Information Technology**
ITE	**-**	**Information Technology Expert**
SE	**-**	**Student Expert**

LIST OF ATTACHMENTS

CHAPTER 1: INTRODUCTION

1.1   Introduction

Playing video games is usually seen as a negative thing. However, these days, society's perception of video games has changed. This is because video games can be educational, informative, and be used as a learning tool. Even educators believe that using entertainment and fun-based teaching methods allows the students to have direct experience from the active interactions in the learning process. Educational games can be considered an example of these fun-based teaching methods (Ambu-saidi and Balushi, 2009).

This game-based learning was developed for third-year primary school students, and it focuses on the subtopic Animals in the year 3 Science subject. This game provides 3 different notes based on the subtopic at every level. This means that third-year primary school students can use this game-based learning method instead of using a textbook as learning material.

Third-year primary school students are still in the age where they get distracted easily by whatever happens around them. Keeping them focused during a learning session can be very challenging. The way a school conducts its teaching lesson by having a teacher explain from the textbook to the entire class is ineffective, especially when teaching Science. Klisch, Miller, Wang, and Epstein (2012) discovered that science education games effectively increased adolescents' knowledge about the science content presented in the game.

1.2 Problem statement

- Lack of attractiveness

According to Ong and Jambulingam (2015), many learning courses' failures can be attributable to their inability to pique learners' interest and attention due to unattractive content. Learners must be able to access e-learning content on various devices, including laptops, tablets, and even smartphones. This is critical for increasing an educational institution's e-learning penetration rate.

- Lost interest in learning

According to Raymond (2008), the respondents from his study stated that the teaching process is ineffective due to the instructor's dull characteristic. Most of the respondents also stated that during class, the instructor only reads the text. If this keeps on going, the students will not gain anything from the class.

- Failures of instructor in giving a proper explanation

According to Raymond's study (2008), many of the respondents stated that the instructor's lack of explaining ability causes them not to understand what is being taught. The instructor does not give good examples and better methods to make their students understand a certain topic.

1.3 Objective

This project embarks on the following objectives:

- To analyse the ability of the third-year primary school students to understand the subtopic Animals in year 3 Science subject.

- To develop a 2D platform game-based learning for third-year primary school students that focuses on the subtopic Animals in year 3 Science subject.

- To evaluate the effectiveness of learning the subtopic Animals in the year 3 Science subject for third-year primary school students using this game-based learning.

1.4   Scope

This game-based learning was developed for educational purposes for third-year primary school students. It focused on the subtopic Animals in the year 3 Science subject. It provided notes based on the subtopic and was designed to attract third-year primary school students to study. There are three levels in this game-based learning, and each level consists of 3 different notes. The software used in developing this project were GDevelop, Adobe Illustrator and Audacity. The elements of multimedia involved in this game-based learning are text, graphics, animation and audio.

1.5   Project significance

This game-based learning aims to help third-year primary school students to understand the subtopic Animals in year 3 Science subject. This game-based learning can give them a new study experience with exciting design and interactiveness. In addition, this game-based learning can help the students understand better about the subtopics since they are learning visually and not just reading texts. Visual learning has proven effective, and the information gets stored as long-term memory. Furthermore, this game-based learning can help teachers achieve learning outcomes by using it as a learning tool. This is because games are a lot more interactive and enjoyable.

1.6   Conclusion

This chapter discusses the game-based learning overview that can help the students understand better about the subtopics since they are learning visually and not just reading texts. There is also an explanation of what game-based learning is about and what its primary goal is.

Furthermore, the explanation of the problem statement is discussed: lack of attractiveness, lost interest in learning, and failures of instructor in giving a proper explanation. Therefore, three objectives need to be achieved by this game-based learning. The first is to analyse the ability of the third-year primary school students to understand the subtopic. To develop a 2D platform game-based learning for third-year primary school students that focuses on the subtopic is the second one. The last one is to evaluate the effectiveness of learning the subtopic for third-year primary school students using this game-based learning.

The software used in developing this game-based learning was also stated: GDevelop, Adobe Illustrator, and Audacity. The multimedia elements involved are mentioned as well, which are text, graphics, audio, and animation.

The literature review and project methodology will be discussed in the following chapter. The initial project or product that dealt with this problem is covered in the following chapter. Finally, the methodology used during production will be discussed.

CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Firstly, the main objective of this chapter is to review the literature on any previous system educational tools that have been developed. There are observed and compared, and then a problem is identified that could contribute to this project. The comparison that is made is based on content, multimedia element, and design. This chapter will clarify the methodology used in the process of developing this project. This chapter will also discuss the required software and hardware for this project.

2.2 Domain

(a)   E-Learning Content

E-learning refers to the use of electronic media or technologies for educational purposes such as teaching and learning (Teo, 2011). According to Roffe (2002), he described e-learning education as the way of people communicate and learn using electronic devices. E-learning is a complex strategy that includes a variety of technologies and methodologies (Clarke, 2007). Newton (2003) stated that the use of technology in education will increase access to education as well as improving teaching and learning quality. Furthermore, e-learning allows students to progress at their own pace (Rao, 2011). Since everyone have a different learning styles and abilities, e-learning allows students to absorb information in a method that is comfortable and acceptable to them, therefore improving the learning process. In fact, according to Simonson, Smaldino, Albright, and Zvacek (2009), the most widely