

**Investigating the Use of “Lughati Tablets” to Promote
Arabic Reading Skills to Students with Special
Educational Needs and Disabilities:**

A case study at The Sharjah City of Humanitarian Services
(UAE)

بحث في استخدام الأجهزة اللوحية من "مبادرة لغتي" لتعزيز مهارات القراءة
باللغة العربية للطلاب ذوي الاحتياجات الخاصة وإعاقات التعلم:
دراسة في مدينة الشارقة للخدمات الإنسانية (الإمارات العربية المتحدة)

by

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**Dissertation submitted in fulfilment
of the requirements for the degree of
MASTER OF EDUCATION**

at

The British University in Dubai

October 2019

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ABSTRACT

Acquiring reading proficiency starts at early ages and develops throughout the years however with Special Educational Needs and Disabilities (SEND) children, this process does not on the whole move along standardized norms for reading development based on chronological age. This study examines the reading development of SEND students who are using Lughati tablets as Assistive Technologies (AT) to support their reading progress in Sharjah City for Humanitarian Services (SCHS). Investigating the use of AT is important due to the various tools that these tablets provide to enable SEND students access educational resources. The study seeks to find answers to 3 main topics: How effective are Lughati tablets in improving the SEND students' Arabic reading skills? What are the teachers' and IT supervisor's experiences and opinions towards using Lughati tablets with SEND students? How can Lughati tablets be best used to support SEND students in developing their reading skills?

A total of 10 SEND students diagnosed with down syndrome, mild intellectual disability, cerebral palsy and borderline intellectual functioning were examined in this study. The methodology involved both qualitative and quantitative methods and data was collected from the SEND students' performances as well as teachers' interviews. Results revealed that overall the Lughati tablets are worth investing for these types of disabilities however it does not imply that these students will be able to read Arabic on their own or score within the normal reading ranges of typically developing children after using the Lughati tablets. The borderline intellectual functioning and cerebral palsy students scored the highest compared to the other disabilities in the study. The mild intellectual disability candidate required more time to develop one reading task at a time whereas the down syndrome students were the least achieving due to their lower capabilities in phonological demanding tasks. Down syndrome students showed progress in visual related tasks more than the other tasks. The study highlights that it might be beneficial for SEND students to use Lughati as an AT along with other comprehensive and explicit reading instructions. In addition, teachers showed positive attitude in using Lughati tablets in their classrooms and they highly recommended that the tablets get modified to be tailored to these students' learning needs and capabilities. Interestingly, teachers were using Lughati tablets to assist borderline intellectual functioning students in overcoming their learning difficulties and later enroll in regular education schools. Although this study is limited to a small number of participants and is based in a single location, this study conveyed the possibility of using Lughati tablets to teach SEND students reading Arabic. Finally, further research can be done to examine the effect of collaborative learning when using Lughati tablets on the SEND students' reading skills.

Keywords: assistive technology, cerebral palsy, down syndrome, borderline intellectual functioning, mild intellectual disability

خلاصة البحث

تعتبر القراءة من أهم لبنات التعلم الأساسية وتبدأ من المراحل المبكرة من نمو الأطفال وتتطور مع الزمن ولكن تختلف قدرات الطلبة ذوي الاحتياجات الخاصة والإعاقات التعليمية عن قدرات باقي الطلبة من العمر نفسه. تهدف هذه الدراسة إلى معرفة مدى تأثير استخدام أجهزة لغتي اللوحية كأدوات مساندة على تطوير المهارات القرائية لدى الطلبة في مدينة الشارقة للخدمات الإنسانية. البحث في مجال الأجهزة المساندة ذو أهمية كبيرة لأن هذه الأجهزة توفر أدوات تعليمية متنوعة لهذه الفئة من الطلبة. تسعى الدراسة إلى إيجاد إجابات لثلاث أسئلة رئيسية: ما مدى تأثير أجهزة لغتي اللوحية على مهارات الطلبة ذوي الإعاقات التعليمية في تعلم القراءة باللغة العربية؟ ما هي تجارب وآراء المعلمين والمشرفين بعد استخدام أجهزة لغتي اللوحية مع الطلبة ذوي إعاقات التعلم؟ كيف يمكن تطوير استخدام أجهزة لغتي اللوحية لتعليم القراءة؟

طبقت الدراسة على ١٠ طلاب مشخصين بمتلازمة الداون، الإعاقات الذهنية الخفيفة، الشلل الدماغي والضعف البيني. واستخدم الباحث الأساليب النوعية والكمية في منهجية البحث وقام بجمع البيانات المكونة من أداء الطلبة في مهارات القراءة بالإضافة إلى المقابلات مع المعلمين والمشرفين. كشفت النتائج على أن أجهزة لغتي اللوحية تسحق أن تستثمر في تعليم الطلبة ذوي الإعاقات التعليمية ولكن لا يستدل بالنتائج على أن هؤلاء الطلبة سيتمكنون بعد استخدام هذه الأجهزة من القراءة بمفردهم أو على تحصيل نتائج متساوية مع الطلبة من العمر نفسه. وأظهرت الدراسة أيضًا أن الطلبة المشخصين بالضعف البيني والشلل الدماغي حصلوا على نتائج أفضل من الإعاقات الأخرى وأن الطلبة المشخصين بالإعاقات الذهنية الخفيفة يحتاجون إلى وقت أكثر لتعلم مهارات القراءة فيما حصل الطلبة المشخصين بمتلازمة الداون على أقل النتائج في مهارات القراءة نظرًا لصعوبة المهام الفونولوجية عليهم. ولكن بينت الدراسة أن الطلبة المشخصين بمتلازمة الداون قد يتطور أداءهم في القراءة باستخدام التعلم البصري. كما وضحت الدراسة أن المعلمين والمشرفين لديهم الرغبة في استخدام أجهزة لغتي اللوحية لتعليم الطلبة ذوي إعاقات التعلم ووجه المعلمون إلى ضرورة تصميم الجهاز بطريقة تتناسب مع متطلبات هذه الفئة. وجدير بالذكر أن أجهزة لغتي اللوحية استخدمت في تطوير مهارات الطلبة المشخصين بالضعف البيني لمساندتهم في التغلب على صعوبات التعلم والالتحاق في مدارس التعليم النظامي. بالرغم من أن هذه الدراسة تقتصر على عدد قليل من الطلبة وتستند على البحث في مقر واحد فقط إلا أنها تعبر عن مدى قابلية تعليم الطلبة ذوي الإعاقات التعليمية باستخدام أجهزة لغتي اللوحية. أخيرًا، المجال واسع لإجراء أبحاث مستقبلية من ضمنها دراسة تأثير التعلم التعاوني بين طلبة ذوي الاحتياجات التعليمية الخاصة من خلال ربط أجهزة الطلاب والمعلمات اللوحية وإتاحة فرص العمل الجماعي لهم.

الكلمات المفتاحية: الأجهزة المساندة، الشلل الدماغي، متلازمة الداون، إعاقة ذهنية خفيفة، الضعف البيني

DEDICATION

To my beloved husband – **Khalid Alnaqbi** – whose unconditional love has showered my life with joy and hope. Thank you for your constant support and in believing in me. I would have never thought that I can take a detour from my current career as a satellite system engineer and pursue my masters in the field of education without your constant encouragement to listen to my inner voice and chase my dreams no matter how bizarre they are. I am forever thankful that you crossed my life and stood next to me when times are good and when times are tough.

To my parents – **Ali Obaid and Asma Saeed** – who were always paving my way throughout my childhood until now. Thank you for your effort and dedication in bringing me up and no matter what I do I would never be able to pay you back. I hope that this thesis is one of my attempts to make you proud of your cherished daughter.

To my parents-in-law – **Ali Alnaqbi and Mariam AlAthmani** – who have treated me like a daughter of their own. Thank you for your support, prayers and immense love.

ACKNOWLEDGEMENT

All praises be to Allah, the Most Beneficent, the Most Merciful, the Lord of the entire universe and the creator of excellence to whom I ought to feel indebted and grateful. Thank you for all the blessings you bestowed upon me, the strength you gave me to do this research and the guidance you provided for me to pursue my studies.

Next, I would like to express my appreciation to my thesis supervisor – **Dr. Naz Awan** – for supporting me throughout my thesis journey. When I first visited the location where I planned to carry out my research and met the research participants, I was scared that I do not have the knowledge and expertise in this field, but she helped me conquer my fears by her big-hearted advises and kind words of encouragement. Thank you Dr. Naz.

I humbly extend my thanks to the Lughati Manager – **Mrs. Badria AlAli** – and Lughati Assistant Manager – **Ms. Marwa AlKhatib** – for allowing me to select the Lughati initiative and the Lughati tablets as the pivotal focus of my study.

I am also grateful to all the educators, supervisors and participants in Sharjah City of Humanitarian Services who spent immense effort and time to help me write my thesis. I would like to particularly thank the Head of Planning and Follow up – **Mrs. Khadejah Banakhramah** –, the educational supervisor – **Mrs. Maha Ebrahim** – and the IT supervisor – **Ms. Seddeqa Suleiman** – for their great support. I would not be able to conduct this study without your guidance and valuable inputs.

Finally, I would like to thank my employer – **Yahsat** – and my manager – **Peter Ghionis** – for allowing me to take some time off my work in order to visit Sharjah City of Humanitarian Services and conduct my study.

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LIST OF ABBREVIATIONS

Abbreviations	Full Form
ADHD	Attention Deficit Hyperactivity Disorder
ARD	Arab Reading Challenge
AT	Assistive Technologies
IQ	Intelligence Quotient
MSA	Modern Standard Arabic
NRP	National Reading Panel
SAV	Spoken Arabic Vernacular
SCHS	Sharjah City for Humanitarian Services
SEND	Special Educational Needs and Disabilities
UAE	United Arab Emirates
UDL	Universal Design for Learning
UNESCO	United Nations Educational, Scientific and Cultural Organization

CHAPTER ONE

INTRODUCTION

“Read [O Muhammad!] in the name of your Lord who created. (96.1) He created man from a clot. (96.2) Read, and your Lord is the Most Honorable (96.3) who taught with the pen, (96.4) taught man what he did not know. (96.5)” - The first revelation of the Quran.

1.1 Overview

Reading is a complex cognitive exercise that requires the use of high mental processes such as imagining, thinking, comprehending, evaluating and reasoning (Catts & Kamhi 2005). Developing the reading skills of children at young age is a critical topic in education because falling behind in achieving reading competency leads to negative results on the children’s academic performance, personal development and social skills (Carson 2012). Therefore, understanding the prerequisites of reading is essential to educators to help them promote appropriate teaching strategies to support their students’ reading development particularly for students with Special Educational Needs and Disabilities (SEND).

In the United Arab Emirates (UAE), the importance of reading has been greatly accentuated over the past few years through the birth of new initiatives that aim to nourish a culture of readers and perpetuate the light of knowledge within the UAE and throughout the whole world. One of the outstanding examples of the UAE’s initiatives that escalated the awareness of reading in the Arab World is the Arab Reading Challenge (ARC) inaugurated by His Highness Sheikh Mohammed bin Rashid Al Maktoum (Arabreadingchallenge.com 2019). ARC is considered the largest Arab literacy competition and has attracted more than 13.5 million Arab students in 2019 (Gokulan 2019).

Moreover, this emphasis in reading and in the Arabic language is not just focused on printed books but also digital applications have been designed to help students read Arabic. In Sharjah, His Highness Sheikh Sultan AlQasimi launched **Lughati initiative** which aimed in improving Arabic language in Sharjah schools by providing tablets embedded with customized educational applications and reading exercises (Lughati.ae 2019). In 2017, Lughati initiative also extended its beneficiaries to include students with Special Educational Needs and Disabilities (SEND) (Gulfnews.com 2019).

In an effort to shed lights on the importance of using technology in improving students' Arabic reading skills, the researcher aims to investigate the effect of using Lughati tablets particularly with SEND students while tailoring the research to the UAE context.

1.2 Statement of Problem

Reading is one of the fundamental areas in education especially for young students. As a result, immense efforts were put into creating research-based reading strategies that outline the basic requirements to enable students to read. The National Reading Panel (NRP) recommended 5 main pillars for a balanced reading literacy and successful reading instruction. These pillars are: phonemic awareness, phonics, vocabulary, fluency, and comprehension (NRP 2000). However, these literacy pillars are often bypassed when teaching students with intellectual disabilities due to the limited research and practices that focus on the reading skills required for these students (Browder et al. 2010). Kliever and Biklen (2001) supported this by stating that the schools are not really a place where students with SEND can learn reading.

Reading instruction for students with intellectual disabilities mainly focus on skill-and-drill activities and functional reading which involves relating words to daily routines such as reading a restaurant menu (Browder et al. 2010). Browder et al. (2006) conducted a comprehensive

review on the studies that involve teaching reading to students with cognitive disabilities and mapped the examined studies to the NRP literacy pillars. They found out that the majority of the examined studies emphasized on teaching sight words with particular concentration on functional reading while there are insufficient evidence-based methods to teach phonics and phonemic awareness (Coyne et al. 2012). Browder et al. (2006) highlighted the need of further investigations to inspect practices for teaching reading to students with cognitive disabilities.

Moreover, Houston and Torgesen (2004) pointed out that for students with intellectual disabilities, the stages of learning reading are different than the normal reading stages and are not linked to the students' ages or grades. Consequently, this adds on the complexity of teaching reading to these students since teachers have to tailor the reading instruction to the corresponding reading capabilities of students.

In addition, there are limited research on measuring the effectiveness and outcomes of the Assistive Technologies (AT) used to enhance the reading skills of SEND students (Edyburn 2003). Alnahdi (2014) stated that educators have to be exposed to the AT that enhance the reading skills of SEND students because of the prominent benefits these technologies offer. In the UAE, the educational sector is undergoing a lot of transformation with the integration of technologies into classrooms however there are scarcity in the studies that examine the use of AT in teaching reading to SEND students (Almekhalfi & Tibi 2012).

Furthermore, Sartawi et al. (2009) conducted a study to measure the skills and knowledge of elementary teachers in teaching reading in the UAE and highlighted that there is a scarcity of publications and studies that scrutinize the methods of teaching reading Arabic in the Arab region.

Due to the shortage of the literature in this area, the researcher believes that this study might add valuable insights to the educators especially those who work closely with SEND students.

1.3 Background of Research

This study will be based in the UAE particularly in the Emirate of Sharjah. Sharjah is well-known for its initiatives in promoting reading and in developing the books' industry and has been selected as the World Book Capital in 2019 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Sharjahwbc.com 2019).

Moreover, the settings of this study will be in Sharjah City for Humanitarian Services (SCHS) where the researcher intends to select samples of SEND students and teachers to investigate the impact of using Lughati tablets in SCHS. SCHS aids more than 3000 students with various disabilities, ages and nationalities and has 2 schools within its premises: Al Wafa School for Capacity Development and Al Amal School for the Deaf (Schs.ae 2019).

The key pillars that form the main building blocks of this research are the Lughati tablets used as AT and the essential reading requirements such as phonics and Phonemic Awareness.

AT are any devices acquired commercially and are customized and tailored to the needs of people with disabilities in order to improve their functional capabilities (Tamakloe & Agbenyega 2017). The term AT was first acknowledged in the Technology-Related Assistance for Individuals with Disabilities Act in 1988. This act was then substituted in 1998 with the Assistive Technology Act of 1998 (Katsioloudis & Jones 2013). Examples of AT used in learning contexts are screen readers, Braille display, voice recognition software, adaptive keyboards and electronic books (Hitchcock & Stahl 2003; Lacey et al. 2007; Mosito, Warnick & Esambe 2017).

On the other hand, phonemic awareness is one of the key requirements for reading proficiency because it supports the development of word recognition and reading comprehension (Carson 2012). Phonemic awareness is the ability of the readers to listen and manipulate the sound structure of spoken words at the syllable, rhyme and phoneme levels (Gillion 2002). When a reader is sensitive to the sound structure of spoken words, the reader becomes aware of the interconnections of the letters and their sounds which enable the reader to decode printed words and comprehend their meanings (Catts & Kamhi 2005). Teaching phonics and phonemic awareness in early childhood is vital because of the pivotal role it plays in predicting and identifying reading problems more than other educational measures such as vocabulary and listening comprehension (Carson 2012). Thus, the researcher chose phonics and phonemic awareness as the main readings skills to focus on.

1.4 Research Questions

In order to investigate the impact of using Lughati tablets as AT in Al Wafa School in SCHS, this research anticipates examining the following questions:

How effective are Lughati tablets in improving the SEND students' Arabic reading skills?

What are the teachers' and IT supervisor's experiences and opinions towards using Lughati tablets with SEND students?

How can Lughati tablets be best used to support SEND students in developing their reading skills?

1.5 Methodology Overview

The researcher anticipates using quantitative and qualitative analysis to scrutinize the research questions. The quantitative data will be extracted from samples of the work of SEND students

who are using Lughati tablets and their evaluation over a period of time. The qualitative data will be obtained from the interviews of the educational supervisor, teachers and IT supervisor who are observing these SEND students. All participants of this study are affiliated with SCHS.

