

COMPUTER-BASED LEARNING USING DOUDOU LINUX TUXPAINT FOR WORD ACQUISITION AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

This study is an experimental designed to examine the effects of computer-based learning (CBL) using Doudou Linux Tuxpaint (DLT) on word acquisition among children with autism spectrum disorder. The research focuses on the level of word acquisition before and after the intervention, the effectiveness of DLT and interview session with the teachers about feedback on the implementation of Doudou Linux. Single Subject Design (A-B -A) used to collect the data during baseline (A), intervention (B) and maintenances (A) phases. Two samples were selected in this study using systematic and purposive sampling. The data were analyzed and presented in the form of line graph (visual representative), percentage (%) and interview transcript. The results show that the participants had displayed greater improvement on word acquisition across intervention phase. The score rate of correctly pronounces the words above 90% for each of participants and they were able to acquired twenty-three (23) single words independently in 26 session. The interview session with the teacher found that, Doudou Linux Tuxpaint helps to enhance the word acquisition and reading ability among children with autism spectrum disorder.

Keywords: Computer-Based Learning, Doudou Linux Tuxpaint, Word Acquisition.

2017 GBSE Journal

INTRODUCTION

Autism spectrum disorders (ASD) is a neurodevelopment disorder which is symbolised by deteriorations in communication skills, social interrelation and stereotyped patterns of behaviour (Sani-bozkurt & Ozen, 2015; Ankenman, Elgin, Sullivan, Vincent & Bernier, 2014; Poslawsky, Naber, Van Daalen & Van Engeland, 2013). Autism spectrum disorders are a composite evolution disorder that is generally diagnosed before the child's age of 36 months (Boyd, Odom, Humphreys & Sam, 2010). According to Sullivan (2013), the current study from the Centers for Disease Control and Prevention (CDC 2012) estimated autism prevalence was 1 in 88 children. On the other hand, there was no official report or statistics for the size of the autism spectrum disorder in Malaysia (Ziv, Sheva & Yasmine, 2014). This is because autism is classified under learning impairments along with other cognitive developmental disabilities by the Ministry of Education Malaysia, 2012. According to Tina, Lay, Noel & Arnold (2014), intake of children with autism into the National Autism Society of Malaysia (NASOM) increased 30% over the past three years.

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STATEMENT OF THE PROBLEM

Children with autism are facing many difficulties in the aspects of learning, communication, and thinking (Tindell, 2009). The delay in language is characterized by a deficiency in a structural language that includes phonology, morphology, syntax and semantics (Taylor, Maybery, Grayndler & Whitehouse, 2014). Moreover, they did not acquire words and sentences within normal developmental periods like other normal children (Stagg, Davis & Heaton, 2013). Many of them speak by simulating words that they do not realize (Luckevich, 2008). Computer-Based Learning (CBL) has been evidenced to be efficacious for autism children to learn word acquisition. According to Cullen, Keesey, Alber-Morgan & Wheaton (2013), who used CBL Kurzweil 3000 software to teach sight word acquisition to children with mild disabilities.

In Malaysia, most of the previous studies used computer-based learning to teach Malay language. Nor Ilayni, Ahmad Fauzi and Faszilah (2012), carried a study that examined computer-based learning to teach Malay grammar to standard three students. Computer-based learning using Doudou Linux can address this problem by providing reinforcement, imitation technique, immediate feedback, repetition exercise and multimedia. Therefore, previous researches which have been done in oversea focuses more on using computer-based learning to teach vocabulary and sight words. Past local research seems to be very few studies on integrating technology for autism children. It is not known whether CBL Doudou Tuxpaint can be used for teaching word acquisition among children with autism as there does not seem to be many studies done in this area using CBL.

