

Faculty of Cognitive Sciences and Human Development

**THE DEVELOPMENT OF MOBILE BASED LEARNING IN APPLIED  
BEHAVIOURAL ANALYSIS FOR AUTISM IN  
MALAY LANGUAGE**

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**Bachelor of Science with Honours  
(Cognitive Science)  
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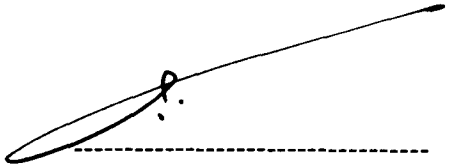
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The project entitled 'The Development of Mobile Based Learning in Applied Behavioral Analysis For Autism in Malay Language' was prepared by Rafidah binti Rahman and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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## **ABSTRACT**

This research objective is to design and develop an adaptive mobile based learning in Malay Language for parents or caregivers on how to teach their autistic children by applying Applied Behavioural Analysis (ABA). The main purpose of developing this mobile application is to make sure that autistic children could get a better intervention through ABA approach so that they would not depending on the therapist or need go to the autism centre which is costly. Basically, this mobile application explains the user requirements which is include the introduction of ABA, the characteristics, early preparations, strategies and the activities. All of the contents were present in words explanations, images and videos.

Moreover, user interface design and usability principle also include in creating this mobile based learning as it is the important element to develop an effective mobile based learning because those element will help this application usable for the target user. Instructional System Design was used as the methodologies to create the mobile based learning. The system design included five stages which is analysis, design, development, implementation and evaluation. All of these stages also known as ADDIE and its main purpose is to ensure user will achieve the goals of the instruction for the whole process. Lastly, in order to evaluate the contents and the user interface design for this mobile application, formative evaluation was conducted using the usability testing by questionnaires and short instructed interviews.

## ABSTRAK

Objektif penyelidikan ini adalah untuk mereka bentuk dan membangunkan satu aplikasi mudah alih yang membantu para ibu bapa mahupun penjaga agar dapat mengaplikasikan Terapi Tingkah Laku (TTL) kepada anak-anak autistic mereka. Tujuan utama aplikasi mobil ini adalah untuk memastikan kanak-kanak yang menghadapi autism dapat menerima pembelajaran yang seimbang dan terbaik melalui terapi tingkah laku di rumah agar tidak hanya bergantung cikgu terapi semata-mata serta ibu membantu ibu bapa yang tidak berkemampuan untuk menghantar anak mereka ke pusat terapi yang mempunyai kos yang tinggi. Aplikasi mobil ini menerangkan tentang terapi tingkah laku, ciri-ciri, persediaan awal, strategi dan aktiviti-aktiviti terapi tingkah laku yang boleh diaplikasikan oleh ibu bapa di rumah untuk anak-anak mereka. Kesemua maklumat di sampaikan melalui ayat, gambar dan video.

Di samping itu, reka bentuk antara muka khususnya buat pengguna dan prinsip kepenggunaan turut memainkan peranan penting dalam membngunkan aplikasi mobil yang berkesan. Sistem rekabentuk intstruksi turut digunakan dalam kaedah metodologi yang terdiri daripada analisa, rekabentuk, pembangunan, implimentasi dan penilaian. Kaedah ini yang dikenali sebagai ADDIE adalah untuk memastikan matlamat pengguna dapat dicapai. Akhir sekali, untuk proses penilaian maklumat dan rekabentuk antara muka, pembentukan penilaian dilaksanakan dengan melakukan temuramah ringkas dan mengedarkan boring soal selidik.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **BACKGROUND OF STUDY**

In this new era globalization, mobile device become rapidly develop throughout the year. Based on Kelly (2013), number of mobile phone uses in 2012 grew 2.5 times to 36 million and keeps on growing until today. Basically, mobile device defined as any type of handheld computer. According to Zeus Kerravala, we've officially entering a "mobile-first" world which is means the mobile search has overshadowing desktop searches. (Gaudin, 2015). That is why mobile based learning became the best medium to deliver information and an excellent tool in learning. Based on Hashemi and Gashemi in 2011, mobile technology device should has three criteria which is capable to provide communication and information functions, small and easily carried and the most important is at least part of the time, without any physical connection to a fixed power source or telecommunication services. Mobile learning can be a formal or informal platform in learning experiences (Wanger & Wilson, 2005). Laptop computers and mobile phones are example of revolutionizing education that transform traditional classroom-based learning and teaching into learning in anytime and anywhere education.

