UNIVERSITI TEKNOLOGI MARA

DEVELOPING TOUCHSCREEN NUMERACY LEARNING APPLICATION FOR CHILDREN WITH AUTISM

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Thesis submitted in fulfilment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Art & Design

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CONFIRMATION BY PANEL OF EXAMINERS

I certify that a panel of examiners has met on 27th February 2018 to conduct the final examination of Muhamad Fairus Bin Kamaruzaman on his **Doctor of Philosophy** thesis entitled "Developing Touch Screen Numeracy Learning Application for Children with Autism" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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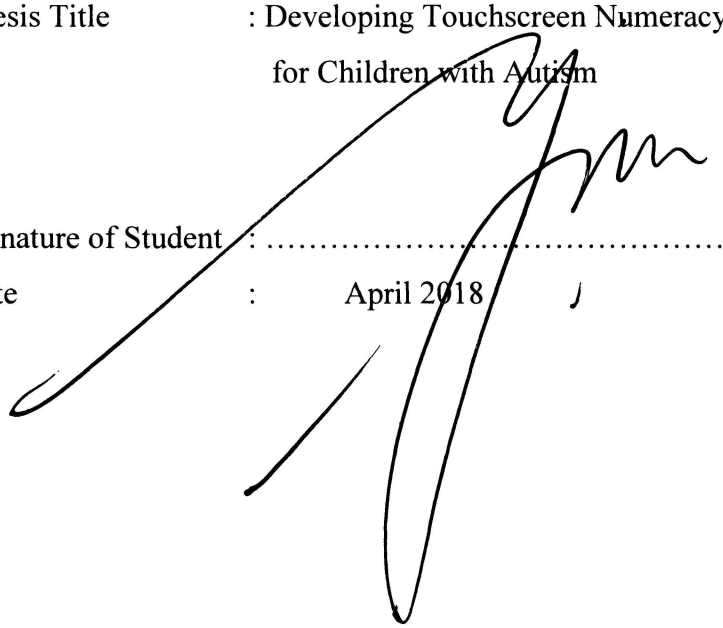

ABSTRACT

Education is fundamental to nation building, providing every child with building blocks for success, which in the end shaped the nation's economic growth and social cohesion. It is imperative the children with autism talents be continuously cultivated and not be neglected. Children with autism are conditions where children may exhibit developmental disabilities, communication obstacle, significant social, behavioural challenges and process information differently compared to their normal typical peers. Known as visual thinkers, the use of visual images as a visual support in the learning environment has been found effective for children with autism. The use of assistive learning technology such as tablets has gained state-of-the-art research interests as children with autism have an affinity with the mechanism. Nevertheless, research on assistive learning technology as intervention approach for children with autism is still at its experimental level, here in Malaysia. Research have shown it is important for children with autism to acquire fundamental skills to achieve some degree of independence. Despite large enhancements in early diagnosis and interventions, most children with autism are unlikely to live independently when they grow up. This qualitative study aims to 1) examine the current learning process for children with autism 2) determine how assistive learning technology application may influence the learning process for children with autism and 3) formulate the assistive learning technology application for children with autism. A touchscreen assistive learning numeracy application (TaLNA) was developed by using Adobe Flash Professional CS6 with Adobe AIR 19.0 integration and ActionScript 3.0. It works on a smartphone as well as a tablet device. TaLNA is an educational tool that consists of a learning module and learning activities with different learning outcomes. TaLNA focuses on children with learning disabilities in primary schools in Malaysia specifically for children with autism in Special Education Integration Program classes. The subject content was adapted and aligned with the Integrated Curriculum for Learning Disabilities issued by Ministry of Education Malaysia. In order to motivate the children with autism to concentrate and keep learning, an interactive agent was embedded inside the said apps. Thirty children with autism and six special education teachers from two integrated primary schools and one autism centre in the Klang Valley, Selangor, Malaysia participated in this research study. Based on the experimentation, direct observation and interview with the special education teachers as well as autism experts, it is shown that the children with autism gained positive attitude, increased self-confidence and obtained self-reliance in using the TaLNA. It is an aspiration that TaLNA could uplift the instructional learning environment for children with autism, which could avail boost in early childcare education (ECCE) and thus foster the quality of life for children with autism.

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