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Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities among Grade Three Learners with Dyslexia in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences

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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities among Grade Three Learners with Dyslexia in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences

By

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A thesis submitted to the University of Witwatersrand for the degree of

a. Doctor of Philosophy (PhD)
in the Faculty of Humanities
(Inclusive Education)

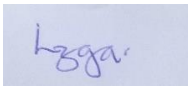
Supervisor: Dr Peter Aloka

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DECLARATION

I, *Lilian Zindoga*, do hereby declare that this PhD Thesis is my own unaided work. All sources used or quoted have been cited in full or otherwise acknowledged by means of complete references. It is being submitted for the Doctor of Philosophy in Inclusive Education Degree at the University of the Witwatersrand, Johannesburg and has not been submitted before for any degree or examination at any other University.

Lilian Zindoga

SIGN:  **DATE:** 18-04-24

DEDICATION

I dedicate this PhD thesis to my darling husband,

Lovemore Zindoga

And our one and only daughter and three sons

Thelma, Trevor Tafara, Stanley Takudzwa, Lovemore Tawananyasha **Zindoga**

I appreciate you being there for me during this trying time. Without your encouragement and persistent tolerance with me, I would not have been able to earn this degree.

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Fear not, for I am with you; be not dismayed, for I am your God, I will strengthen you, I will help you, I will uphold you with my righteous right hand.

(Isaah 41: 10)

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ABSTRACT

Learners with dyslexia (LWD) have difficulties in accurate and fluent word recognition and poor spelling and decoding abilities. Such learners also face challenges in various areas. In addition, dyslexia is linked with experiences of stigmatization and lowered self-concept. However, every learner in the society including those with dyslexia who have been excluded from the formal education system, must get access to quality education without discrimination. In South Africa, White Paper 6 outlines a national strategy for systematically addressing and removing barriers to learning through establishing full-service schools, converting special schools into resource centres, training education managers and teachers, and developing institutional and district support structures and pursuing a funding strategy. However, several studies report that LWD are still many and disadvantaged in the inclusive school set-ups. LWD continue to face academic, social, and psychological challenges in school and therefore early interventions are crucial for the development of these learners. This study aimed to examine effectiveness of mnemonic and sub-lexical reinforcement techniques in enhancing reading abilities among grade three LWD in two public schools in Mpumalanga, South Africa and was guided by two theories: Skinner's reinforcement theory and the Information Processing Theory (IPT). The study was also informed by the Human Rights Model of Disability and the Inclusive Pedagogical Approach. This study was anchored on pragmatic research paradigm. Within the mixed methods methodology, the Sequential Triangulation design guided the data collection process. The sample size consisted of 43 learners: 23 grade three LWD from the intervention and 20 learners from the control schools. Pre-and post-tests were administered to the learners during the first three months and during the second half of the research period which took 6 months using the quantitative sample of 43 LWD. The initial test was the Bangor Dyslexia test that was administered to all grade three learners from both the experimental and the control schools. The study's qualitative data, in the form of interviews, was also undertaken in the second phase of the data collection period where 6 parents of LWD were selected using purposive sampling and 3 English Grade three teachers, plus the principal and the deputy principal underwent semi-structured in-depth interviews. The research tools used were reading tests, short reading comprehension passage, questionnaires, and interview guides. Validity of questionnaires was ensured by Keyser Meyer Oklin test while reliability was ascertained by use of

Cronbach's alpha. Quantitative data were analyzed using both descriptive and inferential statistics whereas the qualitative data was analyzed using thematic analysis.

The study findings indicated that the use of mnemonic reinforcement techniques to enhance reading abilities among grade three learners with dyslexia in primary schools is highly effective. The findings further revealed that repeated reading as a form of sub-lexical reinforcement techniques is effective in enhancing reading abilities among learners with dyslexia. The findings also revealed that there is a significant effect of gender in influencing enhancement of reading performance by mnemonic intervention, with the female learners having better scores than males. The findings indicated that girls had comparatively higher improvement in performance than the boys in the two components of reading ability (reading and comprehension) and in the overall reading ability, after having gone through sub-lexical intervention.

The findings further indicated that generally older children in the intervention group had relatively higher improvement in performance in overall reading ability and its two components (reading and comprehension) than the younger children in same group. The findings indicated that there was statistically significant difference in reading scores between younger and older children among grade three LWD who received sub-lexical treatment, with older learners having higher scores than younger learners. The study recommends that the Department of Basic Education should revise the policy that reading is tested from grade one, instead of from grade three, and that those who are not able to read do not proceed until and unless they are able to read. Moreover, the Department of Basic Education should organize workshops that train teachers in various approaches on how to improve reading of learners with reading problems because the workshops would help teachers by equipping them with the most widely used approaches to reading instruction to enhance learners' reading abilities of learners in early years.

Key Words: *Mnemonic; Sub-lexic; Reinforcement Techniques; Reading Abilities; Grade Three Learners with Dyslexia; Primary Schools; Age; Gender; Differences; Mpumalanga; Age Difference; Gender Difference, Learning Disabilities*

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LIST OF ABBREVIATIONS & ACRONYMS

ADHD:	Attention -Deficit Hyper Disorder
APA:	American Psychological Association
BDA:	British Dyslexia Association
BDADI:	British Dyslexia Association and Dyslexia Institute
BPS:	British Psychological Society
CWD:	Children With Dyslexia
COVID-19	Corona -virus infection-19
CPD:	Continuing Professional Development
CRPD:	Convention on the Rights of People with Disabilities
DD:	Developmental Dyslexia
DDE:	District Department of Education
DI:	Differentiated Instruction
DRC:	Dual Route Cascaded
ECD:	Early Childhood Education
EFL:	English as a Foreign Language
ESL:	English as Second Language
GPC:	Grapheme -Phoneme Conversion
HRDM:	Human Rights Disability Model
HRMD:	Human Rights Model of Disability
ICT:	Information and Communication Technology
IDA:	International Dyslexia Association
IDAS:	Increased Development of Attention Skills
IDEA:	Individuals with Disabilities Education Act

IE	Increased Enthusiasm
IE:	Inclusive Education
IEP:	Inclusive Education Pedagogy
IPA:	Inclusive Pedagogical Approach
IPA:	Inclusive Pedagogy Approach
IPAL:	Increased Punctuality Among Learners
IPPAF:	Inclusive Pedagogy Approach in Action Framework
IPT:	Information Processing Theory
IWR	Increased Word Recognition
KMO:	Kaiser Meyer Oklin
KWM:	Keyword Mnemonic
LTM:	Long-term Memory
LWD:	Learners With Dyslexia
MMR:	Mixed Methods Research
MoL:	Method of Loci
NDE:	National Department of Education
NEPA:	National Educational Policy Act
NRP:	National Reading Panel
PA:	Phonemic Awareness
PDE:	Provincial Department of Education
PFC:	Prefrontal Cortex
SAPF:	South African Policy Framework
SAS:	Structural Analysis Synthesis
SASA:	South African Schools Act
SD	Standard Deviation
SIAS:	Screening, Identification, Assessment and Support

SLD:	Specific Learning Disability
SNE:	Special Needs Education
SPSS	Statistical Package of Social Sciences
STM:	Short-term Memory
SvPPA:	Semantic Variant of Primary Aphasia
TA:	Thematic Analysis
UDL:	Universal Design for Learning
UNESCO:	United Nations Education, Scientific and Cultural Organization
USA:	United States of America
WBC:	World Blind Centre
WM:	Working Memory

CHAPTER ONE
1.0: INTRODUCTION

1.1 Background to the study

Learning disability refers to disabilities that are not physical and they are normally covert. Muktamath, Hedge, & Chan, (2022). Muktamath, et al., (2022) argue that children with learning disabilities are often misunderstood and accused of having poor listening skills, being lazy or clumsy and this often leads to low self-esteem, lack of confidence, and poor motivation. Muktamath, et al., (2022) further point out that specific learning disability is a clinical condition which is not always synonymous with "Learning disabilities" as defined by the educational system: not all children with learning deficits diagnosed by the school system would fit the definition for a DSM-5 clinical diagnosis of specific learning disability. Individuals with Disabilities Education Act (IDEA) define a specific learning disability as having problems in one or more of the basic thought processes involved in understanding or using speaking and listening or writing and reading skills, which manifests itself in the inability to listen, think, speak, read, write, spell, or count. Furthermore, Radhika (2018) highlights that learning disabilities are complicated and are more than the stereotypical perceptions of the disorder which are simply reading difficulties, or letter problems. The United States (US) Department of Education, (1995) further assert that perceptual impairments, brain damage, mild inability to pay attention and think clearly, dyslexia, and developing aphasia are all included in the specific learning disability category. In addition, the American Psychological Association, APA, (2013) emphasizes that learning disabilities are diagnosed using both educational and medical perspectives. What this generally implies is that a grade three learner who cannot understand or use the English language or local language, spoken or written is said to be having dyslexia.

There is no single, agreed upon definition of dyslexia. Shaw, et al., (2022) define dyslexia as a Specific Learning Disability that impact on reading and writing abilities while, comparatively, Shaw, and Anderson (2018) point out the experiences of helplessness and hopelessness encountered by junior doctors with dyslexia which may be because of fear of unfair treatment and personal feelings of inadequacy. Moreover, Shaw and Anderson (2018) highlight that these experiences may also be fueled by incidents of aggressive behavior from other medical students. In addition, Anderson, and Shaw (2020) further

argue that most junior doctors were diagnosed with dyslexia at University/ Medical school where most reported that dyslexia impacted upon their self-concept, and nearly half felt it influenced their career objectives and goals with medicine. Participants in the study also reported bullying from peers, academic and clinical teachers at medical school and at the workplace from peers. To make matters worse "psychological" and "pastoral" support were lacking. Therefore, dyslexia affects anyone, and this means that a person might have dyslexia but still be intelligent in other subject areas and be successful in life.

International Dyslexia Association (I.D.A) (2017) posit that dyslexia is linked to problems related to age-appropriate reading, spelling, and/writing. I.D.A. (2021) furthermore asserts that dyslexia is a specific learning disability that is neurological in its origin, characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. Snowling (2020) and I.D.A (2021) concur that dyslexia involves difficulties in reading aloud and spelling. Similarly, Wu, et al., (2022) point out that dyslexia is an impaired inability to understand written and printed words. Wu, et al., (2022) further highlight that epidemiological longitudinal data show that dyslexia is highly prevalent, affecting 10-20% of the population regardless of gender. In comparison to Wu, et al's 10-20% prevalence of dyslexia, Ooko and Aloka (2021) point out that dyslexia is a reading disability and is by far the most common learning disability, affecting over 80% of those identified as having neuro-cognitive disorders.

The primary symptoms of dyslexia are inaccurate word recognition and poor spelling difficulty that, in turn, affect the ability to read a text easily, ability to understand something and ability to translate ideas and thoughts into a written language (Ooko & Aloka 2021). Moreover, Roitsch and Watson (2019) point out that dyslexia in grade three learners may be noted when a child has difficulty linking sounds with letters, failure to read smoothly, spelling problems, challenges with written expression and poor handwriting. Conversely, Ooko and Aloka (2021) defined dyslexia as many different abilities to function or develop which is constitutional in origin and may affect oral language skills, motor function, organizational skills, and ability to understand how mathematics is used. According to Ooko and Aloka (2021), dyslexia is a problem that hinders smooth flow and correctness when a person is reading and spelling words. I.D.A. (2017) contends that dyslexia refers to a cluster of symptoms, which result in people having difficulties with specific language skills, particularly reading. British Dyslexia

Association (2013) defines dyslexia as a specific learning difficulty that interferes with the development of the ability to read and (write).

Learners with dyslexia (LWD)face various challenges in different areas. Makgato, et al., (2018), pointed out that children with dyslexia often have associated deficits in areas such as oral language acquisition, writing abilities, mathematical abilities, motor coordination, postural stability and dexterity, temporal orientation, visuo-spatial abilities and dexterity and attention abilities. Moreover, Yang, et al., (2022) stress that dyslexia may have a lifelong harmful alteration on individuals. Furthermore, Gibby-Leversuch, et al., (2021) point out that dyslexia is linked with experiences of stigmatization and lowered self-concept. The British Psychological Society (BPS) (2005) highlight that dyslexia is evident when a child reads or spells very slowly, with mistakes. The BPS (2005) definition focuses on literacy learning at the 'word level' and implies that the problem is severe and persistent even if appropriate learning opportunities are provided. Most importantly, LWD have difficulties in accurate and fluent word recognition, poor spelling, and decoding abilities (Ooko & Aloka, 2021). Ooko and Aloka (2021) also concur that LWD have inaccurate word recognition, poor spelling, and decoding abilities. Metsala and David (2017) observe that students with reading disabilities and reading fluency have been proved difficult to remediate.

In Malaysia, Nurul et al., (2018) reviewed various health practices that are used to manage the problems of reading and writing, and impairment of different thinking domains for children with dyslexia and discovered that there are a few type of treatments such as the multi-sensory method, the remediation of phoneme segmentation, and mental exercises targeted on the brain which can be used to improve ability to read and write. Moreover, these can be used to remedy various thinking spheres of knowledge among children with reading problems. According to Nurul et al., (2018), most of the treatments are focused on the features of communication such as accuracy in identifying sight words, the alphabet and the skills used to write effectively. Cognitive training was carried out to improve mental abilities. It is therefore important for the education system of a country to test such methods or treatments to help LWD. If they are found to be working, then the National Education Policy Act should embark on giving pre-service and in-service training to all stakeholders, particularly educators, to help improve reading abilities of LWD.

Developmental dyslexia is a lifelong hereditary condition causing late talking, learning new words and delay in learning to read. In Italy, Cancer, et al., (2020) reported a linkage between reading skills and music. The findings of different researchers, as stated by Cancer, et al., (2016), indicate that action taken aimed at improving basic awareness of sound of children with developmental dyslexia may influence the ability to read. They further point out that teaching learners music theory and practical skills alone failed to make reading skills better compared to methods that have existed for a long time for developmental dyslexia. According to Cancer, et al., (2016), both treatments, issued for 13h over 9 days, notably made reading speed and accuracy of a group of Italian students with dyslexia aged 8-14 years better. It can thus be noted that using such different training approaches could enhance reading abilities among LWD.

Over the years, mnemonic reinforcement technique was, and remains, a successful strategy to instruct learners with disorders that affect the ability to understand, or use spoken or written language, do mathematical calculation or coordinate movements. Talking about mnemonics, Pattern, (1990) asserts that objective testing confirmed that use of memory skills increased recall, at least 10-fold. Furthermore, Dresler, et al., (2017) point out that memory is one of the main features of human mental processes, and it is essential for discovering new information and enables one to accomplish future set plans. In addition, Kurniati, et al's (2019) study revealed that there was an important difference between students with an intellectual disability's basic English communication ability before and after being taught using picture mnemonics. Kurniati, et al., (2019) suggests that picture mnemonics should be used by teachers to teach students with special needs. This, therefore, implies that LWD can benefit from picture mnemonics.

Many researchers have used mnemonic instruction as techniques for instructing learners with different kinds of impairments. Lubin and Polloway (2016) highlight that mnemonic techniques have been used in contexts which cater for learners with disabilities and special needs as well as in programs that develop learners' general knowledge, literacy, skills, and competencies for many years now to help learners to remember concepts taught. In addition, a study by Radovic and Manzey (2019) suggests that mnemonic acronyms could be used to help students to remember topics and ideas. The use of mnemonic devices has been used to encourage students who may be experiencing

difficulties. From the above research, it can be concluded that mnemonic instruction may be used both mainstream and special education teachers.

Previous research also indicates that the sub-lexic reinforcement technique has been used in the school set-up but mostly for learners who are between 5 and 15 years. In the sub-lexic reinforcement technique, you use grapheme –phoneme version and this means that the sub-lexical approach bypasses the lexical system. Lopes and Barrera (2019) define sub-lexic technique as the syllabic highlight technique. Lopes and Barrera (2019, p.2) further postulate that: 'Learning to read in alphabetic systems is based on the understanding that writing represents the sounds of speech and that for one to be able to read, it is necessary to relate the orthographic patterns of the written words to the phonological and semantic representations associated with them.'

In addition, Muller, et al., (2020), highlight that in primary school learners who have reading problems usually struggle with word reading as they find it difficult to read from sound or sign system to recognizing whole words directly. Wright et al., (2011) assert that children start to construct meanings of words by setting up a word bank or written list that they acknowledge by perception. To clarify the difference between lexical and sub-lexical representations used to understand what is heard, Vitevitch (2003), on one hand, highlight that lexical representations are like whole word forms, whereas sub-lexical representations resemble parts of words like phonemes or biphones. On the other hand, Hasenacker and Schroeder (2022) explain that the Dual Route Cascaded (DRC) theory of reading is a model that explains mental processes that allows us to convert print to understand what we are reading which differentiates between sub-lexical and lexical reading routes, and it can perform two tasks to study reading which are lexical decision and reading aloud.

Hasenacker and Schroeder (2022) further explain that the sub-lexical route involves the process of generating pronunciation for words based on their written form (grapheme-phoneme conversion) -GPC-) rules to work out non-words grapheme by grapheme while the process whereby skilled readers can recognize known words by sight alone, using a dictionary and it involves reading by accessing a lexicon or memory store of previously seen written words. This can be done by pasting words or nouns on objects, for example pasting the words 'chair', 'window', 'door' on the back of a chair, window, or door. Moreover, Hasenacker and Schroeder (2022) highlight that the conversion of letter to

sound is mainly used by children in the beginning of learning how one's writing system works, and the lexical route then becomes successful with experience. Furthermore, Dial, et al., (2019) equate phoneme identification to sub-lexical, and word identification to lexical tasks.

Moreover, Pae, et al., (2017) assert that comparing visual designs and font size may affect reading performance and word recognition among readers of different linguistic backgrounds. In their study on use of constituent parts of words and how single words are recognized among native Chinese and Korean speakers, Pae, et al., (2017) discovered that Chinese speakers were incompetent in recognizing unusual words at the sub-lexical level, but more competent at the lexical level. Similarly, Conrad, et al., (2022) point out that classical linguistic theory supposes that elements of sound are not internally related to the meaning of words. This, therefore, implies that if a grade three learner with dyslexia, has grasped knowledge of the alphabetic principle, graphemes, and phonemes, they may not go wrong in mapping and mastering reading.

An emergent reader in danger of difficulty reading finds it hard to recognize that the language expressed in speech like "mat", is made up of three separate units of sound (m/a/t) and therefore finds it more challenging than his peers to depict those units of sound onto the written symbol that represents a sound, 'm', 'a' and 't respectively (Wright, et al., 2011). Wright et al., (2011) concurs with Muller, et al., (2020) who maintain that transition from letter-by-letter phonological recoding requires one to learn how to spell words from sounds, for example 'str- ee- t' for street. Instead of the child relying on an adult or on picture-word matching, as held by Wright et al., (2011), grade three teachers of LWD must, therefore, try sub-lexic reinforcement/ syllable highlight technique/phonological awareness/ synthetic phonics, for them to be on top of the situation (being able to teach LWD successfully).

Furthermore, in England, Glazzard and Stones (2020), suggest that synthetic phonics, which work the same way as the sub-lexic technique, has benefits in word-reading and spelling. Glazzard and Stones (2020) claim that synthetic phonics teaches the units of sounds associated with written symbols where the sounds are taught separately then blended (synthesized). In addition, Glazzard and Stones (2020) assert that synthetic phonics include segmenting, the ability to break up spoken words into their separate sounds down into its individual sounds. For example, the word cup is made up of three

sounds, /c/-/u/-/p/. Therefore, spellings become easy when a child knows how to sound letters then blends them into a whole word.

In South Africa, Mbatha (2018) reported that it was important to provide teachers with a curriculum that comprised all senses, including visual, auditory, and kinesthetic learning styles. Also of vital importance, was introducing the teacher to learners, treatment of learners with problems, having a parent program in place, taking one day of treatment per week during the school day, modifying and improving methods of assessment, and teaching to help learners' needs and various backgrounds. As Mbatha (2018) puts it, inclusive schools must ensure that learners achieve their learning goals and are provided with enough support that is relevant, and meaningful. Furthermore, Mbatha (2018, p.1) points out that teachers' attitudes towards inclusive education are generally negative compared to that of teachers in special schools because of the inconsistencies in the level of assistance each teacher receives to apply inclusive education. It therefore points to the fact that the Department of Basic Education at national, provincial, down to the district level, have a big task ahead of them of making sure that they start the ball rolling and that suggested intervention strategies are put into effect.

From the above definitions, the current study adopted the I.D.A. (2017) definition which states that dyslexia is a problem affecting the nervous system in its origin, that it is characterized by difficulties with accurate and/ or fluent word recognition and by poor spelling and decoding abilities. Furthermore, Mbatha (2018) defined dyslexia as incompetence or marked difficulty to read or spell, regardless of usual intellectual functions, ongoing neurological conditions that impede the ability to process, identify graphic symbols, especially those related to language. Thus, in this study, dyslexia refers to grade three learners with difficulties in spelling, decoding and reading.

In South Africa, Leseyane, et al.'s (2018) study reported that there are several difficult situations faced by learners with dyslexia in mainstream schools and therefore recommended training of teachers so that they do not seek help from outside on how to teach reading. In terms of the inclusive policy, the article by the same author which explored what LWD experience in mainstream schools, no solution has yet been found to assist LWD. It is of concern to bear in mind that Leseyane et al., (2018) believe that

the establishment of diverse, equity and inclusion policy in South Africa, several groups, including children with disorders remain vulnerable. The same authors echo that most learners who have learning conditions or physical disabilities are stigmatized, labeled, and excluded in school and by their peers. Furthermore, Leseyane et al., (2018) also found out that children with disabilities are rejected by their peers in mainstream classes. From these observations, it can be deduced that the research by Leseyane, et al., (2018) was mainly focusing on LWD's experiences in the mainstream school.

Other studies that have been done in South African context include that of Ndombo, et al., (2013), in Gauteng Province which revealed that there was some evidence of dyslexia among learners, and that their level was below par. This study also suggested integrating phonological, reading, and writing skills to help LWD. However, the study by Ndombo, et al., (2013) was a baseline survey but it lacked an intervention in its procedure to address the problem of dyslexia among learners. Moreover, Olivier (2017)'s study in Gauteng suggested that there was need for teachers to change their attitudes so that this could shape, influence, and inform the way they instruct and assist learners with a language-based learning disability. The present researcher agrees with Olivier (2017)'s findings that teachers' attitudes influence the way they teach learners with dyslexia. Furthermore, Olivier (2017) suggested that it was essential for teachers to address the challenges of teaching and supporting LWD through organizing the best ways to look after resources meant for such learners.

Interesting research on taking on a screening tool for dyslexia in isiXhosa was carried out by Clark, et al., (2019), in South Africa which points out that while much investigation has been executed to understand dyslexia in the English-speaking population, little has been done to explore more about dyslexia in African languages. A focal point around Clark, et al., (2019)'s study is that there is need for a literacy screening tool in African languages to help in identifying which children have developmental difficulties that may become obstacles to their learning, and therefore identifying and providing effective early support to at risk children. This is important in terms of the ability to identify printed words using sound spelling connections and have sight word repertoire in South Africa. As indicated in Clark, et al., (2019)'s conclusion, it is indeed crucial to take on and measure a child's progress through foundational early childhood developmental milestones for dyslexia for not only the Bantu language of the Xhosa

learners, but also for all the other ten South African home languages. Clark, et al., (2019)'s research findings reveal the new tool for testing dyslexia, the new checklist/ reminder for teachers and parent interview, offer professionals whether an isiXhosa - speaking child is at risk of dyslexia or not.

Literature indicates that approximately five (5) million people in South Africa have problems of reading and writing either in school or at the workplace (Asiko (2013). Looking into problems of dyslexia to learning, Leseyane et al., (2018) claim that it is important for children and adults to obtain literacy skills currently. Furthermore, Leseyane et al., (2018) state that learners with dyslexia can also be psychologically or socially affected, because they have learning difficulty. In terms of prevalence of dyslexia in South African lower primary schools, no figures have been provided so far, yet there are many learners from grade R to grade 7 with reading difficulties. No research has provided statistics on the statistics of learners with dyslexia in public primary schools yet. To address reading challenges, Asiko (2013), manager of a non- profit organization called Strive International, that seeks to improve the academic experience of learners with reading problems in Africa, in her speech in a conference in September 2013, said that the conference aimed to increase awareness of the challenges of LWD, to identify the appropriate interventions to take in South Africa and to agree on policy recommendations. Furthermore, Asiko (2013) went on to comment on the effects of marginalization of learners with dyslexia and the lack of a clear meaning of dyslexia in an African context.

From existing literature in the circumstances in South Africa, it has been noted that little attention has been given to the efficacy of the mnemonic and sub-lexical reinforcement interventions on learners with dyslexia. Only a few authors have touched on mnemonic and sub-lexic techniques as some of the techniques to help learners improve their reading ability. Dunlosky et al., (2013) have researched on whole word reading and use of letter-sounds (grapheme-phoneme conversion) and their results show that children can read aloud using lexical and sub-lexical coding processes. Furthermore, Burt & Hefferman (2018) researched lexical and sub-lexical subtypes of individuals in terms of reading and spelling in adults. Moreover, Geertsema, et al., (2022) study in South Africa reported that most parents of children with dyslexia knew about dyslexia. Most parents of CWD found it difficult to grapple with dyslexia and the social stigma attached to it. Furthermore,

parents of CWD knew of the part they had to play in their children's education. However, shortage of resources in the country led to poor involvement of parents.

In another research in South Africa, Makgato, et al., (2022) indicated that most primary school teachers were aware about dyslexia. Many of them were using inadequate strategies to teach learners with reading problems under their care. Most recently, Altin et al., (2023) study in South Africa reported that communication and language skill specialists were not convinced of their ability to provide a proper detection of the problem. Leadership declaration discussed how much they doubted the significance of speaking about spoken parts of sentences and words in assisting LWD.

Furthermore, while Glazzard and Stones' (2020) study argues that there is no single method of teaching children to read that is superior to any other, the same authors highlight how much synthetic phonics are used in England. Similarly, South Africa can also adopt this technique- synthetic phonics, or sub-lexic technique. From the reviewed studies above, there seems to be very scanty research that has been done on interventions for LWD in the country. Most of the previous studies were baseline in nature without any intervention specifically for LWD. Moreover, Altin et al., (2023) recommended that there is need for more training on how to address dyslexia among learners in public schools. Thus, the current research investigated the recommendations of this study.

Therefore, the current research sought to add to literature by focusing on the effectiveness of mnemonic and sub-lexic reinforcement techniques on grade three LWD. Therefore, the current research investigated the effectiveness of mnemonic and sub-lexical reinforcement techniques on enhancing the ability to decode written letters and words into their associated phonetic code among grade three learners with learning difficulties that affect skills involved in accurate and fluent word reading and spelling in two state-controlled schools in Bohlabela District, Mpumalanga Province, South Africa. Moreover, the study also examined gender and age differences in the effectiveness of mnemonic and sub-lexical reinforcement techniques as interventions.

1.2 : Statement of the problem

Education must be delivered in a manner that accommodates the different cultural, personal, emotional, and educational needs of all learners in the society including those

with disabilities like dyslexia who have been marginalized from the structured education system (Leseyane, et al., 2018). In South Africa, it is expected that LWD are given adequate assistance to help them succeed and function well in schools.

In addition, the South African Schools Act (SASA) Act 84 of 1996 aims at ensuring that all learners have equitable and standard education and imposes schooling for every child between seven and fifteen. Furthermore, South Africa's Policy Framework on Inclusive Education, section 29 (1) (a) regulates that children with disabilities must be accommodated. In addition, White Paper 6 outlines addressees the removal of obstacles to learning through establishing schools that have broadened their mission and vision to meet learners' needs, creating resource centers out of special schools, in-service training of education personnel, as well as developing school and district support structures and pursuing a way of providing financial assistance. However, several studies report that LWD are many and still at a disadvantage in the inclusive school set-ups. For example, Leseyane et al., (2018) found that learners with reading problems were ill-treated by other learners who picked on them. Moreover, he also observed that when learners with reading problems failed to read and write properly, they were mocked by their classmates who performed better than them. In addition, the same author stressed that children with disabilities were ignored, worried, and bullied in mainstream classes. These LWD also developed a negative self- concept, anxiety, anger, and depression (Leseyane et al., 2018).