Malaysian community are still lack of awareness regarding to the increasing number of autism. However, the availability of intervention and therapy still insufficient, inaccessible and discouraging. Based on Autism Spectrum Disorder Fact Sheet in 2015, autism defined as complex neurological problem which effects socializing and interacting ability and they also stated that the number of autism around the world increase by year to year. 'Spectrum' are used as refer to the difficulties on people who having ASD in widely experiences. Previously,

autistic disorder, Asperger's disorder and pervasive developmental disorder are used before the term of ASD spectrum are introduced (Autism Spectrum Disorder Australia, 2016).

There are problems that parents or teachers as the primary caregiver need to face such as financial, psychological and emotional challenges. For parents who busy with their career, they need to send their autistic child into autism centre and teachers also have to prepare more knowledge or skills in teaching the child as the number are increasing. However, the facilities and conditions in some autism centre reported always disappointing regarding to the unconducive and failed to fulfil the requirements for children.

## **PROBLEM STATEMENT**

There are a few existing mobile application that allow peoples to learn and get information about Autism Spectrum Disorder. For example, Autism iHelp, Autism Therapy, Social Skills for Autism, Autism Parenting Magazine and many more (Google Playstore, 2016). These application mostly focus on expression and how to interact with autism but not specifically shows how to communicate with them. Some of the content from those applications did not suitable being apply in Malaysian due to the different culture and situation. The lack of transparency and clarity on how to develop the autistic's skills, interest and communication make parents or families difficult to share information to the others. Based on World Health Organization key facts, there are 1 out of 160 children from all over the world has autism which is from different degree whether low, medium or high (World Health Organization, 2013). By Ministry of Health Malaysia, the prevalence of Autism Spectrum Disorder (ASD) in Malaysia was approximately 1.6 in 1000 (Family Health Divison, 2006). However, in USA, the overall prevalence of ASD is 14.7 per 1000 meaning that one in 68 children who aged eight years and the prevalence shows an increasing trend over the years (Investigator of Developmental Disabilities, 2010). For the recent research,

The Malaysian Times in 2014 also has estimated that one out of every 600 children in Malaysia was born with autism which is lead to the statistics of 47, 000 of the people in this country are suffer from autistic.

However, even though there are high statistic of autism prevalence in Malaysia, not all autistic children receives proper therapy and intervention. Malaysia still lacked of learning conducive for children who has disabilities disorder especially for Autism Spectrum Disorder (ASD). Besides that, the Malaysian National Autism Society stated that an increase number of intake to the autism centre and the waiting list keeps growing longer (Rosmah Mansor, 2013). Since ASD is more popular in West Country compare in Asian, so most of the methods and therapist are from that country. Hence, Malaysian faces several problem in applying some of the learning styles from the methods that introduced by the West Country for autistics children especially in understanding their needs and how to communicate with them. According to the Nurul Husna and Nik Suryani research on, they reported that Malaysian teachers are facing problem in such of lack of skill and training.

Some parents having elevated risk because experiencing the depressive symptoms and negative effect (Ekas & Whitman, 2011). Parenting a child with ASD may challenging that lead to the increasing of parenting stress especially in emotional (Dabrowska & Pisula, 2010).

Rosmah Mansor has introduced Permata Kurnia as one of the initiative programme to help children who has special disabilities such as autistic. However, how far this programme can help autistic's children in education and communication? Applied Behavioural Analysis (ABA) approach are still unwell known methods in Asian country including Malaysia itself. This method are already applied in West Country and considered as the effective way to help children who suffer from ASD. ABA should be introduced in our country and applied based

on Malaysian context to make sure autistic's children receive a conducive therapy in effective ways.