PURPOSE OF THE STUDY

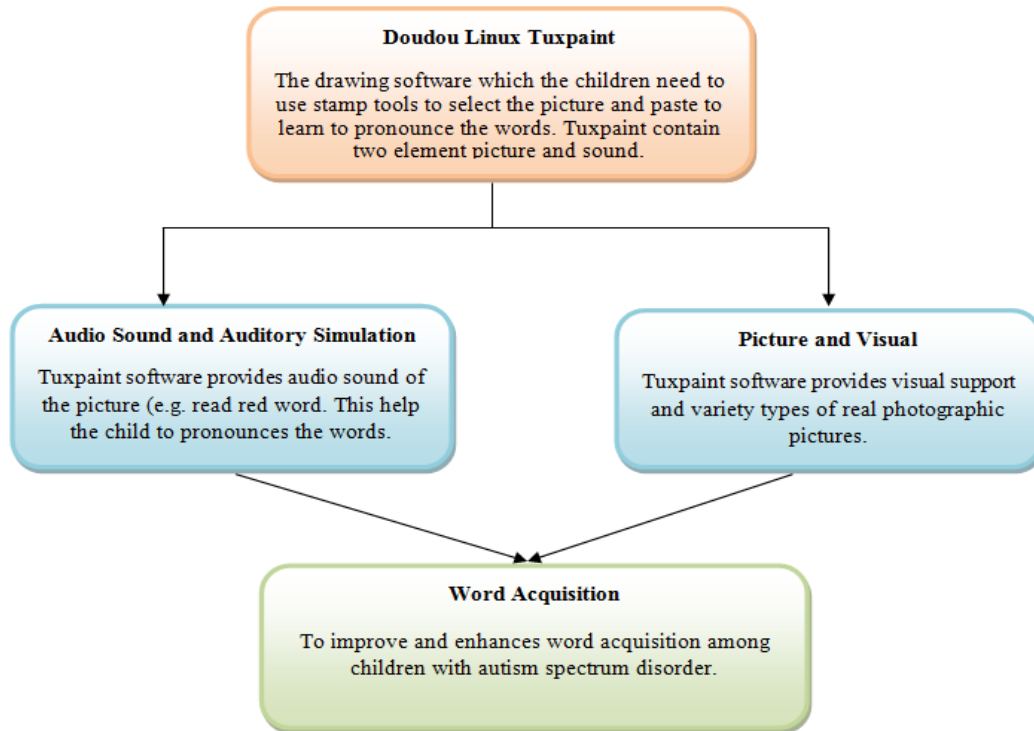
The purposes of the research to (1) examine the level of word acquisition before and after using computer-based learning through Doudou Linux Tuxpaint, (2) the effectiveness of Doudou Linux Tuxpaint intervention in word acquisition of children with autism spectrum disorder and (3) to gather feedbacks from teacher on children with autism spectrum disorders towards computer-based learning Doudou Linux Tuxpaint.

THEORETICAL FRAMEWORK

In this study, there are three main theories use to build up the theoretical framework. There are two main components in Vygotsky theory; scaffolding and zones of proximal development that was implemented in this study. During the phases of intervention and maintenance, the teacher provides minimum verbal prompting that helps the participant to master on learning the words. The right scaffolding provides a strong foundation to the children with autism to learn word acquisition. The author implements two components from Skinner theory into this research; reinforcement and imitation technique. Thorndike developed three laws from his theory which was the law of exercise, effect and intensity. The law of exercise will help the children with ASD to

memories and to practice the correct pronunciation of a word by repetition which leads to mastery of a language.

CONCEPTUAL FRAMEWORK



The conceptual framework of this study has been developed based on the past literature review. Conceptual Framework allows researchers to use this framework as a guideline and an early overview to do research. Smyth (2004), the structure of the conceptual framework is a set of comprehensive ideas and theories that help researchers to identify the problem, research question and finding the appropriate literature. In education research the use of the conceptual framework to clarify clean picture on research question and goals. The conceptual framework of computer-based learning by using the Doudou Linux including picture or visual, audio sound and auditory simulation help to improve the word acquisition in children with ASD.