1.6 Significance of this Research

Most of the literature reviewed in the area of phonemic awareness were in English language and were carried out in English-speaking countries (Almekhlafi & Almeqdadi 2010). Very few research in the area of phonemic awareness were conducted in the Arab world and particularly in the UAE. Tibi (2005) conducted a research in the UAE to assess the level of knowledge and teaching skills of 145 elementary school teachers in phonemic awareness. They highlighted the concern that the teachers -whether they taught students in regular education schools or students with SEND- had low levels of phonemic awareness in both their knowledge and teaching skills and that they were not trained for teaching phonemic awareness during their university-level learning. Almekhlafi and Almeqdadi (2010) pointed out that during their research they discovered that the materials used to teach Arabic phonemic awareness were merely translations from the materials used in teaching English phonemic awareness and were adjusted to suit Arabic language.

From an AT perspective, although there has been a lot of advancement in this field in the UAE, there are limited studies regarding the actual implementation of AT in education and assessing the value of using AT with SEND students (Almekhlafi & Tibi 2012).

The researcher aims to put one of the first pieces of the education mosaic in the UAE in the area of Arabic reading skills and AT in an attempt to enhance the learning experience of SEND students in the UAE.

1.7 Thesis Structure

Chapter 1: Thesis introduction section. This chapter is dedicated for paving the way for the research and providing the reader with an overview of the study, the significance of researching this topic and the main areas that the researcher is intending to investigate.

Chapter 2: Literature review section. This chapter lays the foundation of the thesis by discussing the theories of reading and the previous studies that have similar research scopes as this study. It also portrays the essential concepts that will be used later on for results comparison.

Chapter 3: The present study section. This chapter highlights the methodology the researcher adopted in the study, the research tools, the participants' data and the methods of data collection. It also discusses the validity and reliability of the research methods and the ethical considerations.

Chapter 4: The results and discussion section. This chapter scrutinizes the findings of the present study and correlates these findings with the results of other studies discussed in the literature review. It also points out to the limitations of the study and their effect on the validity of the results.

Chapter 5: The conclusion section. This chapter stitches the main points discussed in the previous chapters and enriches the reader with the take-away gems from the study. It also provides suggestions for future research and portrays the researcher's personal reflections.

CHAPTER TWO

LITERATURE REVIEW

“When I look back, I am so impressed again with the life-giving power of literature. If I were a young person today, trying to gain a sense of myself in the world, I would do that again by reading, just as I did when I was young.” — Maya Angelou

2.1 Importance of Language and Reading

Human language is a complex system of conventional symbols used to articulate thoughts and facilitate communication between human beings. The language development is dependent on the cultural, social and historical contexts as well as the cognitive, biological, psychosocial and environmental factors (Catts & Kamhi 2005).

There are 5 main parameters that represent language: phonology, semantics, morphology, syntax and pragmatics (Catts & Kamhi 2005). Phonology is the characteristic of language that is related to the speech sounds and how these sounds can be combined and used in different word positions. The rules that governs the distribution of speech sounds in a word are different from a language to another. Semantics is the characteristic of language that is related to the meaning of individual words (i.e. lexical semantics) as well as the meanings from the relationship between the words (i.e. relational semantics). Morphology is the characteristic of language that is related to the grammar that modulates the meaning and tenses of the sentences. Syntax is the characteristic of language that is related to the combination of words to form meaningful components of phrases, clauses and sentences. Finally, pragmatics is the characteristic of language that is related to the use of language in a context such as greeting, inquiring, conversating and narrating.

According to Butler and Silliman (2008), language is a tool that allows people to analyze and synthesize what is heard or read in order to build new understandings and interpretations. The study of language involves the amalgamation of several disciplines such as linguistics, language science, developmental psychology, education, special education and learning disabilities.

Moreover, the skill of reading is one of the major learning components of literacy which requires the readers to acquire a necessary level of language decoding abilities in order to construct meanings and new understandings (Mosito, Warnick & Esambe 2017).

It is highly emphasized in the literature that reading is a skill that is not innately acquired nor a skill that is attained by listening and observing others (Phajane 2014). In addition, success of students in school is inextricably connected to the ability to read because students who do not develop their reading skills in their early learning stages would find it difficult to cope with the schools' curricula at upper grades (Schmidt, Rozendal & Greenman 2002). Therefore, it is of paramount importance to examine the theories of reading to understand how students learn to read in their early learning stages in order to implement effective reading strategies in classrooms (Carson 2012).

2.2 Theories of Reading

There is ample amount of literature that discuss theories of learning how to read and the process of word recognition. To encapsulate these theories, this section will describe and discuss 5 main word recognition models.

2.2.1 Dual-route Model

The dual-route is one of the first models the theorists proposed to describe how readers recognize words (Baron & Strawson 1976; Coltheart et al. 1993; Frederiksen & Kroll 1976; Morton & Patterson 1980). According to this model, the readers identify words and access their meanings through two separate processes: phonological route (sub-lexical route) and a visual route (orthographic route).

When a reader learns a new word, the word is stored in an internal lexicon which is similar to a mental dictionary a person possesses (Coltheart et al. 1993). The phonological route refers to the ability of the reader to segment the words into letters or group of letters then connect the graphemes (the letters) to the phonemes (the sounds of the letters) (Carson 2012). As a result of linking graphemes to phonemes, the reader is able to form a phonological representation of the word and access the internal lexicon to understand the meanings of the words (Invernizzi & Hayas 2011). The phonological route allows a reader to read pseudowords or words that has no meaning.

Alternatively, when a word is phonetically irregular or does not conform to regular sound to letter matching, the visual route is utilized where a reader links the shape of the words to access their meaning (Carson 2012). The visual route depends on how frequent the reader is exposed to the words and does not require phonological skills and letter-sound knowledge (Coltheart et al. 1993). Example of words that are recognized by the visual route are ocean and sugar (Invernizzi & Hayas 2011).

In the opinion of the dual-route model theorists, the phonological and visual routes are used interchangeably. For a beginner reader, the phonological route is used to read new and unfamiliar words but as the reader familiarizes with the words, the visual route is utilized

directly without the need to segment the word and match graphemes with phonemes (Carson 2012; Johnston & Watson 2005). This is an important finding in the literature since it highlights the importance of phonological awareness especially with beginner readers or students at their early learning stages.

Although the dual-route model was predominant, it faced several criticisms. Ehri (1992) argued that words which are irregular are partially regular. For instance, the word 'island' has a regular part 'land', a part which is not pronounced 's' and a part that is letter-name recognized 'i'. Moreover, Stanovich, Siegel and Gottardo (1997) and Manis et al. (1996) claimed that for children with reading disabilities such as dyslexia, they struggle in both phonological and visual routes.

Coltheart et al. (1993) and Invernizzi and Hayas (2011) pointed out that reading and word recognition utilize multiple routes and are not confined with the phonological and visual routes. This proposition opened the door to investigate the connectionist model approach.

2.2.2 Connectionist Model

The connectionist approach or the neural network modelling uses computational modelling to emulate the cognitive processes which involve the coordination of phonological, visual, semantic and linguistic processes (Plaut 2005).

Berninger et al. (1999) conducted a study using a connectionist framework to assess the effect of early intervention on 48 children at the end of first grade who have reading disabilities. They pointed out that students who just concentrated on learning phonics rules stumbled as they encountered unfamiliar words because the phonics rules they learnt apply for single letters and not for spelling larger units. They suggested that for beginner readers it is beneficial to teach

them spelling-sound connections of multiple units of 2 or 3 letters as well as the sounds of single letters. Also, they highlighted the benefits of learning vocabulary and activities that increase the knowledge of word meanings prior to reading new words in texts especially with children with low verbal abilities (Berninger et al. 1999).

Abbott et al. (1997) examined 16 children with reading disabilities during their second grade and experimented several methods of reading interventions such as phonological and orthographic (or visual) coding. They emphasized on the benefits of using a balanced approach which employs the phonological, orthographic and semantic connections. Interestingly, the researchers pointed out that children who suffer from impaired phonological awareness may improve with ‘phoneme deletion games’ whereas children who suffer from orthographic impairment may benefit from ‘looking games’ where students try to recall whole words, cluster of letters or color-coded word units.

Since most of these researches are bounded to the capabilities of the readers, it is of great significance to explore the process of reading development. Next section outlines the reading instruction from a developmental perspective.

2.2.3 Developmental Model

Based on the developmental model theorists, the ability to read and recognize words mature over time and is proportional to the readers’ increased awareness of oral and written language skills (Carson 2012). The main phases of reading development are: pre-reading, early reading, decoding and fluent reading (Ehri 2005).

Advanced readers are able to construct meaning while they recognize words in isolation as well as within texts which allows them to decode words from memory without the need to stop and break their train of thoughts (Ehri 2005).

There are various theories the developmental model researchers proposed. These theories vary in their number of developmental phases or stages but there are several areas of overlap between them. Among these developmental model theorists are: Gough and Hillinger (1980), Mason (1980), Marsh et al. (1981), Chall (1983), Frith (1985), Ehri (1998, 1999, 2002), Stuart and Coltheart (1988) and Seymour and Duncan (2001). Figure 1 portrays the different phases and areas of overlap between these developmental model theories (Ehri 2005).

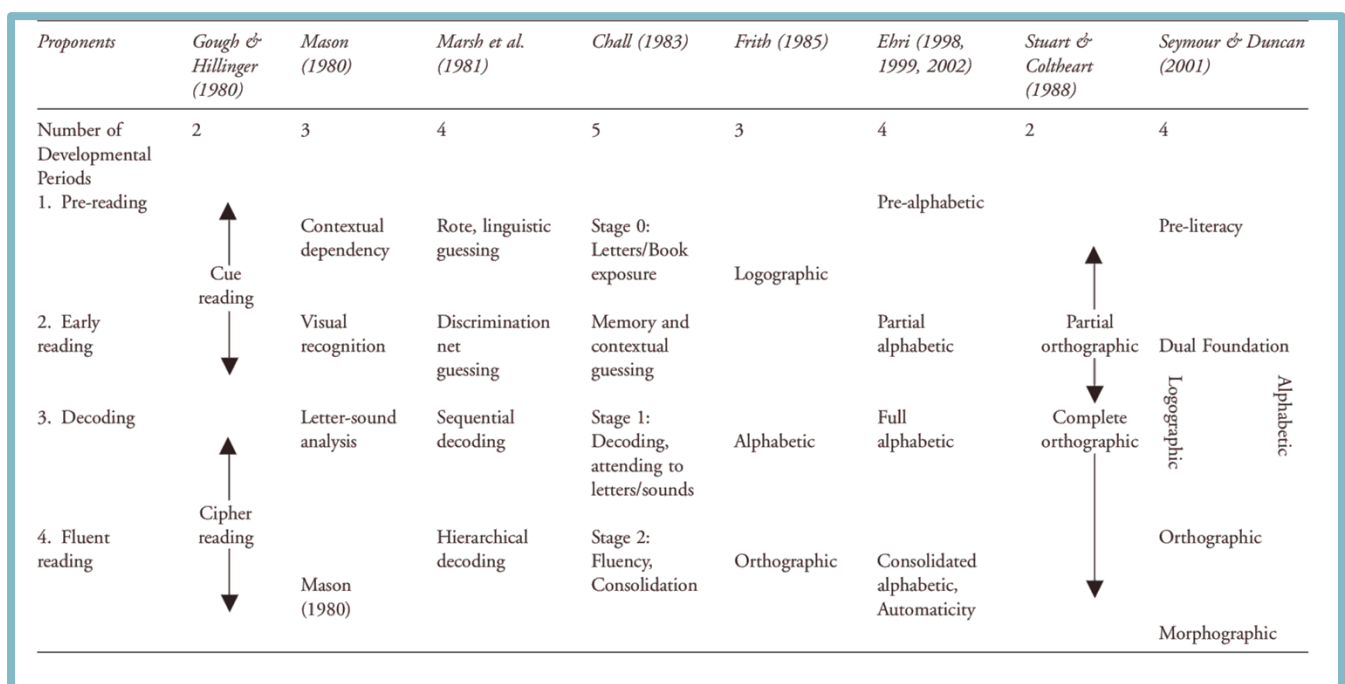


Figure 1: Developmental Model Theories

To further elucidate the developmental model, the key reading phases involve three stages: logographic phase, alphabetic phase and orthographic phase (Ehri 2005; Frith 1981; Seymour and Duncan 2001). The logographic phase is related to the readers' ability to recognize words on the basis of distinctive visual features. Moreover, the alphabetic phase is related to the

readers' ability to recognize words on the basis of letter-sound rules. In this phase, it is essential that readers develop their phonological awareness and phoneme-grapheme connections. Lastly, the orthographic phase is related to the readers' ability to recognize words on the basis of larger spelling units or morphemes such as 'ing' 'ed' without the need of using letter-sound rules which improves the speed and efficiency of reading.

Although recognizing individual words is crucial for developing reading skills, it is important to elevate the readers' skills to read words within a context of connected text (Carson 2012). Thus, reading instructions that focus on an interactive model and reading comprehension became of great interest.

2.2.4 Interactive Model

The interactive hypothesis stated by Rumelhart (1977) adopts the notion that there are two processes that occur simultaneously or alternatively: bottom-up and top-down. The bottom-up process is a data-driven method that involves converting letters into sounds to access meaning from memory whereas the top-down process is a conceptually-driven method that involves using semantics to access meaning (Kim & Goetz 1994; Rumelhart 1976). Consequently, according to Rumelhart's (1977) interactive theory, the phonological, orthographic, syntactic and semantic processes all interact in synergy to access the meaning from connected texts.

Stanovich (1980) modified Rumelhart's (1977) model into an interactive-compensatory model where the compensatory hypothesis considers the differences in the reading levels between individuals and indicates that the various processes of reading can compensate one another if a deficit occurs in one of them (Kim & Goetz 1994). For example, if a reader faces difficulties using the orthographic process this could be compensated by developing their phonological process.

2.2.5 Summary of Theories of Reading

To summarize, the theories discussed in this section were a brief outline of the models for learning reading and word recognition. There are numerous literatures written in this area over the past decades however the key information derived from this section is that to develop reading skills we require to nourish the readers' ability to use several processes such as phonological, orthographic and semantic routes. The phonological route refers to the ability of the reader to link letters (graphemes) to sounds (phonemes) and this process forms the basic pedagogical pillar of this research. In the next section, the researcher will highlight some of the causes for reading difficulties discussed in the literature in an attempt to pave the way for teachers to understand the hurdles students face when learning how to read.

2.3 Causes of Reading Difficulties

Understanding reading difficulties that learners face is a complex task and ample research have been conducted to identify and classify the causes of reading difficulties. From the perspective of educators and parents, knowing the causes of reading difficulties can help them adopt reading instructions that are tailored to the needs of the learners. This section will outline some of the extrinsic and intrinsic causes of reading difficulties reviewed in the literature.

2.3.1 Extrinsic Factors of Reading Difficulties

The extrinsic factors are the environmental variables that might cause reading difficulties such as lack of early literacy experience, inadequate opportunities to learn reading, low socioeconomic status and insufficient reading instruction (Catts & Kamhi 2005). Lawson (2012) underlined the significant influence of reading stories to children at home and its effect on the children's development in language as well as its influence on the children's reading achievement in later stages at school. Researchers also indicated that when children are exposed to print knowledge and phonological awareness at their early ages, they are more

likely to succeed in reading throughout their school years (Cunningham & Stanovich 1997; Feltorn 1998). Moreover, Catts and Kamhi (2005) indicated that children who get insufficient opportunities to read and who do not necessarily have a language disorder could be susceptible to reading difficulties since reading is the main source of vocabulary and advanced grammatical knowledge.

2.3.2 Intrinsic Factors of Reading Difficulties

The intrinsic factors are the internal variables that may sprout from a genetic or a neurological basis (Catts & Kamhi 2005). The cognitive-perceptual deficits stemming from these bases may include: visual-based deficits like poor visual memory and erratic eye movements, auditory-based deficits like difficulty in perceiving rapid changing sounds, attention-based deficits like Attention Deficit Hyperactivity Disorder (ADHD) and language-based deficits like inadequate phonological awareness (Catts & Kamhi 2005). The focus of this research will be language-based intrinsic reading difficulties with particular concentration on phonemic awareness.

The following sections will highlight some of the conditions that are diagnosed with language-based intrinsic reading difficulties such as down syndrome, mild intellectual disability, cerebral palsy and borderline intellectual functioning.