Martinelli, (2021) echoed that learners with reading difficulties often suffer from lack of confidence about who they are and what they can do because they have sub-standard sense of self-value and poor opinion of themselves. In addition, it has been reported that learners with dyslexia were not satisfied with how teachers in public schools treated them and were intolerant with them. In other words, they were unsatisfied that teachers in public schools were intolerant with them. Therefore, in South Africa, very little research exists on intervention techniques for improving reading abilities of learners with reading difficulties in schools. Moreover, the cause of learning disabilities is not yet known. Therefore, the consequences of not solving the problem will continue to be there and those affected will continue to be socially and psychologically affected.

Consequently, the present study undertook to fill these gaps by scrutinizing the effectiveness of mnemonic and sub-lexic reinforcement techniques among LWD in two public schools in Bohlabela District, Mpumalanga Province, South Africa.

1.3 Rationale of the study

Limited amount of investigative work was carried out on enhancing reading abilities among learners at the exit-level of the foundation phase in South Africa. In South Africa, Grade 3 progression is based on children aged 10-11 years (Hall, 2019). According to Hall (2019), the indicator measures the number and percentage of children who have passed grades 3 and 9 by the appropriate age and that the age limit is generous. This means that if a child started school in the year that they turned 7 and progressed one grade every year, they would be expected to complete grade 3 in the year that they turn 9 (Hall, 2019). In South Africa, grade 3 learners are often 8 to 9 years of age and from Early Childhood Education (ECD)- (4-5 years), they take two years, grade zero (0), and grade R (Informal learning), then at the age of six, they begin grade one (the start of formal school). It therefore follows that by the time they get to grade three, it would be their fifth year in school.

Current studies have evolved around how dyslexia affects typical reading and enhances reading abilities among primary school learners starting from grade three. For example, Snowling, et al., (2020), on one hand, argue that learning to read has an advantage on communication skills and that fluent readers read more and learn new written information better than children who are not good at reading. Snowling, et al., (2020) further highlight that language use by children who read less does not match with their peers. Elliott (2020) argues that most researchers working in distinctive disciplines view dyslexia as the same as reading difficulty. Elliott (2020) describes dyslexia as dyslexia 1, a word-level reading difficulty, and dyslexia 2, dyslexia as a clinically derived subgroup of poor decoders. The present researcher agrees with Elliott (2020) that science-related issues, educational policies, activities and curricula, and fairness in society is that many scholars, nurses, educators, lawyers, and parents feel that reading problems can be identified, but often not recognized, condition that is faced only by some people who present with serious problems in deriving meaning from text.

From one standpoint, Scotland, et al., (2007) maintain that research on dyslexia investigates and focuses on the nature, causes, diagnosis, and various forms of treatment based on strong theories and philosophies. Elliot, et al., (2007) further posit that the interactions between the behavioral, social, and emotional dimensions experienced by learners with dyslexia has been given attention for public awareness. In Kuwait, Altaimimi (2016) highlighted that there were general educational challenges in implementing inclusion for children with dyslexia in Kuwait, and the interested parties involved include teachers, parents, and schools.

Other studies have focused on other interventions, but the mnemonic and sub-lexical reinforcement interventions have received very little attention in addressing the low reading abilities of grade three LWD. In Malaysia, Nurul Annis, et al., (2018), reviewed different interventions used to enhance the competence of children with dyslexia and found out that there was little mediation like the multi-sensory technique, the sound intervention, and the neuroscience method which can be used to enhance literacy and impairment in mental processes among children with reading problems. Learners with reading difficulties keep on encountering academic, social, and psychological challenges in school and therefore early interventions are crucial for the development of these learners.

The present study is important because learning institutions need to be made aware that learning disabilities like dyslexia do exist and are neurologically linked disorders that impede academic skills like reading (Scott-Quinlan, 2020). Research on learning disabilities is important as teachers could attempt to understand a situation rather than focusing on providing remedial support to teaching skills related to specific learning disabilities. The present study is important because teaching using mnemonics enables learners to encode and retrieve information from the long -term memory while teaching phonics helps them to identify the underlying sounds as they read and spell words, which helps them understand how words are formed and constructed. With knowledge of phonics, confidence in reading improves in learners as they are better able to decode unfamiliar words and recognize patterns in language. Therefore, the present study sought to enhance reading abilities among grade three learners with signs and symptoms of dyslexia, early before the individuals face difficulties in reading.

1.4 Aims of the study

The study analyzed the effectiveness of mnemonic and sub-lexical reinforcement techniques on enhancing reading abilities among grade three learners with dyslexia in two government funded primary schools in Mpumalanga, South Africa. The study also aimed at examining age and gender influences in the effectiveness of mnemonic and sub-lexical reinforcement techniques in enhancing reading abilities among grade three LWD.

1.5 Research objectives.

The research was guided by the following key objectives:

a). To assess the effectiveness of mnemonic instruction on enhancement of reading ability among grade three learners with dyslexia (LWD).

b). To establish the effectiveness of sub-lexical reinforcement and enhancement of reading ability among grade three learners with dyslexia.

c). To examine the gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three learners with dyslexia in South Africa.

d.) To establish the differences in effectiveness of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability based on ages of grade three learners with dyslexia.

1.6 Research Questions

The following research questions guided the study:

a). How effective is mnemonic instruction in enhancing reading ability among grade three learners with dyslexia?

b). How effective is sub-lexical reinforcement in enhancing reading ability among grade three learners with dyslexia?

c) What is the gender influence on effectiveness of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three learners with dyslexia?

d). What are the differences in effectiveness of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability based on ages of grade three learners with dyslexia?

1.7 Research Hypothesis

The research was guided by the following research hypotheses:

Ha 1: *Mnemonic instruction is effective in enhancing reading ability among grade three LWD.*

Ha 2: *Sub-lexical reinforcement is effective in enhancing reading ability among grade three LWD.*

Ha 3: *There are significant gender influences on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancing of reading ability among the grade three LWD.*

Ha 4: *There are significant differences in effectiveness of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability on the basis of ages of grade three LWD.*

1.8 Delimitations of the study

The current research focused on grade three learners in two government fully funded schools in Bohlabela District**,** Mpumalanga Province, South Africa. The schools were selected from two different circuits (Ximhungwe and Mkhuhlu). The schools are located in the peri-urban centres of Bushbuckridge Municipality. The intervention school, Mvuyazi Primary School is located in Cork Village, just next to Mkhuhlu Mall whereas the control school, Hundzukani Primary School, is located deep in the rural village of Huntington Trust in Ximhungwe Circuit. The schools were selected mainly because they enroll learners with different abilities including those with varying learning difficulties such as reading problems. Moreover, the two schools have many learners with dyslexia in their grade three classes. The study used two interventions, namely mnemonic and sub-lexical reinforcement techniques, and the learners at grade three level, specifically eight to nine- year- old learners, were involved.

1.9 Operational definition of key terms

The following terms were defined as used in the study:

1.9.1 Dyslexia: This refers to a language –based learning disability with a cluster of symptoms which result in people having difficulties with specific language skills, particularly interpretation (International Dyslexia Association 2017). In the present

study, it refers to a learning disorder among grade three learners characterized by difficulty reading due to problems identifying speech sounds and phonological recoding.

1.9.2 Learners with Dyslexia: This refers to learners who usually experience difficulties in communication skills (International Dyslexia Association 2017). In the present study, this refers to learners in grade three who have trouble mixing up words, connecting letters to the sounds they make and then blending those sounds into words and trouble processing words.

1.9.3 Mnemonic Instruction: This refers to a set of strategies designed to help students improve long-term memory retrieval and retention using visual and auditory clues. This technique activates prior knowledge, builds on what learners already know and allows them to understand new information. Most mnemonic techniques depend on key words, rhyming words, or abbreviations formed from the initial letters of other words, for example, DBE. In the present study, this involves singing foundation phase songs, reciting rhymes, story-telling and doing sounds of the alphabet (A-Z) and vowels (a,e,i,o,u).

1.9.4 Sub-lexical instruction: This refers to a reinforcement which uses knowledge of phonemes (the sounds of letters) and graphemes (the sounds of groups of letters).

1.9.5 Grade Three: It is the third school year of primary school and students are usually 8-9 years old, depending on when their birthday occurs. In South Africa, grade 3 learners are often 8 to 9 years of age and from Early Childhood Education (ECD)- (4-5 years), they take two years, grade zero (0), and grade R (Informal learning), then at the age of six, they begin grade one (the start of formal school). This implies that when they enter grade three, it will be their fifth year in school.

1.10. Thesis layout

The chapters in this PhD thesis are presented as follows:

Chapter One: *Introduction to the Study*

This chapter presents a general description of the introduction to this study. This chapter contains the background, rationale and assumptions, statement of the research problem, aims and objectives of the study, the research questions and research hypotheses for this study. Delimitations of the study and the key terms related to the study were also provided.

Chapter Two: *Review of the literature*

Relevant literature relating to the study was reviewed and the chapter also dealt with an overview of both international and local literature that focuses on using mnemonic and sub-lexic reinforcement techniques to enhance reading abilities among grade three learners with dyslexia in public primary schools as well as analysis of age and gender differences.

Chapter Three: *Theoretical framework of the study*

This chapter provided an overview of the theoretical underpinnings of this study. The theoretical framework critically discussed the two theories appropriate for this study, namely, Skinner's Reinforcement Theory and the Information Processing Theory. Moreover, the chapter presents the Human Rights Model of Disability and Inclusive Pedagogical Approach.

Chapter Four: *Research Design and methodology*

The research design and methodological underpinnings for this study were discussed here. This includes the research paradigm and design adopted in this study. In addition, this chapter presented information regarding the sampling procedures, sample size, data collection instruments, validity and reliability of research instruments and procedures followed by data analysis. In conclusion, the methodological norms and ethical considerations for this study were discussed.

Chapter Five: *Quantitative Results*

This chapter integrated the presentation and discussion of the quantitative research findings of this study. Quantitative analysis of the questionnaire (pre and posttests) and data collected were dealt with in this chapter.

Chapter Six: *Qualitative results*

This chapter presented the qualitative research findings for this study. Qualitative results from the intervention school on using mnemonic and sub-lexic reinforcement techniques in enhancing reading abilities among grade three learners with dyslexia in public primary schools in Mpumalanga as well as analysis of age and gender differences, were provided. The findings from this section complement and expand on the findings from quantitative data.

Chapter Seven: *Summary of findings, discussions, conclusions, and recommendations*

This chapter presents the summary of quantitative and qualitative findings of the study. Secondly, the conclusion was presented with the major findings of this study and lastly, recommendations for practice, policy as well as limitations of the study were provided.

1.11: Conclusion of the Chapter

This chapter presented the introduction and background to the study, statement of the problem, rationale of the study, aims of the study, research objectives, research questions, research hypothesis, delimitation of the study and operational definition of terms. The next chapter, chapter two presents literature review of the study.

CHAPTER TWO
2.0: LITERATURE REVIEW

2.1: Introduction

This chapter presents the literature review of the study. The chapter begins by a presentation of writings on inclusive education, then followed by the South African setting. Moreover, the chapter presents writings on effectiveness of mnemonic and sub-lexical reinforcement techniques on enhancing the potential to read among LWD. The study also presents literature on age and gender contrast in the effectiveness of mnemonic and sub-lexical reinforcement techniques on enhancing reading abilities among LWD. The literature is reviewed from the global, regional and the existing local context in line with the themes above. Furthermore, the existing exploration from a survey of previously published research on a topic are identified.

2.2: Inclusive Education

The term has hidden fundamental activities and meanings that are difficult to discover, and these vary from place-to-place Loreman, (2017). There is no single definition of inclusive education, but Loreman (2017) views it as elimination of hurdles to taking part, identifying factors that cause exclusion of individuals or groups of children from schooling with their peers and then ensuring elimination of obstacles, while at the same time promoting inclusion and collaborative learning for all children. Similarly, Majoko, et al, (2018,17) postulate that inclusive education refers to supporting needs of all learners, removing obstacles to learning and ensuring that children are treated fairly in school. Furthermore, Loreman (2017) and Majoko (2018) confirm and concur that for inclusive education to be successful, there should be elimination of barriers and that there should not be discrimination among diverse learners. In a nutshell, inclusive education

(IE) is equivalent to fairness and justness in an educational system where diverse students flourish, learn, and perform at an acceptable academic level. The present study adopted the definition whereby everyone's needs are considered and that all learners participate and achieve together, and that there is elimination of barriers.

The Salamanca 1994 statement (Framework for Action) organized by the Government of Spain and United Nations Educational and Scientific Organization (UNESCO) in a conference that adopted that every child has a fundamental right to education and must be given the opportunity to achieve and maintain acceptable level of learning. The Framework of action points out that 'inclusion and participation are essential to human dignity and the enjoyment and exercise of human rights' and that it is guided by 1recognition of the need to work towards "schools for all". IC means real learning opportunities for groups who have traditionally been excluded, including speakers of minority languages. Acedo, et al., (2009), alludes that including everyone is a process which identifies and removes obstacles to learning, aims at Education for ALL and free education for learners from 5 years up to the age of 15. In other words, inclusive education is when children with additional learning needs and special educational requirements are educated together with their peers within a general learning environment that is least restrictive. It is indeed a trend that all countries, globally, follow and offer inclusive education since the Salamanca Statement was published.

2.2.1: Inclusive Education in South Africa

South Africa is no exception among countries practising inclusion in the education sector. Inclusive Education (IE) in South Africa is guided by Ubuntu, which is the African Philosophical concept of that refers to the sense of togetherness, and viewing people as being one part of a larger whole (Akabor & Phasha, 2022). Moreover, Akabor and Phasha (2022) reiterate that many schools in South Africa are well known for encouraging competition among learners by rewarding their individualistic efforts, yet these rewarded learners generally comprise less than ten percent of the school population.

Ubuntu emphasises restorative justice (harmony in the community) (van Norren, 2022). It indicates 'being self through others' (Mugumbate & Nyanguru 2013). In other words, Ubuntu Philosophy is about relationships of care and obligations. It tries to create a culture that promotes togetherness, and in such a case the stakeholders should exercise

humanity in a more philosophical sense to mean ‘the belief in a universal bond of sharing that connects all humanity’. In IE, it means that the teacher should check if their actions put the child first and to help better them because if students are dealt with well and are harmonized, they are likely to perform better. However, Akabor and Phasha (2022) indicate that there is a disconnection between the sense of Ubuntu in demonstrating inclusivity theoretically, yet in practice we continue to promote competition in schools. On the other hand, Ngubane and Makua (2021) argue that an indigenous philosophy and cultural practice like Ubuntu remains overlooked in educational spaces, especially in Africa and specifically, in South Africa.

Ngubane and Makua (2021) further point out that Ubuntu philosophy has a capacity to promote co-existence, social cohesion, and inclusivity among students from diverse ethnic and cultural backgrounds. However, it becomes an unbalanced scale when learners with special needs lag whereas we want them to fit into the mainstream school system, where we recognise and respect their differences while overcoming hurdles to learning in the classroom. Education White Paper 6 highlights that ‘all-round’ education is about accepting that all children need support, their differences need to be admitted, their participation in the culture and curricula of educational institutions needs to be maximised, and learners’ individual strengths need to be developed and to enable them to take part critically in learning. Therefore, White paper 6 outlines that the education and training system must be transformed to contribute to creating a caring and humane society (Education White Paper 6 Special Needs Education Building on Inclusive Education and Training July 2001). This implies that the White Paper 6 is there to guide how Inclusive Education should be put into practice in South African schools.

South Africa, like other countries worldwide, has a Policy on Screening, Identification, Assessment and Support (SIAS), which is there to provide a document that sets out goals used in decision-making and offers guidelines on how to screen, identify, assess and support learners who experience barriers to learning, including those with disabilities, and thereby improve the teaching and learning environment for maximum participation by all learners (SIAS Policy, 2014). The SIAS policy is aimed at enhancing access to quality education for less privileged learners and those who are marginalized. The Ubuntu philosophy, White paper 6 as well as the SIAS policy (2014) all converge and

point at the same individual, who is the learner, who needs to be included into relevant educational spaces, and that all barriers to their learning must be overcome.

2.3: Dyslexia

Dyslexia is a learning disability that primarily affects the skills involved in accurate and fluent word reading and spelling. It is neurobiological in origin, characterized by difficulties with accurate and/or fluent word recognition and poor spelling and decoding abilities (International Dyslexia Association (I.D.A.), 2017). Elliot (2020) concurs that these problems arise from a shortfall in the sound system of language that is often unexpected in relation to other cognitive abilities and the supplying of purposeful direction of the learning process. Snowling, et al., (2020) also concur that dyslexia is a problem in learning to clarify and to write or print. Hoskins (2015) argue that dyslexia is a multi-faceted learning disability that can range from mild to severe and is found both in children and in adults. Martinelli (2021) reiterates that if learning to read becomes an on-going struggle that leads a child falling behind his/her age peers, it is possible that he/she has a learning disorder known as dyslexia. From the above definitions, the present study adopted the definition by IDA (2017).

2.3.1 Origin of Dyslexia

Dyslexia was coined one hundred and fifty years ago, through the Word Blindness Centre and Tim Miles to more recent brain function case studies (Snowling, et al., 2020). Kirby (2020) concurs with Snowling, et al., (2020) that the features of dyslexia were first discovered in the 1870s. Kirby (2020) further points out that dyslexia was invented by Rudolph Berlin, a German ophthalmologist and academic. According to Kirby (2020), in the United Kingdom, in 1962 a conference was held in London where those who attended decided that dyslexia required more joint research after which the Word Blind Centre (WBC) for Dyslexic Children was formed in Bloomsbury. In 1972, as highlighted by Kirby (2020), the WBC prepared for a series of later organisations, including the British Dyslexia Association and Dyslexia Institute.

Children at risk of dyslexia should be identified and tested by Schools Psychological Services as early as possible. Therefore, children depending on the severity of their condition should enrol in tutoring programs or receive specialized education. In as much as learners are concerned, once a parent or teacher identifies a future problem within

them, they need to have the psychological tests done and then start to engage with educational therapy. As a matter of fact, learners who exhibit signs and symptoms of dyslexia like those with delayed speech and speak like a younger child need to be put under spotlight so that they start getting help before the problem gets worse.

2.3.2 Characteristics of Learners with Dyslexia

An individual with dyslexia seems to have trouble distinguishing between sounds (Thebe 2022). A LWD is also characterised by having difficulty putting across various sounds together to form speech. Furthermore, Thebe (2022) points out that naming letters of a word, identifying words and converting messages into intelligible language are other challenges faced by LWD. Other problems associated with dyslexia are reading for understanding, reduced immersion, word building and storytelling that can obstruct the growth and development of knowledge and meaning of words. Thebe (2022) further raises other possible indications of dyslexia as problems with spelling, reading, writing, or doing what has been directed carefully. LWD also reverse letters, get sequences in wrong order, difficulty in dealing with observing and listening information, analysis of messages, poor handwriting because of skills including reaching, grasping, and manipulating objects with hands and physical skill difficulties, challenge in recalling things, lacking direction of attention, and becoming too tired quickly. This implies that all other subject areas that LWD do are also affected and they spend a long-time completing task that involve reading and writing.

Different authors have similar or different views on characteristics of learners with dyslexia. Roitsch, and Watson (2019), highlight that dyslexia is characterized by the wide order of characteristics in the individuals it affects, and that from youth to adulthood, individuals with dyslexia display different attributes. Moreover, Roitsch and Watson (2019) posit that young children with dyslexia have difficulty linking letters with sounds, while older individuals encounter reading proficiency, naming letters and drafted expressions. Roitsch and Watson (2019) further point out that in a study, preschool learners had problems in learning to talk, learning sound and letters, colours and digits, handwriting, reaching, grasping and manipulating objects with hands and common words while older LWD may have bad handwriting, difficulty learning different languages, problems organising language, memorising problems, spelling mistakes, and persistent reading, writing and calculating complications. It has also been discovered that

individuals with dyslexia often show deficits in dealing with understanding of sounds, blending, and meaning of words (Rotsch & Watson 2019). This therefore implies that both specialist and regular teachers, from Foundation Phase right through to tertiary education should know about the different attributes of dyslexia to be able to deal with learners of such calibre.

2.4 Mnemonic Instruction

The term "mnemonic" comes from the Greek word 'mnemnikos' "of memory" and is an approach used to assist memory, starting from 477 BC: Mocko, et al., (2017). Jurowski, et al., (2015) postulate that mnemonic devices are learning approaches, which can often increase understanding and later the retrieval of information. Jurowski, et al., (2015) further explain mnemonic techniques as application in growing better ways to turn thoughts into communication, so that it is much easier to recollect. Therefore, memory systems are special ways cautiously used to improve memory and that they help utilize information already stored where it creates long-lasting memories to be remembered (Jurowski et al., 2015). Furthermore, Dave and Awasthi (2019) study in Indonesia, define mnemonic instruction as a strategy for reinforcing reminiscence and that it provides things that you can see or in the form of words for students who have difficulty in keeping possession of details. Dave and Awasthi (2019) further expand that memory techniques are strategies that awaken previous knowledge to link new information to background knowledge. This is also supported by Piaget' s theory that says that learners construct knowledge rather than passively taking in information and that humans create knowledge through the interaction between their experiences and ideas. Jeremy, et al., (2020) point out that Piaget pronounced a theory which posits that individuals do not acquire knowledge and understanding by passively perceiving it and how infants and children develop cognitively as they grow.

Mnemonic techniques encompass different action plans that are relevant across several settings and maybe used successfully with students with different capabilities (Lubin & Polloway 2016). Lubin and Polloway (2016) further highlight that, the frequently used mnemonic devices include an abbreviation formed from the initial letters of other words, acrostics, keywords, peg words, symbolics and pictographic. Mocko, et al., (2017) add that a mnemonic can be arranged by its appearance, for example an acronym based on initial letters of the target material and by its function, for example remembering a fact

versus remembering a procedure. Putnam (2015) argues that mnemonics are powerful ways to learn large amounts of information and are the most important tools and analysis of all methods used in education. However, Jurowski, et al., (2015) argue that there is a deficiency in the actual evaluation on the subject on the effectiveness of mnemonic instruction. The next section presents literature on mnemonic reinforcement technique as intervention to improve reading abilities on grade three LWD.

2.4.1 Effectiveness of Mnemonic Instruction on Enhancement of Reading Ability on LWD.

Literature on different positive and negative reinforcement approaches and their effectiveness does exist. A lot of research on memory devices that help learners recall larger pieces of information and its effect on learning words and their meanings shows that mnemonic devices can improve the process of acquiring building blocks in second language, boost memory, and increase creativity (Scruggs, et al., 2010). Fatima's (2020) study reported that the application of mnemonic technique can improve the number of words someone knows. In Saudi Arabia, Al-Khawaldeh and Al-Khasawneh (2019), established that teaching mnemonic keyword strategy on acquiring and keeping of many words among students with learning disabilities was effective. The study reported the power to retain and recall information and past experiences that people type into search engines to find what they are looking for on vocabulary understanding and retention among grade 9 students with learning disabilities and that the powerful influence of the keyword method on learners' remembering of information concerning recall and retention has been confirmed by many researchers. This reviewed study by Al-Khawaldeh and Al-Khasawneh (2019), in Saudi Arabia involved learners who were at formal operational stage, but the present study involved learners at concrete operational stage.

Othman, et al., (2019) study reiterate that the connection of pictures and sounds with mnemonics can make it more influential and successful in assisting learners of English language as a second language to remember more effectively and for a lengthy time, and this can be attained through the keyword (Othman et al., 2019). Lubin and Polloway (2016); Siegel (2017) and Mahdi and Gubeily (2018); all agree that mnemonic is effective with learning problems. Lubin and Polloway (2016), however, advocate that mnemonic strategies may be used on learners with varying abilities. Similarly, Prater

(2021) adds that consolidating the keyword and peg-word methods can be highly successful for recalling undisclosed pieces of information on number or reasoning.

In the United States of America, another study by Almutairi (2018) among third-grade students reported that special education teachers mentioned visual thinking tools that make pictures of one's thoughts, questioning, product discovery and development of work, partner-reading strategy, using different grouping, thinking aloud, and discussing the text with the students as the top seven plans of action. The above reviewed study was purely experimental in nature, and it lacked qualitative aspects which could have provided participants' feelings and experiences. However, the present study adopted a mixed methods paradigm hence the results are more comprehensive.

In addition, in another research by Lubin and Polloway (2016), in the United States of America, found that instructional strategies to improve retention and recall of information through visual or auditory clues is an effective technique that may be used across different specific areas of instruction as well as across capabilities. The study reported that learners with different learning disabilities obtained and kept concepts when taught using mnemonic instruction. The reviewed study above was not specific to learners with dyslexia but different abilities, but the present study focused on grade three LWD.

To promote academic success in school, Metsala and David (2017), in America, recommend teachers to teach students ways in which to recall information and what to remember, using a variety of plans of action but by far the most powerful have been the keyword method, the peg-word method and letter strategies. In another study, in Saudi Arabia, Fasih, et al., (2018) established that the use of the keyword mnemonics to tailor instruction to meet individual needs is an educational implication that can aid teachers seeking to improve student results. A critical problem with most of the past researchers was that they did not pay enough attention to the effects of using mnemonic strategies to improve reading comprehension, which the present study would make a follow up on. Moreover, in another study, in Iraq, Mahmood and Khalaf (2022) found that the group that received the variable being tested was able to recall information in the novel material while the group in the experiment which a variable is not being tested was not able to keep the main information in a written test. Most of the reviewed studies above examined

the effectiveness of mnemonics but the intervention was not specific to learners with dyslexia, but the present study adopted the two interventions for LWD, and this is the research gap that the present study filled.

In Romania, Cioca and Nerisanu (2020) concluded that there were effects of the visual mnemonic devices on creative performance, but it was done among high school learners. Therefore, the present study made a follow up based on this study's recommendations by focusing on grade 3 LWD. Similarly, Whitescarver (2018) in the United States of America, confirmed that mnemonic devices benefit enhancement of learning and facilitation of recall. The study further argued that mnemonics have shown to be a successful teaching method for English second language learners and those with disabilities to obtain new vocabulary. In Saudi Arabia, Al Khawaldeh and Khasawneh (2019) reiterate that the keyword strategy is crucial in the learning and keeping of a list of words and recommended future research works to copy this kind of studies to get extensive knowledge of the part played by the important words in a sentence and on retention of stock of words. The reviewed studies above are relevant to the present study because both examined mnemonics as a strategy on learners in general, but they were not specific to disabilities unlike the present study which focused on grade three LWD.

In Iran, Fasih, et al., (2017) indicated that using memory aid for rhymes and acronyms improved the reading for comprehension of third-grade senior high school students, and they liked using the skill for learning new materials to improve their understanding of reading in future. Students also improved on tests during the memory teaching methods, and this increased student commitment and competition towards new words (Fasih, et al., 2017). In Indonesia, a quantitative study by Rasmitadila, et al., (2020) disclosed that, a method of teaching reading that can be used as a different method in succeeding in students' ability to read and the reading method of pictures and syllables can improve the student's skill of reading. The reviewed study is relevant to the present study because it focused on keyword mnemonic vocabulary teaching, but it was done among learners in high school while the present study would develop an intervention for LWD at grade three level.