METHODOLOGY

This research is using single subject design (A-B-A) to collect the data. The experimental conditions were baseline, intervention and maintenance. Two children with autism spectrum disorder between ages 6 years old to 8 years old were selected to participate in this study. A purposive sampling was chosen for this study. The research was conducted at non-governmental organisation (NGO) autism centres which located in Kuala Lumpur. The centre has been selected based on research criteria. The instrument used in this study is score and evaluation form, word acquisition form and interview form as the main research tool to collect data about the computer-based learning using Doudou Linux Tuxpaint in word acquisition. The score and evaluation form

were used to collect information through intervention session process and determine the outcome of the treatment. The instrument used to contain the word by theme and the intervention measure in the form of a six-point Likert scale (1-6), namely (1) *I=off task*, 2=*verbal prompt*, 3=*pronounce front sound*, 4= *pronounce last sound* 5=*substitute another word*, 6=*pronounce correct*. The instruments was verify with three experts in instructional technology and two more experts from the special education department. A small pilot study was conducted with two children with autism spectrum disorder which no involved in actual research. The data analysis and present in visual inspection, percentage of word acquisition and transcribe.

FINDINGS

Level of Word Acquisition Before and After using Computer-Based Learning through Doudou Linux Tuxpaint?

The present study found remarkable effects of Doudou Linux Tuxpaint on word acquisition among children with ASD. On the whole, participants had greater improvement on word acquisition after the commenced of intervention phase. Across the intervention phase, participants were showing gradual progress on word acquisition. In the baseline, most of the first sessions where participants went off task (1) and slowing the needs of verbal prompting (2) to learn the words. During intervention, participants mutually responded to Doudou Linux treatment and had shown progression in word acquisition. Base on the scoring rate, participants had scored with verbal prompt (2) to last sound of a word pronunciation (4). Along with that, the two participants had acquired wordings between the seven and ten sessions during intervention. Data collected during the maintenance phase showed that participants are able to pronounce independently and stable the score at (6) for most of the words mentioned. Apart from that, participants are able to maintain the effect of intervention after the treatment terminal.