2.3.3 Down Syndrome and Reading Difficulties

Down syndrome is considered one of the most common genetic disorders that cause intellectual disabilities with a particular effect on the language capabilities (Verucci, Menghini & Vicari 2006). Byrne, McDonald and Buckey (2002) conducted a 2 years study on 24 children aged between 4 and 12 years old who were diagnosed with down syndrome and were attending mainstream schools. The main aim of the study was to assess the development of the reading skills of students with down syndrome. They selected 2 control groups of typically developing

students from the same schools receiving the same educational curriculum. One control group consisted of students matched with the same reading age and the other group consisted of average readers. Results revealed that down syndrome students progressed with their reading skills over the 2 years, however, their mean reading age was significantly behind their peers in the control groups. Moreover, students with down syndrome were able to read isolated words but found difficulty in passage comprehension. The researchers concluded that children with down syndrome can be taught reading however they highlighted that there is no evidence that these students will improve in their language or memory skills. These results agreed with Fletcher and Buckley's (2002) findings where they assessed the reading skills of 17 children with down syndrome and reported that the students were able to read individual words but were unable to comprehend passages.

Verucci, Menghini and Vicari (2006) investigated the reading skills and phonological awareness of 17 individuals with down syndrome and compared their results with 17 typically developing children with mean chronologic age of 7 years old. They indicated that both groups achieved similar scores for syllable blending and first syllable recognition tasks however the down syndrome individuals performed lower on rhymes, syllable segmentation and syllable deletion. They indicated that lower performance in these tasks is because they require high phonological processing.

Abu Khadra (2013) conducted a study on 16 children aged between 3 and 6 years old who were diagnosed with down syndrome and who attended a special needs school in Lebanon. She investigated an early intervention reading program designed to teach students with down syndrome reading the Arabic language. Interestingly, she mentioned that students with Down syndrome are visual learners and they showed remarkable strengths in word identification tasks since they require the use of visual memory.

2.3.3 Mild Intellectual Disability and Reading Difficulties

According to the National Academies of Sciences, Engineering, and Medicine (2015), mild intellectual disability is the most common intellectual disability compared to moderate, severe and profound cases. Mild intellectual disability constitutes of about 85% of the intellectual disability cases and individuals in this group have approximately an Intelligence Quotient (IQ) range of 50 - 69.

Allor et al. (2009) examined the effect of reading intervention on 3 students between the ages of 6 - 9 with IQs (44, 55, 63) for a period of 3 years. The five main reading intervention areas were vocabulary, phonological awareness, phonics and word recognition, fluency and reading comprehension. Their study highlighted that the teaching methods that are effective for children with high IQ ranges were also successful for children with mild intellectual disabilities.

Allor et al. (2010) explored the effect of reading instruction on 59 students with intellectual disabilities who have IQs in the range of 40 - 69. They concluded from their study that for students with mild disabilities, the reading instructions should be very comprehensive and explicit and that these students require longer period of time to learn the basic reading skills.

Wise et al. (2010) concluded from a study that involved 80 elementary school students with mild intellectual disabilities that the phonological processing is correlated with the students' ability to read and their reading performances.

Finally, Alnahdi (2015) highlighted that for mild intellectual disability it is crucial that the teachers focus the scope of their reading instructions to one reading skill at a time.

2.3.3 Cerebral Palsy and Reading Difficulties

Cerebral palsy or brain paralysis is a multiple motor disorder that is caused due to a damage in the brain either before, during or after birth (Miller & Bachrach 2017). Cerebral palsy may cause implications on several areas such cognition disabilities, learning disabilities, visual impairments, hearing impairments and communication disorders (Miller & Bachrach 2017).

Gillies (2017) collected the data of 3944 children in New South Wales state in Australia and reported the educational data of 1770 children with cerebral palsy. During the period from 2010 to 2014 they found out that about 33% of the children with cerebral palsy attended special education school and 67% attended regular education school. The researchers stated that the results of the reading and numeracy standardized tests of the children with cerebral palsy revealed that 50% of them were exempted from the standardized tests due to their inability to take the tests however one third of them were able to score within the reading and numeracy normal range.

Card and Dodd (2006) conducted an interesting study to compare the phonological awareness of children with cerebral palsy who can speak with children with cerebral palsy who cannot speak. Their findings indicated that the children with cerebral palsy who can speak performed better in phonological awareness tasks that included rhymes, syllable segmentation and phoneme manipulation. They also highlighted that the phonological awareness performance of the non-speaking group varied according to the mental processing required to perform the task. Moreover, Critten, Messer & Sheehy (2019) stated that the children with cerebral palsy who have impairments in verbal communication would have difficulties in reading and spelling. However, they noted that the learning profile of children with cerebral palsy depends on the severity and location of the damage and the paralysis in their brain therefore it cannot be assumed that all of the cerebral palsy children have similar cognitive abilities.

Critten, Messer & Sheehy (2019) selected 15 cerebral palsy students out of 60 cerebral palsy students attending 2 special education schools who were between 6 and 11 years old. The selection was according to the students' ability to speak, ability to see (with glasses if required) and their ability to perform the tasks without the need for communication devices. They discovered that one third of them were able to score within an age appropriate reading range and that cerebral palsy students with high reading scores had better phonological abilities such as phoneme segmentation. They also suggested that reading instruction for this group should include the use of visual memory and spatial relationships in order to develop their reading skills.

2.3.3 Borderline Intellectual Functioning and Reading Difficulties

The borderline intellectual functioning is a condition used to describe individuals who have IQs on the border between the IQ of people with intellectual disability and the IQ of people with normal intellectual functioning (Wieland & Zitman 2016). Their IQ range is approximately between 71 and 85 and about 13.6% of the population are assumed to be in the range of borderline intellectual functioning (Wieland & Zitman 2016).

Di Blasi et al. (2014) highlighted that children and adolescents with borderline intellectual functioning often face difficulties in their everyday lives, in their academic achievements and their occupational functioning due to their slow learning process and poor attention in comparison with typical developing children and adolescents of the same chronological age. The researchers stated that students with borderline intellectual functioning may show poor reading fluency and reading comprehension however they are often not properly diagnosed or are not offered appropriate reading interventions.

Di Blasi et al. (2019) conducted a study to investigate the reading skills of 106 children with borderline intellectual functioning and 168 children with mild intellectual disability. Both groups consisted of students from second to eighth grades. The researchers focused on three areas of reading: reading fluency, reading accuracy and reading comprehension. They used standardized tests to compare the results of these two groups with the results of typical developing children. They revealed that both groups scored lower than the typical developing children depending on the severity of their intellectual disability however the borderline intellectual functioning group were better in performance than the mild intellectual disability group. They noticed that the children in both groups had the greatest difficulty in the reading fluency especially at older grades.

Furthermore, Allor et al. (2014) implemented a study on 141 students in grades 1 to 4 with IQ range between 40 and 80 to study the effect of long-term reading intervention program on their reading skills including their phonological processing, vocabulary, word identification and fluency skills. The 141 students were assigned to 2 groups: the treatment group and the contrast group to observe the differences in their performances. There was a total of 20 verbal borderline intellectual functioning students; 10 in the treatment group and 10 in the contrast group. The researchers revealed that in general the treatment groups performed better than the contrast groups with the borderline intellectual functioning students scoring mostly higher than the other students. They emphasized on the importance of recognizing borderline functioning students in regular education schools as well as supporting teachers in modifying their reading instructions to tailor them to the borderline students' learning requirements.

2.4 Models of Literacy Instruction

In the past, there has been a dispute between 2 methods of literacy instruction: the whole-language instruction and phonics instruction. Recently, the researches converged into emphasizing the significance of using a balanced approach that utilizes both the whole-language and the phonics literacy instructions to implement reading instructions that can suit diverse students in classrooms (Carson 2012).

The whole-language reading instruction encourages readers to use semantics, prior knowledge of words, text context and text structure to extract the meaning of words (Moats 2000; Pressley 2006). In contrast, the phonics reading instruction encourages readers to connect letters and sounds to derive meaning (Walker 2008). Examples of phonics-based instruction are combining letter-sound connections to form words as well as identifying, segmenting and blending consonants, syllables and rhymes (Walker 2008). A balanced literacy approach amalgamates the whole-language and phonics-based instructions which allows learners to adopt several reading strategies where they can benefit from phonics-based instructions when dealing with unfamiliar words rather than just relying on context meaning (Gaskin 2011).

2.4.1 Elements of Reading Instruction

The National Reading Panel (NRP) examined researches in the area of reading instruction for students in grades K-12 and issued a report outlining reading strategies for teachers to adopt (Shanahan 2005). The five components of reading instruction derived by the NRP are: phonemic awareness, phonics or print awareness, oral reading fluency, vocabulary and reading comprehension.

Phonemic awareness is the capability to hear and manipulate sound units such as syllables, onsets and phonemes that affect the meaning of words (Browder et al. 2009). For example, the

word ‘bike’ /b/ /I/ /k/ and the word ‘cat’ /c/ /a/ /t/. The ability to hear and identify these phonemes is essential especially for early learners because it prepares them to make the connections between letters and their sounds (Shanahan 2005). Teachers may use songs and games to develop this skill particularly for students in kindergarten and first grade.

Phonics or print awareness is the ability to correspond printed words to speech i.e. translating printed text into pronunciation (Browder et al. 2009). Reading activities such as dictation and spelling words based on the letters’ sounds are beneficial for students at various ages (Shanahan 2005).

Oral reading fluency is the ability to decode meaning from text accurately and automatically without the need to slowdown in order to connect letters and their sounds (Pikulski & Chard 2005). One of the reading activities that help students improve their oral reading fluency is using flashcards where students are rewarded when reading words faster and correctly (Al Otaiba & Hosp 2004).

Vocabulary is the ability to understand the meaning of words and the relationship between concepts in order to achieve comprehension (Beck, McKeown & Kucan 2013). Teachers may improve students’ vocabulary by reading activities such as completing the sentences, engaging with passage reading and linking words to pictures (Browder et al. 2009).

Finally, reading comprehension is the ability to interact with the text and interpret, extract and construct meaning (Snow 2002). Teachers may use comprehension reading strategies such as asking questions, predicting story events and ask students to retell stories using picture sequencing (Browder et al. 2009).

2.4.2 Summary of Models of Reading Instruction

In this section, the researcher outlined the three major categories of reading instruction: whole-language, phonics instruction and balanced instruction. Also, the researcher discussed the 5 elements of reading instruction: phonemic awareness, phonics or print awareness, fluency, vocabulary and comprehension. In the next section, the researcher will further explore one of the areas of reading instruction which is phonemic awareness.

2.5 A Contextual Lens on Phonemic Awareness

2.5.1 The Role of Phonemic Awareness in the Process of Learning to Read

Phonemic awareness is a skill that requires the reader to have the ability to hear and manipulate the sound structure of words and acquire syllable, rhyme and phoneme awareness to be able to decode texts and access meaning (Carson 2012; Gillion 2004).

Researchers emphasized on the fundamental role of phonemic awareness especially at early learning stages as phonemic awareness is considered an important prerequisite for reading and a predictor for reading difficulties (Justice 2006; Nelson 2010). When assessing reading difficulties with children, researches illustrated that a lot of these children have inadequate phonemic awareness skills (Catts et al. 1999).

2.5.2 Levels of Phonemic Awareness Development

Phonemic awareness is a skill that develops over time. According to Schuele and Boudreau (2008), children at early learning stages recognize syllables and rhymes which are the larger units of words and then begin to recognize smaller units such as phonemes. Researchers postulate that at the age of three and four, children start to develop their syllables awareness. By the age of four and five, the children's rhyme awareness starts to emerge (Carson 2012). Children then start to recognize the first sound in a word and develop phoneme-level skills at

the age of four and five and continue to develop their phonological awareness skills as they grow (Dodd & Gillon 2001; Lonigan, Schatschneider & Westberg 2008). Knowing the stages of phonemic awareness development is crucial for assessing and monitoring the reading performance of children (Gillon 2004).

2.5.3 Assessing Phonemic Awareness Instruction

There are several methods for measuring and assessing phonemic awareness discussed in the literature. Catts et al (1997) conducted a research to document the reading activities related to assessing and measuring phonemic awareness and have discovered over 20 tasks. They classified these tasks under 3 main classifications (Catts & Kamhi 2005): phoneme segmentation, phoneme synthesis and phoneme comparison.

Phoneme segmentation are the tasks which involve pronouncing, counting, deleting and adding phonemes and reversing sounds in a word. Phoneme synthesis are the tasks which involve blending individual phonemes to form a word. Phoneme comparison are the tasks which require children to compare the phonemes in different words.

Examples of activities related to assessing phonemic awareness arranged according to the difficulty of the tasks are in Appendix A.

Integrating phonemic awareness reading instruction into schools' curriculum is essential for the development of reading skills (NPR 2000). To reap the benefits of reading instruction, researchers suggest that systematic and explicit phonemic awareness instruction is most effective at early learning stages and can be transferred to students via simple, short, and fun tasks (Shanahan 2005). Also, researchers recommend assessing children's phonemic awareness levels multiple times through their learning development (Catts & Kamhi 2005).

2.5.4 Summary of Instruction in Phonemic Awareness

In this section, the researcher underlined the role of phonemic awareness instruction, its different levels of development and methods of assessing phonemic awareness. In the following section, the researcher will highlight the relevance of this research to the Arabic language.

2.6 Phonemic Awareness from Arabic Language Perspective

The Arabic language is one of the languages that are characterized by a linguistic phenomenon called diglossia which refers to the characteristic that the language has 2 level of formality or styles (Ferguson 1959). In Arabic, there are two types of language styles: Modern Standard Arabic (MSA) and Spoken Arabic Vernacular (SAV). MSA is the style of language used in formal Arabic speeches and writings such as newspapers and books whereas SAV is the style used in informal communication between people (Al-Sulaihim & Marinis 2017). MSA is acquired through formal education in school and is common between all dialects of Arabic i.e. the formal Arabic language is identical in the language components regardless of the differences in SAV between countries and dialects (Al-Sulaihim & Marinis 2017). The diglossia in Arabic language may pose difficulties in learning reading and acquiring phonemic awareness due to the gap between MSA and SAV since children are exposed to SAV at home prior to learning MSA at school (Abu Rabia and Taha 2006; Saiegh-Haddad et al. 2011; Taha 2013).

In studies related to Arabic phonemic awareness, the researchers based their studies on measuring and assessing the reading tasks in MSA style. Most of these studies cited literature from the English language to explain phonological awareness and reported similar findings as the English phonemic awareness studies in terms of the importance of this skill in reading proficiency especially in early learning stages (Al-Sulaihim & Marinis 2017). Also, these

researchers used similar measures and tasks to assess Arabic phonological awareness as the English literature. Examples of tasks cited in these Arabic studies are letter-sound recognition, initial sound identification, rhyme awareness, phoneme segmentation, phoneme position and syllable deletion (Abu-Rabia & Taha 2004; Al Mannai & Everatt 2005; Al-Sulaihim & Marinis 2017; Saeigh-Haddad 2007; Tibi 2010).

However, Arabic language have different language structure than English language and very few studies talked about the structure of the written language and how that affects the Arabic phonological awareness. An interesting study by Abu-Rabia and Taha (2004) highlighted that the reading errors in reading Arabic language may occur due to the alteration in shape of Arabic letters when placed at the beginning, middle or end of words. In addition, he pointed out that the differences in the number of dots on some letters, the diacritical markers that contribute to the Arabic phonological awareness and the combination of consonants and vowels in Arabic words also pose difficulties in reading in Arabic. Furthermore, Abu-Rabia (2001) stated that an advanced reader has to acquire the ability to vowelize the end phoneme in words according to their grammatical role in a sentence which requires advanced Arabic phonological awareness levels.

In the UAE, Tibi (2005) conducted a study to examine teachers' Arabic phonemic awareness in terms of their knowledge and skills. Tibi (2005) indicated that there is a lack in Arabic teaching material and Arabic literature that focus on phonics, rhymes and phonemic awareness. Moreover, Tibi (2005) highlighted that teachers in special education stream and regular stream receive similar university-level education which are mainly focused on the knowledge acquisition rather than the practical skills. Thus, Tibi (2005) underlined that teachers require phonemic awareness training to improve their teaching skills in this area.

In the next section, the researcher will explore the use of AT in teaching reading skills to students with learning disabilities.

2.7 Using AT to Teach Reading Skills

2.7.1 Overview of AT

AT are the equipment and devices used to compensate the functional weaknesses of SEND students in order to improve their ability to learn (Alnahdi 2014; Coyne et al. 2012; Katsioloudis & Jones 2013; Tamakloe & Agbenyega 2017). Researchers highlighted the importance of exposing teachers to AT in order to implement these technologies in classrooms and help SEND students overcome their academic difficulties (Mull & Sitlington 2003).

There are various types of disabilities mentioned in studies that focused on using AT in improving literacy. Some of these disabilities include multiple disabilities, intellectual disabilities, physical disabilities, developmental disabilities, down syndrome, vision impairment, deaf or hard of hearing and autism (Coyne et al. 2012; Coulon 2015).

SEND students with intellectual disabilities encounter difficulties in learning, reasoning, problem solving as well as in practical and social skills (Verdugo Alonso 2010). AT provide reading intervention assistance through computer-assisted instruction that includes scaffolding skills, systematic direct instruction, prompting features, repetitive practice and wide variety of applications that use multiple ways of representing and communicating information such as video and audio features (Blachburn 2018; Coulon 2015; Lucas 2015; Scruggs 2008). Selecting appropriate AT and aligning the use of AT with the curriculum to provide reading instruction for SEND students are important processes because students vary in their disabilities and educational needs (Blachburn 2018).

