MOBILE GAME FOR CHILDREN WITH AUTISM SPECTRUM DISORDER TO SUPPORT THEIR POSITIVE BEHAVIOURAL SKILLS

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MOBILE GAME FOR CHILDREN WITH AUTISM SPECTRUM DISORDER TO SUPPORT THEIR POSITIVE BEHAVIOURAL SKILLS

TAN SHIN WEY

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

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2017

DECLARATION

I hereby declare that this project report entitled

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DEDICATION

This honour final project is dedicated to my beloved parents and my lovely friends. Throughout this project, I had received much love and endless support from them which had motivated me to complete this work successfully. To my parents and sister, thank you for always be there for me despite my ups or downs. Also, a special thanks to my best friends who have shared their opinions and ideas with me to improve my work. Their efforts and words of encouragements will always be appreciated regardless it was directly or indirectly. Without all of these, I wouldn't be able to complete this project by myself which I am greatly indebted to.

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ABSTRACT

Autism is one of the fastest growing disorders that had been happening around the world. The increasing rate of occurrence in Malaysia which is estimated to occur in 1 of every 625 children had since become a great concern to the community. Due to insufficient resources to cater for the autism education services, ineffectiveness of teaching strategy involved and inadequate good positive behavioural support, this project is initiated as a means of solution to aid in the situation. This project aims to design and develop a mobile games application featuring personalisation avatar to foster autism children's positive behaviour in social practices aspect. The development of the project will be carried out based on Agile methodology. The methodology consists of five phases which are concept development, design, implementation, testing and deployment. This project has found three themes in relation to the use of personalisation avatar feature from the usability testing. They are i) Personalised avatar can triggers children with ASD's interest, ii) Personalised avatar can promotes emotions and feelings in children with ASD and iii) Avatar can facilitates social interaction among children with ASD. Thus, the mobile game developed can support children with ASD especially to facilitate their positive behavioural skills.

ABSTRAK

Autisme adalah salah satu gangguan neurologi yang semakin mendapat perhatian di seluruh dunia. Kadar autisme di Malaysia dianggarkan berlaku pada setiap 1 dalam 625 kanak-kanak telah menjadi kebimbangan besar kepada masyarakat. Oleh kerana sumber yang terhad untuk menampung perkhidmatan pendidikan autisme, ketidakberkesanan strategi pengajaran yang terlibat dan sokongan tingkah laku positif yang tidak mencukupi, projek ini dijalankan sebagai satu cara penyelesaian untuk membantu dalam keadaan tersebut. Projek ini bertujuan untuk mereka bentuk dan membangunkan aplikasi permainan mudah alih yang menampilkan peribadi avatar untuk memupuk tingkah laku positif kanak-kanak autism dalam aspek amalan sosial. Projek ini akan dibangunkan berdasarkan kaedah metodologi Agile. Metodologi tersebut terdiri daripada lima fasa iaitu pembangunan konsep, reka bentuk, pelaksanaan, pengujian dan penempatan. Projek ini telah mengenal pasti tiga tema berhubung dengan penggunaan avatar peribadi daripada ujian kebolehgunaan. Ia adalah i) Avatar peribadi boleh merangsang minat kanak-kanak dengan ASD, ii) Avatar peribadi boleh menggalakkan emosi dan perasaan kanak-kanak dengan ASD dan iii) Avatar boleh memudahkan interaksi sosial antara kanak-kanak dengan ASD. Justeru, permainan mudah alih yang dibangunkan ini dapat menyokong kanak-kanak dengan ASD terutamanya untuk memudahkan kemahiran perilaku positif mereka.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATONS

ADHD	-	Attention Deficit Hyperactivity Disorder
API	-	Application Programming Interface
APK	-	Android Package Kit
ASD	-	Autism Spectrum Disorder
CG	-	Computer generated
NASOM	-	The National Autism Society of Malaysia
SME	-	Subject Matter Expert

CHAPTER I

INTRODUCTION

1.1 Introduction

While the world keeps evolving towards modernisation, the prevalence of autism is increasing commonly today. Autism Spectrum Disorder (ASD) is a neurological disorder which impacts a child's social interaction skills and imagination (PERMATA, 2017). Both autism and ASD are common terms that are used to describe a group of complex disorders of brain development. It is identified that autism occurs more frequent in boys three to four time more than girls. Despite that, the symptoms tend to be more severe among the girls (Gomez, 2016).

In Malaysia, the rate of occurrence is not much far behind the number. Azizan (2008) stated that the ratio of individuals diagnosed with autism in Malaysia is estimated 1 in 625 children. The number shows that it is important to support these children. Hence, the resources in the country are needed to be doubled or tripled in order to tackle the situation (NASOM, 2017). Awareness program and providing better services for autism can makes a great help to the society (Gomez, 2016).

With this issue arising, it leads to the initiation of this project which aims to cater the needs of children with autism in social practices aspect. The use of mobile games is to cater the effectiveness of educating these children on road safety learning. Mobile technologies such as smart phones, tablets and PDAs are able to support patients in mental decay to solve some of their behaviours and physiological

problems (Hani and Abu-Wandi, 2015). Boyd et. al. (2015) also revealed a positive result of using collaborative assistive technologies including video games, on iPad, to facilitate social relationships for children with ASD. Thus, mobile game is promising to support behavioural skills for children with ASD.