In Europe, Suarez, et al., (2020) study indicated that the connection between religion and forms of social interaction is not always dependable, that all teachers did in-service

training to apply theory in practice linked with different ideas about how people learn and keep information and that teachers keep in existence a single set of procedures that unites different paths and procedures to instil knowledge to learners based on their abilities, both when they perform activities or learn to read in the classroom. The reviewed study used quantitative data collection tools in the form of questionnaires to analyse beliefs about learning to read but lacked the feature that aims to analyse non-numerical data to gain understanding of individuals' social reality, including attitudes, beliefs, and motivation. Hence, the present study used qualitative data collection tools in the form of interview guides which as well probed the participants to reveal their thoughts and feelings pertaining to the intervention teaching methods used. In Saudi Arabia, Almekhlafy and Alqahtani (2020) longitudinal experimental study reported a substantial difference in learners' motivations after the intervention. The reviewed study was implemented on preparatory year students at a university whereas the present study was executed among grade three LWD. Moreover, the reviewed study used exit slips as motivation and the present study also adopted the quantitative tool, to motivate grade three LWD since they have a short attention span, given their age.

Moreover, in Indonesia, Marthila's (2019) quasi-experimental study deduced that there is significant effectiveness of using mnemonic technique in teaching vocabulary in the first semester of grade seven. Marthila's (2019) study was computable and was done among grade seven learners while the current study employed mixed methods and dealt with grade three LWD. In another study in Saudi Arabia, Othman, et al., (2019) study results showed that Saudi students were optimistic about the mnemonic keyword method used to instruct words known to a person. Moreover, Avci and Gumus (2020) study in Turkey indicated that educational achievement and ability to remember positions of the treatment group were considerably higher than those of the control group.

In Turkey, Balantekin (2021) study on a grade three primary school student with dyslexia indicated that the student's word recognition level, reading speed, comprehension percentage and reading motivation improved. While Balantekin (2021) used single-subject research on one grade three LWD, the findings could be very limited to one case, but the present study used 23 learners as its sample in the intervention, hence its findings are more comprehensive. In Indonesia, Istiqomah (2020) indicated average student ability in identifying compound complex sentence at the fourth semester in the academic

year. While Istiqomah (2020) employed a descriptive quantitative study, the analysis seems to bring non conclusive results, the current study employed mixed methods research (MMR), and hence its results are more inclusive.

In China, Huang, et al., (2021), indicated that organization, time management, prioritization, concentration, and motivation, being popular and general perception about oneself in the group of learners with dyslexia were considerably lower than those who did not receive the experimental treatment, indicating that CWD have a poorer self-concept than "on-time" developing children. An empirical interventional study design with a static group contrast was carried out by Ehsanpur and Razavi (2020), in Iran. The findings showed that the speed of learning and retention among trainees by the experimental group was more than the traditional method.

Some researchers in Africa have informed on the success of mnemonic instruction on learners with varying abilities and disabilities, including learning disabilities and intellectual disabilities. However, there are few research studies that are available in Africa. In Nigeria, Akinsola (2014), concluded that mnemonic and background knowledge were more effective at improving the students' achievement in Mathematics. In Kenya, Makau, et al., (2019) in a study, found out that mnemonic techniques had no effect on Mathematics learning outcomes and that there were major differences in social studies skills, abilities, knowledge, or values between learners exposed to learning through mnemonic techniques. The reviewed studies above were quantitative in nature, and they involved learners at secondary schools, but the present study adopted a mixed methods paradigm hence very comprehensive in nature and focused on grade three LWD.

It is very encouraging and advocated for when at-risk students like those with dyslexia, are supported through redirecting unwelcome behaviour, and positive effects of a reinforcement technique are noted after intervention. In, Nigeria, Okoro, et al., (2020) study disclosed that the mnemonic technique was successful and had better achievement than those in the conventional strategy group. While Okoro, et al., (2020) study investigated normal developing grade six learners' achievement in Mathematics using mnemonics, the present study assessed the achievement of grade three LWD in English reading.

In South Africa, Dwarika (2019), qualitative study indicated that members had grown new knowledge about ecosystem difficulties that affect conduct and were seriously involuntary about their quality of practice following their involvement in the accessibility of schooling positive behaviour support model. Once more, in South Africa, a pilot study by Dean, et al., (2021) reported that most published studies exhibited positive outcomes of Information and Communication Technology (ICT) reading interventions on learners' reading. While these two South African studies: Dwarika (2019) and Dean, et al., (2021) were qualitative in nature and the other a scoping review, respectively, the present study employed mixed methods to enable triangulation of data from different methods, thus increasing the validity and trustworthiness of the research.

From the foregrounding studies above, most of them have involved learners beyond grade three. However, the present study involved the grade three learners who are the cornerstone or foundation in terms of the education of a child. Consequently, the reviewed studies are still relevant because they address the situation under examination in the present study. The researcher argues that focusing on grade three learners is most important as the intervention would address challenges of dyslexia early. Moreover, most reviewed studies were quantitative in nature, and they need in-depth findings which could have been obtained from qualitative research. Thus, the present study filled in this gap by providing a pragmatic understanding of the phenomenon to give complimentary findings.

2.5 Sub lexical Reinforcement Technique

Sub-lexic technique corresponds to parts of words, such as phonological segments (that is phonemes) or sequences of segments (biphones). To be able to read a word requires the ability to use and interpret visual information, correct spelling, sounds, and the meanings of words, phrases, clauses, and sentences (Hasenacker & Schroeder, 2022). Learners should be taught how to develop literacy skills as young and as early as possible and not to wait until they have reading difficulties. Eslick, et al., (2020) stress that phonemic awareness skills should begin in the early years when learners begin school in the foundation phase. In the processing of speech, there are representations known as lexical and sub-lexical, where lexical corresponds to full word forms and sub-lexical corresponds to word constituents such phonemes and biphones (Vitevitch 2003). Glazzard and Stones (2020) postulate that gains in word reading and spelling are

produced by a systematic approach to phonics, and these results emphasize England's current policy commitment to synthetic phonics.

Alvarez-Canizo, et al., (2018) assert that several studies have shown that youngsters develop orthographic representations of new words after repeated exposure, which enables them to read those words more quickly and smoothly. The phonological technique, or synthetic, blended, or inductive phonics, is also known as sub-lexical technique. It is a way of teaching English reading that begins by teaching letter sounds before progressing to merge these sounds together to produce full articulation of full words. An example would be to take a simple word like cat separately into three letters, pronounce a phoneme for each letter in turn: k/a/t and blend the phoneme together to form a word. The present study employed the sublexic reinforcement technique as an intervention to improve the ability to read among grade three LWD in the experimental school.

2.5.1 Effectiveness of Sub-lexic Reinforcement Technique in enhancing reading abilities of LWD

The usefulness of the Sublexic Reinforcement Technique has been analysed in the past. In Australia, Wright, et al., (2011) reported that despite focusing on sub-lexical reading skills, there were substantial and clinically significant gains on several measures of phonological decoding skill and irregular-word reading, and the word-level skill improvements were accompanied by modest gains in text reading accuracy and reading comprehension. The reviewed study investigated a LWD and Asperger's disorders while the present study investigated LWD only. Moreover, the reviewed study only included one learner, whereas multiple students from two different public schools participated in the current study.

In Canada, Metsala and David (2017) discovered that sound-symbol relations are represented in a learner's memory and automaticity may increase connecting larger units of letters to pronunciation for each intervention phase. This implies that learning using sub-lexical intervention was important compared to when the experiment was done prior. In contrast to the current study, which focused on students with dyslexia, the studies described above focused on students with Asperger syndrome or attention-deficit

hyperactivity disorder (ADHD). Another study by Smith, (2016) conducted in the United Kingdom used a literature review as a technique and discovered that while few papers advocated using whole language while educating students with dyslexia students, many articles and books did. Additionally, Smith (2016) discovered that some LWD still struggle academically even after receiving early intervention. The study suggests that teachers use a trial-and-error method to figure out what is best for the individual in that situation, or that the best course of action is a combination of various approaches and principles, such as using phonics and whole language strategies to combat dyslexia and enhance reading skills. Therefore, the current study adopted the sub-lexical intervention to improve reading abilities among grade three students exhibiting indicators of dyslexia as a follow-up to the suggestions in this study.

The research community in the United Kingdom, according to Bowers (2020), is in unison that whole language instruction and other meaning-based reading strategies should be avoided in favour of emphasizing the teaching of letter-to-sound correspondence in English reading instruction. Bowers (2020) asserts that while different instructions highlight some of these characteristics while downplaying or ignoring others, there is still some overlap amongst methods, which makes it more difficult to compare them. Furthermore, Bowers (2020) emphasizes the need of deliberately and consistently teaching letter-to-sound correspondences in the foundation stages of reading instruction as one of the therapies to enhance reading skills among grade three LWD. Phonological dyslexia is a subtype of dyslexia where a person is not able to identify the phonemes or letter sounds that make up words whereas the surface type is characterized by the inability to read words with 'irregular' or exceptional print-to-sound correspondences, according to research by Borleffs et al. (2019). Another study by Leech et al. (2016) found that late-identified reading difficulties were heterogeneous; some children struggled with word-level processing and comprehension, whereas others only had problems with one of these skills. Few of the former had yet been recognized by their schools, even though most reading skill deficiencies were roughly as severe for late-as for early identified reading problems, and profiles of associated features were similar.

After being exposed to new words repeatedly, young children develop abstract mental representations of the spellings of words that make them to be able to read those words more quickly and fluently, according to research published in England by Canizo, et al.

(2018). These studies, however, did not account for word-related factors. Moreover, the aforementioned study makes distinctions by highlighting that some syllables consist of only one vowel sound, whereas others have two or three vowel sounds; and that speech sounds that make up words are called phonemes and individual letters or group of letters that represent individual speech sounds are called graphemes. The findings suggest that the easier it is to understand a word, the simpler it is to represent it orthographically.

In addition, developing children displayed a notable boost in vocabulary learning that is provided when spellings are shown during study periods, but not during testing, but for CWD, this effect was initially evident but then reached a condition of stability, according to Baron, et al.'s (2018) quasi-experimental study conducted in the USA. Like the reviewed study, the current study followed up on the study and involved grade three LWD aged 8 to 9 to examine the efficiency of sub-lexic reinforcement strategy on improving reading ability.

Furthermore, reading aloud necessitates mapping an orthographic form to a phonological one, according to a 2020 USA study by Borghesani, et al. According to Borghesani et al. (2020), the interaction between sub-lexical/phonological neuro-cognitive systems and lexico-semantic neuro-cognitive systems supports a dual-route model for reading aloud. The current study looked at grade three students with dyslexia, whereas the reviewed study compared healthy age-matched controls and patients with semantic variant of primary aphasia (svPPA) patients. Additionally, a study conducted in the United States by Nevenglosky, et al. (2019) revealed that teachers needed more knowledge before the anticipated implementations took place as well as awareness of the demands on their personal time. In contrast to the prior study, which used a qualitative case study and lacked quantitative findings for easy generalization, the current study used mixed methods research, which combined qualitative and quantitative techniques to produce thorough results.

In a different study by Murphy- Odo (2021) carried out in the Republic of Korea, the effect of phonics education on word reading abilities had a modest and numerically notable mean effect size. Murphy- Odo (2021) interprets these findings as evidence that teaching phonics to English language learners improves their word-decoding abilities. In addition, the same author goes on to state that this finding implies that training second

language readers using phonics and/or phonemic awareness (PA) techniques has a remarkable probability and notable impact on their capacity to decipher pseudowords in English. The approach of the reviewed study was systematic literature, and the intervention was phonological awareness or phonics teaching, however the findings were not supported by an empirical study like the one conducted in the current study.

Wahyuni, et al. (2016) found that students in Indonesia responded well to the approach and were willing to follow the program. Additionally, the results showed that children were eager to participate more in class activities, particularly those that utilized songs, games, storybooks, sound sheets, sound books, flashcard sheets, and word boxes. The examined study relied on qualitative methods like observation, documentation, and interviews; generalizable quantitative data was absent. However, the current study used quantitative techniques, such as pre- and post-test writing by the sample students, and questionnaires among the students' parents, all of which produced results that could be applied generally.

According to a Chinese study by Sun and Xie (2021), phonics has long been recognized as a useful tool for teaching young English language learners about the connection between the alphabet's written letters and their corresponding sound patterns. In their study, Sun, and Xie (2021) used a systematic assessment of the literature to examine 113 academic articles that were pertinent to the phonics-based method to teaching English learners in China between 2011 and 2020. The results of the systematic literature review showed that there is no standard method for teaching phonics among English teachers, but that using a phonics approach can significantly increase students' vocabulary pronunciation. In contrast to the previous work by Sun and Xie (2021), which used a systematic literature review as its technique, the current research involved a sample of 23 learners in the experimental school and 20 learners in the control school, with the researcher conducting hands-on teaching employing phonics instruction. While the previously reviewed study did not specify a grade level, it did note that phonics education was employed in all Chinese primary schools, the current study focused on grade three LWD in South African primary schools.

Glazzard and Stones (2020) points out that systematic phonics instruction improves word reading and spelling in the United Kingdom, but there is no conclusive proof that synthetic phonics is the best strategy for promoting reading development. The material

in the study, according to the reviewed article's conclusion, shows that there is a clear governmental agenda in England that mandates the teaching of synthetic phonics in both schools and initial teacher education programs. These studies are concerned by severely limiting trainees' exposure to a repertoire of reading development practices hence unable to assist reading development in all children. Gellert and Elbro's (2017) study in the United States of America demonstrated that the dynamic test considerably increased the prediction of word reading difficulties in grade 1 learners even though the variables whose effects on the outcome were identified by the investigator as the focus of the study. Additionally, it is hypothesized that the dynamic exam taps into processing and acquisition of sub-lexical units, both of which are critical for the development of early reading, but less so with vocabulary and non-verbal intelligence. The study concluded that the dynamic test used acquisition of sub-lexical units and processing necessary for the early development of reading successfully, which the present study is also focusing on as one of the instructional strategies.

Rasmitadila, et al.'s (2020) quasi-experimental study in Indonesia revealed that there were disparities in the reading abilities of the student groups who received the structural analysis synthesis (SAS) reading technique and the Gasuka reading method. According to the study's findings, both the SAS and Gasuka reading methods can help students become better readers. According to the study's findings, both the SAS and Gasuka reading methods can help learners become better readers. A quasi-experimental study in Slovenia by Skubic et al. (2021) found a numerically notable difference in phonological awareness between the intervention and control groups, favouring the intervention group. The study's findings supported the idea that musical exercises based on Edgar Willems' methodology are an excellent and successful way to encourage phonological awareness, particularly in young children. Although the evaluated study employed a quasi-experimental approach, it did not produce any qualitative data. The current study, however, used a combination of methodologies that produced complementary results. Additionally, whereas the current study included students in the age range of 8 to 9, the prior study concentrated on students in the age range of 4 to 7.

According to a study by Bowers (2020) in the UK, systematic phonics is a crucial part of teaching beginning readers and is more powerful than familiar methods like whole language. The study used meta-analyses to evaluate the effectiveness of systematic phonics for people of different ages and abilities. The present study used mnemonic and

sub-lexic reinforcement approaches to improve the reading skills of grade three LWD, whereas the evaluated study concentrated on systematic phonics training. The grapheme-phoneme correspondences (GPCs) knowledge of children in Australia varied, according to Larsen et al. (2020), and children were likely to pronounce single-letter graphemes correctly compared to multi-letter graphemes. GPCs that occur more frequently in text performed better. The execution of grapheme-phoneme correspondences (GPCs) was the main emphasis of the study under review, and the current study additionally used the sub-lexic reinforcement technique.

Canizo, et al.'s (2018) quasi-experimental study in Spain discovered that the kinds of syllables that are allowed and the written symbol representing a sound, but not syllabic frequency, had an impact on the creation of abstract mental representations of the spellings of words. The findings suggest that the easier it is to understand a word, the simpler it is to represent it orthographically. Similar findings were made in Indonesia by Paris (2019), who conducted a quasi-experimental study and discovered a big difference in the mean reading test scores between the preliminary and the test given after completion of programme following the introduction of the phonics strategy to study. The study found that teaching grade seven learners to read using a phonics approach was much more effective than other methods.

According to a quasi-experimental study conducted in Ecuador by Chamba and Ramirez-Avilla in 2021, there was a numeric remarkable improvement in participants' knowledge of the components of speech between what students need to learn and what they have learnt. The results also showed that, in the post-test, both treatment groups remarkably performed better than the group that comprises participants who do not receive the experimental treatment. Additionally, according to Pallathadka (2022), word recognition is essential for reading comprehension since, to comprehend what they are reading, pupils must correctly read most of the words in a book. According to a study by Monster, et al (2022) conducted in the Netherlands, word exposure, word meaning, and word form, all influence how accurately and quickly children will recognize words they hear in upper primary school. As stated by Monster et al. (2022), teachers must enhance their students' word recognition so that they can advance to grade three and beyond with more proficiency in phonological recoding (converting a written string to its spoken version.

Alfa and Karim's (2016) research in Malaysia found that while some peers had a favourable impact on students' performance, changes to the student program made by the

administration had a detrimental impact. Additionally, a study conducted in Iran by Izadpanah and Rezaei (2022) revealed that interactions between teachers and students, academic self-control, academic engagement, and academic hope are connected to students' academic zeal. Most of the Grade 3 learner participants with dyslexia in the intervention in the current study showed improved interest for their schoolwork. The students' effort to attend additional lessons also demonstrated their excitement. Additionally, the intervention led to greater enthusiasm because of feelings of pleasure, accomplishment, and joy from being able to read for the first time, all of which reinforced learners' reading skills. It can be deduced from the numerous criteria utilized by Alfa and Karim (2016) and Izadpanah and Razaei (2022) that academic zeal depends on the effort made by the professors and students under study.

Keller, et al. (2020), in the USA highlighted that some teaching strategies are more successful than others because they take advantage of the natural oscillations in students' attention. According to Amerstorfer and von Munster-Kistner (2021), adopting Problem-based Learning (PBL) as the foundational teaching style in Austria was successful in boosting student learning. While Amerstorfer and von Munster-Kistner (2021) and Keller, et al. (2020) both focused on university students, the current study studied grade three LWD, filling in research gaps in the body of literature. The determinants of single word spelling performance in youngsters utilizing a novel test combining regular words, irregular words, and pseudo words were published by Niolaki, et al. in Britain in their study from 2022. In a different study, van Rijthoven et al. (2022) found that LWD outperformed classmates who were typically developing in verbal learning and verbal consolidation. A quasi-experimental study conducted in Spain by Sanchez, et al. (2019) highlighted the significance of learning techniques and practical teaching methodologies in raising academic performance.

Boyes, et al.'s (2017) study in Australia on the increased development of phonemic skills found that almost all parents said the program helped them learn how to help their child with reading and spelling, that they would use the resources provided, and that they would probably attend a future workshop. Research by van Viersen, et al., (2022) in Norway on improved fluency in reading difficult sentences revealed that word-and text processes together accounted for a comparable proportion of variance in all fluency outcomes. The Brannan, et al. (2020) study also discovered that teachers who incorporated independent reading believed it was crucial for children to read extensively and proficiently. The results also indicated that there were no remarkable demographic

differences in reading volume or achievement between the independent reading group and the no independent group.

The usefulness of sub-lexical intervention among learners with disabilities has seldom ever been studied in Africa. In Olubusula's (2014) study in Nigeria, teachers for the synthetic phonic groups underwent training while those in the group that did not receive the experimental treatment continued to follow the traditional way of teaching. According to the findings, teachers felt more at ease teaching English as a second language and appreciated how simple and helpful the synthetic phonics curriculum was. Olubusula's (2014) study was entirely experimental in character, and it did not provide holistic participant dimensions that would have revealed their in-depth reactions and sentiments. The current study used a mixed methods paradigm, which consists of two methodologies that are complementary to one another. According to a quasi-experimental study conducted in Nigeria by Amadi and Offorma (2019), synthetic phonics significantly increased students' reading achievement more than analytic phonics. The investigators concluded that synthetic phonics, as opposed to analytic phonics, is a more successful teaching method to beginning readers. The previous work utilized a between-subjects design in which participants have not been randomly assigned to conditions, another group where participants are allocated into treatment and control arms and a partial experimental methodology, whereas the current study used a mixed methodology, an experimental and control group, as well as sub-lexical instructional and mnemonic reinforcement methodologies.

In Kenya, Ooko and Aloka's (2020) quantitative study, a numerical remarkable difference between an assessment measure given to participants before undergoing treatment and an assessment measure given to participants after receiving treatment was identified, indicating that behaviour modification techniques had a substantial impact on learners' English reading abilities. Eventually, the study finds that, when compared to prompting, shaping, and modelling methods, coaching behaviour modification practice had the greatest impact on English language reading ability. While the previously discussed study used specific modification strategies, the current study made use of sublexic reinforcement strategies to improve reading skills in LWD. Gumede (2020) found that the grade 9 cohort of students in government schools in Zimbabwe had reading comprehension skills below those expected for grade 4. Students from private schools created better narratives than those from government school students, whose were riddled

with errors. The investigation so demonstrated that the R-grade government school students' reading competency was below the necessary level. The evaluated study used qualitative and quantitative techniques, although it lacked qualitative findings that would have yielded more in-depth findings. As a result, the current study used a mixed-methods strategy to produce complementary findings.

According to a study by Mohammed and Amponsah (2018), in Ghana, students lacked the confidence to practice reading in class, teachers and parents lacked motivation to foster a love of reading, there were no pre-readers available at school or at home, there was no library, teachers lacked adequate knowledge of the phonemic awareness strategy for teaching reading, there were no reading clubs, and there was no reading competition among students in the school. Mohammed and Amponsah (2018) highlight that successful students in school are those who take an interest in reading because many of the subjects taught, and class assignments given require reading comprehension. They also claim that reading and language proficiency are both the means and the end of educational achievement. Most students who struggle to read and spell have weak phonological processing skills, and Mohammed and Amponsah (2018) note that this hinders students' ability to read words fluently because reading is a technical process involving reading letters and words one at a time.

Through dual pathway models, Tshililo (2016) adds that reading depends on children's cognitive development in South Africa. To put it another way, when reading, the grapheme-phoneme principles and letter sound correlation are used as the children speak words (Snowling & Hulme, 2005 in Tshililo (2016)), yet youngsters find it challenging to read novel words. Snowling and Hulme 2005 in Tshililo (2016) further postulate that dual route models occur in two routes, that is, lexical route and non-lexical route. The National Reading Panel (NRP) research from 2000 found that explicit, systematic phonics instruction is an important and crucial component of a comprehensive reading program in South Africa. Facts and findings give converging evidence to support this claim. Giving a blanket endorsement to any phonics education, however, should be done with caution (NRP 2000). NRP (2000) goes on to state that it's critical to understand that the objectives of phonics education are to give kids valuable knowledge and skills and to make sure they know how to use those skills in their reading and writing. Teaching phonics is therefore a means to an aim. Finally, systematic phonics training aims to

improve word identification and decoding accuracy, both of which support understanding (NRP 2000). A statistical process of analysing and combining results from several studies conducted by the National Reading Panel (NRP) in 2000 used data from 66 treatment-control comparisons drawn from 38 investigations.

Additionally, Cekiso (2012) recommends that English language teachers in South Africa give learners reading strategy instruction to help them develop as strategic readers to address the low reading proficiency of students. To teach beginning readers and to prevent and treat reading problems, systematic phonics training should be included in activities that help struggling reads develop their ability to read, according to the findings. According to the study's findings, systematic phonics training within a comprehensive prescribed and required courses related to reading and language arts appears to have a stronger impact on learners' reading development than whole language, an approach to learning that sees language as a whole entity.

The foregrounding study was conceptual in character and based on a piece of academic writing demonstrating knowledge and understanding of the academic literature of earlier published studies. However, the current study used an empirical approach within a mixed methods paradigm to conduct the investigations, thus the results would be more accurate. Additionally, some of the papers that were evaluated were on students from mainstream schools and others were on students with various disabilities, but very little research was found on students with dyslexia. Thus, by concentrating on LWD, the current study filled this knowledge vacuum. Additionally, most of the evaluated studies are quantitative in character and lack qualitative components for in-depth findings. They typically used quasi-experimental study methodologies. To produce complementary results with breadth and depth elements, the current study utilized a pragmatic research strategy.

2.7: Gender Influences on Effectiveness of the Mnemonic Instruction and Sub-lexic Reinforcement Techniques

2.7.1 Gender Influences on Effectiveness of the Mnemonic Instruction

According to an experimental investigation by Dakhiel and Abu Al Rub (2017) conducted in Saudi Arabia, there were no notable demographic gender-related differences or interactions. The study utilized students with learning difficulties

generally, but the current investigation concentrated on grade three LWD. In a different study, Tabatabaei and Hejazi (2011) found that first, in the vocabulary immediate post-test, girls outperformed males in terms of percentage scores. Second, females dramatically outperformed males in retention scores on the delayed post-test. Third, a comparison within groups revealed that females significantly outperformed males in terms of language retention and immediate post-test results.

Although the study was quantitatively analysed using vocabulary pre- and post-tests, it lacked qualitative in-depth results that would have allowed respondents to express deeper understanding of experiences, phenomena, and context. The present study, on the other hand, employed triangulation, a mixed-methods research design that integrates mixed methods research viewpoints, data collecting, analysis, and inference procedures, for the general aims of breadth and depth of understanding and corroboration.

In Australia, a 26-year-old student who had just started as a first-year Indonesian student at a selected institution received an intervention using the mnemonic keyword approach of learning foreign language vocabulary. The findings showed that, in comparison to her other study methods, the Key Word Mnemonic (KWM) had a greater impact on the learner's ability to acquire and retain Bahasa Indonesian. Since the case study only involved a single female student, gender did not play a significant role during treatment. Foong & Goh (1997) found remarkable differences between males and females in the categories of compensation and learning strategies concerned with managing emotions, both negative and positive in a different investigation. However, few studies using the keyword strategy compared the vocabulary growth of male and female learners. Additionally, there have only been a few investigations on the viewpoints and beliefs of English language learners in the field.

Most prior studies on students' attitudes and preferences toward vocabulary learning procedures at the University level were started in ESL environments, even though most English language learners and English language teachers are in EFL contexts. In another study, Osuh and Mwankon (2022) found that there was no remarkable difference between boys and girls in the recall task on the word repetition mnemonic, and that girls remembered more and performed better on mental image mnemonic and sentence mnemonic than boys, in Nigeria. The present study examined grade three boys and girls with dyslexia on reading of set words for end-of-term examination, in contrast to the

reviewed studies that compared "normal" secondary school male and female learners on vocabulary improvement, image mnemonic, phrase mnemonic, and word repetition on mnemonic.

According to a quasi-experimental study by Oyundoyin and Bolaji (2018) conducted in Nigeria, reading comprehension performance among students with intellectual disabilities was not significantly influenced by gender. This suggests that students who are male and female fare equally well on the reading comprehension test compared to their male counterparts. The study suggested that the two strategies may be utilized to improve reading, thus the current study did a follow-up on the study that was examined. Funmilayo's (2022) study in Nigeria once more found a sizable impact on students' performance in, interest in, and attitude toward biology. Additionally, gender had no discernible influence on students' academic achievement, biology interest, or attitude. Moreover, the Okenyi (2022) study in Nigeria found that the prior knowledge educational technique was superior to the mnemonic instructional strategy, although gender had no bearing on the outcome. Similar findings were found by Musa, Dauda, and Umar (2016) in Nigeria, who found that while there was no gender difference in mathematics performance or a notable effect of gender on students' learning goal orientation in favour of males, there were gender effects on students' competence and avoiding failure in front of others.

A modified version of the mnemonic keyword approach was used to teach students German nouns, meaning and grammatical gender, according to Desrocher et al.'s (2009) experimental study. The findings indicated that learning the gender in addition to the instance of translating appeared to slow down the acquisition of native translations. In their experimental study from 2009, Desrocher et al. employed a modified version of the mnemonic keyword strategy to teach students German noun meaning and grammatical gender. The aforementioned study did not involve LWD even though it had interventions, but the present study was done among grade three LWD.