2.7.2 AT and Reading Skills

Chera and Wood (2003) designed a software that contains 6 animated multimedia talking books that focus on promoting children's phonological awareness. They examined 75 children with reading difficulties in the age of 3 to 6 years old, 15 of them were in the control group. They used several methods to measure the phonemic awareness such as the British ability scales word testing and visual and auditory letter-sound awareness tasks. The children exposed to the talking books showed significant improvements in phonemic awareness than the control group.

Furthermore, there are several studies that used AT to improve the reading and writing skills of students with intellectual disabilities. Example of AT used are: Pentop Computer FLYPen by LeapFrog (Doughty et al. 2013), iPads and electronic books (Miller, Krockover & Doughty 2013), computer-assisted instruction for spelling in a multi-touch tablet (Purrazzella & Mechling, 2013), DynaVox® Speech Generator (McMillan & Renzaglia 2014) and Computer-Assisted Simultaneous Prompting (CASP) for Sight Words (Coleman et al. 2015).

2.7.3 AT from a UAE Perspective

In the UAE, there are several education policies that highlight the importance of utilizing technologies in teaching SEND students and training educators on these technologies such as Dubai Inclusive Education Policy Framework (Knowledge and Human Development Authority 2017). Moreover, there are laws that were issued to support the merge of SEND students into regular education classrooms such as Federal Law 29/2006 (Ministry of Education Special Education Department 2006). However, very few studies were conducted to examine the effect of using AT with SEND students in UAE.

Almekhalifi and Tibi (2012) carried out a study in 5 Emirates in the UAE (Ajman, Ras Al Khaimah, Sharjah, Dubai and Fujairah) to scrutinize the use of AT in teaching SEND students.

Their participants were teachers specialized in special education and speech therapy who work in special need centers and special education classrooms. One of their outstanding findings is that there is a lack in the quantity and quality of the software programs used for SEND students and most of the AT devices were for commercial purposes rather than educational purposes. Moreover, Almekhalafi and Tibi (2012) pointed out that most of these AT devices were used to teach the alphabets and vocabulary and they did not find any AT devices used for improving phonemic awareness designed for SEND students. These results raise a red flag on the importance of amending the design of the AT devices in order to have a meaningful purpose in the learning development of SEND students especially from a literacy point of view.

2.7.4 Summary of AT and Reading

In conclusion, the researcher articulated some of the findings that are related to the use of AT. It is evident that - in the UAE - there is a lack of studies examining the use of AT in educational contexts that involve teaching SEND students reading skills like phonemic awareness. In the next section, the researcher will outline important characteristics that AT devices have to include in their design in order to support literacy skills.

2.8 Important Characteristics of AT

The Universal design for Learning (UDL) is a scientifically valid framework which provides principles for designing flexible programs that supports the needs of SEND students (Rose & Meyer 2002). Universally designed AT devices provide activities and materials that support 3 main areas. Firstly, UDL provides multiple ways of representing the content like text to speech, electronic Braille, digital talking books and video and audio features. Secondly, UDL offers multiple features that allow the learners to demonstrate their understanding and indicate their progress like prompting features. Thirdly, UDL supports multiple ways of engaging the

learners with the material via appropriate challenges that motivate the learners (Wehmeyer 2006).

Moreover, AT devices have to be flexible, simple to use, require minimum physical effort, tolerate errors, designed in an appropriate size and can be stored in an appropriate space for easy access (Alnahdi 2014).

Butler and Silliman (2008) indicated that both the language specialist and the learner have to understand how to use the technology to improve the learners' literacy skill. They highlighted that language specialists have to incorporate the use of the technology-based methods in the literacy development of the learners.

Since teachers are the main players in the effective use of AT, it is essential to probe the teachers' appetite towards using these technologies in classrooms.

2.9 Teachers' Opinions on AT: Pros, Concerns and Challenges

In several studies, teachers encouraged the use of AT in classrooms and illustrated that using AT could assist with academic success given that the AT is selected according to the SEND students' learning needs (Tamakloe & Agbenyega 2017). Edyburn (2006) and Kozulin (1998) articulated teachers' views on using AT by stating that these devices can be used as educational tools that help SEND students in engage in purposeful learning and interact with their teachers.

Furthermore, teachers recommended that SEND students engage in cooperative learning experiences when using AT so that they improve their social skills and they don't get isolated when working with these devices (Fleer 2010; Rogoff 2003). Also, Parette et al. (2009)

accentuated the important role of AT in increasing the confidence and independency of SEND students especially in early interventions.

Almekhalifi and Tibi (2012) examined teachers' perceptions on using AT in the UAE and indicated that special education teachers showed positive attitude and willingness to use AT to support SEND students. The special education teachers examined in this study highlighted the effect of using AT in improving their teaching techniques as well as in increasing the motivation and engagement of SEND students which may reflect positively on their academic achievement.

Moreover, studies conducted to probe the special education teachers' views on using AT portrayed that teachers and administrators have to receive adequate amount of training to acquire the knowledge and skills regarding available AT and their uses in educational contexts (Edyburn 2005). Likewise, SEND students and their caregivers require assistance in the selection of the AT devices which are tailored to their needs. They also require support and training in using the AT devices to successfully incorporate AT into the teaching and learning processes (Edyburn 2006; Parette et al. 2007).

In addition, Nguyo (2015) pointed out that the underuse of AT devices might be due to the unwillingness of the SEND students to use these AT devices, the poor performance of these devices and the lack of awareness and knowledge on how to use AT devices. Mull and Sitlington (2003) indicated that the availability and the high costs of the AT devices can become a barrier in using AT devices in schools.

Almekhalifi and Tibi (2012) highlighted that one of the main obstacles of using AT is that SEND students were not trained on how to use and manage their AT devices. Also, lack of

professional training, administration support and technical support were also found as hinders to the success of AT devices implementation.

2.10 Summary

To summarize, the literature review opened the door for ploughing new fields of understanding. The researcher addressed the importance of language and reading, the theories of reading, the causes of reading difficulties, the importance of phonemic awareness in reading instruction and the effect of using AT. Moreover, the researcher highlighted the concerns and challenges that teachers face when using AT to teach SEND students. In the following section, all of these concepts will be intertwined in order to scrutinize the effectiveness of using Lughati tablets as AT with SEND students in SCHS.

CHAPTER THREE

THE PRESENT STUDY

“Methodology should not be a fixed track to a fixed destination but a conversation about everything that could be made of happen” — J. C. Jones

3.1 Methodology

In the present study, the researcher used a mixed method approach in an attempt to encompass several aspects of the research such as the effect of using the Lughati tablets on SEND students, probing the opinions of the teachers who supervise these SEND students as well as gathering their recommendations.

The quantitative method involves measuring the effect of the Lughati tablets by assigning 21 tasks and evaluating the SEND students' achievement over a period of time. These tasks are related to the Arabic reading skills such as Arabic phonics and are assigned in the Lughati tablets. The selection of the Lughati tasks and the criteria used for this evaluation were based on several meetings with the educational and IT supervisors. In addition, the observation of SEND students' during the period of the research and the evaluation of the student's capability of achieving the tasks were done by the teachers in SCHS.

On the other hand, the qualitative method comprises of the teachers' inputs through a focus group interview with the teachers supervising the SEND students and an interview with the educational supervisor. The interviews aim to highlight the teachers' perceptions regarding using Lughati tablets with their SEND students in SCHS.

3.1.1 Participants

The 4 main groups participating in the research were the SEND students, the teachers supervising these students, the educational supervisor and the IT supervisor. The educational supervisor is in charge of managing and directing the teachers who work in SCHS whereas the IT supervisor is responsible for administering the use of Lughati tablets and assisting the teachers during their lessons. SEND students are from both genders whereas the teachers, the educational supervisor and the IT supervisor are female participants.

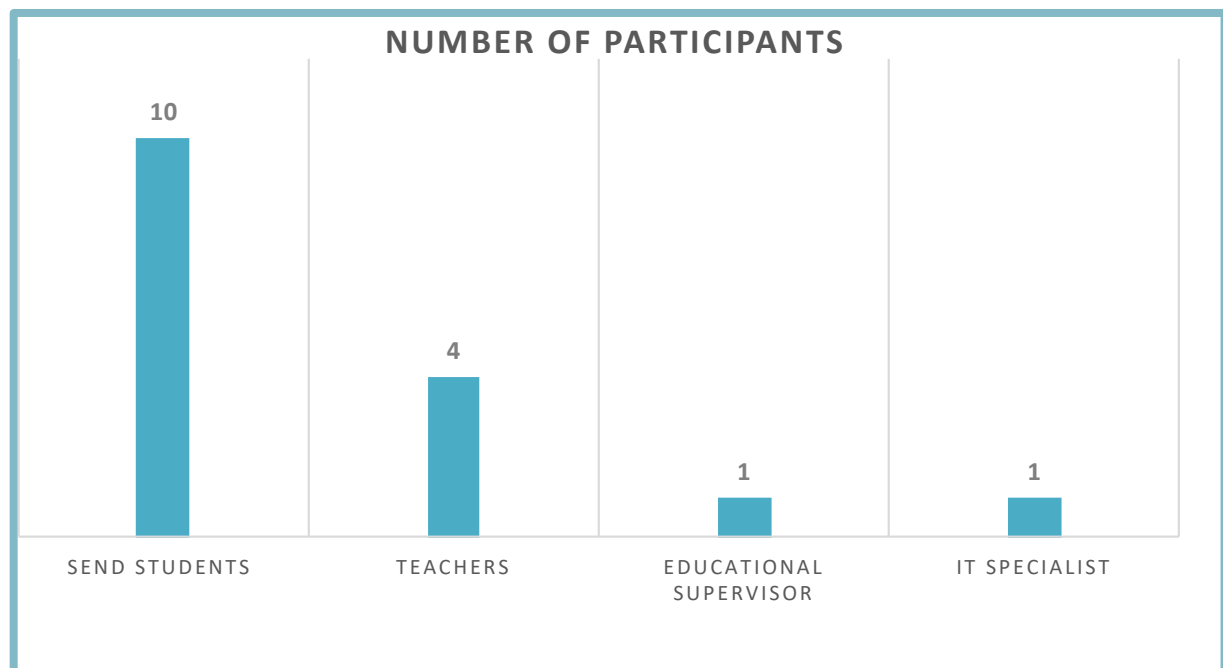


Figure 2: The Study Participants

3.1.1.1 SEND Students

A sample of 10 students with different types of special educational needs and disabilities were selected for this study from a total of 71 student in AlWafa School in SCHS who were using Lughati tablet as a part of their learning development plan. The selected students are between the ages of 6 -10 years old and each student has his/her own learning objectives tailored to the students' capabilities.

In this study, the SEND students have 4 types of disabilities: down syndrome, cerebral palsy, mild intellectual disability and borderline intellectual functioning. The chart below shows the distribution of the students according to their disabilities.

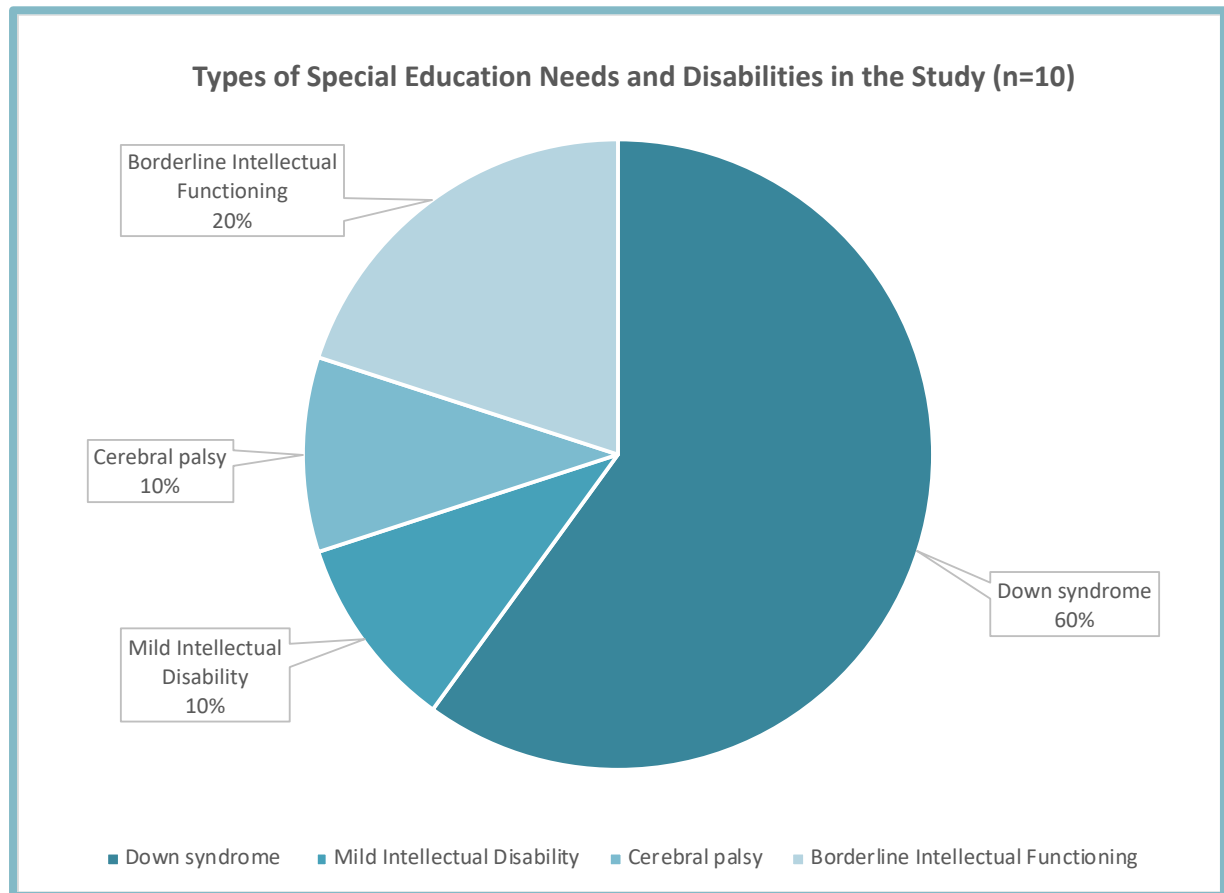


Figure 3: Types of SEND students' Disabilities in the Study

This sample of SEND students was selected after an initial assessment done by the educational supervisor prior to the beginning of the research. The initial assessment was used to filter the 10 participants from the pool of 71 student on the basis of their learning objectives since the research is mainly focused on reading skills. Moreover, the students were also chosen according to their level of their receptive and expressive language, the degree of disability and their capability of using the tablets. Examples of the selection criteria are the students' capability of expressing what they learnt during the Lughati training sessions, their ability to

hold the tablet and move their fingers on the tablets' screens and their ability to understand the required tasks from them.

In particular, the SEND students who were diagnosed with borderline intellectual functioning were chosen for this research because the teachers were training them to enroll in regular education schools and were in the process of parting from SCHS.

After the initial assessment and the selection process, the nominated SEND students were trained on using the Lughati tablet and getting familiarized with the Lughati application features before incorporating the phonics and phonological awareness skills into their learning plan.

3.1.1.2 Teachers

4 teachers were training, observing and evaluating the sample of SEND students in the research. The table below shows some of their demographic information:

Teacher	Academic Qualification	Number of Years in Teaching Profession	Age
A	Bachelor's in literature and Education (Arabic and Islamic Concentration) Diploma in Special Education	8	30 - 40
B	Bachelor of Science (Family Science)	1	Not Stated
C	Bachelor's in literature (Arabic and Islamic Concentration)	11	20 - 30
D	High School	14	30 - 40

Table 1: Teachers' Demographics

3.1.1.3 Educational Supervisor

The educational supervisor played a vital role in the study since she was the main contact point between the researcher and the participants in the study. The educational supervisor was closely observing the utilization of the Lughati tablets and linking the SEND students' learning objectives to the Lughati tablet features.

Moreover, she was also responsible for selecting the tasks and the evaluation criteria and communicating the learning and teaching requirements to the teachers and IT supervisor.

Educational Supervisor	Academic Qualification	Number of Years in this Profession	Age
A	Diploma of Education and Educational Rehabilitation	20	40 - 50

Table 2: Educational Supervisor's Demographics

3.1.1.4 IT Supervisor

The IT supervisor was in charge of administering the use of Lughati tablets, managing the software updates, putting the tablets in the charging banks and training the teachers on using the tablets.

She also took part in the process of selecting the Lughati app features related to the phonics and phonological awareness tasks.