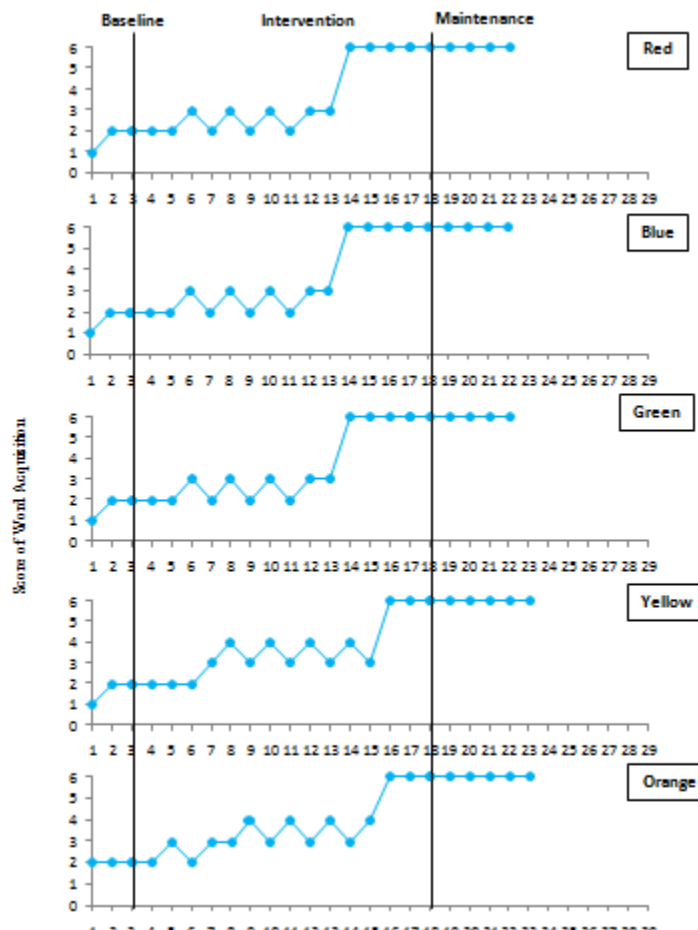


Figure 2: Score of Word Acquisition of Colors Category; Child A

Figure 2 shows the score of word acquisition based on colors category. The graph represents word acquisition probe data for each wording in baseline, intervention and maintenance. Word acquisition before the intervention showed that the responses Child A in baseline was off task (score 1). In the second and third session of baseline, Child A was able to respond with the verbal prompting (score 2). During intervention, Child A showed some gradual progression of word learning whereby the score increase from verbal prompting (score 2) to pronounce correctly (score 6) the words. Child A is able to acquire the words red, blue and green quickly compare to yellow and orange. Moreover, visual stimulation enable Child A to choose and click on the picture with colors and to paste it correctly on the screen, while audio stimulation assist Child A in listening for the correct word pronunciation. Besides that, Child A has established significant improvements in word acquisition after the intervention session. The score of maintenance phase by Child A were constant for all the five sessions. Child A managed to pronounce unaided (score 6) on all the five single words of the colors category. On the whole, the level of word acquisition before and after using Doudou Linux Tuxpaint shows that Child A had acquired all the five single words with the data point showed word learning progressions.

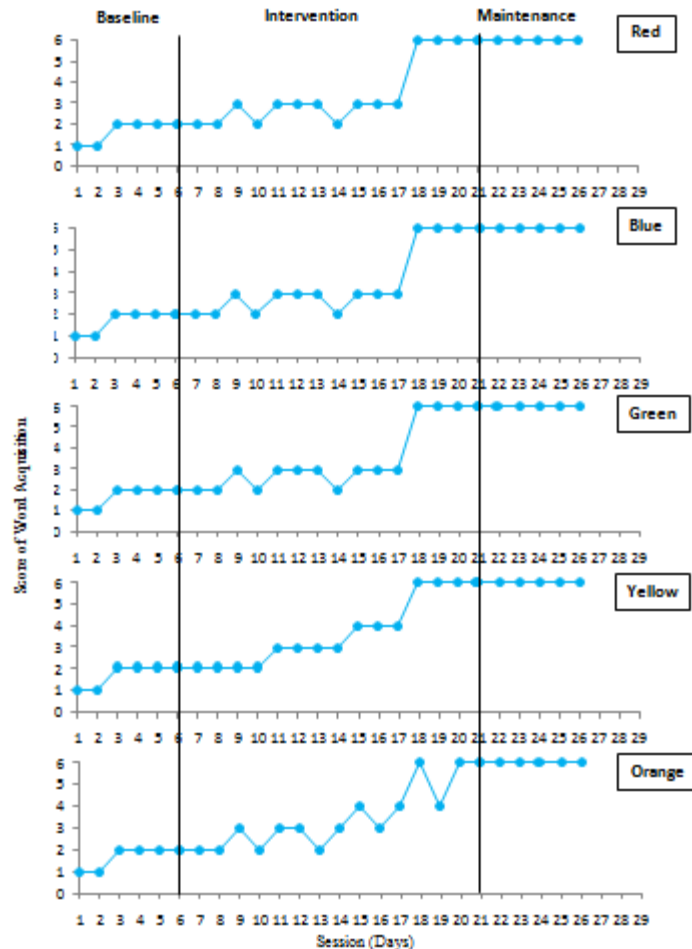


Figure 3: Score of Word Acquisition of Colors Category; Child B

Figure 3 shows the score of word acquisition based on colors category. Graph represents the word acquisition's probe data of each word in baseline, intervention and maintenance. The word acquisition before the intervention shows that Child B went off task (1) in first and second sessions of baseline. However, he started showing response on verbal prompt (2) towards words starting from the third session. On intervention phase, Child B display unstable data score for red, blue and yellow words. The score rose from verbal prompt (2) to pronounce correctly (6) at the eighteen session of intervention. From the observation, Child B needs more time to learn the word orange. There is progression occurred at the ninth to eighteenth sessions of intervention. Doudou Linux Tuxpaint application shows effect on Child B to acquire the words of colors. Child B cooperates with the teacher to pronounce the word and click on the correct picture of the colors. Word acquisition after intervention session showed that Child B is able to maintain a linear score at 6 for all the five sessions in maintenance phase. Child B is able to pronounce all the five single words presented in the color category at the end of maintenance phase. Taken as a whole, the level of word acquisition before and after using Doudou Linux Tuxpaint proved that Child B easily acquire single syllable words like red, blue.