2.7.2 Gender Influences in Effectiveness of Sub lexical Reinforcement Technique

Gender is a component that is frequently claimed to affect the development of reading skills, according to Vlachos and Papadimitriou (2015), and girls are typically regarded to outperform males in reading and writing tasks. The gender gap is evident in many areas of learning, including interest, attitude, needs, beliefs, and motivation (Zeynali 2012), suggesting that gender may have a general impact on learning. Zeynali's (2012) research in Iran also notes that numerous studies have demonstrated how gender affects students' academic interest, need, and success. Furthermore, Kaushanskaya, et al. (2011)'s quasi-experimental study in the USA found that while males outperformed females on phonologically familiar novel words, this difference did not hold true for phonologically unfamiliar novel words. According to the data, girls are more likely than boys to use their native language's phonological expertise when learning novel words. The current study, which contrasted with the earlier one, focused on grade three LWD. Furthermore, the current study employed mixed methods, where the advantages of one type of data frequently balance the disadvantages of the other, in contrast to the reviewed study's quasi-experimental design, which is less reliable and weak for establishing a causal relationship between cause-and-effect variables.

Holmes and Segui (2004) showed in an experimental investigation that French native speakers use lexical and sub-lexical clues to assign sexuality during seeing and recognizing words. In an experimental study, Holmes and Segui (2004) demonstrated how native French speakers assign gender to words by using lexical and sub lexical cues. Instead of being gender-neutral, linguistic expressions were dependent on whether a word's ending was usual for a certain gender. Lexical cues depended on how informative or uninformative the related definite article was. When both the sub-lexical and lexical cues were uninformative, and classified into proper, common, abstract, collective, and mass nouns and the verification of verb followed by noun phrase of the non-specific article and noun resulted in longer periods than when one or both cues were informative. Instead of doing a strictly experimental study that lacked qualitative components, the current study used a mixed method approach since combining data sets can help researchers better capture the issue at hand, produce more conclusive evidence, and satisfy the need for a comprehensive understanding.

Additionally, a quasi-experimental study found no gender differences in accuracy, fluency, or comprehension scores, which indicated that there were no disparities between the two sexes in the overall performance of reading. The reviewed study concluded that

gender did not significantly affect reading performance by utilizing quasi-experimental methods, but the current study addressed the research topics more thoroughly by using both qualitative and quantitative components. According to a 2019 study by Naumann in the United States, third graders had stronger correlations between assessments of how easy a subject was to learn and actual study time than first graders.

Afonso, et al. (2014) found that the regularity effect only affected the length of time taken for a person or system to respond to a given stimulus or event and the ratio of the number of erroneous units of data to the total number of units of data, indicating that the regularity effect is not caused by the simple statistical distribution of word-endings across genders. Although the study previously mentioned involved older participants and featured interventions, it is still relevant today because it was conducted with LWD in grade three. According to an experimental study by Ngogare, et al. (2021), female students in Indonesia surpassed their male counterparts in reading comprehension. In a similar vein, Marjanovic-Umek and Fekona-Peklaj's (2017) research in Slovania revealed that the extent to which gender influences a child's or adolescent's language depends greatly on the child or adolescent's age and the language element being assessed. Similar findings were found in Sigmundsson, et al. (2017), in Norway which showed that girls remarkably outperformed boys in all four of the criteria (big letters, sound of large letters, small letters, and sound of small letters) that were evaluated.

A quasi-experimental study by Oman et al. (2018) revealed that there were marginal gender differences and that boys scored better on the coordination motor test than girls did on one of the working memory tests. The study also found two substantial associations between motor performance and academic success in math and science, as well as significant correlations between cognitive characteristics and academic performance. Additionally, Ballart and Oosterven (2019) support Zayed and Jansen (2018)'s finding that women outperform men on verbal reading examinations but fall short in math and science assessments. In a Brazilian quasi-experimental study, de Oliveira et al. (2017) found that female students performed better on assessments based on the reading of low-frequency terms and sentence comprehension. However, male students performed worse on these tests than female students did. According to Martinez's (2020) research conducted in the United States, women outperformed males in terms of free memory recall and outperformed them in terms of visual-spatial memory

recall. Comparatively, the present study's qualitative findings showed that females' memories are superior to boys. It might be argued that girls have a sharper memory than boys and are better at understanding concepts. According to a study by Bailey, et al. (2020) in the United States, females engaged more in classrooms where the instructor called on most hands raised or in classes where there were more female students present. Because female students were more likely to participate more and receive higher grades in classes with numerous female students present, gender gaps in participation and final course grades were positively connected.

McGinnity, et al. (2022) found that parental reading, early childhood education participation, and primary school length all aided in language development in Ireland. However, the benefits of parental reading and early childhood education exposure were largely similar for boys and girls, although there was some evidence that boys benefited more from longer exposure to school than girls. Reilly, et al. (2018) asserted that in the United States, females outperform males on verbal and language ability tasks. Furthermore, Reilly, et al.'s (2018) study revealed that while it is generally agreed that men and women do not differ in terms of the existence of a broad mental capacity that influences performance on cognitive ability measure, gender differences are frequently seen for more specialized cognitive abilities like language and visual-spatial ability.

In general, there is not much study in Africa on how gender affects the efficiency of the sub-lexical reinforcement strategy. However, Wilsenach and Makaure's (2018) research in South Africa revealed that girls outperformed boys in all reading tests as well as on use of the sounds of one’s language/phonemes to process spoken and written language. The study's findings showed that females performed much better than boys in numerous cognitive-linguistic activities that fall under the category of phonological processing. Girls outperformed boys in reading a word in which all the letters represent their most common sounds, words where the usual spelling rule does not apply, nonsense words, and eloquent reading, it was also discovered. Cekiso's (2017) research in South Africa also found that, even though girls outperformed boys in reading IsiXhosa, there was no discernible gender gap in reading comprehension between boys and girls in the English reading comprehension test compared to IsiXhosa. The present study used reading assessments (where the students read 80 words), whereas Cekiso's (2017) study used reading comprehension tests. Additionally, the present study filled a gap on gender differences in sub-lexic reinforcement strategy efficiency.

2.8. Age Influences on the Effectiveness of Mnemonic and Sub lexic Reinforcement Techniques

2.8.1 Age influences on the effectiveness of mnemonic instruction on the enhancement of reading abilities among grade three LWD

According to Roy and De Haan's 2003 research, older participants consistently performed worse on memory tasks than young individuals and had steeper Xatter learning curves. The study concluded that while retrieval is largely unaffected by age, older adults struggle with the encoding stages of acquiring face-name associations. Additionally, preventing mistakes from happening during learning improves memory performance and may be a useful tactic for dealing with age-related memory loss. In contrast to the current study, which included grade three LWD, the review study above comprised older people and young adults. In a different experimental investigation, Bobby's (2022) research in India found a notable demographic difference between the mean, before treatment and after treatment scores of the dyslexia screener and Colorado learning disability questionnaire's outcome measures. The study also found that using mnemonic devices can help students with learning impairments become more adept at learning. The present study sought to reduce the difference in the literature by determining the effectiveness of mnemonic reinforcement techniques on improving the reading abilities of grade three LWD. There are similarities between the reviewed study and the current study in terms of the learning disability (dyslexia) and age of learners (5-12 years).

Another study, conducted in New York by Jacobs, et al. (2001), examined the cognitive correlates of verbal recall memory and the use of mnemonic devices as people age. The findings indicated that for both young and older participants, the relative advantages of blocked list display on recall measures were comparable. The results also indicated that working memory abstract thinking abilities were not as highly connected with recall performance as word finding abilities were. While the present study included students in grade three who were at the concrete-operational level of knowledge development, the reviewed study had considerably older participants who were at higher levels of knowledge development. According to a 2019 study by Naumann in the United States, third graders had stronger correlations between assessments of how easy a subject was to learn and actual study time than first graders.

In a word-association task, the young demonstrated a transfer of knowledge between similar contexts, according to Brathen, et al's (2022) quantitative study. Young adults who have undergone episodic memory training may benefit from applying those skills to untrained memory tasks. Kirchhoff et al. (2014) discovered that people develop many thinking abilities that appear to peak around age 30 but suddenly decline with age. Yu et al. (2018) found that the use of semantic clustering increased with age and that prefrontal cortex (PFC) volumes decreased with age. Importantly, the right dorsolateral prefrontal brain volume contributed to the explanation of the association between age and the process of grouping search queries that are similar on a semantic level into clusters based on meaning. These findings add more weight on the idea that the relationship between the brain and behaviour changes as a person develops and show that prefrontal cortex maturation promotes the development of strategy utilization.

In the United States, Husa et al. (2017) found ways of remembering information through lowering the Prefrontal cortex (PFC) volume in older participants. Together, these findings may suggest that when somebody forgets due to age, there is an advantage in development of a portion of the brain also called 'frontal granular cortex'. The youngest group of participants in a different study conducted in Canada by Metsala and David (2017) performed better on tests of word and pseudo reading. All age groups showed measurable and meaningful improvements in terms of fluency and comprehension reading. The present study included learners in grade three who have the dyslexia condition, as opposed to the students in the previously reviewed study who were significantly older in age. According to a study conducted in Germany by Radovic and Manzey (2019), mnemonic acronyms can be utilized to increase resilience to the negative effects of interruptions. Age-related factors were not brought up. The Method of Loci (MoL) was taught and trained in England, according to Sandberg et al. (2021), and surveys were conducted using a custom-developed application. The results showed that older adults did the most practice, while younger and young-old participants demonstrated the highest level of the strategy of memorising new information. Additionally, it was claimed that almost half of survey respondents said that the technique of memorising new information had improved their memory in daily life. According to a study by Othman, et al. (2019) conducted in Saudi Arabia, Saudi students had favourable opinions of the vocabulary instruction method that included mnemonic keywords.

According to the results, the application of the mnemonic keyword strategy was the primary element that influenced the students' attitudes.

2.8.2 Age Influences on the Effectiveness of Sub lexic Reinforcement Technique on Enhancement of Reading Abilities of Learners

When it comes to narrowing the reading success gap, studies with younger children typically report more encouraging results than those with older readers (Metsala & David 2017). According to Vlachos and Papadimitriou's (2015) study, which found a substantial age effect on reading performance, it was discovered that in terms of all components of reading, older participants performed better than younger ones. Vlachos & Papadimitriou (2015) further point out that it was important to train learners in reading starting from 3 years and above through to higher learning. Therefore, Vlachos and Papadimitriou (2015) advise teachers to place a high priority on reading instruction during the first school years to prevent reading difficulties in later academic years as well as possible performance differences caused by age. In keeping with the previously reviewed study, the current study implemented the recommendation to give reading instruction special priority, especially for the grade three participants in the study.

The youngest group of participants in Metsala and David's (2017) study performed better on tests of word and words that have no meaning. As a result, different components of reading across the board improved significantly and meaningfully. Beyond pre-intervention fluency scores, participants' mastery of accelerated, sub-lexical sound-spelling reading provided variation to fluency outcomes. Rashotte, et al. (2001) looked at students in a program for group reading instruction and found that age-related impacts on reading outcomes are not always obvious when direct age comparisons are performed. The study recruited all the participants in a consistent manner and compared the results on reading and direct and systematic instruction in core learning areas, such as reading, writing, math, and social emotional behaviour (Spell-Read-PAT) across grades 1-6. After 31–35 hours of teaching, all students made considerable gains, although for accuracy, fluency, and comprehension, main and interaction that may arise when considering the relationship among three or more variable of grade were mostly absent. Rashotte et al.'s (2001) study included students in grades one through six, but no students with dyslexia

were among the participants. As a result, the present study would reduce the difference between two people or things in the literature by concentrating on LWD.

O'Brien, et al. (2011), in the USA, showed age-related effects on this set of children's sub-lexical orthographic recognition efficiency. Additionally, the findings indicated that first graders performed less quickly than second and third graders on the orthographic recognition search task and with less accuracy than third graders in correctly recognizing all the search targets. The evaluated study featured therapies with first graders, but those learners did not have dyslexia. In contrast, the current study involved LWD, so it would close this gap in the body of research. In the USA, Clark, et al. (2015) conducted a study to see if there are any age differences on a stimulus provided by comparison in time or space, of individual elements that involved associative learning and motor learning. The study revealed that older adults showed lower performance compared to young people spanning from ages 18 to 26. The present study, in contrast, focused on young LWD in grade three who were between the ages of 8 and 9. Additionally, Speece, et al.'s (2011) study in America concentrated on evaluation with the aim of creating a set of tests grouped together and administered to learners in grade one in danger for reading difficulties. While some writings emphasize that younger learners pick up language more quickly than older ones do, other writings hold the divergent belief that even older learners pick up language just as quickly as younger ones do. For instance, a 2019 study by Ozfidan and Burlbaw in Saudi Arabia found that younger learners are more successful than older learners, that their language-learning processes are less demanding and require less work, and that they are more adept at learning languages. Furthermore, Alfian's (2020) research in Indonesia discovered that age is one of the most crucial variables, with one of the suggestions being that acquirers who started their natural exposure to a second language as children typically obtained higher second language proficiency than those who started as adults.

Double, et al.'s (2019) study in England found that there has been a lot of speculation about how phonics education affects the development of early reading. According to the research by Double et al. (2019), there is factual detail to support the claims that early matching of sounds spoken English with individual letters or groups of letters done efficiently to foster reading development and that early phonemic awareness has only

weak associations with later literacy. The ability to change suddenly or completely, activities or stimulus sets quickly is a key component of a mental quality that consists of the abilities to learn from experience, and it is associated to learners' academic success, cognitive ability, and creativity development (Feng et al., 2020).

In contrast, Kupis et al. (2021) found that older people and children were more likely than younger adults to have brain dynamic patterns linked to lower cognitive flexibility. Another study in the USA by Wilson, et al. (2017) found that although younger adults performed better overall, both adults 18 years and above persons showed flexibility by minimizing the influence of systematic differences between reported and unreported data. Another study conducted in Saudi Arabia by Alsubaei (2022) identified three themes: direct and indirect influences on early literacy learning environments at home, as well as difficulties in setting up such environments. Both Strauss and Bipath's (2021) and Alsubaei's (2022) investigations show that young learners have growing interest in reading or emerging literacy.

Crucial foundational literacy ability for young learners is letter-sound correspondence since it will support the development of talking, reading books, singing songs, playing with rhymes, and drawing in the future. Recognizing letter forms, naming the letters, sounding out the letters, and finally fusing the sounds to form words are fundamental reading skills that must be taught to students for them to become proficient and quick readers (Azuddin et al., 2020). Higuchi, et al. (2021), in Japan also support the idea of teaching young students about letter-sound relationships. The findings imply that well before learning to read letters, children had already started to understand implicit letter-sound correspondences. According to qualitative research conducted in Malaysia by Azuddin et al. (2020), the participants did succeed in recognizing letters and their sounds following the intervention. The current study focused on LWD in grade three, as opposed to Azuddin, et al. (2020), who focused on pre-schoolers. In a different study by Karpovich (2018) in the United States discovered that the treatment group had a slight increase in their mean score, demonstrating the intervention's beneficial effects.

In addition, there is evidence of literature on young learners' growing interest in reading or their developing literacy. There is research that is pertinent to the current study

regarding how age affects reading readiness. For instance, Ihezie and Akujobi's (2020) study on reading readiness in Nigeria found that indicators of high levels of reading readiness included keen interest, accurate alphabet recitation, decoding and blending, and proper handling, while indicators of low levels of reading readiness included economic factors, the educational and socioeconomic backgrounds of the parents, the knowledge and experience of the parents, a lack of phonemic awareness, and a poor reading culture. According to a quasi-experimental study by Strauss & Bipath (2021), there is no correlation between print and digital reading behaviors and children's emergent language and literacy development in the home and factors such as age, gender differences in educational outcomes such as achievement, attainment, and experiences within the education system, family size, and employment status. In South Africa, Cekiso, et al.'s study (2022) revealed that several factors, including parents' low levels of education, an unfavourable home environment, their socioeconomic status, and a lack of reading materials at home and at school, had an impact on the reading performance of students from rural areas. The current study focused on grade three LWD rather than the same age developing peers examined in the Cekiso, et al., (2022) study.

According to the idea of reading carefully to find out what the author intends, most research have concentrated on students in traditional classrooms, leaving out the context of those who have dyslexia. By focusing on LWD and instructing them in a resource room, the current study filled in gaps in the body of literature by comparing and contrasting existing literature in order to bring out their strengths and weaknesses. Therefore, while some of the research analysed involved students older than 10 years, the current study investigated LWD in grade 3 (8–9) to bring out the perspective of those still in the period of development known as concrete operations.

2.9 Conclusion of the Chapter

Through comparison and contrasting of existing literature, this chapter has critically brought out the gaps for the current study and explained how the study intends to fill these gaps. The chapter included the literature on dyslexia, its causes, the traits of LWD, the effectiveness of mnemonic education, and sub-lexic reinforcement approaches on improving reading ability in LWD. The chapter also included research on how age and gender affect how well mnemonic training and sub-lexic reinforcement approaches work

for LWD. The theoretical foundation of the investigation is presented in the following chapter.

CHAPTER THREE
3.0: THEORETICAL FRAMEWORK

3.1 Introduction

This chapter introduced the theoretical framework that was employed for the inquiry. The two theories that served as the framework for this work were the information processing theory and Skinner's operant conditioning theory. The Information Processing Theory is a supporting theory to Skinner's Operant Conditioning Theory, which is the study's primary theory. The chapter also covered the inclusive pedagogical approach and the human rights model of disability. Following is a discussion of the two theories, the Human Rights Model of Disability, and the Inclusive Pedagogical Approach:

3.2 Skinner's Operant Conditioning Theory

Skinner's Operant Conditioning Theory was used in this research to comprehend the success of the two interventions on improvement of the ability to read among learners with reading problems. The Operant conditioning theory was advanced by BF Skinner and the key element in it is Reinforcement. Specifically, Skinner was concerned in how reward and punishment might change behaviour (Leeder 2022, p.30). Skinner (1963) defined reinforcement as making a particular reaction stronger, and Kim (2013) added that reinforcement is what makes learned behaviours continue to be performed. According to Hsieh (2011), positive reinforcement is when behaviour becomes more frequent because of the presentation of a stimulus. The students had to give a response for each frame and receive instant feedback when Skinner applied operant conditioning to classroom instruction and discipline (Schunk 2012). Positive behaviour would continue in this situation because intermittent reinforcement is very powerful.

It appears that the goal of the sub-lexic reinforcement strategy will have been accomplished once a learner with dyslexia in grade three is able to pronounce the sounds of the alphabet correctly. Reinforcement is the central idea in BF Skinner's theory (Rafi et al., 2020). Response strengthening is caused by reinforcement, which raises the frequency of responses or increases the likelihood that they will take place (Schunk 2012, p. 90). According to Skinner, if we can alter the learner's behaviour, we can get the desired learning outcome. Both positive and negative reinforcement work to strengthen

behaviour. Positive reinforcement, according to Schunk (2012), is the process of adding a pleasurable stimulus to reinforce behaviour and enhance the likelihood that it will occur again. Negative reinforcement, on the other hand, is the process of strengthening behaviour and raising the likelihood that it will happen again by removing an unpleasant stimulus.

The present study used positive reinforcement strategy to increase the likelihood of desired behaviour among grade three LWD. Rafi, et al. (2020) found several tactics for coping with disruptive behaviour, including using positive reinforcement, constructive criticism, classroom management techniques, and faculty involvement. A reinforcement schedule should be established for students who exhibit extremely disruptive behaviour, according to recommendations made by Rafi et al. (2020, p. 178). Teachers need to be skilled in using positive reinforcement and behaviour modification techniques in the classroom, as well as knowledge of relevant pedagogical topics. Because they only apply to specific people at specified times and under specific circumstances, reinforcers are situation-specific (Skinner, 1953).

In addition, Skinner (1953) emphasized that reinforcers of behaviour can sometimes be predicted. Events like teacher praise, leisure time, privileges, stickers, and great grades are frequently seen as particularly encouraging by students. Positive reinforcement is the process of providing a stimulus or altering a circumstance after a response to increase the possibility that the same reaction will be made in the future. According to Schunk (2012), one instance of positive reinforcement is when a teacher allows a student independent study time and then compliments the student for their hard work. Only when people are aware of what to do can they receive reinforcement for responding correctly, and in operant conditioning, behavioural change has significant learning implications (Schunks 2012). Schunks (2012) further emphasizes that strategies for behaviour change involve chaining and repeated approximations or shaping. Shaping, a conditioning paradigm used in the experimental analysis of behaviour or differential reinforcement of subsequent estimations to the intended shape or pace of behaviour, is the fundamental technique of operant conditioning for changing behaviour. Schunks (2012) asserts that in order to change behaviour, one must first determine what the learner is currently capable of doing, the desired behaviour, possible reinforcers or things that increase the likelihood that a specific behaviour or response will occur again in the learner's surroundings, the desired

behaviour broken down into manageable steps to be learnt in an orderly manner, and the learner's progression from the initial behaviour to the desired behaviour.

Shaping is learning by doing and receiving constructive criticism. In the present study, shaping was applied in teaching reading to grade three LWD and it would be seen in a learner attempting to read the word “mat”. The student tried to segment the three letters in the word “mat” then blend the sounds to m-a-t (through sub-lexic reinforcement technique). Chaining, a process of creating or changing some of the variables/ characteristics that serve as the stimulus for the following reaction, is the other technique for changing behaviour (Skinner 1953). Examples of variables are age, sex, height, race, and nationality. In the same vein, a grade three LWD would also learn reading words and sentences through music mnemonics whereby they start by learning a rhyme or song (for an example, Hey diddle diddle, the cat and the fiddle), then use the rhyme or song to ‘recite’ words or sentences. The reinforcer would be in the form of verbal praise from the teacher or getting a sweet for each correct word that they would have read.

According to Overskeid (2018) and Skinner (1957), operant behavior is a link in a chain of events that has no obvious beginning or end. Overskeid (2018) reaffirms that reinforcer is also a behavior and that it cannot be stated to exist independently of conduct. In the present study, grade three LWD who managed to read some words, were allowed to choose any short- story books of their choice from the library and take them home to read for a week. This was meant to motivate other learners to work hard and be able to read given words to get story books. According to Overskeid (2018), it is not evident if discriminative and reinforcing stimuli are a component of the environment; in other words, the definition of the "environment" as things that happen outside of behaviour as opposed to outside the body makes the idea more relevant. According to Skinner (1963), we learn to see when we are stimulated by actual objects, but we can also learn to see without actual objects if other factors are in play. These other factors do not always have to be external to the body. Therefore, for grade three learners with dyslexia, the researcher provided audio-visual teaching and learning aids to help learners to improve their reading abilities. B.F. Skinner argued that humans only learn the technology of behaviour, according to Amutani (2014). As for the present study, the researcher used the principles from positive reinforcement as indicated in the Skinner’s theory of Reinforcement to motivate the learners and direct their behaviour through using various,

interesting teaching, and learning activities. As stated earlier on, LWD who displayed positive behaviour in reading abilities, were rewarded through verbal praise, good grades or feeling of increased accomplishment or satisfaction.

In addition to being used extensively in teaching (classroom management) and instructional development (programmed instruction), operant conditioning has also been used extensively in therapeutic settings (behaviour modification). According to Staddon and Cerutti (2002), Skinner argued that operant behaviour required an easy-to-repeat response, such as pressing a lever for rats or pecking an illuminated disk for pigeons (a key), for theoretical reasons. Therefore, for this study, the stimulus –response theory was applied in the classroom with grade three LWD whereby practice should take the form of question (stimulus)- answer (response) frames which expose the student to the subject in gradual steps. According to Skinner's behaviour modification therapy, the fundamental idea is to alter environmental factors that are connected to a person's behaviour. This is done by rewarding desired behaviours and ignoring or punishing undesirable ones (Skinner, 1938, 1953). The idea of behavior shaping through successive approximation is another significant contribution made by Skinner in 1951.

According to Skinner, if rewards and punishments are applied in a way that encourages or advances an organism toward the desired behaviour, operant conditioning principles can be used to develop very complicated behaviour. Meador and Hatfield (2010) draw attention to the fact that Skinner (1953) proposed consecutive approximation and shaping as shorthand for successive reinforcement of behaviours that were getting closer and closer to the target behaviour. Meador and Hatfield (2010) also contend that shaping entails gradual changes in the shape of an organism's behaviour, much like the moulding of clay to create beautiful pottery. Additionally, Papageorgi (2018) reiterates that successively closer approximations of behaviour are reinforced until the individual exhibits the desired response/terminal behaviour. Ploog (2012) defines shaping as a practical procedure carried out by a person to create new behaviours, such as teaching a LWD to segment and blend words to learn reading phonetically. Given their age, it appears LWD in grade three benefits greatly from behaviour shaping. In relation to the present study, for grade three LWD to retain what they have learnt, the teacher had to repeat mnemonic reinforcement techniques related to reading readiness like memory rhymes, memory games, letter and letter sounds, music, and phonemic awareness activities.

Previous studies provide evidence for the usefulness of using Skinner's theory of operant conditioning. For instance, Skinner's operant learning principle is said to have classroom implications for boosting the likelihood of the desired behaviour, according to Rafi et al. (2020) in Pakistan. To improve the desired behaviour in the classroom, evidence-based practice and policy can be implemented using the findings of the review on Skinner's reinforcement principles. In the current research, where the researcher dealt with LWD, Skinner's operant learning principle would increase desired behaviour, which is enhancing reading abilities. As such, if the researcher provides positive reinforcement such as mnemonic and sub-lexic interventions then, the LWD would be encouraged to learn to read.

Skinner correctly hypothesized that finding useful reinforcers would frequently prove difficult in field situations. As such, during the intervention in the study, the researcher identified various activities (using mnemonic and sub-lexic reinforcement techniques) to help improve the reading abilities of grade three LWD. To effectively apply the principles from this theory, the researcher utilized effective reinforcers to help grade three LWD to recognize letters of the alphabet and be able to read from three-letter words to longer words to sentences and comprehension passages. Furthermore, to apply Skinner's reinforcement theory in the classroom, the researcher created a system of positive incentives for individual, group and class behaviour as well as ensures that positive reinforcement is immediate so that it can be associated with positive behaviour. With grade three LWD, the researcher always gave a verbal "good job", a good grade or a feeling of increased accomplishment or satisfaction, when they managed to read words, to encourage them. Timely positive reinforcement was practiced as well as develops a rewarding system like stickers, tokens, certificates, or tangible rewards. The researcher also adjusted teaching methods and strategies and makes learning relevant by having the grade three learners more engaged in learning and retains knowledge for their own success and happiness.

The study analyses next theory on the Information Processing Theory.

3.3: Information Processing Theory (IPT)

The Information Processing Theory (IPT) was developed by among others, George Miller in the 1950s. According to the hypothesis, our brains sort information based on

what we are currently focusing on, what is kept in our working memory or short-term memory, and then what is finally preserved in our long-term memory. The first idea is "chunking," which refers to the capacity of working memory or small amount of information that can be held in mind. Miller (1956) put out the hypothesis that short-term memory could only store 5–9 chunks of data, with a chunk denoting any significant unit. A chunk could be a set of numbers, text, chess squares, or faces of individuals. The idea of chunking and the short-term memory's constrained storage became fundamental ideas in all later theories of memory.

The second concept that of information-processing uses the computer as a model of human learning (Miller, 1956). This perspective holds that there are three different classifications of memory: sensory registers, which receive all the information a person senses, short-term memory (STM), also known as working memory, which holds new information until it is either lost or stored in long-term memory, and long-term memory (LTM), which can hold a maximum amount of information and can store information for a long time. Activating prior knowledge and ensuring that the information is relevant are two critical components of good information encoding. Chunking, rehearsal, imagery, mnemonics, schema activation, and degree of processing are techniques for aiding encoding. In the present study, encoding and decoding was made possible and easier through reciting the letters of the alphabet, use of phonic games, use of picture-word /sentence matching, as well as recitation of music and of rhymes to enhance reading abilities among grade three learners with dyslexia. Reading was also possible since phonic games, and music mnemonics helped to make the process fun and in turn helped learners to retain what they were learning and stay motivated.