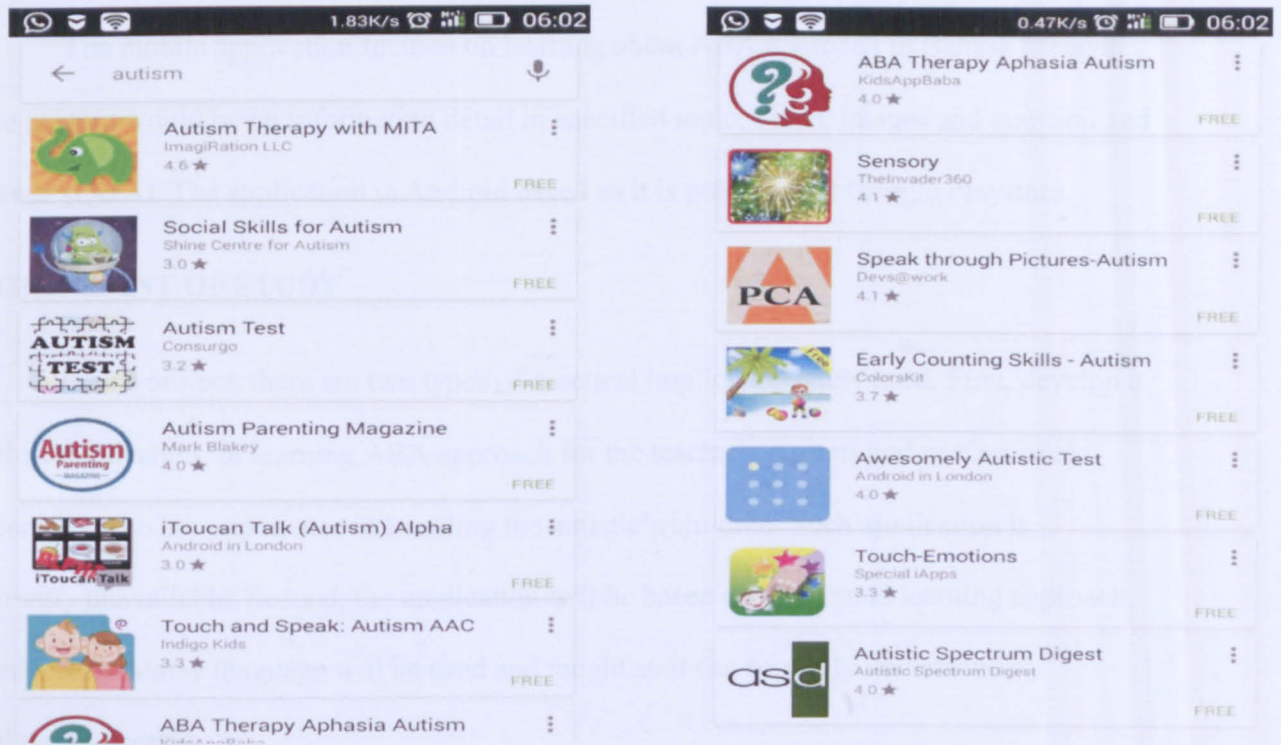


Figure 1&2. Existing application on Google Playstore.

(Google Playstore, 2016)

## OBJECTIVE OF STUDY

### General of objective

To develop and evaluate mobile based learning system targeting parents or caregivers so that the autistic children could receive a proper intervention through Applied Behavioural Analysis approach without relying on the therapist or need to go to the autism centre.

### Specific Objective

- i. To design and develop a mobile application on how to approach autistic children by applying the ABA methods

- ii. To evaluate the usability of the created mobile application.

## **SCOPE OF THE STUDY**

The mobile application focuses on learning about ABA approach in Bahasa Melayu. The content would be on information detail in specified topic, video, images and question and answer (Q&A). The application is Android based so it is published at Google Playstore.

## **SIGNIFICANT OF STUDY**

In this project, there are two types of practical implication study used. First, develop a mobile application for learning ABA approach for the teachers, parents and professionals especially who has experience in handling the autistic's children. Such application is currently unavailable. Second, the application will be based on contextual learning approach. Lastly, fully Malay language will be used and taught so it can be easily understand by Malaysian peoples.

## **RESEARCH QUESTION**

- I. How to design a good contents of mobile based learning for ABA approach?
- II. What are the appropriate elements and contents to be integrated on the mobile application system?
- III. What are the reliable contents of mobile applications for learning ABA approach for autistic?
- IV. How the user interface and contents of mobile based learning developed will interact with the user during the learning process of ABA approach?

## CHAPTER TWO

### LITERATURE REVIEW

#### COGNITIVE SCIENCES

Cognitive sciences define as an interdisciplinary science that lies on many fields such as psychology, artificial intelligence, philosophy and linguistics. All these fields are develop the theories about human perception, attention, thinking and learning (Merriam-Webster, 2016). According to Paul Thagard (2013), term of cognition refers to thinking process which is include in perception, problem solving, decision making, learning, language and emotional experience. Cognitive science can be roughly conclude as the scientific interdisciplinary study of human's mind. This course is viewed mind as an information processor that will represent and transform the information. Based on the perspectives of mind the mental representation and its process act to manipulate the information (Friedenberg, & Silverman 2006).

Computer is an information processors and of course it can performs many kind of task but controlled by human. Computers will received and stored input as an information then the information will be process using any software on the computer such as text editor. After that, all information may serve as output that appear on screen monitor. While, in human's mind perspectives, information that act as input will enter our mind through perception on how we see, hear or touch. Then, the information will be store on our memory whether sensory memory, long-term memory or short term memory. From our memory, it will process into human thought which is become the outputs that either in physical behaviour or language. These analogy between computer and human mind are shows how information being process which is actual physical or human memory formation. Hence,

cognitive scientist conclude that mind act as a machine or medium that trying to understand (Friedenberg & Silverman, 2006).

