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Study on Mobile Learning Applications for Dyslexia and Autism

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Abstract - *In this paper, we have discussed present technologies and applications developed for dyslexics and autistics. The existing learning applications attempts to design a stimulating and interactive experience for children, through various word learning games, assessments, puzzles and 3-D graphics which could encourage the learning process. The ability to learn, read, speak, write, communicate, interact or work with numbers are the main skills in human beings. Dyslexics and autistics commonly lack many of these essential skills. As this disorder is lifelong it will be extremely difficult for such students to have a successful career. In addition to the traditional classroom contexts, the use of advanced technologies in the learning process and its assessment through the mobile learning tests is being discussed. This paper aims to assess the usability of technology in education sector.*

Key Words: **Autism, Dyslexia, Learning application, Mobile learning**

1. INTRODUCTION

Autism and dyslexia are both developmental disorders of neural origin. They are lifelong and therefore have to be studied in adults as well as in children. Individual variability is enormous, and, as a result, behavioral diagnosis remains problematic. The study of the underlying cognitive abilities in autism and dyslexia has acted as a gateway for the emergence of developmental cognitive neuroscience. Autism has 3 hallmark features—delays in speech & communication, repetitive behaviors such as playing with only few selective toys, running up and down a slope etc., or demonstrating a narrow repertoire of behaviors, and lack of mingling socially. Dyslexia is manifested as difficulty in reading, writing, doing math, despite normal intelligence. Autism and dyslexia can be seen as 2 separate diagnoses, however may share certain features. For example, ADHD is frequently associated with autism as well as seen along with dyslexia. Similarly, language and visual processing difficulties are related to both. Sensory processing defects are also closely associated with both conditions. As we still do not understand the neural basis of these disorders fully, technology can take two approaches in helping those affected. The first is to compensate externally for a known difficulty and the other is to achieve the same function using a completely different means.

1.1 Background

Mobile technologies like smartphones and tablets specifically have long moved past the early adopter stage in the 21st century society and in 21st century education. The desktop and laptop computer "programs" of the 1980's and 1990's have been replaced by online and mobile "apps" that are more portable, lightweight and customizable. This new way of learning proved to be useful for dyslexics and autistics. There are many problems faced by dyslexics and autistics which we have analyzed. The difficulty varies for different age groups i.e from kindergarten to being teen, from teen to adult. Mostly dyslexics have problems in phonological awareness: like confusing vowel sounds 'I' for 'E'. Difficulty in rhyming, chunking words into syllables. Blending sounds into a whole word. Typical spelling mistakes: wont instead of want. Unable to remember times tables and number sequences. Writing issues, someone with dyslexia is likely to have lots of ideas but have difficulty putting them into writing. Many people with dyslexia write long rambling sentences with no punctuation. Although there may be lots of ideas they often do not know where to start. Immediately forgetting what has just been read.Slower reading speed. Missing out words or skipping lines as they read. Mixing up left and right. Reversing numbers ,someone with dyslexia might see **57** but remember it as **75.**Many dyslexics under ADHD face common difficulties similar to autistics like communication difficulties, behavioral patterns, more time to interact and collaborate with people and even difficulties in recognizing emotions.

1.2 Game playing as learning process

Games provide an individualized teaching and learning environment, which may aid in the development of memory, visual perception, auditory ability, language, reasoning, time and space orientation, and motor coordination. In this context, the games can be powerful teaching tools in order to increase the knowledge of young people and consequently improve their self-esteem, if used with pre-defined objectives. One tool that is being embraced by therapists, counselors, teachers, parents and their children to help those with autism to better communicate and connect with others and the world around them is virtual reality. Virtual reality based games which could encourage the learning process. As communication and social anxiety is another main problem both dyslexics and autistics share in common. So the existing technology creates a virtual classroom where they could calmly involve themselves in reading and other verbal activities. In addition to that facial emotion recognizing feature and

learning behavioral pattern is included systems using different machine learning algorithms are being studied by many researchers. As parent's involvement improves learning, many applications are designed considering it.

2. RELATED WORKS

This study involves two applications proloquo2go and dyslexia quest developed for dyslexics and autistics. These applications provides a wide range of educational and learning material in a uniquely engaging manner (touch-screens), whilst giving users option to choose from information which will enrich knowledge and improve skills.