1.2 Problem Statement

There are several problems that needed to be addressed:

i) Inadequate of good positive behavioural support

Children with ASD mostly face difficulties in understanding physical and social environments which cause them to exhibit challenging behaviour (PERMATA, 2016). In their studies, the greater number of good positive behavioural can solve the issue by cultivating positive behaviour in children with ASD. Without having a proper positive behavioural support, it would impact their quality of life.

ii) Ineffectiveness of teaching strategy

Effective teaching strategy such as teaching using technological and multimedia-based devices have been found to promote teaching better by ushering in a new model of connected teaching (US Department of Education, 2017). Assistive technology in the classroom is found to be necessary for some students with ASD to support their communication and learning (Autism Community, 2011). Therefore, utilising the technology in teaching would make a better teaching strategy to capture the children interest and engage them in educating the social practices activity.

iii) Insufficient resources to cater for autism education services

The growing number of children with ASD increases the challenge for education authorities to meet their needs (NASOM, 2017). Hence, the resources in the country to develop facilities and programmes are much needed in order to overcome the increasing demand for education services.

1.3 Objective

The objectives of this project are stated as follow:

i) To investigate how the personalisation avatar feature plays important role for fostering children with autism's positive behaviour

ii) To design and develop a mobile games application featuring personalisation avatar for children with autism

iii) To evaluate the user experience of the mobile games technology on autism children towards road safety mobile games

1.4 Scope

This research project will focus primarily on the children with ASD of age between 5 and 11 years old. Research setting of the project is one of the autistic centre which based in southern region of Malaysia. Meanwhile, the focus group participants will be selected by the special education teacher and grouped according to their knowledge on project content. The theme selected for the project is road safety due to lack of awareness among these children. Hence, the project will develop a single player game deployed on the Android platform.

1.5 Project Significance

This project will benefit both special education teacher and children with ASD in terms of educating process. By utilising the mobile games technology in teaching, children with ASD would be able to learn the provided content faster and easier while creating an enjoyable experience for them. Research found that children with ASD display much interest on technology devices and spent a large amount of time on video games. This shows that mobile games would make an effective tool in cultivating and supporting positive behavioural skills among these children. On the

other hand, the teacher could be benefited as they would face less difficulties and not needing to spend a large amount of time on teaching the content.

1.6 Conclusion

The outcome of this project is to develop a simple mobile game for educating social practices on road safety among children with ASD. The cultivating positive behavioural skills in the game design element are important to trigger the children's imagination for cognitive development. It is expected to become a reliable support content for the children to learn and apply in the real situation. Besides that, it would also be accessible by anyone who needed the content.

This chapter describe the introduction and background to the problem, the objective to be achieved, scope that focused on and the significance of the project. Next in chapter two, literature review on other projects for ASD using game domain will be done by reviewing the other related works for further investigation.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter reviews the existing literature on the use of avatar feature and games to support the study undertaken. The literature review will continue on from problem background that is introduced in Chapter 1. Intervention using games technology is first discussed followed by the use of avatar feature. The positive behaviours that could be fostered from the personalisation avatar are then identified so these criterions can be used in the adaptation in the next chapter. Past research efforts relating to the fields and potential advantages of mobile games technology implementation are also explored. Lastly, project methodology and requirements were discussed before moving to the analysis segment.

2.2 Domain

The domain for this project is the technology intervention for children with ASD. Based on the literature review, this project found that games technology and personalised avatar are able to support children with ASD. The details of each aspect will be discussed in the next section.

2.2.1 Use of games technology in autism intervention

The term games in the special education often defined as important and highly dynamic educational motivators, which enable users to be involved in immersive experiences while provoking reflection and improving cognitive capacity (Saridaki and Mourlas, 2016). As games had been used to integrate learning since the early century, it had become a tool for teaching and learning since then. This soon leads to the acceptance and prevalence of game based learning application such as Khan Academy, when the games began to grow along with technology (Teach Thought, 2012).

Hence, games potential as an intervention for children with special needs is evident because learning and interpersonal communication tools nowadays, are getting more digital and focussed on logics of production, exchange and sharing of contents (Bertolo and Mariani, 2013). This is also supported by the fact that individuals with ASD usually find computers and electronics less intimidating to work with for many reasons (Ardamerinos et. al., 2015). One of the reasons is that it is easier for them to focus visually on the material illustrated on the screen. As a result, vast numbers of game based learning application can be found currently in the market. Therapeutic games, including Second Life developments, make up almost 65% of the entire games for health market in 2008 (Cannon-Bowers, 2010).

According to Boyd et. al. (2015), games are found to have great potential as an intervention for children with ASD due to the ability to interweave thoughtfully applied design elements with the naturally occurring contingencies (i.e., having fun together). Children with special needs benefit the use of computer-based technologies such as games to facilitate their educational activities in learning aspect (Hasselbring and Glaser, 2000). For example, word processing, communication, and multimedia projects using these technologies can help students with specific learning and emotional disorders keep up with their non-disabled peers.

Bono et. al. (2016) revealed that intervention through computer games have been shown to be effective for children with learning disabilities in terms of learning cognitive and social skills improvement. In fact, children are trained using games because they enjoyed playing games rather than undergoing the conventional learning process. The main benefits from the use of games technology as intervention