Cognitive science is one of the basic science that analyse, predict, and describe some specific application which involving some interdisciplinary perspective such as philosophical, psychological, cognitive modelling, neuroscience, network, linguistics, artificial intelligence, and cognitive robotics (Cognitive Science Department, 2004). Cognitive model are field that explained the learning process on how we categorize perceptual based on questions (Busemeyer & Diederich, 2010).

Cognitive model's goal is to discuss scientifically some of the basic cognitive process and how the process interact. Mostly, the concept of cognitive model being used by clinical psychologist such as differentiate the process of cognitive between normal person and clinical patients who having autism, schizophrenic, dyslexia and others. (Busemeyer & Diederich, 2010).

The oldest discipline in cognitive is Philosophy that has contribute two major which is generality and normativity (Thagard, 2009). Based on Friedenberg and Silverman (2006), philosophers had narrow their process to more specific problem which is concern about the nature and mind's characteristics. In cognitive psychology area, mental ideas and mental activities such as vision and memory are investigated. For the experiment, scientific method are applied for both mind and behaviuour (Friedenberg & Silverman 2006). Starts with making hypothesis about how the world works, experiment is conducted then based on the result, hypothesis is determined either valid or not. For more information about cognitive psychology in cognitive science, it will described more detailed in chapter 2.1.

Cognitive neuroscience is study of brain and nervous system. Scientist keep making a deeper understanding on how billion nerve cells in brain are produce, grow and connect

together (SFFN, 2016). Hence, in cognitive neuroscience, we can see how those cells are organized into effective, functional and remain working for human's life. According to Friedenberg and Silverman (2006), cognitive linguistics is focusing on the language which lead to the experiment about computer modes, the part of brain damaged, compare the diverse language and study on how ability of language can change during experiment. In the other hand, according to Encyclopedia Britanica, it stated that Artificial Intelligent is the ability of computer to perform any task with their intelligent beings while Elaine Rich also make definition that Artificial Intelligence us study on how computer doing things but at the same time people are still better (Verlag, 2011).

## **COGNITIVE PSYCHOLOGY**

Cognitive psychology lead to study of information that goes on human's mind which include perception, attention, memory, language, consciousness and thinking (McLeod, 2007). In Cognitive Psychology, there are a lot of behaviourist approached on order to study the stimulus and response of human. However, some psychologist believe that for behaviourist approach, internal behaviour can't be studied because we did not know a person's mind. Meanwhile, in cognitive approach, internal mental behaviour can be studied by using experiment.

Based on McLeod (2105), Cognitive Behavioural Therapy (CBT) giving idea on how we think (cognition), how we feel (emotion) and how we act (behaviour). Basically, people's thought will determine their feelings and behaviour. Therefore, CBT is a therapy that will help people to focus on how their think about something and how exactly their behave consequences. Then from the therapy, they can observe whether their thinking and behaviour could improve or maintained.

In cognitive psychology, cognitive approach determines that abnormality occurred because of faulty cognitive about other people, world and surrounding. These might be causes by distortions cognitive that happened on people who has dyslexia, autism and other disorder (McLeod, 2015). According to Friedenberg and Silverman (2006), behaviourist looked mind as mapped with environment onto an organism's response. B.F Skinner (1904-1990) stated that in order to form behaviour of human, it is not simply through learning but should be focus on how people emitted the reaction into environment (Sternberg & Mio, 2012). Skinner believes that reinforcement and punishment also can help to form human behaviour instead of operant conditioning.

## **LEARNING DISABILITIES**

Learning disabilities are categorized as learning problems but it is not comes from intelligence or motivation problem. Children who suffered from learning disabilities should not be said as lazy or dumb because in fact they are smart as other peoples. The simply definition of learning disabilities are, see, hear and understanding things in different ways. This problem lead to trouble with learning new information and skills and how they put that thing together (Gina, Melinda & Jeanne, 2016).

According to the Cortiella and Horowitz in 2014, learning disabilities are not sign for failure. Every person who has learning disabilities can be successful person like other person if there are given a right instruction and follow by the guidance and support. The history of learning disabilities are related to the intellectual disability and developmental disability which is lead to the history of psychological in general. Instinct and research about the learning disabilities prove that people who with learning disability as just same with others include the friendship, genuine social relationship, meaningful occupations and recognised position in the community (Fatimah Nasir, 2015).