IT Supervisor	Academic Qualification	Number of Years in Teaching Profession	Age
A	Diploma in Special Education	15	30 - 40

Table 3: IT Supervisor's Demographics

3.2 Methods of Data Collection

To scrutinize the research questions, there are 3 main streams of data collected from the participants: the SEND students' assessments, the focus group interview and the educational supervisor interview.

3.2.1 SEND Students' Assessments

There are 2 major evaluation points that were carried to assess the selected sample of students. The first was in January 2019 and the second was in June 2019. Between January and June, the students were using Lughati tablets to learn and practice tasks that involve phonics and phonological awareness skills.

Table 4 shows the 21 criteria used for the evaluation process in January and June 2019. These criteria were created by the educational supervisor and teachers and were linked to each of the students' learning objectives during the academic year. The SEND students were graded according to his/her capability of completing the tasks within the allocated training session. All of the tasks below were performed using the Lughati tablet.

N	Criteria (Assessed in January 2019)
1	The student is capable of opening the tablet alone when requested
2	The student is capable of holding the tablet with his/her hands
3	The student is capable of choosing the educational program in the tablet that he/she is assigned to work on
4	The student is capable of completing the shapes by moving his/her finger on the screen and following the arrows
5	The student is capable of listening to the stories and tracking the words with the embedded narration in the tablet
6	The student is capable of moving to the next page by clicking on the arrows on both sides of the screen
7	The student is capable of selecting the right color for painting the assigned drawings in the tablet
8	The student is capable of constructing a whole picture from smaller pictures (Ex: Jigsaw puzzles in the tablet)
9	The student is capable of matching an image with its shadow on the tablet
10	The student is capable of listening and seeing the letter songs on the tablet
11	The student is capable of moving his/her finger on the Arabic letters on the tablet's screen (drawing the letters)
12	The student is capable of constructing the shape of the letters from smaller pieces (drawing the letters on the tablet)
13	The student is capable of matching colors (Ex: matching blue color with blue color on the tablet)
14	The student is capable of linking the colors with the images on the tablet
N	Criteria (Assessed in June 2019)
15	The student is capable of selecting the correct consonant and vowel marks and placing them on the letters of the assigned words on the tablet
16	The student is capable of selecting the correct long vowels to complete the word
17	The student is capable of constructing a word from letters
18	The student is capable of choosing the images that starts with the assigned letter from the letters' train
19	The student is capable of splitting the word into syllables
20	The student is capable of choosing the correct box to disclose the image that matches the assigned image (memory game)
21	The student is capable of free-drawing using the tablet

Table 4: SEND Students' Evaluation Criteria

Although several studies discussed in the literature review mentioned several tasks and methods for assessing phonemic awareness instruction, Arabic norm-referenced tests are lacking and most of the researchers were developing their own experimental measures to test phonics and phonemic awareness. In addition, each SEND student selected in the present study has his/her own learning requirements which makes it difficult to derive assessment tools from past studies and apply these tools on them. Moreover, since all the tasks are practiced and evaluated within the Lughati tablets, the tasks and assessments were chosen in congruence with the features of the tablet.

3.2.1.1 Lughati Tablet Overview

The Lughati tablet is a Samsung tablet which is covered by a purple elastic shock absorbing cover which protects the tablet from any physical damages. The tablets are stored in the charging banks provided by Lughati and are kept in the IT supervisor office.



Figure 4: Lughati Tablets Stations

All Lughati tablets have an application called ‘Horouf’. Horouf is a part of Kalimat Group and was launched in 2013 to create interactive print and digital Arabic publications used as educational tools for children. Horouf application is very simple to navigate and has several features that support learning the Arabic language in an engaging way such as using rhymes

and songs, interactive characters, fun games and drawing tools. On Lughati's main website, there is a teacher's portal where they can access all the tutorials on the various features available in the Horouf application and learn how to use them (Lughati.ae, 2019). Lughati also provides technical support to the schools in case there are some damages to the tablet.

Figure 5 shows the main page where the students can choose which area they want to learn. Examples are the Big Book (contains story books with the function of listening to the narration, recording students' voices and learning vocabulary), the Leveled Readers (contains story books for beginners and advanced learners), the Family Letters (includes interactive videos and songs about



Figure 5: Lughati Tablet and Horouf App main page

the Arabic letters, exercises on writing the letters and interactive games such as the Letter Train), the Phonics (contains videos, exercises and games about the Arabic phonics such as segmentation of words and selecting the correct diacritical markers, consonants and vowels in a word), the Grammar (contains exercises for advanced learners such as vowelizing words according to their position in sentences) and My Own World (for free writing and drawing).

3.2.1.2 Selecting the Tasks

The researcher conducted a meeting with the educational supervisor and the IT supervisor to select the appropriate tasks within the Lughati tablets. For the current study, 2 main features of Horouf application were used: Family Letters and Phonics.

The tasks selected are in accordance with the tasks discussed in the literature review which are mainly related to phoneme segmentation, phoneme synthesis, phoneme comparison, letter sound recognition, initial sound identification and rhyme awareness (Abu-Rabia & Taha 2004; Al Mannai & Everatt 2005; Al-Sulaimi & Marini 2017; Catts & Kamhi 2005; Saeigh-Haddad 2007; Tibi 2010). The assessment criteria the researcher used to investigate the SEND students' capabilities in performing the assigned tasks are 10, 11, 12, 15, 16, 17, 18 and 19 (refer to table 4). The other assessment criteria such as the ability of holding the tablet and navigating the application were there to support the phonics tasks.

Figures below show examples of phonics and phonemic awareness tasks on Lughati tablets:



Figure 6: Letter Train

Figure 6: The Letter Train is one of the games in Lughati tablet where the students select the objects that start with the letter displayed on the train. This game helps the students identify objects, learn the names of the objects when they click on them, learn the sound of the letters and the first letter of a word and allows the students to interact with the tablet by moving their fingers across the screen. Not all objects displayed on the screen starts with the required letter, so when a student places a wrong object on the train, they are informed that it is a wrong answer and they try again. If students placed all objects correctly, they get a positive feedback and a thumbs up.

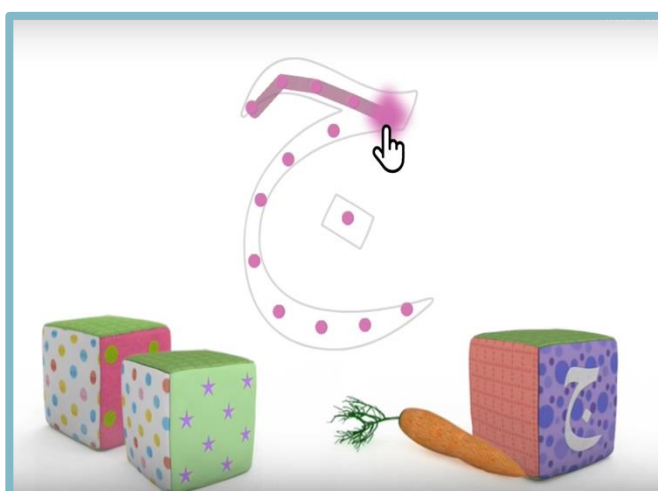


Figure 6: Alphabets Tracing

Figure 7: Tracing the alphabets on Lughati tablets helps the students recognize the shape and sound of a letter by interacting with the letters on the screen.



Figure 8: Letter Sound Identification

Figure 8: Letters songs on Lughati allows the student to listen to the pronunciation of the letter and see how the shape of the letter changes if it is placed at the beginning, middle or end of a word. It also helps students learn new words and names.



Figure 9: Arabic Letters Song

Figure 9: Alphabets interactive videos uses rhymes and songs to familiarize the students with the letters and their sounds.



Figure 7: Constructing Words

Figure 10: Lughati tablets also contains word constructing exercises that enable students to construct a word from single letters. This task is useful for beginner learners because of the shaded word on the background that gives hints to the students on how to construct a word and the shape of the letters at various positions in a word.



Figure 11: Consonant Marks

Figure 11: Consonant marks interactive videos use rhymes and songs to familiarize the students with the different sounds the consonant marks produce when they are placed on the letters. Figure 11 shows one of the Arabic letters and an interesting character who sings the different pronunciations of the letter (ba | bo | be).



Figure 12: Consonant Selection

Figure 12: Consonant marks exercises allow the students to practice putting the 4 different types of Arabic consonant marks on the letters of the word.



Figure 8: Long Vowels Selection

Figure 13: Long vowels exercises allow the students to practice putting the 3 different types of Arabic long vowels to complete the words.



Figure 14: Constructing Words from Syllables

Figure 14: Constructing words from syllables exercises are helpful to help students recognize and be able to read several clusters of words and put them together.



Figure 15: Dividing Words into Syllables

Figure 15: Dividing words into syllables exercises are beneficial in improving the students' ability to deconstruct words into separate clusters.



Figure 16: Lughati Prompting Features

Figure 16: This figure shows one of the prompting features of Lughati tablets when a student correctly performs an exercise (thumbs up). The prompting features are often combined with sounds and verbal reinforcers such as 'good job' and claps.

3.2.1.3 Individual Educational Plan

Each SEND student in SCHS has an “Individual Educational Plan” which comprises of a set of behavioral goals that the student has to achieve in a specific period of time as well as the teaching procedures to achieve these goals, the teaching strategies, the teaching aids and the behavioral reinforcers. It also has an evaluation section for the educational supervisor.

There are 5 main areas the Individual Educational Plan focuses on which are the intellectual skills, the linguistic skills, the social skills, kinesthetic skills and personal care skills. The scope of this study aligns with the linguistic requirements of the SEND students. Refer to Appendix B for a sample of the Individual Educational Plan.

The Individual Educational Plan is similar to the lesson plan used in regular education schools however this is more specific to the SEND students’ educational needs and varies between students even within the same classroom. In this study, the Lughati tablet was added into the SEND students’ Individual Educational Plan as a part of the assisting tools.

Assisting tools are used to help the teachers explain a topic or train the students to do a certain behavior. Along with Lughati tablets, the teachers in this study used other teaching aids to teach the students Arabic phonics. Examples are the flash cards, pictures, smart board, 3D objects, computers and worksheets.

3.2.2 Focus Group Interview

The focus group consisted of the 4 teachers supervising the SEND students and the IT supervisor. The interview was in the IT supervisor's office and all the teachers gathered in a circle around the researcher. Before starting, the researcher gave a brief overview on the purpose of the research and collected the teachers' consents on their willingness to participate. The researcher then asked open-ended questions and guided the sequence of the interview. During the interview, the researcher noticed that some participants were less proactive in the discussions than the others and asked them to share their views. The interview was audio recorded, transcribed and translated by the researcher.

There were 5 main topics discussed in the interview: training on using Lughati tablets, using Lughati tablets as AT in SCHS, using Lughati tablets to teach reading skills to SEND students, challenges in using Lughati tablets with SEND students and Teachers' recommendations.

3.2.3 Educational Supervisor Interview

The researcher conducted an interview with the educational supervisor after the conclusion of the research period in September 2019. The main objectives of the interview were to review the teachers' responses in the focus group interview and review the progress of the SEND students observed during the study. Also, the educational supervisor discussed the SEND students' pre and post results and their Individual Educational Plans. She also provided her recommendations and future work plans. The interview was audio recorded, transcribed and translated by the researcher.

3.3 Research Design

The research design of this study is an amalgamation between the quantitative and qualitative methods. In particular, the quantitative method spots the light on the ability of the SEND students to perform certain allocated tasks within the specified research period whereas the qualitative method seeks to probe the teachers' experiences using Lughati tablets in teaching Arabic reading skills.

The 3 main instruments used are the SEND students' assessments, the focus group interview and the educational supervisor interview.

3.3.1 Validity and Reliability of the Research Method

According to Gibbs (2007), the validity of the research method and results are associated with all the procedures that ensure the accuracy of the research tools and findings whereas the reliability depends on the consistency of the researcher's method and findings with other researchers in the same field.

To ensure the validity of the research methods and results, the researcher employed the triangulation method (Creswell 2009) of combining different streams of data: the SEND students' assessments, the teachers' interview and the educational supervisor interview.

Moreover, the educational supervisor and the IT supervisor were the main contributors in selecting the sample of students, selecting the tasks and designing the evaluation criteria. The educational supervisor integrated the research objectives into the teachers' lesson plans and supervised the students' and teachers' progress throughout the study period. Thus, the researcher minimized the interaction with the participants to neglect the biases that can rise from the researcher's observation. Also, since the educational supervisor is more experienced

in the field and has a better understanding of the cases of disabilities in SCHS, her involvement and decisions during the selection process places more validity to the data collected.

In addition, the researcher reviewed the responses of the focus group and the pre and post results of the SEND students with the educational supervisor as a method of member checking (Creswell 2009) to eliminate the bias of the researcher presence during the focus group interview.

On the other hand, the reliability of the research tools -such as the tasks allocated to test the students' reading skills- corroborated with the methods used in the literature. This will be further elaborated in the results and discussion section.

3.3.2 Research Flowchart

Figure 17 shows the research flowchart and the important building blocks of the research design.

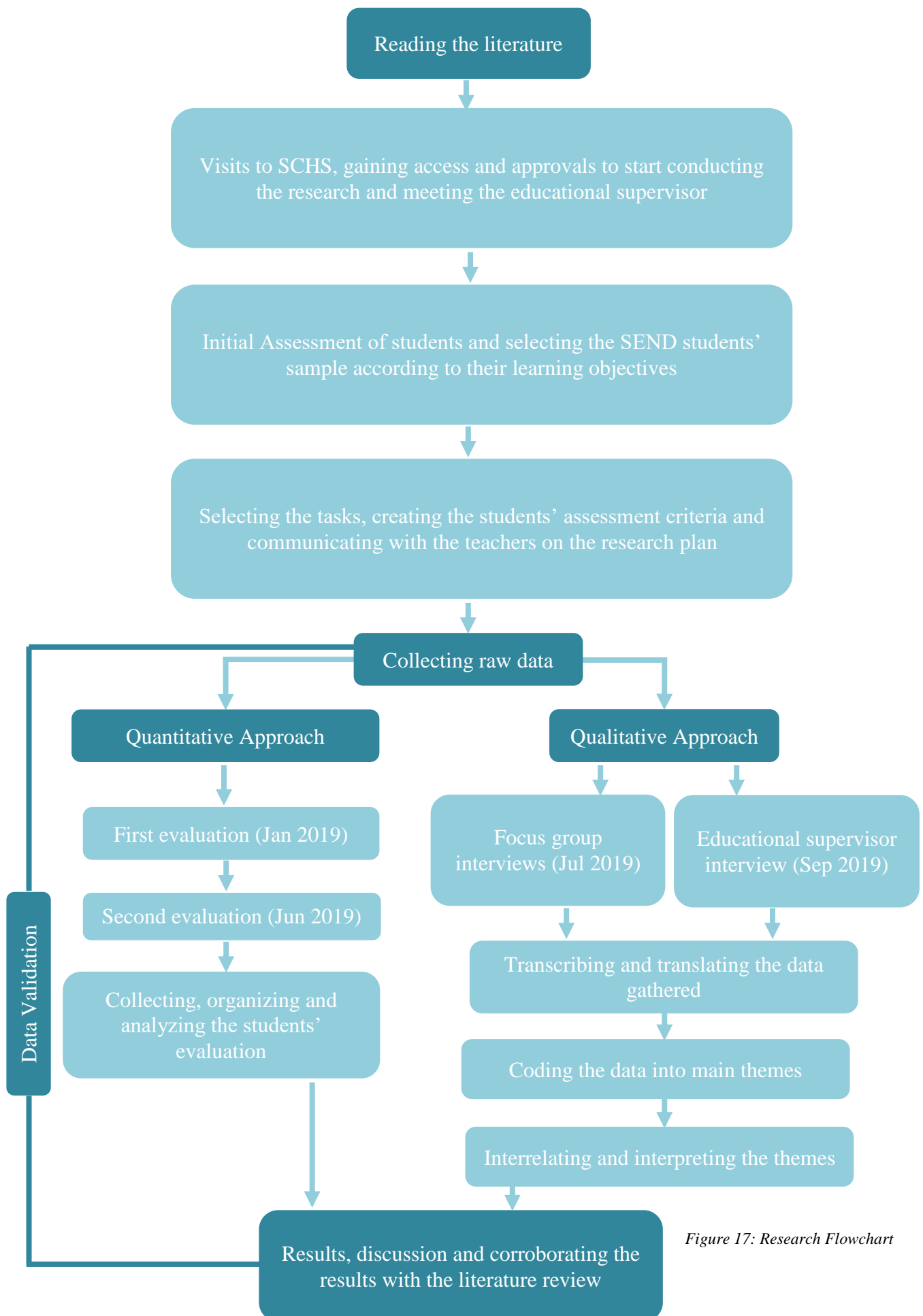


Figure 17: Research Flowchart

3.4 Ethical Considerations

3.4.1 Gaining Access

To carry out the study, the researcher sought out approval from SCHS to gain access in order to communicate with the participants and conduct the tests and interviews with them. Also, the researcher asked approval from her employer to allow her to leave work on certain days of the week to conduct her study. Appendix C contains the official SCHS contract that the researcher signed at the beginning of the study on October 22, 2018 and the university letters to the researcher's employer and SCHS explaining the role of the researcher in the study.

