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EVALUATING USABILITY OF MOBILE APPLICATION FOR DYSLEXIA DISABILITY

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ABSTRACT

In millennium era, Information and Computer Technology becomes very crucial in everyday life. User able to perform various tasks such as education, entertainment, business, social life, and others just at their fingertips. Nowadays, world of mobile becomes wider with lot of users from children, teenagers, until elderly people. Unfortunately, mobile application is often developed to deliver business objectives, rather than by its usability from the perspectives of end user. This study aims to evaluate the mobile application in terms of its usability from the perspectives of children whom diagnose have Dyslexia. This aims achieved by performing the pre- and post-usability evaluation to see the comparison of usability level, and using satisfaction survey based on the five usability attributes defined by Nielsen quality model: learnability, efficiency, memorability, errors, and satisfaction. The result identifies that user's suggestion and recommendation is important to developed the prototype and thus the usability level is increased in terms of all usability attributes.

Keywords: *usability, mobile application, dyslexia, human computer interaction, user experience*

ABSTRAK

Dalam era milenium, Teknologi Maklumat dan Komputer menjadi sangat penting dalam kehidupan seharian. Pengguna dapat melakukan pelbagai tugas seperti pendidikan, hiburan, perniagaan, kehidupan sosial, dan lain-lain hanya di hujung jari mereka. Pada masa kini, dunia mudah alih menjadi lebih luas dengan banyak pengguna dari kanak-kanak, remaja, hingga orang tua. Malangnya, aplikasi mudah alih sering dibangunkan hanya untuk menyampaikan objektif perniagaan, dan bukannya dengan kebolehgunaannya dari perspektif pengguna akhir. Kajian ini bertujuan untuk menilai aplikasi mudah alih dari segi kebolehgunaannya dari perspektif kanak-kanak yang mendiagnosis menderita Disleksia. Matlamat ini dicapai dengan melakukan penilaian pra- dan selepas- kebolehgunaan untuk melihat perbandingan tahap kebolehgunaan, dan menggunakan kaji selidik kepuasan berdasarkan lima sifat kebolehgunaan yang ditakrifkan oleh model kualiti Nielsen: keboleh belajar, kecekapan, memorabiliti, kesilapan, dan kepuasan. Hasilnya mengenal pasti bahawa cadangan dan cadangan pengguna adalah penting untuk membangunkan prototaip dan dengan itu tahap kebolehgunaan meningkat dari segi semua sifat kebolehgunaan.

Kata kunci: *kebolehgunaan, aplikasi mudah alih, disleksia, interaksi manusia komputer, pengalaman pengguna*

DEDICATION

In the name of Allah, The Most High, The Most Gracious, The Most Merciful. All praise and thanks are due to Allah: for His help and instilling in me the courage and strength to complete of my dissertation. Nothing is possible without His help.

First of all, I want to express my gratitude and thanks to my supervisor, Dr. Khaironi Yatim for his guidance and supervision. I am also expressing my gratitude to all lecturers from Faculty of Computer Science and Information Technology (CSIT) and course mate Master of Software Engineering batch of 2016/2017.

I am dedicating this dissertation to all my beloved young generation whom diagnosed as Dyslexia Disability. I put high hope to them so that they can be success in the upcoming futures and achieving their ambition. Let us hope that with the modernization of technology can help them in their life.

Finally, my deepest gratitude goes to my family; my parents for love and inspiration throughout my life, my mother Atikah Abd Kadir, my father Muhamad Derohad, my sisters and brothers. Without their moral support and encouragement, I could hardly complete this study.

DECLARATION

I hereby declare that the dissertation is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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SUHAZLI MUHAMAD

Date:

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LIST OF ABBREVIATIONS

CD	Cognitive Disability
CSUQ	Computer System Usability Questionnaire
GQM	Goal Questions Metrics
ICT	Information and Communication Technology
ISO	International Organization for Standardization
MA	Mobile Application
PACT	People, Activities, Context, Technology
QUIS	Questionnaire for User Satisfaction Interaction
SDLC	Software Development Life Cycle
SUS	System Usability Scale
HCI	Human Computer Interaction

CHAPTER 1
INTRODUCTION

1.1 Overview

Information and communication technology (ICT) has become an important gateway nowadays for the society and everyday life to get the information such as e- and m-learning, doing online transaction, media, and others. The era of ICT has emerged to mobile since 2000s where it provides the services not only for text messaging and making phone call but adding the features of internet access, short-ranged wireless communication like Bluetooth and NFC, and other services. Reporting in the first quarter of 2016, the top manufacturers of mobile devices are Apple, Samsung, and Huawei.