The term of Specific Learning Disability (SLD) has been used by the Individuals with Disabilities Education Act (IDEA) to promote their definition of learning disabilities in education law aspects. They defined SLD is one of the basic psychological processes that involving in how to use proper language, written or spoken which will cause the ability of listen, speak, think, read, write, spell or do the mathematical calculations (Cortiella & Horowitz, 2014). Maternal illness, taking alcohol or drugs during pregnancy, oxygen deprivation, maternal malnutrition and low birth weight are the factors that might be causes the learning disabilities. These factors can be happened during the brain developing of child before or during birth.

From the previous research, there is no evidence that shows any motor or intellectual disabilities, emotional disturbance, cultural or environmental factors, economic disadvantages or inadequate instruction as the factors of learning disabilities. However, some cases reported that there is higher prevalence of learning disabilities among poverty due to the poor nutrition, ingested toxins or other risk factors at early and critical stages of development (Cortiella & Horowitz, 2014).

According to the Province of British Columbia (2011), the most common type of learning disability are dyslexia, dyscalculia and dysgraphia. Dyslexia is a reading disorder or can be simply to the lack of phonemic awareness because people who having dyslexia generally has difficulties in word recognition, spelling, decoding and learning the sequence of alphabet. Dyscalculia or known as arithmetic disorder is having difficulty in learning number or comprehending mathematics. Having problems in keeping the number lined up, easily confuse in basic operations or facts, experiencing anxiety when asking to handle the mathematical concepts but able in solving word problems are such of characteristics of dyscalculia disorder. Next, dysgraphia which is referred to the writing disorder is defined as the difficulty in writing or drawing. Dysgraphia's person easily get tired while writing and

they will hardly avoid from any writing or drawing task. They are disable to reproduce letters due to mistake in spelling and inconsistent speed in writing.

The other types of learning disabilities are dysortographia, auditory processing, visual perception, sensory integration, organizational learning and social cue. Each child or person who has learning disabilities considered as individual not as a member of particular category, with acknowledgement of factor's range, it would determine their appropriate educational provision (Malin, 1995).

### **AUTISM SPECTRUM DISORDER (ASD)**

Based on Autism Speak in 2013, they stated that autism generally defined as complex neuro-developmental disorders that known as Autism Spectrum Disorder where can be categorized by three degrees which is social interaction, communication and restrictive or repetitive behaviours and interest. ASD will be non-verbal and asocial and characterized by their idiosyncratic social skills and play (FirstSign, 2012).

During the development, they having some difficulties compare to normal people such as difficulties with behaviour by using their imagination, social, language and communication (Scottish Intercollegiate Guidelines Network, 2014). According to Jordan and Powell (1997), autistic could not perceived the stimuli in their environment compare to the non-autistic which is a normal person. In addition, they also sums up that autistic unable to interpret the sensory information and make meaning on what their perceived. Hence, it can be said that autistic seems to be ignored about their surrounding because of they unable to interpret some information that detected by the scenes.

### **Characteristics of ASD**

Generally, ASD tend to have high sensitivity to stimulus and try to avoid them such as touch, sound, light and movement (Davis, 2009). In order to response on the stimulus, they

will automatically response through unexpected behaviour such as running or avoiding people, hiding or covering their ears from hear anything (Davis, 2009).

The most common characteristics for ASD are having limited social communication because they difficult to show their own facial expression and making eye contact (Morrier, 2013). They easily became awkward especially when they are surrounded with a lot of people because they are difficult to join in back- and- forth conversations or any interactions.

Besides that, based on Morrier (2013), ASD basically have stereotyped behaviour because they like to flap and twist their hand or finger and said as preoccupations person due to the over-focused on unusual objects. He also stated that ASD easily change their behaviour based on their surrounding such as getting upset or angry when thing around them changes suddenly for an example when light is turn on and off.

For ASD, there are some cases where the child's development is delayed from birth but there are also child develop normally before losing their social or language skills (webMD, 2006). Since ASD has limited either verbal or non-verbal communications, they are not easily giving response in conversation and not aware to people around them (Morrier, 2013). That is why most of ASD shows that they always avoiding people, enjoy playing around alone and sometimes shows the unusual behaviour such as lining or spinning things up.

### **Parent's challenges**

According to Ministry Health of Malaysia, 1 of 600 children has autistic but the caregivers are still facing a lot of challenges. Study shows that parents of child who has ASD are having elevated risk because experiencing the depressive symptoms and negative effect (Ekas & Whitman, 2011). Parenting a child with ASD may challenging that lead to the increasing of parenting stress especially in emotional (Dabrowska & Pisula, 2010). There are