FUNologo: A Mobile-based Virtual Reality Assisted Learning Among Children with Phonological Dyslexia

Chapter 1

THE PROBLEM AND ITS BACKGROUND

This chapter presents the problem and its background. It consists of the introduction, the statement of the problem, the objective of the study, the significance of the study, the scope and delimitation of the study, and the operational definition of terms.

INTRODUCTION

Dyslexia is a term used to describe a group of symptoms that cause people to struggle with specific language abilities, such as reading. This difficulty may have an influence on the individual's ability to study, particularly in math, science, and social studies. When a child has reading difficulties, it creates gap since the child does not have the same reading capacity as other students (Bianan & Delos Santos, 2020). Proctor et al. (2019) defined dyslexia as a learning disability that impairs literacy and language development. It is evident from a child's early years and is expected to have lifelong effects. A dyslexic individual's cognitive abilities may not measure up to their other cognitive capacities such as phonological processing, skill acquisition, response time, and other cognitive abilities.

Studies from 2016 has been made in various contexts prior to the prevalence of dyslexia which shows that among the research subjects with learning difficulties, 80% has been affected with dyslexia (Velez et al., 2016). Furthermore, approximately between 5% and 15% of students globally with learning deficit has been considered to have dyslexia as a primary factor of learning disability, in accordance with the study made by the National Institute of Neurological Disorder and Stroke (De la Peña, 2016; Menéndez & Martinez, 2019).

Majority of individuals are unaware that dyslexia may impose serious life problems; people who are undiagnosed might lose their touch with the fulcrum of life (Bianan & Delos Santos, 2020). In the Philippines, dyslexia is a topic that is inadequately judged and understood by Filipinos. Taino (2017) stated her concern about dyslexic Filipino children being characterized with degrading adjectives such as stagnant, falling-behind, and unintelligent. Out of 43,303,145 Filipino children and teenagers (0-24 years old), 48.81% consists of learning disabled which includes dyslexic individuals, according to the data from the Department of Education (DepEd) in 2010 (Bianan & Delos Santos, 2020).

Phonology, on the other hand, is the study of the formation and organization of sounds in spoken language, a term coined by Clark and Yallop (1991) to describe their theory of speech. It depends on the language on which sounds can be combined, and what places they can be placed

in which context or position inside a word. Individuals who have the capacity to discern and manipulate specific sounds inside words through reading and spelling are considered phonologically aware.

Moreover, phonological awareness encompasses issues affected with fundamental reading and spelling abilities. The easiest way to evaluate phonological abilities is to have students manipulate words by adding, deleting, or changing sounds. Learning that speech may be broken down into distinct sounds is an important initial step in understanding phonology (Kilpatrick, 2015).

Altogether, Phonological Dyslexia is a reading disability that affects non-word reading skills, not just the ability to read words. Though, phonological dyslexia has symptoms similar to deep dyslexia, it is distinguished by the fact that people with phonological dyslexia do not commit the same kinds of semantic errors such as deep dyslexia (Welbourne & Lambon-Ralph, 2007). The treatment for phonological dyslexia consists of improving consonant–vowel correspondences and retrain sublexical skills in the context of spelling non-words. To detect and correct spelling errors, participants were guided through an interactive treatment using phonological skills and orthographic knowledge (Beeson et al., 2010).

Traditional speech therapy for dyslexia requires a lot of patience and commitment, which leads to larger rates of dropouts in the middle of the individual's learning process (Rodriguez-Cano et al., 2021). Al-Labadi and Sant (2020) indicated that as technology has become more readily available to students, teachers have begun to use it in the classroom to better engage students with the course content as substitute to traditional teaching methods. Consequently, technology can provide solutions in the realm of special educational needs, with an increasing interest in assisting individuals with learning disabilities such as dyslexia. Numerous research studies have indicated that the use of technology benefits students experiencing curricular challenges in terms of motivation, collaboration, and attention (Baelo & Rosen, 2021).

The spread of virtual reality is undoubtedly becoming more prevalent as technology advances. Virtual Reality (VR), a computer-generated environment that simulates realistic-looking scenes and objects, is examined to be one of the most promising treatment options for learning disabilities (Alemi & Khatooni, 2020). Rodriguez-Cano et al. (2021) described virtual reality as a safe, versatile tool with excellent adherence rates and has the ability to provide a multimodal approach. Ladendorf et al. (2018) explained that as a result of the widespread use of mobile learning devices, developers now have the freedom to create new and compelling virtual reality applications. Learners may now access the same virtual reality content as they did previously use 3D VR viewers. Using the 3D virtual reality viewer, a developer may build an immersive environment, which elevates the standard desktop program to a higher degree of user satisfaction.

STATEMENT OF THE PROBLEM

One of the most primary indicators and causes of dyslexia is lack of phonological abilities. A difficulty with phonological processing is mentioned in several definitions of dyslexia. Among 62 to 75% of individuals with dyslexia are divided into people with phonological processing issues alongside with people with surface dyslexia (Zabell & Everatt, 2002). The proponents aim to develop a mobile-based virtual reality assistance learning that would effectively reduce the underlying factors of phonological dyslexia among children, as well as to help teachers, and parents in improving the child's cognitive functions such as reading fluency, comprehension, and word decoding.