Effectiveness of Doudou Linux Tuxpaint Intervention in Word Acquisition of Children with Autism Spectrum Disorder

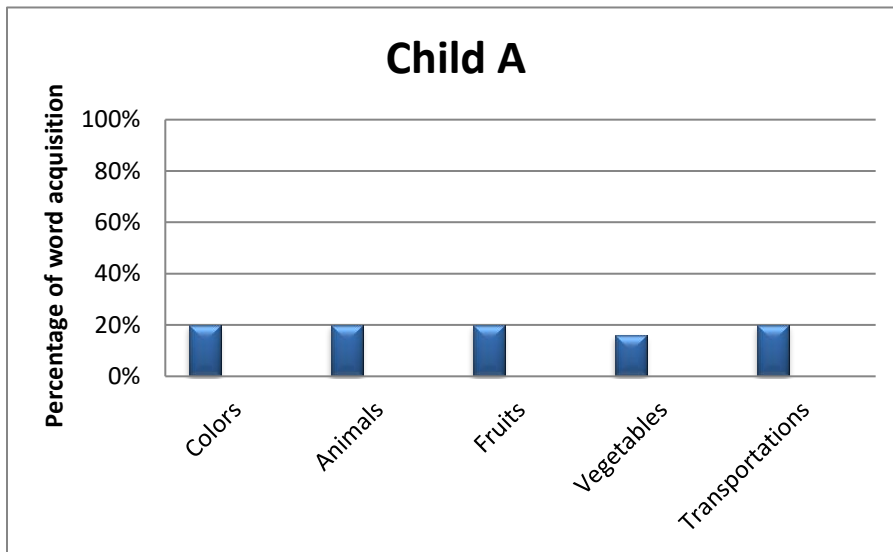


Figure 4: Percentage of Word Acquisition of Child A

Figure 4 shows the percentage scoring of word acquisition on Child A. Child A had maintained 20% scoring of word acquisition in the category of colors, animals, fruits, and transportation right after Child A had successfully completed fifteen sessions of intervention. Child A is able to pronounce independently with data point 6 on all five single wording of colors, animals, fruits and transportation category. As for the vegetables category, Child A is able to score only 14% whereby he needs verbal prompting to pronounce the word of potato. The effectiveness of Doudou Linux

Tuxpaint in word acquisition for Child A scoring is 96%. In Overall, he had master twenty-four single words.

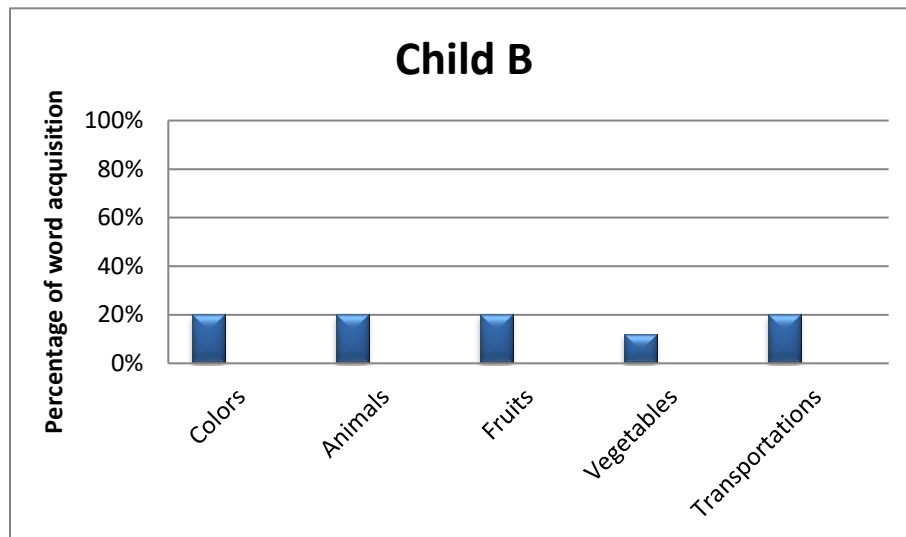


Figure 5 shows the percentage scoring of word acquisition on Child B.

Child B had maintained 20% scoring of word acquisition in the category of colors, animals, fruits, and transportation right after Child B had successfully completed fifteen sessions of intervention. Child B is able to pronounce independently with data point 6 on all five single wording of colors, animals, fruits and transportation category. As for the vegetables category, Child B is able to score only 12% whereby he needs verbal prompting to pronounce the words of broccoli and potato. The effectiveness of Doudou Linux Tuxpaint in word acquisition for Child B scoring is 92%. In Overall, he had master twenty-three single words.