Intangible Processing Theory ("IPT") "attempts to describe how sensory input is perceived, transformed, reduced, elaborated, stored, retrieved, and used" (Kandarikis & Poulos 2008, p. 111 in Tangen & Boarders (2017). In other words, IPT offers advice on how memory might be improved as well as an explanation of the procedure for gathering, processing, storing, and retrieving information from memory. Tangen and Boarders (2017) contend that IPT is rooted in the larger cognitivism educational paradigm, which links learning to mental processes.

Prior to the development of cognitivism in the 1950s, the dominant paradigm was behaviourism, which connected learning to stimulus-response kinds of reinforcement (Tangen & Boarders 2017. Tangen and Boarders (2017) assert that the rise of cognitivism marked the start of research into the more complex mental mechanisms underlying how and why humans learn. IPT is one notion that derives from the idea of a paradigm shift in education. Since reading entails the collection, processing, storing, and retrieval of information from memory, the information processing theory served as the starting point for the present research. When the investigator used mnemonic techniques, this enhanced the grade three LWD's memory of words and sentences they would have read.

According to Glendenning (2020), the Information Processing Theory consists of four distinct parts: the sensory register, the control processes, the active memory, and the explicit memory. On the other hand, Lutz, Huitt, et al (2018) analyse three different types of memory and propose that sensory memory, which is connected to the senses, constitutes the first stage of stimuli perception. Lutz & Huitt (2018) contend that each sort of sensuous perception has its own section and that stimuli that are not perceived cannot be processed further and cannot be stored in memory. Short-term or working memory, which is frequently considered as active or conscious memory since it is part of the memory that is actively being processed while new information is taken in, is the second stage of information processing (Lutz & Huitt, 2018). Short-term or working memory, which is frequently considered as active or conscious memory since it is part of the memory that is actively being processed while new information is taken in, is the second stage of information processing (Lutz & Huitt, 2018).

The long-term memory, which is the third type of memory, contains all of a person's prior impressions, knowledge, and information learnt. Long Term Memory (LTM) is a more long-term repository where facts can be stored in a dormant form, not being used, until it is retrieved back into resuscitation (Lutz & Huitt, 2018). Lutz and Huitt (2018) reiterate that there are different types of LTM and that the precise way(s) that information is kept, offers very important information, including that it would be understood that images would be more easily and immediately stored in memory if the knowledge is pictorial rather than verbal. What this implied for the present study was that for grade three LWD to grasp content taught, they would strictly require teaching and learning aids so that they store the information learnt and be able to retrieve it when needed.

Information Processing Theory is concerned with how people perceive their surroundings, their capacity to store that information in memory, and how they later recover that information (Zhou & Brown, 2015). The IPT is founded on the hypothesis that people think about the information they receive rather than just react to external stimuli. The IPT model states that: “Since computers analyse data and choose how to store it, they are frequently used as analogies for the human mind. To understand how people learn new information, create and store mental representations of it, recall it from memory, and how and what they already know influences what and how they learn, information processing theory focuses on the aspects of memory” (Glendenning, 2020 p.3).

Lutz and Huitt (2018), concur with Glendenning (2020), that teachers are concerned in the study of people’s knowledge because knowledge informs the choice of long-term learning objectives and effective teaching strategies. This is because how people learn, acquire new information, and retain previous information, helps teachers to understand different learning styles and to know what works best for individual learners. The Information Processing Theory attempts to clarify and explain the mechanism of these processes as well as describe the cognitive processes that take place within persons (Alhussini 1976, referenced in Glendenning 2020). Grade three learners also can interact with others, which enhances their overall learning. Memory encoding was useful in teaching using both mnemonic and sub-lexical reinforcement techniques. In the mnemonic technique, recitation of a rhyme and using the rhyme to practise reading many words at a time (acquiring and recalling new information from memory) and in the sub-lexic technique, recitation of the alphabet letters and segmenting and blending (acquisition, creating and storing of new knowledge on phonemic awareness through chunking) led the two instruction techniques (mnemonic and sub-lexic) to be effective methods of enhancing capability to read among grade three LWD in the experimental group during intervention.

According to Suppawittaya and Yasri (2020, p. 1 "it is essential to help classify them into 2-3 groups when being delivered" in order to "assist students to memorize and retain learning materials more effectively." Suppawittaya and Yasri (2020, p.2) reiterate that chunking certain types of information would be able to reach short- term memory and

eventually being added into long-term memory quicker than others and that teachers should take into consideration instructional techniques which can enhance students' memorisation and thereby increasing the chance of students' understanding of certain subjects and knowledge. Consequently, all children, especially younger ones, including grade three learners, can benefit from being taught rehearsal techniques. Organization of material into chunks makes it much easier to remember. In such a case, teachers can aid students by preserving material in logical chunks and by showing students how to organize information on their own.

Grade three LWD benefited from both the mnemonic and sub lexical reinforcement techniques whereby material was presented in logical chunks. Suppawittaya and Yasri (2021) assert that chunking may also be caused by grouping based on perceptual traits or by strategic restructuring based on familiarity or past knowledge. For example, with grade three learners, meaningful learning occurs when the learner relates information to prior ideas and experiences. Given such a scenario, teachers should mediate learning by relating new information to students' cultural knowledge and by helping students to learn techniques of self-mediation. This is supported by Miller (1956) who points out that information could be categorized into meaningful units/ chunks, which could increase the amount of recalled information and immediate memory span.

According to Thalmann et al. (2019), retrieving a compact chunk representation from long-term memory in place of separate chunk element representations allows a chunk to lighten the burden on working memory (WM). Einstein is quoted as stating, "If I can't picture it, I can't understand it," which means that some concepts are better understood visually than in tables or words, according to Friendly and Wainer (2020, p. 1). Teachers should assist students in acquiring strategies that use visual imagery and other memory-enhancing strategies in such a situation. Consequently, this is where the mnemonic technique is useful. Students in grade three can be taught to use their senses. In the present study, grade three learners from the experimental school were taught rhymes, followed by words and the rhymes and words would be taught in chunks.

Learning to read for LWD is thought to be linked to the Information Processing Theory (IPT). Information Processing Theory has reportedly been applied in educational research, and there have been positive results, according to prior literature. Ekata (2020)

asserts that Craik and Lockhart used cognitive processes including perception, attention, labelling, and meaning to introduce a flawless systematic grasp of information processing theory. Bransford underlined that all information can be retrieved provided it is accessed in the same manner that it was stored. Ekata (2020) goes on to say that in the 1950s and 1960s, Allen Nuwell and Herbert Simon were the first researchers to link the information processing theory of human brains with that of the computer. They explored and comprehended the cognitive process of the human brain using the knowledge of the computer system in the information processing model as a metaphor.

Understanding the Information Processing Theory (IPT) and how it influences the current study requires knowledge of its emergence, including the pioneering philosophers. The introduction of information processing and the use of innovation in education (and other sectors), internationally, have had a significant effect on how students are taught and learn, particularly those with learning difficulties like dyslexia. The IPT theory is tremendously helpful, especially for educators. Teachers must dissect material into manageable chunks to guarantee that students comprehend a subject thoroughly. Lawless (2019) supports this notion and adds that students should have enough of breaks and opportunity to assimilate the knowledge, make it relevant, connect the connections, and repeat the subject. For students who struggle with dyslexia, making connections between material and actual events and personal experiences is crucial.

According to Lutz and Huitt (2018, p. 25), teachers are extremely interested in studying the way in which people learn because it informs the choice of long-term learning objectives and effective teaching strategies on how one learns, acquires new information, and retains old information. Considering this, the psychological field of cognition encompasses much more than just the acquisition and storage of knowledge. The complete study of how the brain and mind function is what is prioritized. Since the teaching of reading was to be led by the choice of long-term goals and effective teaching methods to improve reading abilities of learners with dyslexia, the present study was therefore informed by the information processing theory.

In conclusion, the Information Processing theory (IPT) is a cognitive theory based on the idea that humans actively process or filter the information they receive from their senses (like a computer) from what we are paying attention to right now to what is stored

in our short-term memory to what is finally retained in our long-term memory. There are two ideas: the first is chunking and the short-term memory capacity, and the second is information processing, which makes use of computers as models for how people learn. Additionally, there are three different types of memory: sensory registers, working memory, and long-term memory. Chunking, rehearsal, imagery, mnemonics, schema activation, and degree of processing are all necessary for effective past knowledge activation during the learning of new information IPT is interested in how humans perceive their surroundings, store information in their memories, and later retrieve it. Humans do not merely react to external stimuli; they also process the information they are given. The consolidation of long-term memory requires repeated repetitions spaced at regular intervals (Parle, et al 2006). Rehearsing letters, letter sounds and using mnemonics helps grade three LWD prepare for reading, as the proverb "repetition is the mother of memory" states.

There is need at this point to indicate the difference between theoretical and conceptual frameworks. A deductive approach to literature review typically makes use of theories and theoretical frameworks while the inductive approach tends to lead to the development of a conceptual framework-which may take the form of a conceptual model (Tam and Leung, 2019). In actual sense, a concept is simply an idea whilst a theory is a set of concepts, models, principles and definitions.

3.4 Human Rights Model of Disability

Constitutional /civil/natural/human rights are rights are based on basic human principles and belong to all of us just because we are human, as the term suggests. Human rights are the cornerstone values that support every society with the rule of law and democracy. Human rights are defined as being inherent to every human being, rights that every human being has because of his or her human dignity, and rights that define relationships between people and power systems, particularly in the State. States have a responsibility to make sure that everyone, particularly the most vulnerable, such those with disabilities and special needs, has access to all their human rights.

Another definition of human rights is provided by Nweke (2020), who claims that all people have these rights regardless of their racial or sexual identity, nationality, ethnicity, language, religion, or any other status. The right to life and liberty, freedom from slavery

and torture, freedom of expression, the right to a job and an education are all included in Nweke's (2020) list of human rights. Human rights thus refer to the right to education in respect to the LWD who are the subject of the current study. Human rights should recognize the significance of equality and non-discrimination of learners with specific educational needs, such as those with dyslexia, and include socioeconomic and cultural rights.

There are various perspectives on limitation. The medical model of disability, the social model of disability, and the human rights model of disability are three independent theoretical frameworks that simultaneously aim to describe and address disability discrimination are the medical model of disability, the social model of disability, and the human rights model of disability. Numerous published opinions have criticized the medical paradigm over the previous six decades and advocated an alternative "social model" (Hogan 2019). Degener (2017) contends that while the social model of disability was created as a response to the medical model of disability, it has also come under harsh criticism.

To improve upon the social model of disability and implement the Convention on the Rights of People with Disabilities (CRPD), the CRPD offered the human rights model of disability (Degener 2017). Similarly, while some academics, such as Degener (2017), contend that the human rights model replaces or advances the social model, Lawson & Beckett (2020) contend that the human rights model is complementary to the social model rather than an advancement of it. According to Lawson and Beckett (2020), the human rights model needs to cooperate with the social model to function well. The right to inclusive education has been added as a new right under international human rights law because of the approval of the CRPD (de Beco, 2022). De Beco (2020) emphasizes that the right to inclusive education emphasizes the significance of giving all children equal treatment throughout the educational system, which is consistent with the education of individuals with disabilities.

De Beco (2020) further adds that this has ramifications for both the fulfilment of legal commitments as well as the application of international human rights law to the fight against inequality. Calderon- Almendros & Echeita- Sarionandia (2022) agree that all-embracing education has been internationally recognized as a fundamental human right

for all and that this recognition seeks to address the dramatic inequality in contemporary societies, as the enjoyment of the right to improvement for many disadvantaged people depends on it being inclusive. They also support this idea. Additionally, according to Calderon-Almendros & Echieta -Sarionandia (2022), many learners with deficits are still routinely segregated into special education facilities and classrooms, infringing upon their right to inclusive education.

To this purpose, South Africa has attempted to establish inclusive education through White Paper 6 (2001), like many other nations worldwide, while having to overcome obstacles and difficulties. Likewise, the present study assessed the effectiveness of two instructional techniques on the enhancement of reading abilities among grade three LWD in Bohlabela district, Mpumalanga province. The two reinforcement methods-mnemonic and sub-lexic- that were used with grade three LWD in the intervention school have helped the students while they are in regular classes. In contrast to other disabilities like those who have severe visual and hearing impairments, who would obviously need special schools or resource rooms, learners with learning disabilities in general and LWD, in particular, require inclusive education settings for their success.

LWD would benefit from inclusive environments that uphold human rights rather than special schools where they would be labelled and stigmatized. In support of this assertion, the CRPD committee, a group of experts charged with overseeing States Parties' adherence to the CRPD, has additionally published a thorough General Comment on "The Right to Inclusive Education" in which it outlines its views on this right's normative elements and offers advice on what inclusive education means in accordance with the Convention. Furthermore, De Beco (2022) emphasizes how the CRC and CRPD "as international instruments go much further than merely prohibiting discrimination" (p. 19).

Having said that, the Human Rights Model connects to the current study in that LWD would fall behind if their human rights were not upheld in classrooms where they are bullied and where teachers fail to uphold the students' rights, The Salamanca 1994 Framework for Action is informed by the principle of inclusion, by recognition of the need to work towards "schools for all" and institutions that include everyone, celebrate differences, support learning, and respond to individual needs (United Nations

Educational, Scientific and Cultural Organization, UNESCO 2005), as well as the Ubuntu Philosophy that addresses inequalities. As a result, the Human Rights model addresses inequalities. However, it appears that different learners will still not profit as much as their peers due to the large classrooms that teachers must deal with, even though human rights for all may be observed in inclusive school environments. Because of the teacher-to-student ratio, the time constraints imposed by the pacesetter or annual teaching plan, and the lack of skills to teach a variety of learners in a single classroom, it means that LWD would not all be catered for.

Additionally, while it may be theoretically correct that all students have the right to learn in inclusive environments and that all barriers should be removed, in practice, educators may be overworked and unable to fulfil these standards. Sanger (2020), who contends that being intentionally inclusive in the classroom requires work, supports this by saying that not all teachers have a clear idea of where to begin or how to increase their efforts in this area. Even if they are labelled, it would be preferable to teach students with learning difficulties separately, at their own pace, by pulling them out to resource rooms to be taught by specialist teachers. However, over time, their peers would quickly get used to them, and the stigmatization would eventually fade.

3.5. The Inclusive Pedagogical Approach

Before understanding inclusive pedagogy, it's critical to define the phrase "inclusive education". Inclusionary education is the process of developing an educational framework that maintains every child's right to an education. The UNESCO states that "Every learner matters and matters equally" (2017, p.). Although inclusive pedagogy "addresses individual differences between pupils but avoids the marginalization that can occur when pedagogical responses are designed only with individual needs in mind" (Florian & Beaton 2017, 870), it does not ignore group differences Sanger (2020) offers yet another definition of inclusive pedagogy: "an approach that seeks to make learning as accessible and welcoming to all students as possible."

The inclusive pedagogical approach (IPA) places emphasis on how to provide everyone with rich learning opportunities so that they can all take part in the classroom community (Black-Hawkins, 2017). The inclusive pedagogical approach places emphasis on how to

provide everyone with rich learning opportunities so that they can all take part in the classroom community (Black-Hawkins (2017). Sanger (2020) also contends that intentional, widespread inclusion must accompany diversity for there to be significant improvements. To put it another way, the three guiding principles of inclusive instruction are that all students must be engaged in the education process, teachers must have faith in their ability to instruct all students, and ongoing professional development is essential.

Differentiated Instruction (D.I.), Universal Design for Learning (U.D. L.), and Florian and Spratt's (2013) Inclusive Pedagogical Approach in Action Framework [I.P.A.A.F.] are a few inclusive pedagogical approaches that have been developed in the late 20th century and that adhere to some fundamental principles of inclusive pedagogy: Loreman (2017). It is important to remember that the inclusive pedagogy evolved from Special Education practices when teachers employed Individual Education Plans (IEPs) to instruct students with impairments in segregated learning environments. The drawbacks of Special Education techniques, as stated by Loreman (2017), were that "such practices were nurtured in segregated environments and may themselves serve to perpetuate segregation." Because of this, inclusive pedagogies (such as U.D.L., D.I., and IPAAF) that strive to deal with the needs of all learners and minimize or eliminate the singling out of individuals for special instruction have been established.

Majoko, et al. (2018) emphasize continuing professional development (CPD), capacity building, through working in partnership with universities to develop responsive quality programs in IC, open educational resources, and innovative and appropriate teacher training materials, all of which are necessary for inclusive education to be successful in South Africa. Regarding teaching LWD in regular classrooms, inclusive pedagogy is by far the greatest IC strategy according to the current study. Teaching students with reading difficulties, let alone those with different learning requirements in a diverse environment, is a tremendous challenge. Black-Hawkins (2017) argues that while numerous governments have passed laws aimed at promoting more inclusive educational systems, advancements in inclusive classroom practices do not appear to have been as simple to achieve. The failure of IC is a result of confusing policies, poorly prepared teachers, unfavourable teacher attitudes, and insufficient funding.

3.6: Justification of the Theoretical Framework of the Study

According to Skinner's operant conditioning theory, behaviour that is reinforced, would have been internalized by the person. As a result, according to Skinner's principle, when a person receives positive reinforcement for a desired behaviour, this causes the person to remember it and store the information in the memory process in the brain that takes information from the short -term memory store and creates long lasting memories, as explained by Miller (1956) in the Information Processing Theory of Successive approximation, in line with Skinner's theory of behaviour shaping, shapes skill performance.

Teachers can use different mnemonic techniques to implement the Information Processing Theory in the classroom. From Skinner's Operant conditioning theory, the two interventions are positive reinforcers for enhancing reading abilities among learners who have dyslexia. On the other hand, from the IPT model, learners would incorporate the visual imagery and keep the facts learnt in their indefinite memory, thereby retaining it because visual images are easier to recall than abstractions. In the present research study, intervention using audio-visual aids when teaching, enhanced learners' recall of content learnt, and the information was kept in the long-term memory. Finally, the IPT model compliments with Skinner's operant conditioning theory of reinforcement in those grades three LWD would benefit from behaviour shaping and positive reinforcement as well as remember most concepts taught through the two interventions, mnemonic, and sub-lexical techniques.

The Skinner's operant conditioning theory informed the present study in that the stimulus -response theory benefits LWD under study in that the question-answer technique brings about immediate feedback. Moreover, the use of Skinner's successive approximation encourages LWD to work harder through behaviour shaping in general, and academic skill performance, in particular, through receiving corrective feedback. Successive approximations or shaping would help grade three LWD when they learn word attack. For an example, when a learner starts learning to read three letter words, the teacher would use phonics to make words. Just like in shaping, LWD would also benefit from the use of chaining. Chaining, an instructional strategy grounded in applied behaviour analysis theory, plays a crucial role in the acquisition of skills (Gollub, 1977; Skinner, 1978). Grade three LWD would benefit in the practice and perfection of reading skills

through the method of chaining, given that reading, like most actions by people, is complicated, and includes several three-term contingencies, antecedent, behaviour, and the consequence (A-B-C) linked successfully.

A grade three LWD learning to read, would start from practising to read simple words until they are able to read paragraphs and stories, using both the two interventions, sub-lexic and mnemonic reinforcement techniques under the present study. Furthermore, considering Skinner's reinforcement theory, the present study has benefitted from behaviour modification in that most LWD have disruptive behaviour. Thus, grade three LWD would improve in terms of both behaviour and reading through incorporating the use of the two interventions (mnemonic and sub-lexic) and behaviour modification, simultaneously. Moreover, the present study was informed by Skinner's reinforcement concept in that the grade three LWD would read a list of words after the intervention methods: mnemonic and sub-lexic techniques, and then the researcher would offer a verbal praise, a good grade or a feeling of increased accomplishment or satisfaction, when they managed to read words, to encourage them. The grade three learners with dyslexia would strive to read given words or sentences to get more rewards in future. As such, timely positive reinforcement was practiced as well as develops a rewarding system like stickers, tokens, certificates, or tangible rewards.

On the other hand, the IPT informed the present study in that there is activation of prior knowledge that is when LWD gain knowledge from easy to difficult or from familiar to unspecified during teaching and learning situations. Therefore, the IPT model was relevant for this study in that it used the computer as a model of human learning and the two interventions are thus aided in terms of retention of memory, especially through use of mnemonic devices. Since the IPT model describes how the brain filters information, it therefore informs the present study in that grade three LWD were able to comprehend and retain memory or knowledge in the different subjects that they learn at school when the two interventions, mnemonic and sub-lexical reinforcement techniques were used effectively.

Furthermore, the IPT theory informs the present study because it prescribes a framework for development of instruction around chunks of information (Miller, 1956). Through using the two intervention methods (mnemonic and sub-lexic), the grade three LWD

would practice reading words a few words at a time. Using music mnemonics, the learners would recite a given rhyme, then later recite six (6) words (for example sibling, brother, sister, young, older, youngest) per day until they finished the eighty (80) words. Thus, using "chunking' in reading helped the grade three LWD, in comparison with having to read the stipulated eighty words in a minute, as expected by the Department of Basic Education in South Africa, yet the learners would find all the words difficult to read. Given their short attention span, the learners would also learn five to ten words per day using the phonics method, which is the sub-lexic technique.

The study was also informed by the Human Rights Model of Disability (HRMD) in addition to the Inclusive Pedagogical Approach (IPA). The Human Rights model informed the study in that LWD, who are a marginalised and vulnerable group would find themselves unable to participate equally in education, if it were not for the morale principles that they have a right to as human beings and as children. This is supported by Alghaib and Tromp (2017) who argue that Article 24 of the UNCRPD needs the development of an all-embracing education system at all levels, where children with disabilities can be part of their local school alongside their non-disabled peers, with the right to support and accommodation to develop academically and socially (p.5). Similarly, the IPA acted as a lens to the study since learners with different needs, in this case, those with dyslexia, require strong support from Inclusive practices like the Inclusive Pedagogy Approach which advocates for the inclusion of all learners in teaching and learning, for continuous professional development (CPD) and teachers who believe they can teach all learners notwithstanding their diversity. Finally, the Inclusive Pedagogy Approach informs the present study in that it considers issues of diversity to engage all students in learning that is meaningful, relevant, and accessible. The approach, therefore, is relevant to the study because without inclusivity, LWD would not receive equity and equality in education.

3.4 Conclusion of the Chapter

This chapter discussed the theories that explains why the research problem of the study exists, namely Skinner's operant conditioning theory and the Information Processing Theory as well as the Human Rights Model of Disability and the Inclusive Pedagogy Approach. The next chapter, chapter four presents the research design and methodology adopted for this study.

CHAPTER FOUR
4.0: RESEARCH DESIGN & METHODOLOGY

4.1 Introduction

This chapter presents the research design and methodology that described how the data was collected and analysed. The chapter begins by a presentation of the research paradigm, research methodology, research site, sample size and sampling methods, data collection instruments, validity and reliability of research instruments, data analysis, and finally ethical considerations.

4.2 The research paradigm/ philosophical assumptions- pragmatic paradigm

The word "paradigm" derives from the Greek language, where it means pattern. It is used to refer to a researcher's viewpoint, which is the position, way of thinking, school of thought, or collection of common views that influences how data is understood or interpreted (Kivunja & Kuyini, 2017). As opposed to how Hesse-Biber (2009) defines a paradigm as "a theory or hypothesis," Aliyu et al. (2015) argue that a paradigm is instead a framework within which theories are constructed and that it fundamentally affects how you perceive the world, determines your point of view, and shapes your perception of how things are connected. The pragmatic (mixed methods) research paradigm served as the foundation for this investigation. A pragmatic approach to inquiry places an emphasis on the creation of knowledge that can be put into practice, acknowledges the connection between involvement, intentional, and substitute, and views inquiry as an experimental process. This approach makes sure that research is both contextually relevant and theoretically informed (Kelly & Cordeiro, 2020). Pragmatism as a paradigm is based upon the premise of utilizing the best methods to investigate real-world problems, allowing for the use of multiple sources of data and knowledge to answer research questions. According to (Allemang, et al 2022) the adoption of a paradigm supports the

researcher in conceptualizing their beliefs about the nature of knowledge and selecting the methods best suited to address their research questions.

Moreover, pragmatism is one of the many paradigms or worldviews that frame and organize contemporary social work research, Kaushik, and Walsh (2019). As a result, a pragmatic research model has less of an impact on the philosophical presumptions used to conduct research procedures, giving researchers more freedom to perform their studies (Brierley 2017). Furthermore, Brierley (2017) contends that pragmatic approaches to research topics focus on "what works" rather than selecting between constructivism, positivism, or post positivism. Pragmatic research, on the other hand, focuses on a single decision-maker within a real-world scenario.

This study adopted the pragmatic research paradigm as a framework to help achieve its goals and as a set of tools useful to solve practical problems in the real world (Kaushik & Walsh 2017). In the present research, the research problem was recognized and analysed in its broadest context, which sparked a research inquiry that aims to deepen understanding of the issue and, ultimately, find a solution. As a pragmatic study, the present study drew upon mixed methods approaches so that the research findings affect practice and policy. A research paradigm has the components of axiology, methodology, ontology, and epistemology, and they are discussed as follows:

4.2.1 Axiology

According to Hogue (2011), axiology refers to the researcher's understanding of values and their role in research. Axiology is the study of set principles that guide your research designs and practices that must be considered while developing an investigation. It examines the philosophical framework for arriving at conclusions that are morally right or valuable (Kivunja & Kuyini, 2017). The term "axiology" refers to the study of the nature of value and valuation, and of the kinds of things that are valuable. In other words, the research model is axiological in that the investigator's values guide the methodological decisions they make (Zaidi & Larsen, 2018). In preparing a study proposal, axiology refers to the ethical issues that must be regarded (Kivunja & Kuyini 2017). Kivunja and Kuyini (2017) go on to say that axiology addresses the issue of what should be done to defend the rights of each participant and that it entails defining, assessing, and comprehending conceptions of good and wrong behaviour.

4.2.2 Methodology

According to Long (2014), methodology describes "the general logic and theoretical perspective" of a study. According to Adedoyin (2020), methodology entails comprehending all aspect of the research process, including its social and organizational background, underlying philosophies, guiding ethical standards, and the political ramifications of the findings. According to Haradhan (2018), research methodology reveals the logic of development of the procedure utilized to produce theory that serves as the procedural framework for the research. This research was conducted using a mixed-methods strategy that combined quantitative and qualitative elements. One aspect of quantitative research is the quantification and analysis of variables to obtain findings. It also entails the use of data that is in the form of numbers and its statistical analysis to respond to queries such as who, how much, what, where, when, how many, and how (Apuke, 2017). Aspers and Corte (2019) define qualitative research as a series of steps that are repeated to improve the research by making important, notable changes resulting from the analysis of qualitative data. On the other hand, Busetto, et al. (2020) define it as the study of the nature of events and is particularly suitable for answering questions of why something is (not) observed, evaluating compound parts of an intervention, and focusing on intervention improvement. In conclusion, qualitative and quantitative techniques work best together rather than in opposition to one another (Borgstede & Scholz, 2021).