3.4.2 Participants Data

The researcher conveyed the purpose of the study to the participants and asked their approvals in taking part in the research. The researcher informed the teachers and supervisors that their participation is voluntary and that their identities will be concealed to ensure the confidentiality of their data. Participants signed agreement forms prior to their participation. Appendix D contains the consent forms.

3.5 Summary

In conclusion, this chapter has a significant importance in sculpting the research as well as identifying the research approaches, tools and key players in order to examine the research questions. After selecting the methodology and research tools, the researcher collected the raw data from the participants, classified the data and then carried out the data analysis. The next chapter will discuss the results that were derived after the data collection.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

“You may never know what results come of your actions, but if you do nothing, there will be no results.” — Mahatma Gandhi

4.1 SEND Students Pre and Post Evaluations

To conceal the identities of the SEND students in the study, the researcher used alphabets to identify the sample of students. Table 5 shows the SEND students with their respective ages and disabilities.

Student	Age	Type of Disability
A	9	Down syndrome
B	7	Down syndrome
C	6	Down syndrome
D	9	Down syndrome
E	9	Down syndrome
F	7	Down syndrome
G	10	Cerebral palsy
H	8	Mild intellectual disability
I	10	Borderline intellectual functioning
J	7	Borderline intellectual functioning

Table 5: SEND Students' Demographics

The SEND students were evaluated using the 21 criteria in table 4 mentioned in Chapter 3. The evaluation took place during 2 periods: January and June 2019. In the first term of the study, the students were trained on essential tasks that are related to their ability to use the Lughati tablets, selecting the educational program related to their tasks, selecting shapes and colors, listening to stories and navigating several programs within the Horouf application (Lughati tablet). Prior to the evaluation, the SEND students were trained by their supervising teachers

on these tasks. Each student spent minimum of 30 minutes using Horouf application in their Lughati tablets. All SEND students (n=10) were able to achieve the tasks in their first evaluation which means all SEND students successfully completed the first 14 essential tasks before moving on to the next training phase for criteria 15 to 21 which are mainly related to their reading skills.

Table 6 shows the SEND students' ability to achieve the tasks during their evaluation period in June 2019. The boxes which are crossed "X" indicate that the SEND student was not able to successfully achieve the desired learning objective during the training period. The training on these tasks took place between January and June.

N	Criteria (Assessed in June 2019)	A	B	C	D	E	F	G	H	I	J
15	The student is capable of selecting the correct consonant and vowel marks and placing them on the letters of the assigned words on the tablet				X	X					
16	The student is capable of selecting the correct long vowels to complete the word	X			X	X					
17	The student is capable of constructing a word from letters	X									
18	The student is capable of choosing the images that starts with the assigned letter from the letters' train										
19	The student is capable of splitting the word into syllables	X				X			X		
20	The student is capable of choosing the correct box to disclose the image that matches the assigned image (memory game)										
21	The student is capable of free-drawing using the tablet										

Table 6: SEND Students' Performance in Second Assessment

60% of the students (n=6) were able to successfully achieve all their learning objectives in the second evaluation phase. Only 4 students were unable to achieve the tasks related to phonics

and phonemic awareness. The tasks that were not attained by these students were 15, 16, 17 and 19 (refer to table 6). According to the results, the criteria which were harder to achieve were the ability to select a long vowel to complete a word and splitting a word into syllables. The criterion with the least number of crosses or unachieved tasks was the students' ability to construct a word from a letter.

The results also revealed that the disabilities that showed lower scores in terms of achieving tasks were the down syndrome and mild intellectual disability whereas the cerebral palsy and borderline intellectual functioning managed to fulfill all criteria.

Despite these outcomes, the results are statistically insignificant because the data collected do not reflect any factors that are correlated and there is no strong evidence for the variance in the results. Evaluation outcomes do not impose that low scores are dependent on a specific disability or a particular age. For example, for the SEND students diagnosed with down syndrome showed various results that are not dependent on their ages. Students B, C and F were younger than the other SEND students with down syndrome and got better results than students A, D and E. Moreover, student G diagnosed with cerebral palsy was performing well in all intellectual activities because his type of cerebral palsy only impaired his physical capabilities. Student G was capable of verbal expression which enabled him to learn, train and achieve tasks better than the others diagnosed with cerebral palsy.

Due to the specialized learning objectives and Individual Educational Plans for each SEND student, the researcher refrained from comparing the results of the pre and post evaluation between the SEND students since it would not have a significant impact on the research outcomes. However, the evaluations were good indicators of the SEND students' milestones in a specific period of time and gave the supervising teachers an opportunity to understand the

learning needs for each student and the areas where they require to focus more on. The second evaluation also indicated that some phonics and phonemic awareness tasks require more time to learn, train and grasp such as splitting the words into syllables and selecting a long vowel to complete a word. If given more time and training, some of the SEND students who were not able to achieve a criterion might gain the required skills to tackle these tasks. In addition, the criteria used in this research were the first evaluation method used with the SEND students using Lughati tablets in SCHS, therefore the evaluation added value in terms of giving the teachers a road map to know which activities to give their SEND students to improve a certain reading skill like phonics.

Since the SEND students' pre and post evaluations are not indicative on their own, the researcher added more depth to the research by probing the responses of the focus group and the educational supervisor.

4.2 Focus Group Interview

The researcher grouped similar open-ended responses into thematic categories (Dey 1998) in order to better analyze the results. The main themes prevalent in the teachers' and IT supervisor's responses are discussed in the subsections below.

4.2.1 Training on Using Lughati Tablets

“We were provided with personal Lughati tablets before starting Lughati initiative in SCHS, therefore we had the opportunity to review Horouf application and have a close glimpse of the programs.”

“Having personal Lughati tablets allowed us to align the appropriate programs in Horouf application with the learning requirements of our SEND students.”

“As an IT supervisor, I provided technical help and was responsible for maintaining the tablets and carrying out the application updates. I was also helping the teachers with the tablets by conducting workshops in SCHS.”

“Lughati website contains tutorials that are very beneficial to the teachers”

“Lughati tablets are very easy to use like any other tablet we use in our daily lives ... learning how to use Horouf application can be easily acquired by just surfing the application and trying it out ... it doesn't require a lot of training”

4.2.2 Using Lughati Tablets as AT in SCHS

“Lughati tablets are very easy to handle. My students can easily carry them around and can open the tablets by themselves”

“Lughati tablets are protected with a purple cover that has a base. The tablets can be easily placed on the table and supported by the base so that the SEND students can use the tablets while they are upwards. Also, the tablet's cover protects the tablet from damages.”

“SEND students enjoy using Lughati tablets because they have multiple ways to learn .. they can access videos, stories, games, songs, puzzles and engage in several activities like coloring, matching and free drawing”.

“Lughati tablets are very engaging and motivating for SEND students because of the sound and animation. SEND students enjoy using the Lughati tablet as a part of their lesson as well as to play and have fun”

“The best feature for me is the ability of SEND students to record their voices and then listen to themselves pronouncing the letters when they read in Lughati tablets.”

“For me, I really like the feedback feature where students can know if they answered correctly or if their answers were wrong. The Lughati application [Horouf application] uses prompting features such as thumbs up and sounds when a student answers correctly which makes learning enjoyable. Our SEND students can learn by trial and error and become independent learners.”

“Lughati tablets improves the SEND students’ independency when using the tablets since they are easy to use and a lot of our students already know how to use tablets at home so they are already exposed to the tablets in their daily lives. Horouf application is easy to use by students and teachers and can enable students to explore and learn on their own.”

“For SEND students with difficulty in physical movements, using Lughati tablets helped them write using the tip of their fingers”

“I often use Lughati tablets as a positive reinforcer for good behaviors in the classroom. When SEND students show positive attitude in the classroom or good performance, I allow them to use the tablets for longer periods of time or in their free time.”

4.2.3 Using Lughati Tablets to Teach Reading Skills to SEND Students

“I was able to link my SEND students’ reading objectives with the Lughati application [Horouf application]. I sometimes align the use of the Lughati tablets to the reading objectives of the students and sometimes allow them to use the Lughati tablets freely and choose their own fun activities.”

“Lughati tablets primary focus is to teach the Arabic language to young children. There are several applications that are very helpful when it comes to teaching Arabic reading skills such as segmenting the words, putting consonants and vowels on the words, recognizing the sounds of the letters and games.”

“For the SEND students enrolled in the academic classes, we make sure that they use Lughati tablets at least 30 minutes per day to consolidate the lessons we teach. We use the Lughati tablets in addition to the smart boards, letters and words cards, ministry books, workshops, competitions, and stories.”

“Lughati tablets became one of the ways I use when teaching my SEND students reading skills. There are several techniques I use when teaching reading. First, we concentrate on visual words. Second, SEND students memorize a word and its picture. Then they learn words that are visible in their surroundings such as door, window and car. I also use Lughati tablets to further strengthen their ability to recognize words and their respective pictures especially in stories and games”

“My SEND students always enjoy the games on Lughati tablets that are related to phonics and phonemic awareness. They particularly like the family letter train when they select pictures that start with a specific letter and place them on the train. Also, they like the game where the character keeps running and the student has to catch the letters by tapping on the tablet. These games are interactive as well as beneficial for learning letters and their corresponding sounds”

“When using Lughati tablets, I like how my SEND students can repeat the exercises in order to grasp the concepts related to phonics and letters’ identification. They can use the tablets to

learn how to write the letters, pronounce the letters with the correct consonants and play language games.”

4.2.4 Challenges in Using Lughati Tablets with SEND Students

“Lughati tablets are designed for students with certain levels of capabilities and who are normally enrolled in regular education schools. Not all SEND students are capable of using Lughati tablets because it is not tailored to their needs. The Lughati tablets are great and have a lot of various learning tools but it becomes challenging when we use it with SEND students because of their different learning objectives and capabilities. For some SEND students, Lughati tablets are very suitable but for others Lughati tablets are very advanced for their learning needs.”

“SEND students enrolled in the academic classes are the main students benefiting from the Lughati tablets. Other SENR students find using Lughati tablets very challenging.”

“There are limited number of practice words in Lughati tablets and teachers can’t add additional words which are related to the SEND students’ curriculum. For example, for the words’ segmentation exercise, there are only 4-5 words that students can use to practice splitting words into syllables. Therefore, some SEND students become so familiarized with the practice exercises and it becomes like a routine task for them.”

“The Wi-Fi connection is slow which makes the use of the tablets very time-consuming since it connects to the internet to carry updates on the programs. The updates can make the tablets malfunction for several weeks which slows down the teachers’ progress.”

Figure 18 describes the 2 challenges discussed by the teacher above.

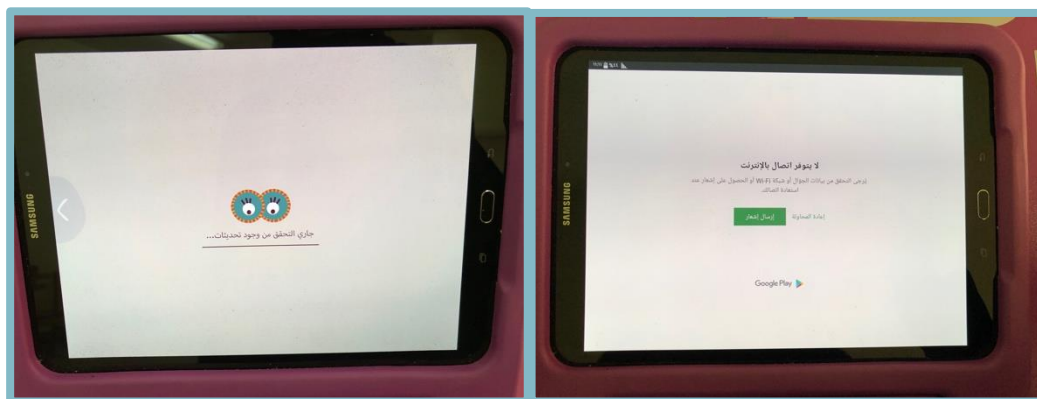


Figure 18: Update and Wi-Fi Challenges

“Some SEND students might get distracted from the teachers’ instructions or move to different programs which causes some delay in the teaching process. Some get very attached to a certain exercise and don’t want to move to other exercises. Some don’t want to return the tablet back to the teacher at the end of the session.”

4.2.5 Teachers’ Recommendations

“Currently, it is not permissible to download external applications on Lughati tablets from Google Play. We can only use Horouf application which is already downloaded on Lughati tablets. There are numerous educational applications that can be downloaded on Lughati tablets from Google Play which can be very beneficial to the SEND students and can improve their learning with the tablet.”

“The stories in Lughati application [Horouf application] are a bit advanced for SEND students because they are long and deal with multiple topics. It would be better to have shorter versions of the stories with a single topic so that the SEND students can comprehend these stories.”

“I recommend establishing a channel of communication between teachers in SCHS and the designers of the Horouf application so that we provide our inputs and share our areas of

concerns. We can also let them understand our SEND students' learning objectives in order to further improve the current application and make it accessible by all SEND students.”

“I recommend that the phonics and reading exercises such as letter segmentation have several levels of complexity so that the students start from easy words and advance to harder ones. Also, as teachers we would like to have the option to add our own words that are in the students' curriculum and when the students are capable of reading, splitting and constructing the words we add another set of words.”

“The Lughati tablet is a great tool to learn the Arabic language as well as learning colors and shapes. It would be great if Lughati tablets also have some activities related to numbers and counting skills.”

4.3 Educational Supervisor Interview

The researcher conducted an interview with the educational supervisor after collecting the SEND students' evaluation and the supervising teachers' inputs. During the interview, the researcher and the educational supervisor reviewed the results and discussed the main themes in the research. Below are the key areas of discussion.

4.3.1 SEND Students' Results and Progress

The educational supervisor pointed out that “for the same type of disability, the SEND students vary in their capabilities therefore it becomes difficult to compare the students' reading capabilities without referring to their Individual Educational Plans. We have several students who are diagnosed with cerebral palsy, some of them are affected by not being able to physically move but their brains function in the same way students with no learning disability function, therefore their comprehension and reading skills are advanced and they can score

high scores in reading tests. On the other hand, we have other SEND students with cerebral palsy who are not able to read and comprehend.”

She stated that “for each SEND student, their perceptual, emotional and motor learning capabilities vary which affect the SEND students’ aptitude to learn reading skills even among students with the same disability.”

Moreover, she highlighted that “the reading skills of the SEND students does not depend on their ages; you can see students younger in age scoring higher than the students who are older than them. This is normal since they vary in their learning capabilities. It is difficult to assess students according to their type of disabilities and ages.”

Regarding the impact of using Lughati tablets in SCHS she stated that “students with low IQ or borderline intellectual functioning are the students with the greatest advantage from the Lughati tablets that is why I focused on integrating the tablets into their Individual Educational Plans as assistive tools in learning the Arabic letters and phonics more than the other students. We worked closely with the SEND students with borderline intellectual functioning disability in order to help them overcome their disability. We used Lughati tablets to assist them in learning the Arabic language and train them till they managed to improve their reading skills. In this study, we selected 2 students with borderline intellectual functioning disability: students I and J. I and J were able after the training on Lughati tablets to read on their own and are capable of reading new words which are not there in Lughati tablets. This year [Sep 2019 – new academic year], they are enrolled in regular education schools after assessing their capabilities and assigning them to the appropriate schools and grades. I will go for some school visits to see their progress at various times this semester.”

When talking about the shortfalls of using Lughati tablets with SEND students, the educational supervisor mentioned that “the shortfalls we faced is not because of the Lughati tablet but it is because the Lughati application [Horouf application] is not designed for SEND students. Currently, the targeted users of Lughati tablets are students in the regular education schools but we hope that there can be some ways of introducing features that are suitable for SEND students such as short stories, practice exercises aligned with our students’ goals and the ability to vary the level of complexity of exercises according to the students’ capabilities.”

4.3.2 SEND Students’ Individual Educational Plans

The researcher saw samples of the SEND students’ Individual Educational Plans. Then the researcher and the educational supervisor discussed how the Lughati tablets align with most of the SEND students’ objectives. Examples of the outcomes required from SEND students are: student can identify similar sounds at the beginning of the words, student can identify different sounds at the beginning of the words, student can name the letters when the letters are presented to them, student can identify common words and can read them, student can read words in a sentence, student can identify colors and shapes, student can point to specific pictures and student can paint and color. The educational supervisor said “ as you can see, the Lughati tablets have the potential of helping us a lot in these areas and it would be very beneficial if we can reach out to the designers of Lughati tablets to inform them about how to make Lughati tablets better by adding functions like counting and numbers and adding levels for learning reading skills.”