Teacher's response about computer-based learning Doudou Linux Tuxpaint

The main purpose of the interview session is to generate information and responses from the teacher on using Doudou Linux Tuxpaint to teach children with autism. The interview's main discussion is pertaining to the effectiveness of Doudou Linux Tuxpaint in word acquisition, on how teachers integrates Doudou Linux Tuxpaint in their teaching syllabus, suggestion, recommendation, and circumstances faced by the teacher when using the software. According to the teacher, Doudou Linux Tuxpaint showed positive response as it was mentioned that Doudou Linux software is good software to learn language. The software is suitable to be used in children with special needs especially children with autism. Moreover, the software provides auditory and visual stimulation for word pronunciation. The use of auditory and visual stimulation will help children with autism to stimulate their brain, increase the cognitive process and enhanced academic performance. Furthermore, Doudou Linux software is not only used for teaching language as a primary tool but a teacher can integrate the software in teaching on reading, numeracy and basic concept for the students. Children with autism will get many benefits by using this software, such as it encourages them to speak, enhances the vocabulary, word recognition, improve the eye-hand coordination and attention spans. In general, the Doudou Linux software beneficial to children with autism, however there are few things that needs to be improved for better learning process.

IMPLICATIONS

Communication is essential to all ages and life skills. The greatest implication of this study was to improve word acquisition of children with ASD using Doudou Linux software. Besides that, it allows children with ASD to practice on their own without help, improve fine motor skills and opportunities are given to children with ASD to build their confidence level through frequent independent practice. Moreover, computer-based learning can also serve as an emotional tool for children with ASD to enjoy using the computer on a regular basis at the same time it increases attention span that allows this category of children to reduce inappropriate behaviours likely are hand-finger flapping or complex whole body movements, rocking and spinning themselves. In addition, implications for teachers are possible to plan effective learning strategies and to provide lessons which are both fun and enjoyable for the students. It also allows teachers to train the student to do their work independently which can save up the teacher's time. The research will benefit the school's administrators to invest money on the computer software.

RECOMMENDATIONS

The findings from this research represent and suggest some of the areas for future research work especially regarding developments in the use of Doudou Linux software in meeting instructional needs for special education program activities. It is recommended that further research could focus on how the Doudou Linux software help improve the student facing difficulty in learning numeracy, research on different categories such as children with Down's syndrome, slow learner, Dyslexia and including more than two participants in the future research.

CONCLUSIONS

The goal of this study was to investigate on how computer-based learning using Doudou Linux Tuxpaint could be used to help children with ASD learn word acquisition. A multiple baseline designs were used to evaluate the progress to learn the target words. In this study, there are five categories was choose and each of the categories have five single words to be learned by the participants. Three research questions were examined in this study. The finding of the study supports the importance to provide the correct scaffolding and immediate feedback from the teacher using Doudou Linux Tuxpaint. The uses of reinforcement activities help the participants to stay focus and continue to learn the words. The imitation technique helps to promote the participant to pronounce the wordings. When the participants keep on practice pronounce the words that be taught for them until they are able to master the words. The present location of this study laid the groundwork to future researchers, should focus on how Doudou Linux software activity can implement to other special needs children to teach language or any other aspects. In addition, this study is conducted in Kuala Lumpur area. Future research is recommended to be conducted in other states.

ACKNOWLEDGEMENT

I would also like to express my gratitude to Dr. Madhyazhagen for his thoughtful consultation and meaningful feedback. I also would like to thank Dr. Dorothy Dewitt and Dr. Aishah for her sincere support and care during the dissertation process, as well as their valuable contributions knowledge about the methodology of the present study. Special thanks to the directors and teachers of Autism Centre Kuala Lumpur for their countless help and assistance. This dissertation would not have been possible without the dedication and commitment of my parents. Without them, the education I have received in University of Malaya and the opportunities I have now would have never been possible; so I owe a lifetime of gratitude to my parents.

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