As mobile devices have been used by various groups of users such as youths, elderly, students, and disabled user, usability is the key success for each mobile application (MA). According to the International Organization for Standardization (ISO), usability refers to the efficient, effective, and satisfactory use of the product in a particular context.

1.2 Problem Statements

Intellectual disabilities, also known as developmental delay or mental retardation, are a group of disorders defined by diminished cognitive and adaptive development. Many cognitive disabilities (CD) have a base in physiological or biological processes within the individual, such as a genetic disorder or a traumatic brain injury. Other CD may be based in the chemistry or structure of the person's brain. Persons with more profound CD often need assistance with aspects of daily living. Dyslexia is one of the types of CD.

Nowadays, ICT skills are becoming gateways to today's world of education, entertainment, business, and social life. With the modernization of technology such as mobile technology, it can significantly improve the quality of people with CD and include them into the society. However, most of the mobile application (MA) developed in the market is not fully utilizing the concept of usability. Consequently, people with CD are neglected from using the MA and improving their quality of life.

Thus, this study recognized the needs to assessing the issues faced by Dyslexia and evaluating the usability of MA using the technique of usability testing and adopting the quality model of usability to support the usefulness in terms of learnability. Besides that, this study helped the mobile developer and designers to focus on the universal design so that every end user of their application can use and interact without any problem and gain the satisfaction.

1.3 Objectives

The specific objectives of this study are as follows:

1. To assess the usability level based on usability attributes of the mobile applications from dyslexia disabled user point of view.
2. To develop usability mobile application based on the assessment as defined in 1.
3. To re-assess the enhancement of the application developed in 2.

1.4 Scope

This study involved three main elements; the assessment of quality model of usability in the testing, the selected of mobile applications, and the main target of user that will be assess through on field assessment. The limitation of these three elements are described as follows:

1.4.1 Quality Model of Usability

Nielsen model will be taken as a reference quality model for this study because it is an international standard for the evaluation of the mobile and web application. For this study,

the attributes of usability tested are learnability, efficiency, memorability, errors, and satisfaction.

1.4.2 Mobile Application

MA consists of various type such as entertainment, business, education, and social media. The MA mostly deployed and marketed to three major operating system which are Google Android, iOS, and Windows. For this study, the application used for assessment are learning application range for children user and developed under Google Android mobile operating system version 6.0 which called as Marshmallow.

1.4.3 Main Target

Usability have the high inter-relationship with the user. There is various type of end user in this world that use the system, ranging from different ages and background. One group of end user, which have been diagnosed having disability was focused on. According to Malaysia Society Welfare Department, there are seven major types of disability such as physical, deaf, vision, mental, cognitive, acquired brain injury, and others. Then, the target narrow down by choosing Dyslexia, which is CD user, was selected as a main target for this study, grouped into the level of skills.

1.5 Contribution

This research is to evaluate the usability of mobile application in terms of effectiveness, efficiency, learnability, controllability, and satisfaction attributes using the Nielsen model from the perspective of dyslexia disable user. The outcome for this study is the development of the prototype of MA based on the heuristic of usability by Nielsen's quality model. The developed prototype must be evaluating to see whether there is any improvement from pre-usability evaluation.

Overall, this research will motivate mobile developer to measure the usability of its application from the point view of various types of end user especially dyslexia disable user. Besides that, by running usability evaluation, it will help to increase the user satisfaction to interact within the application.

1.6 Dissertation Organization

Chapter 1 presents the introduction of mobile application and usability. This chapter discusses on why usability becomes one of important quality in MA. It also includes the problem statement, objective and scope of the study. Chapter 2 gives an overview of the

previous research on the usability and methods used in evaluating the usability. Chapter 3 presents the methodology and approach that was used in this study.

Chapter 4 discusses the analysis from experiment to validate the usability metrics and the discussion of the prototype. Finally, Chapter 5 concludes the work and suggestions for further research that can be done to accomplish the study is presented.

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