4.2.3 Ontology and Epistemology

While epistemology is concerned with the nature of knowledge and methods of knowing and learning about social reality, ontology refers to the types of things that exist in the social world and beliefs about the shape and character of that social reality (Bergin, 2017). Hathcoat, et al. (2017) concur that nature, boundaries, and justification of human knowledge are the main topics of epistemology. Epistemology, to put it simply, is the study of knowledge. Otherwise, it is an approach of thinking that is in opposition to ontology. According to Moon and Blackman (2017), ontology is the "study of being," whereas epistemology is the "study of knowledge." Ontology, a theory of objects and their ties, offers criteria for differentiating different types of objects (concrete and abstract, real and ideal, independent and dependent, and existent and non-existent) and

their ties (relations, dependences, and predication) in quantitative research (Aliyu, et al., 2015). In layman's words, ontology is equivalent with metaphysics, it aims to categorize entities, and it facilitates knowledge sharing. In qualitative research, ontology represents the researcher's viewpoint (Moalusi, 2020). Additionally, Moalusi (2020) emphasizes that when analyzing ontology, one raises questions about the substance of the organizational phenomena that is being studied, where problems about the existence and reality of trust are raised.

Epistemology, or the philosophy of knowledge, is concerned with the mind's relation to reality, how and from when knowledge is acquired (Brown, 2021). There are subjective and objective epistemologies in mixed methods research. According to Moon and Blackman (2014), objectivist epistemology, which is ingrained in quantitative research, holds that reality exists independently of the individual mind or outside of it. According to Moon and Blackman (2014), objectivist research is helpful in supplying external validity, which is applicability of the results to various settings and reliability, or consistency of results produced. According to Moon and Blackman (2014), subjectivist epistemology, which is ingrained in qualitative research, is the idea that reality can be communicated in a variety of sign and verbal systems and is bent and formed to suit the needs of persons. As a result, individuals give the world an explanation and give it an interpretation that has a clear meaning to them.

In mixed methods, there are subjective and objective epistemologies. Objectivist epistemology, which is embedded in quantitative research, assumes that reality exists outside, or independently, of the individual mind. Objectivist research is useful in providing dependability, consistency of results obtained, and external validity which is applicability of the results to other circumstances (Moon & Blackman, 2014). Subjectivist epistemology embedded in qualitative research relates to the idea that truth can be revealed in a range of sign and speech systems and is extended and formed to fit the intention of people such that people impose meaning on the society and explain it in a way that define them (Moon & Blackman, 2014).

4.3 Research Methodology

4.3.1 The Mixed Methods Research Design

A research method is a broad strategy for how you want to address the specific research issue you have in mind (Yin, 2010). To achieve the general aims of the ability to understand, mixed methods research is a type of study in which an investigator collaborates parts of qualitative and quantitative research plans (for example, use of mixed methods viewpoints, data gathering, investigation, and deduction techniques. Investigations utilizing blended approach frequently include at least one quantitative and one qualitative part, according to Creswell and Plano Clark (2011). Using mixed methods approaches, according to Creswell and Plano Clark (2007), leads to a deeper comprehension of study problems and complicated phenomena than using either methodology alone. Complementarity- when results from one method are used to enhance or elaborate results from another method increases additional advantages of mixed methods research (MMR). These benefits are cited by Greene, et al., (1989) in Molina-Azorin (2016).

Additionally, Regnault, et al. (2018) concur that MMR enables the examination of a study subject from a variety of angles. One can, for instance, combine quantitative research's standardized, generalizable facts with qualitative inquiry's rich, subjective views on complex realities. Additionally, Bell et al. (2022) agree that integrating methodologies in a research design helps deepen a project's scope, while Nicolau et al. (2017) underline that combining quantitative and qualitative approaches yields comprehensive results that are highly relevant to researchers. Finally, MMR can be used to produce thorough and reliable results (McBride, et al., 2019) or to provide a wider and far-sighted vision in the results (Almeida, 2018) by adopting quantitative and qualitative methods, this brings the required breadth and depth in the results respectively. Creswell (2012) argues that mixed methods research can be sequential or convergent or parallel in nature. Nicolau, et al. (2017) highlight the main types of mixed methods designs as sequential explanatory, sequential exploratory, and convergent. Within the triangulation design, there exist concurrent and sequential designs depending on the timing of both quantitative and qualitative data collection.

4.3.2 Sequential Triangulation design

In the current study, the Explanatory Sequential Design within the mixed methods research (MMR) was used in a single study (Ivankova, et al., 2006). Additionally, in a sequential method, gathering quantitative or qualitative data forms the basis for the subsequent stages of data gathering and analysis (Creswell et al., 2004). The present study used the explanatory sequential design, beginning with the collection of quantitative data using tests and questionnaires, followed by the gathering of qualitative data using interviews. The first definition of triangulation offered by Valencia (2022) is that it is "the combination of two or more theories, sources of data, research methods, in the study of a singular phenomenon," or "the combination of multiple methods in studying the same object or event to better address the phenomenon researched. Additionally, Valencia (2022) emphasizes that triangulation can be used for a more thorough strategy to tackle the research topic when a single research method is insufficient.

A two-phase model strives to provide the pertinent information required to comprehend the study problem more effectively (Pardede 2018). Pardede (2018) emphasizes starting with quantitative data collection then qualitative data collection to further explain or elaborate the quantitative results that were previously acquired (Figure 1). For instance, a researcher might survey parents of children to gather quantitative data for a study on the effectiveness of memory techniques, and then pick members of the group—in this case, teachers—for interviews to elicit further information about the survey results.

Figure 1 shows how Explanatory Sequential Design takes place during the research process.

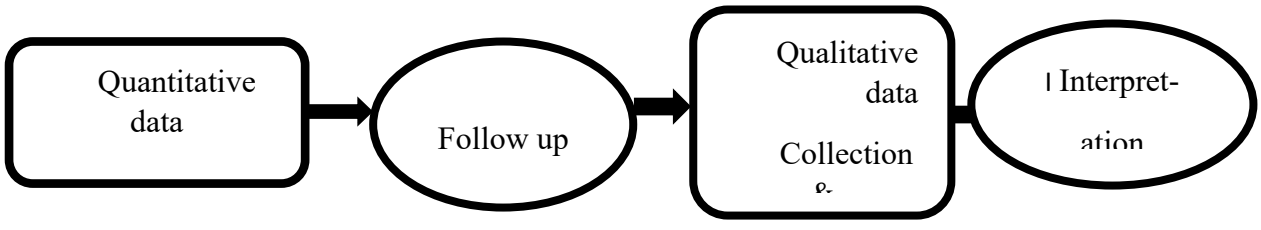


Figure 1: *Explanatory Sequential Mixed methods Design* (Creswell) in Pardede, (2018; 234)

This design was selected because it is easy, flexible, and attractive (McBride et al., 2019). Moreover, Creswell et al., (2003) point out that the purpose of this design is often to utilize narrative data to explain numeric findings, especially those that are unexpected.

As such, the present study chose the sequential explanatory design so as to implement, clearly examine and clarify quantitative data (pre-tests and post-tests) then the qualitative data (interviews) in two phases, given the short space of time allocated for the study's data collection (6 months), subsequently ensued by the rigorous thematic data analysis and to finally conclude with results and findings in the shortest period of time anticipated The researcher chose this research design over exploratory research because it was more straightforward and provided opportunities for further exploration of quantitative results, as opposed to exploratory research's drawbacks of providing ambiguous results, lacking standardized analysis, using a small sample size, and using out-of-date data that could compromise the veracity of the data.

4.4 Research site

A study area refers to a location where people conduct research, including universities, hospitals, research institutes, and field research locations (Heyland & Olsen, 2015). The present study was carried out in Bohlabela District, Mpumalanga Province, South Africa. Two schools were used as the research sites: one school for intervention in Mkhuhlu Circuit and another for control in Ximhungwe Circuit. Both schools are primary schools, non-fee-paying (Quintile 1-3) located in Bushbuckridge Municipality. The intervention school is situated in Cork village, not far from Mkhuhlu Plaza and along the Kruger National Park Highway, while the control school is situated in Huntington village, some thirty minutes' drive from Kruger National Park main gate and along the turn-off from Elephant Point (on the Kruger National Park highway), about ten minutes' drive (from Elephant Point). There are many LWD in the district. Therefore, the study made a comparison of the identified LWD from two different schools in the district after intervention. The rationale for choosing the experimental school, on one hand, was because it was one of the biggest schools in the district (with more than an enrolment of one thousand (1000) learners in total where the required number of 6 grade three teachers (as well

as classes) would be found to be used for the qualitative data collection and analysis. On the other hand, the control school was selected for convenience since it was the closest public primary school to where the researcher stayed.

4.5 Sample size and sampling methods

By using a sampling technique, researchers can draw conclusions about a population without having to look at every single member of the population (Taherdoost, 2016). The sample size refers to the specimen or observations included in the study, and both in vivo and in vitro investigations need to accurately estimate this number. The study's power and impact are determined by the sample size. The size that is chosen needs to be ideal and must be attained through science (Chander, 2017). According to random sample techniques, sampling is generally done in quantitative research (Creswell, 2015). The most straightforward probability sampling technique—simple random sampling—was employed in the current study to choose participants since it is simple to understand and produces findings that can be projected (Taherdoost 2016). Furthermore, good internal validity and high external validity are guaranteed by simple random sampling (Thomas, 2020). 43 students in grade three made up the study's sample, with 30 coming from the control school and 20 from the intervention group. Additionally, 6 parents and 5 English teachers for grade three from the intervention school were interviewed. The parents were selected using simple random sampling while three grade three English teachers, the deputy principal and the principal automatically had to be interviewed as they knew what content was being taught to the learners.

4.5.1 Quantitative sample

For the researcher to analyse the smaller group and make correct conclusions about the larger group, sampling's main objective is to obtain a representative sample, or a small collection of units or instances, from a much larger collection or population (Delice, 2010). The list of people from which the sample was drawn is referred to as the sampling frame by McCombes (2019). In this study, the quantitative sample consisted of forty-three (43) grade three learners from the two primary schools, one from Ximhungwe Circuits and the other from Mkhuhlu Circuits (with the intervention group having 23

learners while the control group had 20 learners with dyslexia). Using purposive sampling, learners were gathered. This design is a type of non-probability sampling where researchers choose people of the public to take part in their surveys by using their own judgment. According to Campbell, et al (2020, p.3), “It is used to select respondents that are most likely to produce relevant and meaningful information and is a method of finding and selecting situations that will employ constrained research resources successfully”.

In addition, the same authors note out that these procedures stay away from random kind of sampling and are ways to ensure that types of cases of those who might be included are included in the research study's final sample. One method of obtaining a tolerable amount of data is by this form of sampling (Ames et al., 2019). Similarly, Prior et al. (2020) highlight that selective sampling is used to access a particular sub-set of people who are likely to possess certain characteristics or experiences, thereby increasing the study’s rigor, credibility, transferability, dependability, and conformability of the findings. Purposive sampling was chosen and implemented in the current study, and it was appropriate since it established the mixed methods results' credibility for data collecting and analysis. Additionally, each case's chosen purposive sampling strategy aligned with the research methodology, goals, and objectives, meeting every area of rigor. Purposive sampling technique has advantages in that it gets richer data for academic study while also saving time and money since it takes time to contact every member of a group. In contrast, probability sampling ensures making of strong statistical inferences about the whole group, but it is unnecessary, time-consuming, devoid of the use of new information, difficult to access a list of a bigger population, costly, time-consuming, and biased (in some cases).

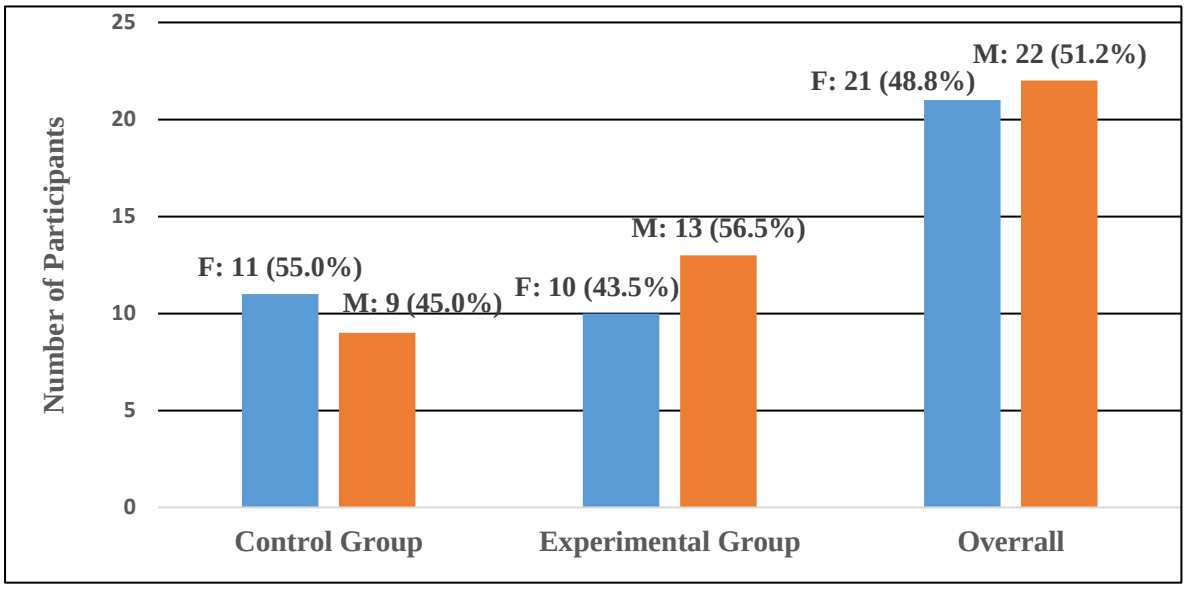
When considering the sample of the population, it was important to select individuals who resembled the whole population by including all demographic groups. Maturity and gender classification of the respondents were among the demographic details that were considered.

4.5.1.1: Gender of the Learners

The study aimed to examine the gender of the learners, which was considered as the basic

genetic differences among the learners. Information on gender was considered important to this research because it is anticipated that performances of the learners may vary given their gender. Figure 2 shows the summary of the gender distribution among the learners who took part in the study.

Figure 2



Gender distribution of the learner study participants (**Source: Primary data (2022)**

The outcome of the exploratory analysis of the background data of the study participants shows that, generally, slightly more men (51.2%) than women (48.8%) participated in the study, which reflects a small gender gap among students with dyslexia. Given that both genders had an equal opportunity to participate in the sample procedures used in this study (the census), it may be assumed that males predominate among grade three LWD from the two primary schools. However, studies suggest that men are diagnosed with dyslexia more often than women, therefore there are more boys than girls with the disorder among elementary school students. Nevertheless, the study included both sexes, suggesting that because it included both sexes, its findings may be applied to a larger population. This is because each gender can provide something distinct to research that the other sex cannot fully fill.

4.5.1.2: Age of the Learners

Figure 3 shows the summary of the gender distribution among the LWD who took part in the study.

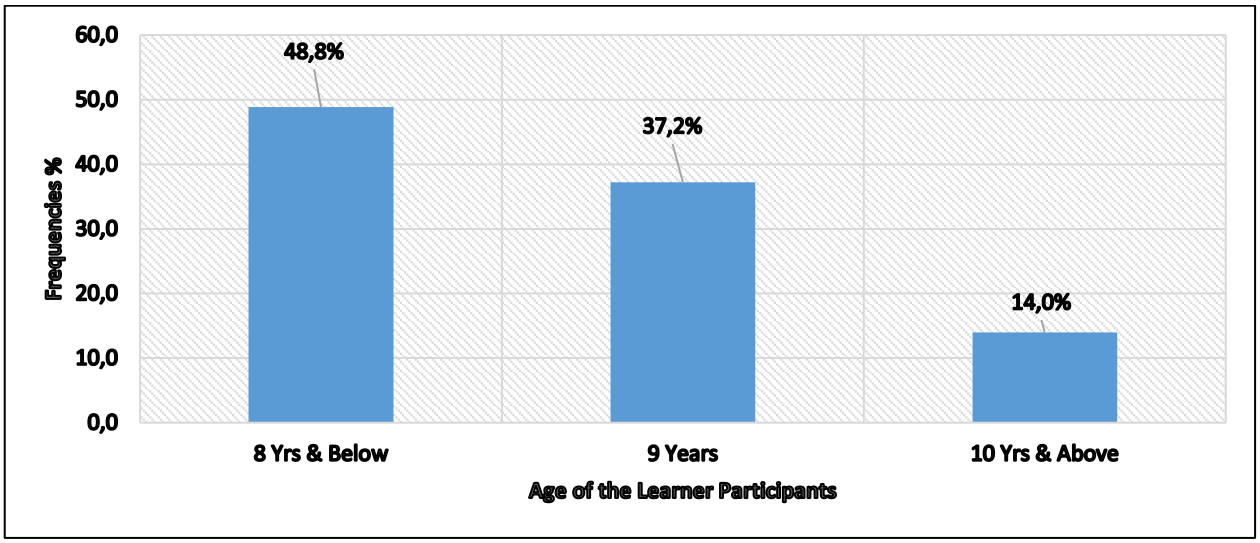


Figure 4**:** ***Age distribution of the learners*** **(n=43) (Source: Study data, 2022)**

In terms of age, results show that most participants were aged 8 years and below, as reflected by 48.8%, followed by 9 years old learners at 37.2%. Those who are 10 years and above formed only 14.0% of the participants. The study obviously selected grade three learners and in South Africa, learners in this level are mostly aged between 8 to 9 years, with entry age to primary schools being about 6 years. This is the foundation phase education where learners are taught elementary skills of how to read, write and calculate in their own language and begin to learn another language.

4.5.2 Qualitative sample

To fully grasp the phenomenon they are researching, qualitative researchers frequently choose their sample strategies carefully (DeCarlo, 2019). Naderifar,et al (2017) highlights that through the systematic collecting of data and the presentation of a rich description utilizing a flexible research methodology, qualitative research offers an orderly way to describe people's experiences and inner sentiments. Non-random sampling was employed in the present research. Non-probability sampling is frequently related to qualitative research and case study research design. Additionally, a non-random selection technique was utilized, in which participants were selected based on

specified traits, causing the overall sample to have the same characteristics as the general population (Taherdoost, 2016). In this study, the participants (5 teachers and 6 parents) were selected because the teachers had been the ones who had been teaching the learners for six (6) months and the six (6) parents/ guardians were the ones who stayed with the learners.

In the current study, individuals were sampled for the qualitative phase using the selective sampling approach. Chittaranjan (2020) points out that a selective sample is one whose characteristics are specified for a goal that is pertinent to the investigation. Additionally, Chittaranjan (2020) emphasizes that the sample gets more purposeful the more inclusion sample criteria are defined, each for a specific objective. By making the sample homogeneous or by removing participants who are at high risk for major adverse outcomes, purposeful samples examine only the population that is of particular interest.

The necessity to gather detailed information from the teacher and parent participants about the efficacy of the mnemonic and sub-lexic reinforcement approaches on improving reading ability among grade three learners with dyslexia made the use of purposeful sampling important to the current study. The researcher had to travel to the research site, which was the intervention school to interview the chosen teachers and administrators and visit specific parents at their homes. Therefore, it was important to minimize travel costs to go and interview the selected participants.

4.6 Data collection instruments

Kabir (2016) suggests that data collection is the process of gathering data for use in business decision-making, strategic planning, research, and other purposes. Tests, questionnaires, inventories, interview schedules or guides, rating scales, survey plans, lab experiments, quasi experiments, archival documents, government sources, and any other forms used to gather data on substantially identical items from ten or more respondents are all examples of data collection instruments (Canals, 2017). The present research used questionnaires and interviews as data collection instruments.

4.6.1 Quantitative data collection

Kabir (2016) claims that quantitative data measures include how many, how much or how often in calculations. They also use a systematic, standardized approach and use techniques like surveys and questioning. In the present study, the procedure involved screening all grade three learners both at the intervention and at the experimental school. Pre-testing was administered using the Bangor Dyslexia Test (BDT) and a short reading comprehension test. The Bangor Dyslexia test is a short, easy-to -administer screener for use with a broad age range, which has been in use in the UK for over three decades. It is an assessment to test reading levels of learners and adults. It was developed by the late Tim R Miles in 1983 as a battery of ten subtests for use across a wide age range, from 7 years to adulthood. In the present study it was used to test reading levels of grade three LWD. The BDT battery is used to screen learners who have signs of dyslexia at the beginning of a research study and once the learners are detected, both mnemonic and sub-lexic methods can be used to improve reading among the learners with dyslexia. It is also suitable for use in the South African context because it was used to select learners with dyslexia from a large group. It was used as a whole. From the conclusions of the tests and performance of learners who were initially very behind in their reading during the present study intervention, it can be safely justified that the Bangor Dyslexia test is accurate. In the present study, the researcher made all grade three students (275 students) from the control and experimental schools take the BDT or battery. Finally, 43 students (23 students from the intervention school and 20 students from the control school) were chosen at random while also considering how many incorrect answers each student received. In the end, the worst fifty learners (those who got more than twenty up to eighty wrong answers) were selected. The researcher just picked any fifty learners who had the worst wrong answers. The selection was done from random sampling. It had 19 items, and the rule was that a grade three learner who attained seven or more wrong answers was dyslexic, while a grade seven learner (or older) would be expected to attain not more than three wrong answers.

After the pre-test, LWD from the intervention school received intervention lessons (using mnemonic and sublexic reinforcement techniques) for one hour per day, five times a week for six months while those from the control school continued receiving their usual reading lessons without any intervention. Post-tests were administered to the learners with dyslexia both at the control and at the intervention school after 6 months. After the

study, the control group wrote post-tests, just like those written by the intervention group. The tests were compared to check the effectiveness of the two techniques (mnemonic and sublexic). Data collection tools to measure reading ability were Structural Analysis Synthesis (SAS) and the Gasuka methods. Structural Analysis is a strategy that is used to facilitate decoding as students become more proficient readers while Gasuka is a teaching strategy that helps learners to read using picture-word, word-word, or picture -sentence method. Two short reading comprehension tests were also given to the grade three LWD to test their reading levels, both those from the control and from the experimental schools. The comprehension tests were very short reading passages with only five simple literal questions that asked for specific details found in the text, such as dates, names, places, colors or events. Alessandri, et al., (2017) claim that evaluating intervention programs is important and collecting data from several points in time is also important to test the long-term strength of intervention effects once the treatment is completed.

4.6.2 Qualitative data collection

According to Clark & Veale (2018), qualitative research is the descriptive and conceptual findings collected through questionnaires, interviews, or observation and the data is in the form of views, feelings, and experiences. In the present study, interview guides were used to collect data from grade three parents as well as English teachers from the intervention school. The interview guides constituted of seven open-ended questions, and it would take forty-five minutes to about an hour to interview one respondent (teacher or parent of grade three LWD.) Pre and post-tests are used to measure knowledge gained from participating in a training course and active learning strategies include students engaged in activities like reading, discussing, and writing (Shivaraju, et al., 2017). In their investigation, Shivaraju et al., (2017)'s results suggested that it may be more fruitful to test students after, than before exposure to learning content. Marshall, et al. (2007) contends, however, that studies have demonstrated that a post-then retrospective pre-test design lowers response shift bias.

When the interviews were carried out, three grade three English teachers, the deputy principal (also a grade three English teacher) and the principal, all from the intervention school were initially interviewed. Each interview was face-to-face, and it took a space of

one hour. After interviews with teachers, again such interviews with parents of grade three-learners ensued. Like the teacher interviews, the parent interviews took an hour long each. The teacher interviews took place in the library where the intervention lessons took place while the parent interviews took place at their individual homesteads. Each individual interview was audio-recorded.

4.7 Data analysis

Data analytics is the science of analyzing raw data to identify patterns, trends, and insights that might provide valuable information about a specific business domain (Stevens, 2021). Both quantitative and qualitative data analysis techniques were used because this study was founded on a mixed-methods research methodology; they are detailed below.

4.71. Quantitative Analysis

The prevalence of specific behaviors can be estimated using quantitative research techniques (Sutton & Austin, 2015). According to Kenton (2020), quantitative analysis is a method for understanding behavior and is portrayed in terms of a numerical value by using mathematical and statistical modeling, measurement, and research. In the current study, the findings of the performance evaluation from the intervention (using mnemonic and sublexic reinforcement techniques) were analyzed.

Descriptive and inferential statistics were used to analyze quantitative data. The responses of the respondents on each sub-scale were described using descriptive statistics, whereas conclusions were supported by inferential statistics. Statistical tests and t-test analysis were used to investigate the differences between the variables, given gender and age. All tests of significance were computed at $\alpha = 0.05$. The Statistical Package for Social Sciences (SPSS) version 26.0 was used to analyze the data.

4.7.2 Qualitative analysis

Sutton & Austin (2015) point out that to comprehend how and why certain actions occur, qualitative research can assist researchers in getting access to the thoughts and feelings

of research participants. According to Kawulich (2015), analyzing qualitative data typically entails familiarizing oneself with the data by immersing oneself in it, looking for patterns and themes, looking for various relationships between data that aid in the investigator's understanding of the details, and finally visually presenting the information and writing it up. Parents and grade three English teachers both from the intervention and control schools were interviewed and their opinions and feelings were analyzed. Interviews were audio recorded, then interpreted after which the researcher analyzed data using thematic analysis (TA), a process of identifying patterns or themes within qualitative data. Braun and Clarke (2012) articulate that TA is a method of analyzing qualitative data that involves reading through a set of data and looking for patterns in the meaning of the data to find themes. TA emphasizes identifying, analyzing, and interpreting qualitative data patterns in group texts like interview transcripts.

Braun and Clarke (2006) outline the six- phase approach to thematic analysis,

Phase One: *Familiarization with research data*

In the first phase, one needs to begin by familiarizing themselves with data. Braun and Clarke (2006) highlight that in this phase, one must immerse themselves in the data by reading and re-reading textual data like interview transcripts, listening to audio-recordings or watching video data and take notes in the process. In the present study, the researcher read repeatedly the interview transcripts to get immersed into the interview data from teachers.

Phase Two: *Generation of initial codes*

In phase 2, one generates initial codes to data. Codes describe what is being said in the interview and relevant to the research question (Braun & Clarke 2012). One can use shorthand if they understand it. Coding involves recording or identifying passages of text or images that are linked by a common theme or idea allowing you to index the text into categories. In the current study, the investigator developed initial codes from the interview data on the results that were very common, for example, from *increased word recognition*; an initial code of IWR was indicated. Moreover, the code of IPAL was developed on *improved punctuality among learners*, IE, was developed from *increased enthusiasm*, while IDAS was developed from *increased development of attentive skills*.

Phase Three: *Search for Themes*

Phase three involves searching for themes, when one shifts from codes to themes. A theme "captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set" (Braun & Clarke 2006, p.82). The main purpose of this phase is to find out patterns and relationships between and across the entire data set. One then combines similar or multiple codes to generate potential themes in relation to the research questions. In the current study, the investigator did search for themes, and some common ones that emerged from interview data include, improved punctuality among learners, increased enthusiasm, increased development of attentive skills, increased spelling and word-building skills, improved performance in other subjects, and increased development of phonemic skills.

Phase Four: *Reviewing themes.*

Dawadi (2020) proposes that at this stage the researcher checks initial themes against the coded data and the entire data set and aims at providing analysis relevant to the research question. Maguire & Delahunt (2017) point out that next, you then color- code individual themes which should be logical and distinct. The current study reviewed the themes to ascertain that correct naming was done in relation to the common trends that were in the interview data.

Phase Five: *Defining and naming themes.*

Defining and naming of themes is the next stage. Braun & Clarke (2006) point out that it is only after someone has adequate knowledge of their statistical map that phase five can begin. At this point one identifies the importance of each theme and decides what aspect of the data each theme shows. One then gives themes working titles and the names need to be strong and enlighten the reader about what the theme is about. The current study ended up defining and renaming topics as reflected by the interview data.

Phase Six: *Producing a report.*

Finally, the researcher compiles concluded themes then produces a conclusive formal report. One therefore needs to convince the reader of the excellence and authenticity of your analysis. Braun and Clarke (2006 p.) conclude by accentuating that "extracts need to be more embedded within an analytic narrative that compellingly illustrates the story

you are telling about your data and to make an argument in relation to your research question". The present study followed the step-by-step thematic approach in analyzing the qualitative data report until a final comprehensive report was completed.