The educational supervisor also pointed out that “the SEND students’ progress is monitored so that their assigned tasks are modified in accordance to their learning development. For example, the SEND students who achieved all assigned tasks in Lughati tablets are given other advanced tasks in the Lughati tablets for example after learning phonics, students can then

move on to grammar exercises on the tablets and so on. If students managed to achieve all of the exercises in the Lughati tablets, then we no longer add the Lughati tablet in their Individual Educational Plan. SEND students who are older than 10 years old are transferred to another SCHS branch for older students.”

4.3.3 Supervising teachers’ Inputs

The educational supervisor went over the teachers’ responses and was in consensus with all of their responses. She also added that “one of the areas that can be beneficial for improving the process of learning with the Lughati tablets is the capability of linking all the students’ tablets with the teacher’s tablet which enables the teacher to control the flow of her lesson, track the students’ progress and keep the students focused on a certain activity. It also promotes group learning and social interaction because multiple students with similar learning objectives can be placed into groups and can work together on certain activities. Currently, each SEND student works on his/her own tablet and might occasionally drift away from their intended tasks.” She gave an example that “the SCHS students enrolled in the academic curriculum or students who have the ability to read and write are placed in a separate classroom and the feature of linking their tablets with the teacher’s tablet is of great benefit for them.”

4.3.4 Supervising Teachers and their Training

When asked about the teachers’ educational background and their training on Lughati tablets, the educational supervisor stated that “teachers in SCHS have their bachelors in various concentrations. Most of them have a degree in the education, special education, psychology and sociology specializations with very few teachers who are not from these backgrounds. All of the teachers joining SCHS enroll in a training program tailored for teaching SEND students. Teachers are supported by lectures, workshops, assisting books, assisting tools and the

mentorship of an educational supervisor. Lughati tablets did not require a lot of training since they are easy to use and teachers were already aware of Arabic phonics and reading skills.”

4.3.5 Areas of Improvements and Future Plans

The educational supervisor highlighted 2 areas where she will work on improving; “for the next year, I am planning to improve the SEND students’ evaluation form since this is the first time we design an evaluation tool for our SEND students that tracks their learning using Lughati tablets. I will add more details to the evaluation form and ask teachers for their inputs. Also, since teachers are becoming more and more experienced on using Lughati tablets we are planning to improve the integration of ICT in our classrooms and look for areas of development in engaging students in several technological tools during their class.”

4.4 Discussion of Results

This study intends to explore if Lughati tablets are suitable to be used as AT to improve students’ Arabic reading skills. In addition, the researcher anticipated to probe the appetite of teachers using Lughati tablets and share their recommendations. There were 3 main streams of data collected: SEND students’ evaluation, focus group interview and the educational supervisor interview.

The SEND students’ performance in this study did not depend on their type of disabilities or their ages. Their tasks and performances depended on their Individual Educational Plan. This result corroborates with Houston and Torgesen (2004) and Blachburn (2018) studies where they pointed out that SEND students’ performances are not related to their disabilities and ages. It also agrees with Coulon’s (2015) findings that a certain AT can be beneficial for one student and not for the other even with the same disability. Coulon (2015) highlighted the importance

of acknowledging the individual needs of the SEND students in order to select the appropriate AT and design a unique learning plan for each SEND student.

According to the SEND students' results in this study, the down syndrome students were finding difficulties in the tasks that involve putting correct consonants and vowel marks, constructing words and splitting syllables. This corroborates with Verucci, Menghini and Vicari (2006) results where they highlighted that the down syndrome students in their study struggled with syllable segmentation and tasks that demand high phonological skills. On the other hand, all the down syndrome students in this study were able to perform tasks that involved images and visual strengths. This aligns with Abu Khadra's (2013) findings where she emphasized that the down syndrome students in her study benefited from visual tasks.

The student diagnosed with mild intellectual disability in this study was able to achieve all tasks except splitting words into syllables which might indicate that a student with this type of disability might be capable of grasping reading skills in the same context as the typically developing children. This result agrees with Allor et al. (2009). The researcher speculates that giving the student more time to train on splitting words might enable him to achieve the task.

The cerebral palsy and borderline intellectual functioning students in this study were all capable of achieving all tasks on the Lughati tablets. This might indicate that some students with cerebral palsy and borderline intellectual functioning can achieve high reading scores compared to the other disabilities. This is also in agreement with the studies discussed in the literature (Critten, Messer & Sheehy 2019; Gillies 2017) which highlighted that some cerebral palsy and borderline students were able to score within the normal range.

Moreover, according to the educational supervisor's input, the borderline intellectual functioning disability students had the greatest advantage of using Lughati tablets. The 2 SEND students in this study I and J are the only SEND students who were capable after the training to read on their own either on the Lughati tablet or hardcover stories. The researcher speculates that the Lughati tablets can be considered as effective AT in the treatment programs of SEND students with borderline intellectual functioning.

The teachers' responses regarding the design and usability of Lughati tablets were in congruence with the UDL framework (Wehmeyer 2006). The teachers expressed that the Lughati tablets offered multiple ways of representing the contents like video/audio features and ability of recording the voice of SEND students. Also, Lughati tablets offered multiple features that indicate the students' progress like the prompting features and multiple ways of engaging and motivating the students. Teachers also gave positive feedback regarding the flexibility, the ease of use, the appropriate size of tablets and accessible storing compartments which also agree with the requirements of AT devices mentioned in Alnahdi's (2014) study.

In accordance with Rogoff (2003) and Flear (2010), the educational supervisor in this study highlighted the importance of creating cooperative learning settings for SEND students where groups of students can work together using Lughati tablets. Several studies also revealed the role of AT in boosting the SEND students' confidence and independency (Parette et al. 2009). Teachers in this study also reverberated this topic and shared their views on how Lughati tablets helped their SEND students in becoming independent learners. Furthermore, the teachers echoed their consents on the role of Lughati tablets in motivating and engaging the students in the learning process. This finding is similar to Almekhalafi and Tibi's (2012) result where they revealed that the SEND students in their study were more motivated and engaged when using AT.

Unlike the teachers' responses in the literature review regarding the necessity of training on AT (Edyburn 2006), the teachers in this study stated that the Lughati tablets are very easy to use in teaching and they received adequate guidance from the educational supervisor to map the use of Lughati tablets to their SEND students' needs.

Finally, there is a consensus among the literature and this study that there is a need to tailor the AT devices to the SEND needs especially when it comes to teaching Arabic reading skills (Almekhalafi & Tibi's 2012). As stated by the teachers and educational supervisor of this study, the Lughati tablet is not designed for SEND students and only a specific group of SEND students can benefit from using these tablets. The researcher believes that this area is worth spotting the lights on since there is room for improvements.

4.5 Limitations

There are several constraints related to the design and methodology of this study that could affect the interpretation of the results. These limitations are important to highlight in order to extract opportunities for future improvements.

This study is limited to the use of Lughati tablets by SEND students in SCHS and aims to explore the impact of using these tablets in learning the Arabic language. The total number of participants in this study is 16 participants from which 10 are the SEND students. The SEND student sample contained multiple types of disabilities and ages and each student had a unique Individual Educational Plan. The small sample size and all of these variant factors imply that it is difficult to generalize the results to a larger population or derive significant relationships from the data.

The selection process of SEND students conducted before the study might have eliminated other SEND students who might show diverse results other than the results collected from this study. Moreover, each group of SEND students were supervised by different teachers during the study period. Teachers might have various levels of knowledge about teaching Arabic reading skills as well as various levels of skills when dealing with technology and tablets.

Although the reading tasks in Lughati tablets and the evaluation criteria were the same for the SEND students in the study, the SEND students were exposed to different types of teaching aids along with the Lughati tablets such as the word cards and smart boards. Also, the students used Lughati tablets at different time durations according to their learning plans.

Furthermore, the training on the Arabic reading skills in Lughati tablets was done in a period of approximately 5 months. By extending this duration, some SEND students who were not able to achieve a certain task might be able to do so given adequate training time.

Also, the evaluation criteria used in this study was designed for the first time in order to identify some Arabic reading skills such as phonics and phonemic awareness. There were no similar forms designed in the past to build on past experiences.

Finally, most of the research reviewed in the literature in the area of AT and students with disabilities were more anecdotal than empirical. This is the case with this study too. Coulon (2015) stated that the reason why research in the area of AT and students with disabilities are mainly anecdotal is due to the small specialized sample size as well as the broad research statements and the lack of practical evidence.

4.6 Summary

In conclusion, this section unveiled fruitful findings that the researcher collected during the period of the study. The researcher then discussed the findings in the light of previous research done in similar fields. There was an agreement between the findings of this study and the literature review in most of the topics discussed. Finally, the researcher stated the inevitable limitations of the study and their consequences on the validity of the results.

CHAPTER FIVE

CONCLUSION

“A great accomplishment shouldn’t be the end of the road, just the starting point for the next leap forward.”—Harvey MacKay

5.1 Conclusion

This study aims to bridge the gap in the literature particularly in the area of teaching Arabic reading skills to SEND students using AT. There are very few case studies conducted in the UAE as well as in the Arab world that targets this field of research and the researcher intended to enrich this area by delving into the literature and exploring new initiatives in the UAE. The Lughati tablets were introduced to SEND students for the first time in SCHS. These tablets were used as assistive teaching aids and integrated into the SEND students’ Individual Educational Plans in accordance with their learning needs which were mainly focused on phonics, phonemic awareness, shapes and colors. There were three main streams of data collected to investigate the impact of Lughati tablets in SCHS: SEND students’ evaluation that took place in January and June 2019, an interview with the teachers and IT supervisor and an interview with the educational supervisor.

Although the SEND students’ evaluations did not unveil statistically significant data due to the differences in the SEND students’ capabilities, the research was fruitful because it created a platform for teachers to mark their students’ millstones and observe the progress of their students in a specific period of time. Moreover, the research conveyed that the borderline intellectual functioning and cerebral palsy students showed meaningful learning progress. However, for the down syndrome students, the Lughati tablet tasks might require high level of phonological processing that they might not be capable of achieving. The down syndrome students were able to perform all visual related tasks which might imply that teachers could select the Lughati tasks which are less phonologically demanding and more visual based for

these students. For the mild intellectual disabilities, the students might require extra training time and more comprehensive and explicit reading instruction to help them progress. It might also be beneficial if teachers could train these students on one task at a time.

Overall, the Lughati tablets seem to be worth investing for the disabilities investigated in this study; however, each type of disability requires certain types of teaching techniques along with Lughati tablets in order to help students learn reading. Also, it is not implied from this study that these students will be able to read on their own or achieve reading scores in the normal range even after using Lughati tablets.

One of the major findings that the researcher anticipates nourishing in the future is integrating Lughati tablets in the learning process of borderline intellectual functioning students who are not properly diagnosed in regular education schools.

Furthermore, the focus group and the educational supervisor provided positive feedback and showed willingness to use Lughati tablets as an assisting aid to teach Arabic reading skills to SEND students. However, all of them emphasized on the paramount importance of tailoring the Lughati tablets to the SEND students' capabilities and allowing these tablets to become accessible for more SEND students who have lower reading abilities than their peers enrolled in the academic curriculum. This improvement in Lughati tablets design can be attained by establishing a communication channel between the teachers in SCHS and the designers of the application where teachers can share their concerns and recommendations. An interesting area of improvement is adding the ability to link the teachers' tablets with the SEND students' tablets to promote collaborative learning between the students working on the same exercises and allowing students to socially interact with each other.

Finally, although the findings of this study correlated with most of the studies mentioned in the literature, this study is the first building block in an attempt to envisage the multitude learning possibilities and numerous opportunities the AT can offer to SEND students. There are still uncharted areas to be explored in this enthralling field of education and there is room for further advancements by people from several specializations such as programming, engineering, special education, language studies and much more.

5.2 Suggestions for further research

This thesis encompassed a small portion of research in the area of using AT to promote Arabic reading skills to SEND students in SCHS. There are ample suggestions to widen the scope of the research and refine it to explore better approaches in terms of the type of research tools, the methodology and the sample of participants.

For further research, the study may include linguists to review the Lughati program and assess the depth and complexity of the language exercises such as the word segmentation, putting consonants on letters, constructing words from letters and the letter train. It would be interesting to map these exercises to linguistic theories to see if these exercises are effective in teaching the Arabic reading skills. Also, further research may include adopting teaching strategies that are aligned with the NRP components of reading instruction and the theories of reading discussed in the literature.

Due to limited time and restricted access, the research was done to a small sample during an approximately one-year timeframe. It would be of great benefit to track the progress of the SEND students across a longer timeframe specifically before introducing Lughati tablets to them, during the use of Lughati tablets and after the completion of all assigned tasks in the tablets. There were two students from this study who were able to enroll in regular education

schools. An interesting future research project would be studying the progress of these students in their new school environments especially if these schools use Lughati tablets or similar ATs which focus on facilitating the process of learning the Arabic language. Also, researchers could further enrich the study by comparing the learning progress and reading capabilities of SEND students in several centers and institutes in the UAE.

Finally, researching about the effect of collaborative learning and group work while using AT for SEND students is a compelling area of research since it opens the door for further insights of how different individuals with similar learning objects but different disabilities work and interact together in the same environment.

5.3 Personal Reflections

Looking back at the journey of writing my thesis, I always remember the moment where I decided to continue my master's studies in the field of education and the startled reactions of my family and colleagues. I recall the day I walked into my first class looking at the educators and teachers around me and saying to myself what have you done.

Coming from an engineering background and working in the space industry, I would have never imagined going through the experience of exploring the educational system in the UAE particularly in the area of special education.

This experience opened my eyes to the possibilities of amalgamating several professions in order to elevate the status of the education in my country. I believe that there is a space for creativity and innovation in education especially for engineers who are inspired to give back to their society. By observing the SEND students and the use of AT in SCHS, I managed to draw an overall picture of how engineers can bring advances through new technologies that

can facilitate the learning of SEND students. I feel that I had memorable experiences in the journey of writing this thesis which are not necessarily noted in this document but will always remain cherished in my heart.

If there is one thing that I learnt from this remarkable experience is that each SEND student is very unique. Creating one research tool that can assess all SEND students' capabilities even those with the same disability and age is a very complex task. It is as if each SEND student has his/her own world with its distinctive rules and boundaries which we have to explore separately to get a glimpse of their worlds. In an attempt to convey the voices of the SEND students who participated in this thesis, they would like to say:

“This is Me...This is my World”

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APPENDIX

Appendix A:

Examples of activities related to assessing phonemic awareness arranged according to the difficulty of the tasks (Catts and Kamhi 2005).

Activity	Objective	
I Spy	Students will learn to identify rhyming words	<p>Place some familiar objects or pictures that rhyme near the small group of children (e.g., “cat,” “hat,” “mat”).</p> <p><i>Model:</i> “I spy with my little eye, something that rhymes with cat. It’s a hat.”</p> <p><i>Guided practice:</i> “Your turn. See if you can guess what I see. I spy with my little eye something else that rhymes with cat.”</p> <p><i>Extra support:</i> “If child struggles, provide a forced choice: “Is it a pen or a mat?”</p> <p><i>Enrichment/extension:</i> “Can you think of something else that rhymes with cat?”</p> <p>Read a book that has lots of rhyming words and have children identify the rhymes.</p>
What starts with my sound?	Students will learn to isolate initial sounds	<p>Place some common objects or pictures that begin with two easily distinguishable letters near the small group of children (e.g., “mat,” “man,” “monster,” “sun,” “sock,” “soap”).</p> <p><i>Model:</i> “I can match these pictures with their starting sound. This letter says /m/ like Mom. So I am going to put all the pictures that start with the /mmm/ sound with the letter.”</p> <p><i>Guided practice:</i> “Your turn to match the pictures with their starting sound. Say /mmm/ with me. Can you find something that starts with /mmm/?”</p> <p><i>Extra support:</i> Give a forced choice, emphasizing the first sound: “Is it ‘mmmmman’ or ‘sun’?” This may be easier using continuous sounds like /mmm/ rather than stop sounds.</p> <p><i>Enrichment/extension:</i> “Can you think of something else that starts with /mmm/?”</p> <p>Read a book that emphasizes alliteration such as <i>Fox in Socks</i> by Dr. Seuss (1965).</p>
Guess my word/ I’m thinking of	Blending and segmenting	<p>Place some objects or pictures that begin with two easily distinguishable sounds near the small group of children (e.g., “mouse,” “man,” “sun”).</p> <p><i>Model:</i> “I am going to say these words in a funny slow way. See if you can guess my picture. ‘mmmmoussss.’ ”</p> <p><i>Guided practice:</i> “Your turn to match the pictures with their starting sound. Say /mmm/ with me. Can you find something that starts with /mmm/?”</p> <p><i>Extra support:</i> “Is it sun or mouse?”</p> <p><i>Enrichment/extension:</i> “Can you think of something else that starts with /mmm/?”</p>
Sound boxes/ Word building	Blending and segmenting	<p>Place some objects or pictures that have 2 or 3 phonemes and that begin with two easily distinguishable letters near the small group of children (e.g., “tie,” “shoe,” “coat”).</p>

Appendix A: Continued

Activity	Objective	
Stand up when you hear your silly-sound-name	Manipulation	<p><i>Model:</i> “Today we are going to build some words with these blocks. First, I’ll make ‘tie.’” Move a marker as you say both sounds in /t/ /ie/. “There are two sounds in ‘tie.’”</p> <p><i>Guided practice:</i> “Your turn to build ‘tie’ with the blocks. Now let’s try to build ‘shoe.’ ”</p> <p><i>Extra support:</i> “Let’s build it together.”</p> <p><i>Enrichment/extension:</i> “Can you build ‘sock’ all by yourself? What word has more sounds, shoe or sock?”</p> <p>Include some decodable words.</p>
		<p>A good transition activity.</p> <p><i>Model:</i> “Today I am going to call you to line up in a silly way. I am going to pretend everyone’s name starts with a /sss/ like Samantha’s. Samantha, you come up and be the leader, because we are using your letter today!”</p> <p><i>Guided practice:</i> Looking directly at her, ask Alexis, “Salexis, will you line up?”</p> <p><i>Extra support:</i> And take his hand and say, “Sonathon, will you line up?”</p> <p><i>Enrichment/extension:</i> “If your silly-sound-name is Sarlos, line up. Sarlos, since your funny name starts and ends with /sss/, you can be at the end of the line.”</p>
Read-aloud books		<p>Choose a predictable story with rhyming text (see Yopp, 1995b, for an annotated bibliography of read-aloud books for developing phonemic awareness).</p>

Appendix B:

SEND Students' Individual Educational Plan Rubric Sample.

