

**THE DESIGN PRINCIPLES OF EDUTAINMENT
SYSTEM FOR AUTISTIC CHILDREN WITH
COMMUNICATION DIFFICULTIES**

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Abstrak

Bilangan kanak-kanak autisme semakin meningkat di seluruh dunia. Kanak-kanak autisme mempunyai tiga masalah utama iaitu daripada aspek bersosial, berkomunikasi dan tingkah laku. Terdapat kira-kira 50 peratus daripada individu dengan masalah autisme mempunyai masalah dalam membangunkan fungsi bahasa mereka disebabkan berlakunya kemerosotan dalam komunikasi. Peranti mudah alih dengan permainan bersifat pendidikan digunakan bagi membantu individu untuk berasa lebih selesa dan lebih santai melakukan aktiviti tersebut. Terdapat pelbagai aplikasi mudah alih yang tersedia untuk individu autisme. Namun, mereka sukar untuk menggunakan aplikasi tersebut. Ini terutamanya dari segi reka bentuk antara muka pengguna aplikasi tersebut. Kajian ini menganalisis aplikasi sedia ada untuk menentukan prinsip reka bentuk berkaitan dengan Aplikasi Didik Hibur yang sedang dikaji. Lima aplikasi telah dikaji dalam analisis ini. Objektif kajian ini ialah untuk mengenal pasti prinsip reka bentuk yang penting dalam mereka bentuk sesebuah aplikasi. Analisis ini telah mengenal pasti lima belas cadangan bagi prinsip reka bentuk tersebut. Cadangan tersebut ialah paparan antara muka yang mudah, saiz imej, beberapa gambar, ikon halaman rerumah, warna, mempunyai imej yang serupa dengan objek kehidupan sebenar, penggunaan aplikasi bagi penjaga, pelayaran, perlindungan kata laluan, audio yang bersesuaian dengan imej, bahasa aplikasi yang digunakan, penilaian parameter untuk mengukur pertumbuhan kanak-kanak, pilihan untuk memuat turun gambar, PECS berasaskan komunikasi dan fungsi sebutan ayat. Cadangan-cadangan ini ditawarkan dalam kajian ini ke arah mereka bentuk dan membangunkan aplikasi prototaip untuk kanak-kanak autistik. Kajian ini memperkenalkan prinsip reka bentuk sistem didik hiburan yang digubal untuk membantu membangunkan kemahiran komunikasi kanak-kanak dengan spektrum gangguan autisme. Kajian ini juga menerangkan reka bentuk, pelaksanaan, dan penilaian aplikasi *ICanTalk* yang merupakan aplikasi didik hiburan mudah alih yang boleh digunakan untuk meningkatkan kefahaman dan kemahiran komunikasi pengguna. Di samping itu, aplikasi ini membantu mereka untuk berhubung dengan masyarakat dan persekitaran. Ini terutamanya melibatkan kanak-kanak autistik yang mengalami masalah komunikasi. Aplikasi ini membolehkan penjaga untuk mencipta kandungan peribadi menggunakan gambar dan audio pada peranti mudah alih mereka (*tablet*). Penilaian aplikasi dengan guru menunjukkan bahawa aplikasi ini sangat berguna dan mudah untuk digunakan. Kesimpulannya, berdasarkan keputusan penilaian, didapati bahawa aplikasi *ICanTalk* adalah berkesan dalam membantu kanak-kanak autistik yang mengalami masalah komunikasi.

Abstract

The number of children with autism is increasing worldwide. Children with autism face three major problems; socializing, communicating, and behaviour. Approximately 50% of all individuals with autism have difficulties in developing functional language owing to communication deterioration. Mobile devices with installed educational games help these individuals feel more comfortable and relaxed doing such activities. Although numerous mobile applications are available for individuals with autism, they are difficult to use; particularly in terms of user-interface design. This study analysed the existing apps in order to determine the design principles applicable to the Edutainment App being studied. Five applications were involved in this analysis. As outlined in the objectives of this study, identifying these design principles is important in designing the app. The analysis identified fifteen suggestions for the design principles. These suggestions addressed, simple interfaces; image size; number of pictures; home page icon; colour; having images identical to real life objects; the use of caregivers; navigation; password-protection; audio appropriate to the images; the app language used; evaluating parameters to measure the child's growth; option for photo loading; PECS-based communication; and sentence pronunciation function. These recommendations are offered by this study towards designing and developing a prototype app for autistic children. This study introduces an edutainment-system design principle formulated to help develop the communication skills of children with autism-spectrum disorders. This study also describes the design, implementation, and evaluation of the ICanTalk app-a mobile edutainment app that can be used to improve users' understanding and communication skills and help them to connect with society and the surrounding environment particularly for autistic children with communication difficulties. This app allows caregivers to create personalized content using pictures and audio on their mobile devices (tablets). The evaluation of the app by teachers suggests that it is useful and easy-to-use. In conclusion, based on the evaluation results, it is found that the ICanTalk app is effective in helping autistic children with communication difficulties.

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Appendix I: Use Case Details



CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter explains the disability of children with Autism in general and the assistive technology provided through the mobile device. It also provides the definitions of Autism spectrum disorder and Edutainment Apps. Besides, it discusses the state of the existing apps for autistic children.

1.1.1 Disabilities of Children with Autism

Throughout the world, there has been an increase in the number of children with disabilities (Dandashi, Alja'Am, & Saleh, 2013). At present, more than a billion people (or approximately 15% of the global population) are living with disabilities, and this number includes children (Kbar & Aly, 2014). Disability thus impacts society because families of disabled individuals are part of, and interact within, the society (Lee, Choi, Song, & Shin, 2014).

The global Education For All (EFA) and UN Convention on the Rights of Persons with Disabilities stressed the importance of education for people with disabilities and thus they encouraged the development of an approach to educate them (Lehtomäki, Tuomi, & Matonya, 2014). According to the Portuguese Child Support Institute, children can develop abilities, such as evolving attention skills, strengthen the memory, advancing and expanding imitation and imagination, through playing (Proença, Quaresma, & Vieira, 2014). This means that playing is an essential part of learning. Without incorporating play, learning can become abusive and cruel (Stasolla, Caffò, Picucci, & Bosco, 2013). One wrong belief is that children with disabilities are incapable of playing. The truth is that such children could play, only in a manner differs from

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