4.8: Validity, Reliability and Trustworthiness of Research Instruments

4.8.1: Validity and Reliability of Quantitative Research Instruments

In their report from 2021, Buntins, Kerres, and Heinemann discuss a variety of study tools, including questionnaires, behavioral analyses, interviews, and behavioral observations. The reliability of a research study's findings in predicting actual outcomes among people who behave similarly outside of the study is one aspect of its validity (Patino & Ferreira, 2018). Similarly, Mohajan (2017) points out that validity refers to how well the results among the study participants represent true findings among similar individuals outside the study. On the other hand, reliability refers to how consistently a method measures something, according to Scott, et al. (2019). The outcomes of the present study were accurate when compared to students in grade three who were comparable but not included in the study.

4.8.1.1: Internal Validity

Internal validity is the extent to which the observed results represent the truth in the population being studied and are not due to methodological errors, according to Patino and Ferreira (2018). This variable makes the conclusions of a causal relationship credible and trustworthy (Andrade, 2018). In the present study, the study design, conduct, and analysis answered the research questions fairly as depicted in the results of the grade three LWD who took part in the intervention. First, internal validity was ascertained by presenting the research proposal and tools to academic staff and fellow students at the Wits School of Education. The feedback that was obtained during these presentation sessions was incorporated into the research tools, and this ensured that they are valid.

Moreover, the cause-and-effect relationships between the test situation and the research outcome was investigated by subjecting the parent/guardian survey data to suitability tests using the Kaiser-Meyer-Oklin measure of sampling adequacy (KMO Index) and the Bartlett's Test of Sphericity. Gravetter and Wallnau (2000) affirm that Bartlett's Test for

Sphericity relates to the significance of the study and shows the validity of responses obtained in relation to the problem that the study seeks to address. Subsequently, the validity of the questionnaire data set for analysis was assessed for each sub-scale and the results were summarized as in Table 1.

Table 1: KMO and Bartlett's Test

Subscales	Kaiser-Meyer-Olkin (KMO index)	Bartlett's Test for Sphericity Approx. Chi-	Df	Sig.
Effectiveness of Mnemonics Interventions	.654	85.491	28	.000
Effectiveness of Sub-Lexic Intervention	.605	146.811	36	.000
Effectiveness of mnemonics & sub-lexic interventions given gender	.668	50.098	21	.000
Effectiveness of Mnemonics & Sub -Lexic Interventions given age	.699	123.547	45	.000

Source: Survey data (2022), SPSS Analysis

Table 1 shows the results of the Kaiser-Meyer-Oklin measure of sampling adequacy (KMO Index) and the Bartlett's Test for Sphericity for each subscale of the parents' questionnaire. It reveals that the questionnaire had sufficient internal validity. This is in line with the recommendation by Kaiser (1974) who holds that the Kaiser-Meyer-Oklin measure of sampling adequacy index > 0.6 is of sufficient internal validity. On the other hand, Tabachnick & Fidell (2001) hold that Bartlett's Sphericity test statistic should be less than 0.05 for an adequate internal validity. From the table, Bartlett's test for Sphericity are all significant ($p<0.001$, $p=0.000$) and Kaiser-Meyer-Oklin indexes are all > 0.6 for all the subscales of the questionnaire. Hence, based on the results, it was correct to conclude that the data were of adequate internal validity therefore it was suitable for inferential analysis.

4.8.1.2: *Reliability of the Instruments*

Reliability is a statistical measure of how reproducible the survey instrument's data is (Surucu & Maslakci, 2020). It also refers to how consistently a method measures

something over time. Furthermore, reliability is the ability to measure instruments to give similar results when applied at different times (Coleman, 2022). Within a qualitative investigation, reliability is sometimes referred to as 'dependability', 'conformability' or 'consistency'. Moreover, Coleman (2022) argues that triangulation may also provide a more compelling argument regarding the reliability of findings.

In the present study, reliability of the questionnaire was tested using Cronbach's alpha coefficient analysis, which is a measure of internal consistency. Pallant (2000) affirms that internal consistence is the degree to which an instrument is error free, reliable and consistent across time and across the various items in the scale. It measures how closely related a set of items are as a group. In this study it was obtained by computing Cronbach's alpha (α) using SPSS Version 26. Bonett (2008) and Oso and Onen (2011) recommend use of Cronbach's alpha coefficient analysis noting that it is the most consistent test of inter-item consistency reliability for Likert scaled or rating scaled questionnaire. In the interpretation of the reliability results, the maximum Cronbach's alpha coefficient is 1.0. George and Mallery (2003) classify Cronbach's alpha coefficient values as: >.9 = Excellent; > .8 = Very Good; > .7 = Good; > .6 = Acceptable; and < .6 =Weak. Similarly, Oso and Onen (2013) hold the view that a questionnaire has a good internal consistency if the Cronbach's alpha coefficient is above 0.6. In this study, the reliability for multi-item opinion items were computed separately for all the subscales in the parents/guardian questionnaires and the coefficient alpha values of the variables were reported in Table 2.

Table 2: *Internal Consistency: Cronbach's Alpha Results for the Questionnaire*

Scale	No. Items	Deleted items	Cronbach's alpha	Conclusion (Reliable/Unreliable)
Effectiveness of Mnemonics Interventions	8	None	.833	Very good
Effectiveness of Sub-Lexic Intervention	9	None	.782	Good
Effectiveness of mnemonics & sub-lexic interventions given gender	7	None	.801	Very good
Effectiveness of Mnemonics & Sub -Lexic Interventions given age	10	None	.663	Acceptable

Table 1 ***Source: Author (2022), SPSS Analysis.***

Table 2 reveals that all the sub-scales met the required level of internal consistency of reliability. All the items in each subscale hung up well with the other items and therefore there was no item deleted from any subscale. The Cronbach's alpha values ranged from a low of 0.663 (Effectiveness of Mnemonics & Sub -Lexic Interventions given Age subscale) to a high of 0.833 (Effectiveness of Mnemonics Interventions subscale). The Cronbach's alpha for all the subscales reveal that the instruments had adequate reliability for the study. This is in line with the recommendation by Oso and Onen (2013) that a coefficient of at least 0.60 is of adequate reliability, implying that the instrument has an acceptable inter-item consistency reliability standard. All items were correlated with the total scale to a good degree in all the subscales. Therefore, the questionnaire was suitable for data collection because it adequately measured the constructs for which it was intended to measure and could be replicated to yield the same results.

4.8.2: Trustworthiness for qualitative research

Gunawan, (2015) claims that a study is trustworthy if the reader of the research report judges it to be so, and trustworthiness has been further divided into credibility, dependability, transferability, and conformability. However, Gunawan, (2015), argues that many qualitative researchers have neglected to give adequate descriptions in their research reports of their assumptions and methods. Shenton, (2004) argues that although many critiques are reluctant to accept the trustworthiness of qualitative research, frameworks for ensuring rigor in this form of work have been in existence for many years. The present study sought to achieve and ensure a trustworthy study, comprised of credibility (in preference to internal validity), transferability (in preference to external validity/ generalizability), dependability (in preference to reliability) and conformability (in preference to objectivity), (Shelton, 2004).

4.8.2.1 Transferability (Applicability)

External validity is "concerned with the extent to which the findings of one study can be applied to other situations", for example being applied to a wider population. The current study ensured that sufficient contextual information about the fieldwork sites was provided to enable the reader to make such a transfer. That means results from both the intervention and the control schools could be applied to the whole country at large.

4.8.2.2 Credibility (Truth Value)

Credibility refers to the confidence that can be placed in the truth of research findings (Moon, et al., 2016). Devault, (2019) reiterates that triangulation and member checks help establish credibility and contribute to trustworthiness and that other factors include prolonged engagement with and persistent observations of research subjects. The present study used sequential triangulation design which implies collecting and analyzing quantitative and then qualitative data in two consecutive phases within one study.

4.8.2.3 Dependability (Consistency)

Dependability refers to the consistency and reliability of research findings and the degree to which research procedures are documented, allowing someone outside the research to follow, audit, and critique the research process (Moon, et al., 2016). The current study documented its research design and implementation including the methodology and methods, the details of data collection (in this case field notes) and reflective appraisal of the interview data obtained from teachers.

4.8.2.4 Conformability (Neutrality)

To achieve conformability, researchers must demonstrate that the results are clearly linked to the conclusions in a way that can be followed and as a process, replicated. The present study linked the results to the conclusions to enable readers to follow the research process, so that any future research could adopt similar methodology to produce a replica of the same in another context.

4.9 Ethical considerations

Some ethical concerns that should be considered while carrying out qualitative research are anonymity, confidentiality, and informed consent (Sanjari, et al., 2014). For researchers, the duty of confidentiality involves elaboration of the form of outcome that might be expected from the study (Sanjari, et al., 2014). This study ensured that participants should not be subjected to harm in any way, respect the dignity of participants, full consent was obtained from the participants prior to the study and protection of the privacy of research participants, was ensured.

4.9.1 Informed consent

Informed consent is one of the founding principles of research whose intent is that human participants can enter freely with full information about what it means for them to take

part and that they give consent before they enter the research (Nijhawan, et al., 2013). Important aspects of informed consent include ethical obligations to promote autonomy, provide information, and avoid unethical forms of bias. In a bid to avoid any harm to participants, the present study considered how the research might negatively affect participants, to avoid psychological or social harm and to protect all stakeholders including the institution (University of the Witwatersrand) and the researcher.

4.9.2 Anonymity

Anonymity means that there is no way for anyone (including the researcher) to personally identify participants in the study (David, 2021). Allen, (2017) adds that providing anonymity of information collected from research participants means that either the project does not collect identifying information of individual persons or link individual responses with participants' identities. In the present study, there was respect for participants, and teachers and learners' behaviors and experiences were of great interest, but the participants were not exposed.

4.9.3 Confidentiality

Confidentiality, like anonymity, is an ethical practice designed to protect the privacy of human subjects while collecting, analyzing, and reporting data. Confidentiality refers to the investigator's agreement with participants about how their identifiable private information will be handled, managed, and disseminated. The present study ensured that the study was conducted, collected, and held data securely and confidentially.

4.9.4 Conclusion of the Chapter

This chapter presented a detailed outline of the research design and methodology that was adopted in this study. The details on research design, participants, methods, data collection as well as analysis procedures were also outlined. The next chapter, chapter five presents the quantitative results of this research.

CHAPTER FIVE

5.0: QUANTITATIVE RESULTS

5.1. Introduction

The quantitative findings and analysis of the study are presented in this chapter. The study objectives and hypotheses serve as the foundation for how the research findings are presented. Both descriptive and inferential statistics were used in the analysis of the data. Inferential statistics were employed to help draw conclusions while descriptive statistics were utilized to characterize the respondents' opinions on each sub-scale. Statistical tests, t-test analysis were used to investigate the differences between the variables, given gender and age. All tests of significance were computed at $\alpha = 0.05$. The Statistical Package for Social Sciences (SPSS) version 26.0 was used to analyse the data.

5.2. Purpose of the Study

The study's goal was to determine how well mnemonic and sub-lexical reinforcement strategies improved the reading skills of grade three LWD in two public schools in the Bohlabela District, Mpumalanga Province, South Africa. The study also sought to determine whether age and gender disparities in the impact of mnemonic and sub-lexical reinforcement approaches on improving reading skills among LWD.

5.2.1 Objectives of the study

The study was guided by the following objectives:

a) To assess the effectiveness of mnemonic instruction on enhancement of reading ability among grade three LWD.
b) To establish the effectiveness of sub-lexical reinforcement and enhancement of reading of reading ability among grade three LWD.
c) To examine the gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD in South Africa.
d) To establish the differences in effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability based on ages of grade three LWD.

5.2.2 Hypotheses of the Study

The study was guided by the following null hypotheses:

H_01: *Mnemonic instruction is effective in enhancing of reading ability among grade three learners with dyslexia*.

H_02: *Sub-lexical reinforcement is effective in enhancing of reading ability among grade three learners with dyslexia*.

H_03: *There is not statistically significant gender influences on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancing of reading ability among the grade three learners with dyslexia*.

H_04: *There is no statistically significant age influence in effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability of grade three learners with dyslexia*.

5.3: Questionnaire Return Rate

Table 3, which shows the summary of return rate of questionnaires from the respondents, reveals that the return rate of the questionnaires was acceptable for the study.

Table 3: *Questionnaire Return Rate*

Respondents	Questionnaires	Questionnaires	Return rate (%)
Group 1- Experimental	30	23	76.7
Group 2 -Control	20	20	100.0
Parents/Guardian	50	23	46.0
Total	100	66	66.0

Table 2 Source: ***Study data (2022)***

The study was done on a total of 43 grade three LWD, 23 of whom were placed in the intervention group and 20 of whom were placed in the control group. Out of these numbers, a total of 66 of them comprising of 23 experimental, 20 control learners and 23 parents took part in the study, translating to an overall response rate of 66%. This response rate's representation was satisfactory. This is corroborated by Creswell's (2014) recommendation that for analysis and reporting on study results, a response rate of 50% is satisfactory, 60% is good and 70% and above is exceptional. This claim suggests that the current study's response rate of 66.0% is adequate. Because the parents/guardians participants were matched with students who were in the experimental group, the 46% (23) parents' return rate was acceptable. The fact that the researcher physically

administered the study's instruments to the respondents after informing them of its purpose and objective led to the good reaction. It was also because of the extra effort put forth by the researcher, who made follow-up calls to respondents to answer their questions and remind them to complete the questionnaires in addition to visiting parents and guardians to fill out and return the questionnaires. The COVID-19 scourge epidemic, which prompted some sampled students and parents avoid participation in events that exposed them to touch with other people out of fear of contracting the disease, was blamed because the response rate did not reach 100%.

5.4: Effectiveness of Mnemonic Instruction on Enhancement of Reading Ability among Grade Three LWD

The study's primary goal was to determine whether teaching LWD using mnemonic devices improved their reading skills in grade three. Both descriptive and inferential statistics were applied to this goal.

5.4.1: Parents' Views on Effectiveness of Mnemonic Instruction on Enhancement of Reading Ability

The descriptive statistics was used to describe and explore the views of the parents/guardians on effectiveness of mnemonics interventions on grade three LWD. The study predicted that teaching grade three LWD, Mnemonic Reinforcement Techniques will improve their reading skills. A questionnaire with eight topics on a Likert scale was provided to parents whose kids had been enrolled in a reading intervention program for two terms to get their opinions on how helpful the program was. Mnemonic reinforcement techniques were used as part of the intervention to improve reading skills. The parent respondents were to respond on the statements using a 5-point Likert scale of: strongly disagree (1), disagree (2), undecided (3), agree (4) and strongly agree (5). Their views were summarized in frequency percentages, mean and standard deviation, as tabulated in Table 4.

Table 4: *Views of parents on effectiveness of mnemonic reinforcement techniques in enhancing reading abilities (n=23)*

Items	1	2	3	4	5	Mean	SD
My child prefers using mnemonics to memorize vocabulary words.	0 (0.0%)	2 (8.7%)	1 (4.3%)	18 (78.3%)	2 (8.7%)	3.87	0.69

My child sees it easier to memorize vocabulary definitions when using mnemonics.	1 (4.3%)	1 (4.3%)	3 (13.0%)	17 (73.9%)	1 (4.3%)	3.70	0.82
I think my child will be able to easily create mnemonics to memorize new information.	0 (0.0%)	1 (4.3%)	5 (21.7%)	16 (69.6%)	1 (4.3%)	3.74	0.62
My child prefers teacher provided mnemonics over learner created mnemonics.	0 (0.0%)	1 (4.3%)	6 (26.1%)	12 (52.2%)	4 (17.4%)	3.83	0.78
My child enjoyed using this memorization strategy.	0 (0.0%)	2 (8.7%)	3 (13.0%)	16 (69.6%)	2 (8.7%)	3.78	0.74
My child prefers to use this Strategy at home always.	0 (0.0%)	1 (4.3%)	2 (8.7%)	18 (78.3%)	2 (8.7%)	3.91	0.60
My child is now able to remember more when using mnemonics.	0 (0.0%)	1 (4.3%)	1 (4.3%)	17 (73.9%)	4 (17.4%)	4.04	0.64
	0 (0.0%)	0 (0.0%)	3 (13.0%)	19 (82.6%)	1 (4.3%)	3.91	0.42
Mean overall rating effectiveness of mnemonics interventions on grade three LWD						3.85	0.6

Key: 1-Strongly Disagree; **2**-Disagree; **3**- Neither Agree nor Disagree, **4**-Agree and **5**-Strongly Agree; ***M***-mean; ***SD***-Standard deviation.

Table 3: Source: Survey Data (2022)

According to the survey's findings, LWD who are enrolled in primary schools can improve their reading skills by using mnemonic reinforcement strategies. A mean rating of 3.85 on a scale of 1 to 5 and a standard deviation of 0.66 reflect this. After participating in a reading intervention program for two terms, most survey participants' parents usually observed improvements in their kids' mnemonic usage and reading skills. For instance, the study's conclusions showed that many kids preferred employing mnemonics to memorize vocabulary words after going through mnemonic reinforcement strategies. A significant majority of parents whose LWD participated in the reading intervention program, 18 (78.3%), agreed and another 2 (8.7%), strongly agreed that their children prefer using mnemonics to memorize vocabulary words. This was supported by a mean response rating of 3.87 (SD=0.69). Only 2 (8.7%) of the selected parents disagreed that their children prefer using mnemonics to memorize vocabulary words.

The study's findings also showed that many students now found it quite simple to memorize vocabulary definitions when using mnemonics after completing the intervention program, as evidenced by a mean rating of 3.70 (SD=0.82) for this aspect of the study. This was further supported by 18 (78.2%) of the parents, who agreed or strongly agreed that their children found it much simpler to memorize vocabulary meanings after receiving the intervention. Only 2 (8.6%) of the parents of grade three LWD who participated in the study disagreed that their children found it simpler to memorize vocabulary definitions while employing mnemonics. This research suggests that the majority of grade three LWD benefit from the use of mnemonic reinforcement techniques to improve their reading skills. The study also aimed to determine how simple it was for LWD who had undergone mnemonic reinforcement strategies to improve their reading skills to come up with mnemonics on their own. The results showed that for most of them, it was relatively simple. This was indicated by a mean rating of 3.74 with a standard deviation of 0.62, as 17 (73.9%) of the parents of LWD who took part in the survey agreed that their children were able to easily create mnemonics to memorize new information. However, about a fifth 5 (21.7%) of the respondents were not sure whether their children were able to easily create mnemonics for memorization of new information, but only 1 (4.3%) of them were sure that their children were not able to create mnemonics on their own.

The survey's results, however, indicate that most learners favour teacher-provided mnemonics above those they have made themselves. This was shown by a mean rating of 3.83 (SD=0.78) and the confirmation by 16 (69.6%) of the participating parents of LWD that their children prefer teacher-provided mnemonics over learner-created mnemonics. Only one parent respondent (4.3%) claimed that their children preferred learner-made mnemonics over teacher-made ones, although more than one-quarter (26.1%) of the respondents were unsure about their children’s preferences. According to the study's findings, most learners with dyslexia in primary schools who utilize mnemonic devices find them to be enjoyable. This was supported by a mean rating of 3.78 (SD=0.78) and by nearly eight in ten (78.3%) of the parents of the LWD who were chosen to take part in the study. These parents attested to the fact that mnemonic devices are a favourite memorization technique among their kids. In fact, a resounding majority of parents whose children had dyslexia underwent intervention stated that their kids always chose to employ the method at home: 20 (87.0%). This response resulted in a

mean rating of 3.91 (SD=0.60), which suggests that using mnemonics reinforcement strategies has improved reading skills among grade three LWD.

The study's findings made it abundantly evident that using mnemonic devices considerably aided LWD in remembering and recalling material. This indicates that it assisted learners in quickly remembering information more effectively than the conventional way of instruction. For instance, when asked about their children's ability to recall what they learn, the parents of the selected LWD who underwent the mnemonics reinforcement techniques intervention answered with roughly nine out of every twenty-one (91.3%) of the selected parents that their children were able to remember more when using mnemonics. This resulted in a mean rating of 4.04 and a standard deviation of 0.64, demonstrating that using mnemonic reinforcement techniques significantly improves reading ability among LWD in primary schools.

5.4.2: Experimental Findings on Effect of Mnemonic Instruction on Enhancing Reading Ability

$H_0$1: *Mnemonic instruction is effective in enhancing of reading ability among grade three learners with dyslexia.*

This objective of the study was to investigate the effectiveness of mnemonic reinforcement techniques on reading abilities among grade three learners with dyslexia. Null hypothesis, "***Mnemonic instruction has no significant effect on enhancing of reading ability among grade three LWD***", was tested. Two groups of LWD were taken into consideration for the experiment: the intervention group and the control group. Group-1, the intervention group, received treatment by having mnemonic reinforcement techniques used to teach them in reading abilities. Group 2, the control group, on the other hand, only received the conventional reading instruction. Both the intervention and control groups received a pre-test of reading evaluation. The first intervention employing the mnemonic reinforcement strategy was given to students in the intervention group following the pre-test, while those in the control group continued to receive their regular reading classes without any additional instruction. Both groups took part in a post-test 1 following the conclusion of the intervention session. Both independent and paired sample t-tests were performed to ascertain the difference in reading proficiency between the two

groups because the study used the traditional pre-test-post-test two-group design for both the intervention and control groups. The researcher was able to make sure that confounding variables and unrelated factors did not affect the results by combining several pre- and post-testing procedures for treatment and control groups. Two subscales, a reading examination, and a comprehension test, were used to assess readers' abilities. The groups and descriptive statistics of each group's performance on the reading and comprehension exams are shown in Table 5.

Table 5: *Descriptive statistics of the scores of the two groups –mnemonic techniques*

Type of Test	Group		N	Mean	Std. Deviation	Std. Error
Reading Test	Pretest scores	Group 1	23	0.82	1.46	0.305
		Group 2	20	2.05	2.72	0.609
		Total	43	1.44	2.21	0.336
	Post-test scores	Group 1	23	19.78	10.38	2.164
		Group 2	20	3.15	3.95	0.883
		Total	43	12.05	11.57	1.764
Comprehension Test	Pretest scores	Group 1	23	0.87	1.22	0.060
		Group 2	20	0.90	1.11	0.250
		Total	43	0.89	1.16	0.177
	Post-test scores	Group 1	23	3.52	1.75	0.366
		Group 2	20	0.50	1.00	0.224
		Total	43	2.01	2.09	0.319

Table 4. Source: English Language Reading Test Scores (2022)

The descriptive statistics of the pre-test and post-test reading and comprehension scores that were obtained using mnemonic strategies are displayed in Table 5. Group 1 (the intervention group) had the greatest post-test scores on the reading and comprehension

exams. The means score recorded for the post-test reading by Group-1 learners was 19.78 (SD=10.38). It was followed by the post-test mean score of Group-1 learners at 3.52 (SD=1.75) in comprehension test. However, the least score recorded were from pre-test comprehension (Mean=0.09; SD=0.29) and reading (Mean=0.43; SD=1.46) test results for Group-1 learners. It is evident that students generally fared worse in reading comprehension than in writing, and that pre-test scores in both reading ability areas were lower than post-test results. According to the findings, the intervention group outperformed their control group peers in nearly every measure of reading proficiency. However, to investigate whether there is any statistically significant difference of reading abilities between experimental and non-experimental groups, four different pairs were compared using t-tests and findings were shown in Table 6.

Table 5**:** ***Pairwise comparison of pre-test and post-test scores for control and intervention (mnemonic treatment) groups in reading test***

Pair	Groups	Mean	Mean Difference	Std. Error Mean	T	df	Sig.
Pair 1	Group-1 pretest - Group-2 pretest	1.04 2.30	-1.256	.844	-.1487	41	.145
Pair 2	Group-1 pretest - Group-1 post-test	1.69 23.30	-21.610	2.009	-10.753	22	.000**
Pair 3	Group-2 pretest - Group-2 post-test	2.95 3.65	-.700	.696	-1.005	19	.327
Pair 4	Group-1 post-test – Group -2 post-test	23.30 3.65	19.65	2.612	7.523	41	.000**

*significant @ 5% level ** significant @ 1% level

Pair 1 of Table 6 compares the reading pre-test results of the experimental group and the control group. To determine whether the randomization procedure was successful, the pre-test results from the two groups were contrasted. The researcher had the chance to validate that the experimental noise and confounding variables were filtered out by

pretesting the two groups. As a result, it made sure that internal validity was met because the pre-test results revealed that the two groups were equivalent.

The variances of the two groups were taken to be equal, and it was assumed that the sample of LWD chosen for the study came from a set of data that was normally distributed. Since there was no statistically significant difference in pre-test scores between the control and experimental groups' reading abilities, it was determined using independent t-test analysis that there was no difference between the groups. This result shows that there were no significant score differences between the two groups prior to the intervention, showing that the randomization technique was successful. It demonstrates that confounding variables and experimental noise were eliminated, indicating good internal validity. In addition, as shown in pair 2, a paired sample t-test was employed to see whether there were any differences between the experimental group's pre-test and post-test scores. The results established that there is a statically significant difference between pre-test and post-test scores for experimental group, t (22) = -10.753; p <.001. It was determined that mnemonic instruction is beneficial in boosting reading abilities among the primary school students with dyslexia since the difference is statistically significant at the 1% level.

It is unknown, nevertheless, whether the current disparity in reading skills is solely attributable to the employment of mnemonic instruction methodologies or to any other supervening variable that was left out of the study. As an improvement on the findings, the study subsequently investigated the solution using a two-control group design. A paired sample t-test was used on pair 3 (Control Group Pre-test - Group 2 and Control Group Post-test - Group 2) to analyse the results. The findings showed that, despite a positive paired samples correlation, there was no statistically significant difference in the control group's reading skills between the pre-test and post-test scores [t (19) = -1.005, p =.327 (ns)]. However, looking at the descriptive statistics of the control group, there is evidence that reading skills score at pre-test improved from a mean of 2.95 (*SD*=3.10) to a mean of 3.65 (*SD*=4.43) at post-test score translating to a rise of 0.7. However, even though there was improvement in performance in reading skills, the improvement was not statically significant. Nonetheless, at least some improvement in performance in reading skills was expected because the learners were being taught whilst using the traditional method of teaching reading skills.

Further investigation to establish whether the significant difference found between the pre-test and post-test scores for the experimental group was solely attributed to the treatment factor or other factors. This was done by conducting a test on pair 4 that checked whether there was any significant difference between post-test scores of the experimental and control group learners. An independent sample t-test analysis result shows that there was a statically significant difference between experimental group post-test (Group-1) and control group post-test (Group-2), t (*41*) = 7.011, p <.001. The mean scores in post-test exams for the intervention group (n=23; *Mean*=38.47; *SD*=21.18) was significantly higher than the post-test mean score for the control group (n=20, *Mean*=3.40; *SD*=7.65). This rise in mean score excludes the influence of pre-test procedure on the score, hence it can be concluded that the statistically significant difference in mean scores noted was mainly attributed to treatment effect, which means that mnemonic teaching strategy has a significant impact on primary school grade three LWD reading skills.

5.4.3: Hypothesis Testing- Effect of Mnemonic Instruction on Enhancing Reading Ability

The null hypothesis of the study was, "***Mnemonic instruction has no significant effect on enhancing of reading ability among grade three learners***". The paired sample t-test used to investigate the existence of differences between pre-test scores and post score for experimental group revealed that there was a statically significant difference [t (22) = -10.753; p <.001] in leaners reading ability before intervention and after intervention. On the contrary, the study established that there was no statistically significant difference in leaners reading ability scores between pre-test scores and post score for the control group [t (19) = -1.005; p =.327]. Further, given that the study had shown that randomization process was effective during sampling of the experiment and control groups, it was evident that reading ability among the grade three LWD was enhanced by mnemonic intervention. Hence, the null hypothesis was rejected, and it was concluded that mnemonic instruction is effective in enhancing reading abilities among the primary school LWD.