2.1 Proloquo2Go

Proloquo2Go is a full featured augmentative communication application (AAC) that offers picture only, picture and text, and keyboard options for message formulation. This app is designed to help teachers and therapists empower kids who have limited or no speech with an alternative way to communicate. It uses an adaptable, multi-size grid format to present images and words. Proloquo2Go is based on core words. Core words are the small number of words that make up about 80% of what we say each day. These are powerful words because they can be used in a lot of contexts and allow us to express many ideas with a small number of words. When user learn how to combine core words with fringe words, they will be able to communicate effectively for the rest of their lives. Core words are a powerful tool so your child can communicate whatever they want to say. Instead of using pre-programmed sentences or phrases like "I want" and "I see," they can choose from a small set of words to create their own sentences. Proloquo is Latin for "speak out loud". The goal is user should able to say what they want to say, whenever they want to say it, wherever they want to say it and to whomever they want. The three research-based vocabularies of Proloquo2Go, Basic, Intermediate Core or Advanced Core help to quickly create an efficient Communication system. The Core Word vocabularies allow for efficient access to the most frequently used words in English, along with a rich array of fringe vocabulary to allow for precise expression and vocabulary growth. Basic Communication is designed for new communicators at the one and two word level to promote developmental progression in communication skills .Different pictures are divided and classified on the basis of actions, senses etc. There are various ways in which user can add new buttons to your vocabulary. Proloquo2Go provides a wide range of options that allow users to control the appearance of folders and buttons in detail. To make it really easy to customize the appearance for individual needs, Options can be customized at user level, at folder level, and at button level. Any setting that is customized at user level (in Options) applies to all folders and buttons of the vocabulary apart from those for which this setting is defined at folder or button level. Augmentative and Alternative Communication (AAC) app Proloquo2Go already provides a voice to over 150,000 individuals around the world. It is one of the few AAC apps that cover all users, from beginning to advanced communicators. To make sure users reach their full potential, AAC best practice recommends starting out with a large grid size. If this is considered too overwhelming for the user, more advanced buttons are hidden and gradually revealed as user skills grow. Yet, this is a time-consuming and complicated task. Proloquo2Go 5.0 introduces Progressive Language, which helps to hide and reveal buttons in a developmental order.Proloquo2go has a large customizable vocabulary system that is folder based. Advanced grammar option allows easily conjugating verbs, or adding plural or possessive Markers, The clues folder allows a user to learn to describe an object and talk around a word that may not be programmed in his/her device. Action words are divided into groups for easier navigation like sensing verbs, telling verbs, things, possession verbs.

2.2 Dyslexia Quest

Dyslexia Quest (DQ) is a game designed to help assess a child's memory and listening skills. It helps point parents and educators in the right direction to support the child since it serves as a basic skills screener to identify strengths and weaknesses. It uses tasks/games to assess a child's strengths and weaknesses in the following areas: working memory, phonological awareness, processing speed, visual sequential order, auditory sequential memory, and visual memory. It has 3 different age levels: 10 and under, 11-17, and adult. It is divided into six task/games that each take about 10 minutes to play. The instructions for each task/game are direct and to the point, using the least amount of words possible. No unnecessary information is given, and it highlights essential material (Signaling principle) If user is a child who struggles with distractibility, it may be best to play this app in increments to get the best results. Upon completion of each adventure (task/game), parents or trainers are given scores and details about their strengths and weaknesses. Kids are inherently motivated to complete each of the quests/tasks whereas the score keeping and gaming nature provide incentive for users to retry levels in order to improve their standing.

The app is designed for a single player and does not support simultaneous multiple users. Dyslexia Quest takes the reader on a journey locating their skills levels in visual memory, phonological awareness, auditory and sequential memory, visual sequential memory, processing speed and working memory in order to determine areas which may need additional intervention and build reading levels. The student is asked to enter their name and age group (under 10, 11-16, and 17+). Upon choosing the appropriate selection, the reader is taken on a journey to assess their knowledge in Visual Memory in Jungle Fever. The app allows the review of the letter/word provided prior to choosing a response. The quest also allows the reader the

option of moving forward to practice based on their score. The following journey allows them to proceed to Boulder Bridge which will assess Auditory and Sequential Memory. It provides the initial instructions and the student must follow the instructions in order. Afterwards, proceed to Creepy Cavern determine skills in Visual Sequential Memory and on to Ropey Bridge which test (Processing Speed). The final areas of assessment are Windy Pass (Phonological Awareness) and the Yeti Heights (Working Memory). Upon completion, the tester is provided with a breakdown of learning strengths and weaknesses on a scale of below, average and high in these areas: working memory, phonological awareness, processing speed, visual sequential memory, auditory sequential memory, and visual memory. In addition to the ability levels, a brief description of each ability level and the uses for each skill level is included. The student also has the option of a reader-friendly description of dyslexia and personal dyslexia quiz. DQ has been developed, researched and tested at the Bristol Dyslexia Centre and is based on the tests of educational psychologists, mirroring the output that they would assess to determine the likelihood of dyslexia .DQ is an interesting study of app design because one of its intended purposes is to share with users how the human brain works. This application can be used as an ongoing progress monitoring tool which help the child feel better about the difficulty at the same time give a profile of user's cognitive strengths and weakness covering quite a bit of cognitive territory for a variety of ages.

2.3 Analysis

Dyslexia Quest cannot afford by financially backward parents since this is an ios application as well as expensive. Even though it gives a snapshot of their cognitive profile at a moment in time, it can be changed anytime and certain emotional risks to any label.

Proloque2go can be difficult to navigate vocabulary in a folder based system can be difficult to navigate if a person does not have the language understanding of what categories an object should be found in and also contain. Unused and unnecessary vocabulary. People who have difficulty motor planning benefit from an app that has static buttons that are always in the same place so that they can learn the motor plan to find a word. Scrolling in Proloque2go may become a hindrance to quick communication If scrolling is turned on a child may visually stem on scrolling words. If it is turned off then they may be slowed by having to press an extra "page up" or "page down" button to find a word they are looking for.

3. CONCLUSION

In this study, we discussed about two existing applications and its unique features considering problems of dyslexic and autistics. Emphasis on using mobile apps to support struggling learners, Although at this stage our present work cannot be conclusive, the preliminary results show the promising prospects mobile learning holds in such contexts as students showed progress in their overall game performance. It is our intention to further continue our research in the field, by testing with the application that we design using advanced technologies like machine learning algorithms effectiveness over an extended period of time to better assess the mobile learning methods and their outcomes reflected in the user's skill improvements.

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