الخطة التربوية الفردية للعام الدراسي 2020-2019

البيانات الأولية للطالب:		
اسم الطالب:	تاريخ الميلاد:	العمر الزمني:
الجنس:	نوع الإعاقة:	القسم:
تاريخ إعداد الخطة:	تاريخ انتهاء الخطة:	
الخطة من إعداد :		

1

الخطة التربوية الفردية للعام الدراسي 2020-2019

تحديد مستوى الأداء الحالي:

المجالات	نقاط القوة	نقاط الاحتياج
المعرفي:		
اللغوي:		
الاجتماعي:		
العناية ذاتية:		
الحركي:		

2

الخطة التربوية الفردية للعام الدراسي 2020-2019

Appendix B: Continued

الأهداف التعليمية العامة في جميع المجالات بناء على قياس مستوى الأداء الحالي

المجال	الأهداف العامة	الوسائل التعليمية	تاريخ البدء	تاريخ الانتهاء
المجال				
المجال				

فريق العمل:

الاسم	الاختصاص	التوقيع

Appendix C:

Ethical Consideration (Gaining Access)

عقد إجراء بحث / دراسة في مدينة الشارقة للخدمات الإنسانية



ثانياً: مدة العقد

تحدد مدة السماح بتنفيذ البحث خلال الفترة مابين 22 / 10 / 2018 و 15 / 9 / 2019 ويحق للفريق البحثي انتهاء العقد وقتما يشاء دون ذكر الأسباب.

ثالثاً: الإلتزامات المادية

لا تلزم المدينة بدفع أي مبالغ أو توفير أية احتياجات للباحث خلال أو بعد انتهاء جهة البحث من إجراء عملها وهذا الأمر شامل لكل تكاليف البحث والدراسة والأدوات المستخدمة

رابعاً: تعديل عنوان أو أهداف البحث:

يلتزم الباحث بعدم إدخال أي تغييرات على أهداف الدراسة أو إجراءاتها التي تم الاتفاق عليها إلا بعد إعلام الفريق البحثي ويحق للفريق البحثي رفض تطبيق الاستبيانات والبرامج التي لا تتناسب مع سياسته وأهدافه وطلب إجراء تعديل عليها

خامساً: نسخ البحث أو الدراسة


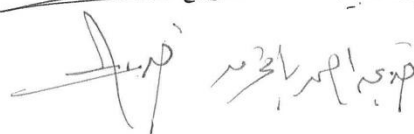
يلتزم الباحث بتقديم نسختين من البحث أو الدراسة إحداها مطبوعة على الورق والأخرى منسوخة على الحاسب الآلي (CD).

سادساً: حقوق الملكية

لضمان حقوق الملكية لأطراف العقد يؤخذ في الاعتبار ما يلي :

- تكون جميع الحقوق المتعلقة بالدراسة أو البحث من نشر أو توزيع أو بيع أو إهداء أو تبادل ملكاً خاصاً للباحث
- يتعهد الباحث- أنه سوف لا يفشي - في أي وقت من الأوقات سواء كان ذلك خلال فترة إنجاز البحث أو بعدها لأي شخص أو مؤسسة - أية معلومات سرية عن المتعاملين مع المؤسسة أو الموظفين
- لا يحق للباحث نشر أو نسخ أي من المستندات أو البرامج المستخدمة في المؤسسة أو تصوير أي من الأفراد دون موافقة

حرر هذا العقد من نسختين أصليتين سلم كل طرف نسخة منها.

اسم الباحث : د. علي مبارك عبيد
التوقيع: 
التاريخ: 22/10/2018
إعتماد رئيس الفريق البحثي: 
التاريخ: 22/10/2018

عقد إجراء بحث / دراسة في مدينة الشارقة للخدمات الإنسانية

الاسم: دري علي صبار
الجهة التي ينتمي لها الباحث: جامعة دبي، البريطة (ماجستير تربوي) / العمل: شركة المياه
المؤهل العلمي: بكالوريوس التخصص: دكتوراه في التربية
التخصص الفرعي: أعمال صناعية
العنوان البريدي: nadaobaid93@gmail.com
هاتف العمل: 0526992665 الجوال: 0555055831
الفاكس: - البريد الإلكتروني: nadaobaid93@gmail.com

عنوان البحث

Investigating the Use of Lughati Tablets to Promote Reading Skills with Special Educational Needs Students at The Sharjah City of Humanitarian Services in the United Arab Emirates (UAE)
وتتضمن بنود هذا العقد ما يلي:

أولاً: أحكام عامة

- يجب أن يلتزم الباحث بتسليم مخطط البحث على أن تشتمل على أهداف وأهمية البحث وفرضياته
- يرفق مع العقد رسالة موجهة من الجامعة أو الجهة المعنية بالبحث تتضمن عنوان البحث والهدف منه والأشخاص المكلفين بإجراء البحث
- يتعهد الباحث بالالتزام بإتباع السياسات التي وضعتها المدينة من حيث السلوك المهني والوظيفي والالتزام بالمواعيد
- يجب أن يلتزم الباحث بالمواعيد المخصصة لتنفيذ الأبحاث بموجب البرامج السنوية للمراكز والأفرع
- يجب على الباحث الإلتزام بحضور الاجتماعات التي سيتم عقدها من قبل فريق العمل في المدينة
- عند رغبة الباحث في الحالات الاضطرارية القصوى تمديد مدة إجراء البحث فعليه أن يتقدم بطلبه في هذا الشأن إلى الفريق البحثي قبل تاريخ انتهاء فترة البحث ب (15) يوماً على الأقل مشتملاً على مايلي:
- تبرير لطلب التمديد موضحاً به ماتم انجازه في البحث حتى وقت طلب التمديد
- خطة العمل لاتمام الجزء المتبقي من البحث خلال فترة التمديد

Appendix C: Continued



10/22/2018

To: H.E Sheikha Jameela bint Mohammed Al Qasimi
Vice Chairperson of the Supreme Council for Family Affairs and Director General of the Sharjah City
for Humanitarian Services (SCHS)

This is to certify that Ms.Nada Obaid with Student ID number 20170505 is a registered part-time student in the Master of Education offered by The British University in Dubai since September 2017.

Ms. Obaid is currently collecting data for her project (The impact of “Lughati” initiative in using tablets and education applications to promote Arabic Language of students with Mental Disabilities in Sharjah City of Humanitarian Services.)

She is required to gather data through conducting Student assessments that will help her in writing the final project. Your permission to conduct her research in your organisation is hereby requested. Further support provided to her in this regard will be highly appreciated.

The student would require to visit Sharjah Humanitarian City several times. Her visit will include some observations and interactions with students and their supervisors. She would require to carry out assessments on the progress of the students using Lughati tablets. The assessments will be done with the help of the supervisors and will target assessing the pre-reading and pre-writing skills of the students.

Any information given will be used solely for academic purposes.

This letter is issued on Ms.Obaid’s request.

Yours sincerely,

Dr. Amer Alaya
Head of Student Administration

Appendix C: Continued



12 May 2019

Dear: Yahsat
Abu Dhabi, UAE

This is to certify that **Mrs. Nada Obaid** with Student ID number **20170505** is a registered part-time student in the **Master of Education** offered by **The British University in Dubai** since **September 2017**

Mrs. Obaid has successfully completed her taught modules and is currently working on her dissertation. She is required to conduct school visits in order to collect data for her research. Upon the final submission and the validation of the Board of Examiners on October 2019, she will be awarded degree of Master of Education.

This letter is issued on Mrs. Obaid's request.

Yours sincerely,

The block contains a handwritten signature in blue ink and a circular official stamp of The British University in Dubai Student Administration.

Dr. Amer Alaya
Head of Student Administration

Appendix D:

Participants Consents.

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

الموضوع: دراسة عن استخدام أجهزة لغتي كوسيلة تعليمية في تعليم اللغة العربية والصوتيات للطلبة أصحاب الهمم في مدرسة الوفاء في مدينة الشارقة للخدمات الإنسانية.

ملاحظة مهمة: سيتم استخدام الاستبيان في دعم بحث جامعي وسيتم التعامل مع كل المعلومات بخصوصية تامة وبدون ذكر أي معلومات شخصية. المشاركة في هذه الدراسة تطوعية.

Name / الاسم	Number of Students Supervised during the Study / عدد الطلبة الذين أشرفت عليهم	Signature / التوقيع
مروى بلال السيد	4	مروى بلال
هبة محمد سعيد	13	هبة محمد
أيما خليل	13	أيما خليل
ليلى خلف	3	ليلى خلف
صديقه جمال	كل مدرسة	صديقه جمال
سما جمال	كل المدرسة	سما جمال

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

Demographic Information

1. **Gender:** Female | Male

1. الجنس: ذكر | انثى

✓

2. **Age group:** 20 – 30 30 – 40 40 – 50 50+

2. الفئة العمرية:

✓

3. **Your academic qualification:**

3. المستوى التعليمي:

دبلوم تربية وتأهيل كروبي

4. **Number of years in the teaching profession:**

4. عدد السنوات في مهنة التدريس:

أبشر في مهنة التدريس 20 سنة

5. **Subject/subjects you teach:**

5. المواد التي تقوم بتدريسها:

براق العربية الخاصة للطلاب

6. **Grades you teach:**

6. المرحلة الدراسية التي تقوم بتدريسها:

الفترة العربية من 6 - 10 سنوات

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

✓

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

الموضوع: دراسة عن استخدام أجهزة لغتي كوسيلة تعليمية في تعليم اللغة العربية والصوتيات للطلبة أصحاب الهمم في مدرسة الوفاء في مدينة الشارقة للخدمات الإنسانية.

ملاحظة مهمة: سيتم استخدام الاستبيان في دعم بحث جامعي وسيتم التعامل مع كل المعلومات بخصوصية تامة وبدون ذكر أي معلومات شخصية. المشاركة في هذه الدراسة تطوعية.

Demographic Information

البيانات الشخصية

1. Gender: Female | Male

1. الجنس: ذكر | أنثى

2. Age group: 20 – 30 30 – 40 40 – 50 50+

2. الفئة العمرية:

3. Your academic qualification:

3. المستوى التعليمي:

بكالوريوس (الليسانس) أدب عربية ثم لغة عربية ودراسات إسلامية
رئيس قسم تعليم مهتم تربيه خاصة

4. Number of years in the teaching profession:

4. عدد السنوات في مهنة التدريس:

8 سنوات

5. Subject/subjects you teach:

5. المواد التي تقوم بتدريسها:

صنايع خاصة بالعربية الخاصة + بعض الصفات التاريخية

6. Grades you teach:

6. المرحلة الدراسية التي تقوم بتدريسها:

الصف الرابع (7 - 9)

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

وافق

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

الموضوع: دراسة عن استخدام أجهزة لغتي كوسيلة تعليمية في تعليم اللغة العربية والصوتيات للطلبة أصحاب الهمم في مدرسة الوفاء في مدينة الشارقة للخدمات الإنسانية.

ملاحظة مهمة: سيتم استخدام الاستبيان في دعم بحث جامعي وسيتم التعامل مع كل المعلومات بخصوصية تامة وبدون ذكر أي معلومات شخصية. المشاركة في هذه الدراسة تطوعية.

Demographic Information

البيانات الشخصية

1. Gender: Female | Male

1. الجنس: ذكر | انثى

2. Age group: 20 – 30 30 – 40 40 – 50 50+ 2. الفئة العمرية:

3. Your academic qualification:

3. المستوى التعليمي:

بكالوريوس علوم الاجتماع

4. Number of years in the teaching profession:

4. عدد السنوات في مهنة التدريس:

10 سنوات

5. Subject/subjects you teach:

5. المواد التي تقوم بتدريسها:

مناهج اللغة العربية الخامسة + بعض الأهداف الأكاديمية

6. Grades you teach:

6. المرحلة الدراسية التي تقوم بتدريسها:

الفئة العمرية (8 - 9) سنوات

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

أوافق

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

الموضوع: دراسة عن استخدام أجهزة لغتي كوسيلة تعليمية في تعليم اللغة العربية والصوتيات للطلبة أصحاب الهمم في مدرسة الوفاء في مدينة الشارقة للخدمات الإنسانية.

ملاحظة مهمة: سيتم استخدام الاستبيان في دعم بحث جامعي وسيتم التعامل مع كل المعلومات بخصوصية تامة وبدون ذكر أي معلومات شخصية. المشاركة في هذه الدراسة تطوعية.

Demographic Information

البيانات الشخصية

1. Gender: Female | Male

1. الجنس: أنثى | ذكر ✓

2. Age group: 20 – 30 30 – 40 40 – 50 50+

2. الفئة العمرية:

✓ 20 – 30

30 – 40

40 – 50

50+

3. Your academic qualification:

3. المستوى التعليمي:

بكالوريوس / دبلوم ثانوية

4. Number of years in the teaching profession:

4. عدد السنوات في مهنة التدريس:

11 سنة

5. Subject/subjects you teach:

5. المواد التي تقوم بتدريسها:

تدريس العربية + مادة ثانية

6. Grades you teach:

6. المرحلة الدراسية التي تقوم بتدريسها:

من (5 - 7)

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

نعم أوافق

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

الموضوع: دراسة عن استخدام أجهزة لغتي كوسيلة تعليمية في تعليم اللغة العربية والصوتيات للطلبة أصحاب الهمم في مدرسة الوفاء في مدينة الشارقة للخدمات الإنسانية.

ملاحظة مهمة: سيتم استخدام الاستبيان في دعم بحث جامعي وسيتم التعامل مع كل المعلومات بخصوصية تامة وبدون ذكر أي معلومات شخصية. المشاركة في هذه الدراسة تطوعية.

Demographic Information

البيانات الشخصية

1. Gender: Female | Male

1. الجنس: ذكر | انثى

2. Age group: 20 – 30 30 – 40 40 – 50 50+ 2. الفئة العمرية:

3. Your academic qualification:

3. المستوى التعليمي:

_____ ثانوية عامة

4. Number of years in the teaching profession:

4. عدد السنوات في مهنة التدريس:

_____ 14 سنة

5. Subject/subjects you teach:

5. المواد التي تقوم بتدريسها:

_____ تدريس الكاريسمة + منهج خاصة للتربية الخاصة

6. Grades you teach:

6. المرحلة الدراسية التي تقوم بتدريسها:

_____ من (5 - 7)

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

_____ وافق

Appendix D: Continued

Subject: A study to investigate using Lughati Tablets as an Assistive Technology in teaching students with Special Educational Needs Arabic reading skills such as Phonemic Awareness.

Important note: The findings of this study will be used as a part of an investigation conducted by a Masters' student. The participants' identities will be concealed to ensure confidentiality. Participating in this study is voluntary.

Demographic Information

1. **Gender:** Female | Male

البيانات الشخصية

1. الجنس: ذكر | انثى

2. **Age group:** 20 – 30 30 – 40 40 – 50 50+ 2. الفئة العمرية:

3. **Your academic qualification:**

3. المستوى التعليمي:

دبلوم معلمي التربية الخاصة

4. **Number of years in the teaching profession:**

4. عدد السنوات في مهنة التدريس:

15 سنة

5. **Subject/subjects you teach:**

5. المواد التي تقوم بتدريسها:

حاسب الالى

6. **Grades you teach:**

6. المرحلة الدراسية التي تقوم بتدريسها:

صفائح خامصة، حاسب الالى، اللغة العربية (5-9)

I am fully aware of the objectives of the study and I am willing to participate voluntarily:

أنا على علم بأهداف الدراسة وأوافق في المشاركة في الدراسة بناءً على رغبة مني:

أوافق