The following research questions are the problems that the proponents aim to answer throughout the study:

1. Does designing and developing a virtual reality assisted learning causes any significant impact on the learning capacity of phonological dyslexic children?

2. How can the proponents achieve the primary objective of the study which is providing proper learning assistance among phonological dyslexic children?

3. How can the study enhance the educational system for phonological dyslexia using mobile-based virtual reality application?

4. How does the FUNologo: a mobile-based virtual reality assisted learning adheres to the ISO/IEC ISO/IEC 9126 for Software Product Quality Evaluation. in terms of:
a. Functionality
b. Portability
c. Usability

OBJECTIVES OF THE STUDY

- To identify the problems specifically its manifesting effects on children, as well as the problems it imposes to the parents, teachers, and the community.
- To design a virtual reality as an innovative educational platform for the phonologically impaired children using Quadric Metric Error algorithm and Diamond Square Algorithm.
- To develop a mobile-based virtual assisted learning as a tool for children with phonological dyslexia as an alternative teaching technique.
- To evaluate the virtual app using ISO/IEC 9126 for Software Product Quality Evaluation.

SIGNIFICANCE OF THE STUDY

Through the study, children with phonological dyslexia can obtain proper learning by utilizing the advanced technology of virtual reality, as well as helping the children's parents/guardians and teachers in regards with the child's learning progress and engagement. Furthermore, the study will be a beacon of knowledge, whose purpose is to spread awareness in the community as well as to help future researchers recognize more comprehensive solutions to the given problem.

The study will be beneficial to the following:

1. **Children** – the study aims to provide proper learning assistance using mobile-based virtual reality application to phonological dyslexic children as it immerses them to study the areas of reading fluency, comprehension and word decoding.
2. **Parents or Guardians** – the study will give parents or guardians further information and guidance about phonological dyslexia and its effects among their children.
3. **Teachers -** the result of the study will help the teachers in handling children with phonological dyslexia effectively and efficiently through virtual reality assisted learning.
4. **Schools –** through the findings of the study, schools and special education centers may provide valuable information about phonological dyslexia and promote virtual reality application to aid learning disabilities among phonological dyslexic children.
5. **Future Researchers** – the study will guide future researchers on formulating extensive research in finding novel solutions to the problem, whose objective is to help the phonological dyslexic community and the academe. The findings from the study can present data that allows future researchers to use as their reference for their future studies.

SCOPE AND DELIMITATIONS

The study will cover the area of phonological dyslexia among phonological dyslexic children using FUNologo: A mobile-based virtual reality assistant as a platform for education. The study also aims to determine the capacity of the virtual reality application in providing proper learning assistance among phonological dyslexic children. The demographics of the study will cover phonological dyslexic children between 5 up to 11 years old, commonly kindergarten to elementary school-aged children. Furthermore, the mobile-based virtual reality application is restricted to the following capabilities:

1. User Profile System
2. Progress of the Student
3. Modules:
    a. Reading fluency
    b. Word decoding
    c. Letter-sound knowledge

However, the study does not cover other types of dyslexia such as deep dyslexia, surface dyslexia, and so on. The study is limited to children with phonological dyslexia, ages 5 to 11 years of age as for the reason that phonological awareness begins to develop at children between 4.5 to 6.5 years of age (Torppa et al., 2007). The study also excludes other forms of learning disabilities such as Dyscalculia or difficulty with numbers and arithmetic, and Dysgraphia or difficulty with writing.

OPERATIONAL DEFINITION OF TERMS

To further understand about the contents of this study, researchers used to define some of the words used:

Cognitive skills - are the fundamental that your brain employs to think, read, learn, remember, reason, and pay attention.

Deep dyslexia - is an acquired reading disorder in which semantically but not visually similar words are substituted in single word reading.

Dyslexia - is a learning disability that impairs literacy and language development.

Learning disability - is a mental disorder that impairs a person's capacity to learn.

Letter-sound knowledge - is knowledge of the letters or groups of letters which represent the individual speech sounds in language.

Orthographic knowledge - is information that is stored in the memory and teaches us how to express spoken language in writing.

Phonology - is the study of how sounds are formed and organized in spoken language.

Phonological dyslexia - is a reading condition characterized by difficulty reading nonwords.

Reading comprehension - is the capacity to read, process, and comprehend material.

Reading fluency - is defined as the ability to read accurately, fluently, and expressively.

Semantics – is the study of the meanings of words and phrases.

Sublexical - refers to the component elements of a word.

Surface Dyslexia - is a sub-type characterized by word recognition and spelling difficulties.

Virtual Assisted Learning - is used in classroom as a learning tool known as Virtual Assisted Learning (VAL). The idea is that students will get a better understanding of a wide range of subjects by using visual exploration tools provided by technology.

Virtual Reality (VR) - a computer-generated environment with realistic-looking scenes and objects that immerses the user.

Word decoding - is the ability to properly pronounce printed words using letter-sound connections and letter patterns.