5.5.: Effectiveness of Sub-Lexical Intervention on Enhancement of Reading Ability among Grade Three LWD

The second objective of the study sought to establish the effectiveness of the sub-lexical technique on enhancement of reading ability among grade three learners with dyslexia. This objective was investigated using both descriptive and inferential statistics.

5.5.1: Parents' Views on Effectiveness of Sub-Lexical Reinforcement Techniques on Enhancement of Reading Ability

Descriptive statistics was used to summarize and explore the views of the parents/guardians on effectiveness of sub-lexical reinforcement techniques on grade three learners with dyslexia. The study visualized that sub-lexical intervention would augment reading abilities among the grade three LWD in primary schools. Parents whose children with dyslexia were placed in a sub-lexical intervention program for two terms were given nine-itemed Likert scaled questionnaire which sought their views on effectiveness of the intervention. The sub-lexical intervention involved reinforcement techniques which were meant to enhance the reading ability. On a 5-point Likert scale with the options of strongly disagree (1), uncertain (3), and strongly agree (5), the parents were asked to reply to the statements. Their views were summarized in frequency percentages, mean and standard deviation, as tabulated in Table 7

Table 7: *Parents' views on effectiveness of sub-lexic reinforcement intervention (n=23)*

Items	1	2	3	4	5	M	SD
My child has the idea of sound-spelling relationships	0 (0.0%)	1 (4.3%)	5 (21.7%)	15 (65.2%)	2 (8.7%)	3.78	0.67
My child is aware of the difference between phonemes (sounds)and graphemes (letter or number of letters that spell a sound)	0 (0.0%)	0 (0.0%)	4 (17.4%)	14 (60.9%)	5 (21.7%)	4.04	0.64
My child can make meaning from text	1 (4.3%)	1 (4.3%)	8 (34.8%)	9 (39.1%)	4 (17.4%)	3.61	0.99
Phonics instruction helps my child to map sounds onto spellings	0 (0.0%)	1 (4.3%)	2 (8.7%)	16 (69.6%)	4 (17.4%)	4.00	0.67
Phonics instruction plays a key role in helping my child to comprehend text	0 (0.0%)	0 (0.0%)	2 (8.7%)	16 (69.6%)	5 (21.7%)	4.13	0.55
Phonics instruction helps in the development of word recognition by providing my child with an important and useful way to figure out unfamiliar words while reading	0 (0.0%)	2 (8.7%)	0 (0.0%)	17 (73.9%)	4 (17.4%)	4.00	0.74

Reading fluency in my child improves their reading comprehension	0 (0.0 %)	1 (4.3 %)	2 (8.7 %)	15 (65.2 %)	5 (21.7%)	4.04	0.71
By end of grade 3, my child will be conversant with most phonics skills	1 (4.3 %)	0 (0.0 %)	1 (4.3 %)	17 (73.9 %)	4 (17.4%)	4.00	0.80
Repeated readings of texts are helpful to my child.	1 (4.3 %)	0 (0.0 %)	0 (0.0 %)	17 (73.9 %)	5 (21.7%)	4.09	0.79
Mean average rating of effectiveness of sub-lexical interventions on grade three learners with dyslexia						3.97	0.33

Key: 1-Strongly Disagree; **2**-Disagree; **3**- Neither Agree nor Disagree, **4**-Agree, and **5**-Strongly Agree; ***M***-mean; ***SD***-Standard deviation.

Table 6: Source: Survey Data (2022)

The study's conclusions indicated that using sub-lexical reinforcement approaches to improve reading skills among grade three LWD in elementary schools is typically successful. The average effectiveness of the sub-lexical reinforcement intervention program was rated at 3.97 on a scale of 1 to 5, with a relatively low standard deviation of 0.33, suggesting that most of the parents of the LWD who were chosen for the study shared a similar opinion about the use of sub-lexical techniques to teach reading, which they generally believed to be effective. The responses and evaluations on numerous items that demonstrated the utilization of sub-lexical strategies for teaching LWD to read supported this conclusion. For instance, the study's conclusions showed that many LWD who had been receiving sub-lexical instruction for two terms had a solid understanding of the links between sounds and letters. This was demonstrated by an average mean rating of 3.78 with a standard deviation of 0.67, where 17 (73.9%) of the parents of LWD who had undergone sub-lexical intervention agreed that their children had improved understanding of sound-spelling relationships and only 1 (4.3%) of them disagreed.) of them did not agree that their children had improved in understanding of sound-spelling relationships. This suggests that after being exposed to sub-lexical procedures for two terms, LWD improved their reading abilities. Therefore, it can be said that sub-lexical reinforcement approaches successfully increase reading skills in dyslexia. This finding agrees with the results of a study by National Reading Panel (2000) which revealed that systematic phonics instruction is effective and should be implemented as part of literacy programs to teach beginning reading as well as to prevent and remediate reading difficulties. This means that there is need for schools to ensure that LWD are taught reading using sub-lexical techniques.

Equally, the survey data revealed that LWD who had been taken through the sub-lexical intervention developed strong awareness of the differences between phonemes and graphemes, which is an important aspect of reading skills. This was indicated by an average mean rating of 4.04 with a standard deviation of 0.64. It was also reflected by more than four out of every five 19 (82.6%) of the selected parents of the learners with dyslexia who agreed that their children, after going through the sub-lexical intervention, were more aware of the difference between phonemes and graphemes. None of the surveyed parents denied that their children with dyslexia who received this intervention had improved in reading skills. Only 4 (17.4%) of the respondents were non-committal on this matter and they remained largely undecided. Nonetheless, the fact that majority of the surveyed parents' responses were in affirmative to the statement suggests that use of sub-lexical techniques of intervention creates awareness on differences between phonemes and graphemes, which is pre-requisite condition for good reading abilities. This finding therefore confirms that sub-lexical reinforcement techniques effectively enhance reading abilities among LWD.

On whether the LWD were able to make meaning from text after going through sub-lexical intervention for two terms, the study shows -that many of them were quite able to do this. This was reflected by most of the respondents who agreed (9; 39.1%) and who strongly agreed (4; 17.4%) that their CWD who had been taken through sub-lexical intervention were able to make meaning from texts, translating to a response rating of 3.61 (SD=.99). Only 2 (8.7%) of the parents did not agree that their children were able to make meaning from texts even after the two terms intervention programme, but some 8 (34.8%) of them were undecided on this matter. However, the fact whether the LWD were able to make meaning from text after going through sub-lexical intervention for two terms, the study show that many of them were quite able to do this. It can be argued that sub-lexical techniques of teaching reading among LWD enhances their ability to read better through improving how they relate meaning from text. Hence, the study has shown that sub-lexical reinforcement techniques are effective on enhancement of reading ability on grade three LWD. This finding agrees with the results of a study by Bowers (2020) which established that reading instruction in English should first focus on teaching letter (grapheme) to sound (phoneme) correspondence rather than adopt meaning-based reading approaches such as whole language instruction. These finding also agrees with Glazzard & Stones (2020) who suggest that synthetic phonics, which work the same way as the sub-lexic technique, produce gains in word-reading and spelling.

Similarly, the data from the survey shows that most LWD who went through the intervention of sub-lexical technique for two terms can effectively map sound onto spellings. This was echoed by most of the selected parents whose children with dyslexia passed through the sub-lexical intervention who strongly agreed [4 (17.4%)] and who agreed [16 (69.6%)] that the phonics instruction their children received through the intervention had helped them to be able to effectively map sounds onto spellings, reflecting a mean response rate of 4.0 with a standard deviation of 0.67. Only 1 (4.3%) of the selected parents of LWD refuted the claim and another 2 (8.7%) of them were not sure whether phonics instruction really helped their children to be able to accurately map sounds onto spellings. Nevertheless, the fact that majority of the parents of LWD confirmed that their children were able to effectively map sounds onto spellings which is an essential reading skill, suggest that phonics instruction as a form of sub-lexical reinforcement techniques effectively enhance reading abilities among LWD. It can be reasoned that sub-lexical intervention among LWD enhances their ability to read by improving their skills to accurately map sound onto spellings. Therefore, the study has shown that sub-lexical reinforcement techniques is indeed effective on boosting of reading ability of grade three LWD. This finding imitates that of Smith (2016) which established that many articles and books recommended a phonics approach when teaching LWD, but only a few articles regarding whole language.

Similarly, the study results reveal that majority of LWD who had been taken through phonics instruction as a form of sub-lexical reinforcement were able to effectively comprehend texts. This was inferred from an average mean response of 4.13 with a standard deviation of 0.55, where only 2 (8.7%) of the surveyed parents indicated that their children with dyslexia were not able to properly comprehend written texts despite the phonic instructions they had been taken through. However, more than nine out of every ten 21 (91.3%) of the surveyed parents of the LWD confirmed that phonics instruction enhanced their children's ability to comprehend text. This implies that use of phonics instruction as a form of sub-lexical reinforcement techniques effectively enhances reading abilities among LWD. Therefore, this finding suggests that sub-lexical intervention is effective in enhancement of reading ability among LWD.

Likewise, the results of the survey also established that phonics instruction help LWD in the development of word recognition. This was confirmed by most of the surveyed parents whose children had dyslexia, as indicated by a mean response rate of 4.00 (SD=0.74), where 21 (91.3%) of them agreed that phonics instruction their children with

dyslexia received helped them to develop word recognition by providing them with an important and useful way to figure out unfamiliar words while reading. Only 2 (8.7%) of the surveyed parents denied that phonics instruction helped their children in the development of word recognition. However, the fact that that majority of the parents of LWD accepted that phonics instruction helped their children to develop word recognition by providing them with an important and useful way to figure out unfamiliar words while reading, suggest that phonics instruction as a form of sub-lexical reinforcement techniques effectively enhance reading abilities among LWD. This finding agrees with Hasenacker & Schroeder (2022) who expatiate that the sub-lexical route uses grapheme-phoneme conversion (GPC) rules to decode non-words letter by letter while the lexical route is used for recognizing words that have a representation in the orthographic lexicon and that it can be assumed that the sub-lexical route is dominantly used by children in the very beginning of reading acquisition. This therefore implies that for LWD, phonics instruction makes them to grasp sounds and simple words, bit-by -bit from, if teachers start from grassroots level. The technique provides LWD with important and useful ways to figure out unfamiliar words while reading.

The response on whether reading fluency in LWD improve their reading comprehension, show that 5 (21.7%) of the respondents strongly agreed and 15 (65.2%) of them agreed that reading fluency significantly improved their children's reading comprehension. However, 2 (8.7%) others were undecided, but 1 (4.3%) disagreed reading fluency in their children improved their reading comprehension. This item received a mean rating of 4.04 (SD=0.71), suggesting that there was a strong agreement among the parents of LWD who took part in the survey that reading fluency improves the learner's ability in reading comprehension. This finding implies that reading fluency is a key component of effective reading and understanding of comprehension. Hence, it shows that sub-lexical reinforcement techniques effectively enhance reading abilities among LWD.

On how much the LWD who were taken through sub-lexical techniques would have learnt on phonics skills by the time they complete grade 3, the results of the survey revealed that majority of the parents whose children with dyslexia were taken through the intervention were satisfied that their children would be conversant with many phonics skills. This was shown by an overwhelming majority 21 (92.3%) of the surveyed parents who either believed or strongly believed that by end of grade 3, their CWD would be conversant with most phonics skills. This item attracted response rate of 4.00 within a

standard deviation of 0.80, with only 2 (8.7%) of the respondents either being undecided or believed that their children would not be conversant with most phonics skills by end of grade 3. Suffice, given that majority of the parents of LWD held a strong belief that their children would better in phonic skills, which is an important aspect of reading skills, by the end of grade 3 it is a clear indication that sub-lexical reinforcement techniques effectively enhance reading abilities among LWD.

Lastly, the survey findings established that repeated readings of texts are helpful to LWD. This was confirmed by most of the surveyed parents whose children had dyslexia, as indicated by a mean response rate of 4.09 (SD=0.79), where 17 (73.9%) and 5 (21.7%) of the respondents agreed and strongly agreed, respectively, that repeated readings of texts are helpful to their children regarding acquisition of reading skills. Only 1 (4.3%) of the surveyed parents denied that repeated readings of texts are helpful to their children. However, the fact that majority of the parents of LWD accepted that repeated readings of texts are helpful to their children, suggests that repeated reading as a form of sub-lexical reinforcement techniques is effective in enhancing reading abilities among LWD.

5.5.2: Experimental Findings on Effect of Sub-Lexical Instruction on Enhancing Reading Ability

$H_0$2: *Sub-Lexical instruction has no statistically significant effect on enhancing of reading ability among grade three LWD.*

The objective here was to investigate the effectiveness of sub-lexical reinforcement techniques on reading abilities among grade three LWD. The null hypothesis being tested was "***Sub-lexical instruction has no significant effect on enhancing of reading ability among grade three LWD***". The hypothesis was tested using experimental data, where two groups of LWD were considered, intervention and control group. Group-1, the intervention group, were given treatment by training them on reading skills using sub-lexical reinforcement technique. Contrariwise, Group-2, the control group were only taught reading through the normal traditional technique. A pre-test reading assessment test was administered to both the intervention and control groups. After the pre-test, learners from the experimental group were given sub-lexical reinforcement, while those from the control group continued receiving their usual reading lessons without any

intervention. Once the intervention period expired, a post-test was administered to both the groups of learners. Independent and paired sample t-tests were used to establish the difference in reading ability between the two groups of the LWD. The learners' reading skills was measured using two sub-scales: reading test and comprehension test. Table 8 shows the groups and descriptive statistics of their performance in reading and comprehension tests.

Table 8: *Descriptive statistics of the scores of the two groups –sub-lexical techniques*

Type of Test	Group		N	Mean	Std. Deviation	Std. Error
Reading Test	Pretest scores	Group 1	23	0.82	1.46	0.305
		Group 2	20	2.05	2.72	0.609
		Total	43	1.44	2.21	0.336
	Post-test scores	Group 1	23	19.78	10.38	2.164
		Group 2	20	3.15	3.95	0.883
		Total	43	12.05	11.57	1.764
Comprehension Test	Pretest scores	Group 1	23	0.96	0.29	0.060
		Group 2	20	0.50	1.12	0.250
		Total	43	0.88	1.16	0.177
	Post-test scores	Group 1	23	3.52	1.75	0.366
		Group 2	20	0.90	1.00	0.224
		Total	43	2.11	2.09	0.319

Table 7: Source: English Language Reading Test Scores (2022)

Table 8 displays the descriptive statistics of pre-test and post-test scores in reading and comprehension tests which were obtained before and after sub-lexical techniques. It is evident that post-test scores from group 1 in both reading and comprehension tests were higher. For instance, the average score recorded for the post-test reading by Group-1 learners was 19.78 (*SD*=10.38) and post-test mean score of Group-1 learners in comprehension test was 3.52 (*SD*=1.75). Conversely, the least score recorded were from

pre- test reading (Mean=0.82; SD=1.46) for Group-1 learners and comprehension (Mean=0.50; SD=1.12) test results for Group-2 learners. Also notable, all the learners generally performed poorly in comprehension than in reading, while pre-test scores were all lower than post-test scores in all the two aspects of reading skills. The LWD who were given sub-lexical treatment exhibited comparatively higher abilities in all aspects of reading skills than their counterparts who did not receive the same treatment. However, to investigate whether there is any statistically significant difference in reading abilities between those were given sub-lexical training and those who only received the traditional teaching, four different pairs were compared using t-tests and findings were shown in Table 9.

Table 9: *Pairwise comparison of pre-test and post-test scores for control and intervention (sub-lexical treatment) groups in reading test*

Pair	Groups	Mean	Mean Difference	Std. Error Difference	t	df	Sig.
Pair 1	Group-1 pretest - Group-2 pretest	1.04 2.30	-1.256	.844	-1.487	41	.145
Pair 2	Group-1 pretest - Group-1 post-test	1.69 23.30	-21.610	2.009	-10.753	22	.000**
Pair 3	Group-2 pretest - Group-2 post-test	2.95 3.65	-.700	.696	-1.005	19	.327
Pair 4	Group-1 post-test – Group -2 post-test	38.47 3.40	35.08	5.00	7.011	41	0.000**

*significant @ 5% level ** significant @ 1% level

Table 8**:** ***Pairwise comparison of pre-test and post-test scores for control and intervention (sub-lexical treatment) groups in reading test***

From Table 9, the results of an independent t-test analysis reveal that there was no statistically significant difference in pre-tests scores between the control and experimental group reading skills [t (41) = -1.487; p =.145] as indicated in Pair 1 results. This finding suggests that the two groups did not have remarkable differences in scores before the intervention hence signifying that the randomization process was effective. This ratifies that the experimental noise and confounding variables were excluded, suggestive of adequate internal validity of the data.

To investigate whether there was statistical difference between pre-test scores and post-test scores for the learners who were treated on sub-lexical technique, a paired sample t-test was used as shown in pair 2. The results revealed that there is a statically significant difference between pre-test and post-test scores for experimental group, t (22) = -10.753; p <.001, suggesting that sub-lexical instruction is effective in enhancing reading abilities among the primary school LWD. Further, an investigation was done to find out whether the existing difference in reading abilities was exclusively due to use of sub-lexical instruction technique or effect of any other intervening variable that was not included in the study. A paired sample t-test on pair 3 (Control Group Pre-test - Group-2 and Control Group Post-test -Group 2) indicate that there was no statistically significant difference, t (19) = -1.005, p =.327 (ns). This shows that there is no difference between pre-test scores and post-test scores in reading skills among the learners who did not receive any treatment. Additionally, investigation to establish whether the significant difference found between the pre-test and post-test scores for the experimental group was solely attributed to the treatment factor or other factors was conducted. This was done by conducting a test on pair 4 that checked whether there was any significant difference between post-test scores of the experimental and control group learners. The result shows that there was a statically significant difference between experimental group post-test (Group-1) and control group post-test (Group-2), t (*41*) = 7.011, p <.001. The mean scores in post-test exams for the intervention group (n=23; *Mean*=38.47; *SD*=21.18) was significantly higher than the mean score in post-test for the control group (n=20, *Mean*=3.40; *SD*=7.65). This rise in mean score omits the influence of pre-test procedure on the score, therefore it was concluded that the statistical significant difference in reading skills between the LWD who were taken through sub-lexic training technique and those who received the traditional training was largely attributed to treatment effect,

which means that sub-lexical teaching strategy has a significant effect on enhancement of primary school grade three LWD reading ability.

5.5.3: Hypothesis Testing- Effect of Sub-lexic Instruction on Enhancing Reading Ability

The null hypothesis of the study was, "***Sub-lexic instruction has no significant effect on enhancing of reading ability among grade three LWD***". The results of the paired sample t-test established that there was a statically significant difference [t (22) = -10.753; p <.001] in learners reading ability before intervention and after intervention. On the other hand, the study established that there was no statistically significant difference in leaners reading ability scores between pre-test scores and post score for the control group, t (19) = -1.005; p =.327. In addition, since the study had shown that randomization process was effective during sampling of the experiment and control groups, it was evident that reading ability among the LWD was enhanced by sub-lexical intervention. Hence, the null hypothesis was rejected, and it was concluded that sub-lexical instruction is effective in enhancing reading abilities among the primary school LWD.

5.6.: Gender Influence on Effectiveness of the Mnemonic Instruction and Sub-Lexical Reinforcement on Enhancement of Reading Ability among Grade three LWD.

The third objective of the study sought to examine the gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. This objective was addressed using both descriptive and inferential statistics.

5.6.1: Parents' Views on Gender Differences on Effectiveness of Mnemonics & Sub-Lexic Interventions

Descriptive statistics was used to summarize and explore the views of the parents/guardians on gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. Parents whose CWD were placed in mnemonics and sub-lexical intervention program for two terms were given seven-itemed Likert scaled questionnaire which sought the respondents' views on effectiveness of the interventions given the gender of the dyslexic learners. The parents' respondents were to respond on the statements using a 5-point

Likert scale of: strongly disagree (1), disagree (2), undecided (3), agree (4) and strongly agree (5). Their views were summarized in frequency percentages, mean and standard deviation, as tabulated in Table 10.

Table 10: *Gender differences on effectiveness of mnemonics & sub -lexic interventions (n=23)*

Items	1	2	3	4	5	Mean	SD
Girls find memorizing words easier than boys	1 (4.3%)	1 (4.3%)	2 (8.7%)	18 (78.3%)	1 (4.3%)	3.74	0.81
Boys were able to use mnemonics to memorize vocabulary definitions compared to girls	0 (0.0%)	2 (8.7%)	2 (8.7%)	15 (65.2%)	4 (17.4%)	3.91	0.79
Boys have the idea of the difference between phonemes (sounds) and graphemes (letters or groups of letters that spell a sound) compared to girls	1 (4.3%)	2 (8.7%)	4 (17.4%)	10 (43.5%)	6 (26.1%)	3.78	1.09
A girl child has the idea of sound-spelling relationship compared to a boy child	0 (0.0%)	2 (8.7%)	4 (17.4%)	11 (47.8%)	6 (26.1%)	3.91	0.90
I understand that reading fluency improves reading comprehension for both boys and girls	0 (0.0%)	0 (0.0%)	4 (17.4%)	16 (69.6%)	3 (13.0%)	3.96	0.56
Both boys and girls were able to create mnemonics to memorize new information	0 (0.0%)	0 (0.0%)	1 (4.3%)	19 (82.6%)	3 (13.0%)	4.09	0.42
Both boys and girls enjoy using the memorization strategy	0 (0.0%)	0 (0.0%)	1 (4.3%)	17 (73.9%)	5 (21.7%)	4.17	0.49

Mean average rating of effectiveness of mnemonics & sub -lexic interventions given gender	3.94	0.41

Key: 1-Strongly Disagree; **2**-Disagree; **3**- Neither Agree nor Disagree, **4**-Agree and **5**-Strongly Agree; ***M***-mean; ***SD***-Standard deviation.

Gender differences on effectiveness of mnemonics & sub -lexic interventions

Table 9: Source: Survey Data (2022)

The results of the survey established a strong gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. This was reflected by the respondents' overall mean ratings of 3.94 with a standard deviation 0.41, where the individual ratings of the indicators of effectiveness of mnemonics & sub -lexic interventions given gender being rated from a low of 3.74 to a high of 4.17, demonstrating that most parents who took part the survey generally agreed that gender has influence on effectiveness of mnemonics & sub -lexic interventions on LWD's ability to acquire reading skills. This concurs with Zeynali (2012) who opines that gender have a predominant effect on learning in general because gender is shown up in many aspects of learning, including interest, attitude, needs, beliefs, and motivation.

The survey results show that most of the respondents held a common stand regarding influence of LWD's gender on their ability to conceptualize certain aspects of reading skills. For instance, the findings of the study have established that girls find memorizing words easier than boys. This was reflected by an average mean rating of 3.74 with a standard deviation of 0.81, where 19 (82.6%) of the parents of LWD said that their girls find memorizing words easier than boys and only 2 (8.7%) of them refuted the claim that girls find memorization words easier than boys. This implies that LWD who are girls usually learn by heart words easier than their male counterparts. Hence, it can be argued that gender influence the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

On the other hand, the results of the survey revealed that boys can use mnemonics to memorize vocabulary definitions more easily compared to girls. This was confirmed by a significant majority 19 (82.6%) of the parents who indicated that their boy child was able to easily use mnemonics to memorize vocabulary definitions than the girl child. Only 2 (8.7%) of the parents did not agree that boys were better than girls in the effective use of mnemonics to memorize vocabulary definitions. This item attracted a mean

response rate of 3.91 (SD=0.79), suggesting that that boys are indeed able to use mnemonics more easily to memorize vocabulary definitions than girls. This is an indication that gender influences the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

Similarly, the study sought to establish which gender has better understanding of the difference between phonemes and graphemes, which a key aspect of reading skills. It emerged from the results of the survey that boys have better idea of the differences between phonemes (sounds) and graphemes (letters or groups of letters that spell a sound) compared to girls. This was shown by a mean rating of 3.78 (SD=1.09) with 16 (69.6%) of the parents supporting the assertion. However, 3 (13.0%) of the surveyed parents rejected the claim that boys have better understanding of the difference between phonemes and graphemes, while 4 (17.4%) of the parents were undecided on this matter. Nonetheless, it is clear from the results that most of the surveyed parents agreed that boys have better understanding of the difference between phonemes and graphemes than the girls. This is a sign that gender sways the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

Regarding sound-spelling relationship, the findings of the study revealed that gender has a bearing on the ability of dyslexic learners to match sound to spelling. This was interpreted from a mean response rate of 3.91 with a standard deviation of 0.90, where 17 (73.9%) of the sampled parents indicated that girl child has more idea of sound-spelling relationship compared to a boy child. Only 2 (8.7%) of the parents did not agree that a girl child has better idea of sound-spelling relationship than boy child, but some 4 (17.4%) of them were not sure. However, given that majority of the respondents were in agreement that girls do better in relating sound to spelling than their male counterparts is an indication that gender influences the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

On flip side, the findings of the study established that sometimes gender may not matter. For instance, the survey data revealed that reading fluency improves reading comprehension for both boys and girls. This was indicated by an average mean rating of 3.96 with a standard deviation of 0.56. It was also reflected by 16 (69.6%) of the selected parents who agreed and 3 (13.0%) others who strongly agreed that reading fluency

improves reading comprehension for both boys and girls. In fact, none of the parents who took part in the survey held a contrary opinion, except some 4 (17.4%) of them were not sure whether reading fluency improves reading comprehension for boys and girls equally. This implies that gender does not fully influence the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three learners with dyslexia. This conforms to a study by Vlachos, Papadimitriou and Walla (2015) which established that there are no significant differences according to gender in total reading performance or in its components tested separately with accuracy, fluency and comprehension, which meant that the two gender did not differ in their reading performance. Therefore, in as much as gender may play an important role in reading skills, it is not the sole determinant of reading ability among the primary school LWD.

Likewise, it emerged from the survey results that mnemonic instruction and sub-lexical reinforcement sometimes cause equal improvement in reading ability among gender in grade three learners with dyslexia. This was reflected from the parents' response, where 19 (82.6%) of the selected parents agreed and 3 (13.0%) others strongly agreed that after intervention in teaching reading, both boys and girls were able to equally create mnemonics to memorize new information. The response in this item attracted a mean rating of 4.09 with a standard deviation of 0.42, suggesting that majority of the parents who took part in the survey felt that gender was not a hindrance to learning as shown by the fact that both boys and girls were able to equally create mnemonics to memorize new information.

By the same token, the study results reveal that both boys and girls with dyslexia enjoy using memorization strategy equally. This was reflected by an average mean response rate of 4.17 with a standard deviation of 0.49, with only 1 (4.3%) of the parents who took part in the survey being undecided whether both boys and girls enjoy using the memorization strategy. However, 17 (73.9%) of the selected parents agreed and 5 (21.7%) others strongly agreed that both boys and girls enjoy using the memorization strategy.

5.6.2: Gender Differences on Effectiveness of Mnemonics Instruction in Enhancing of Reading Ability

This section sought to establish whether gender has influence on effectiveness of the mnemonic instruction reinforcement in enhancing of reading ability among the grade three LWD. The null hypothesis that, "*there is no statistically significant gender influence on effectiveness of the mnemonic instruction reinforcement on enhancing of reading ability among the grade three LWD*" was tested. An independent-samples t-test was used to compare in the mean score in reading ability between male and female among the learners who were taken through mnemonics interventions. Effectiveness of mnemonic instruction reinforcement was measured as the improvement in reading ability after the learners in the experimental group were taken through the interventions. An independent samples t-test was performed to compare the rise in reading ability in male and female. Table 11 gives the summary of findings on effectiveness of the mnemonic instruction reinforcement in enhancing of reading ability among the grade three LWD given gender.

Table 10: ***Gender differences on effectiveness of mnemonics interventions***

	Gender	n	Mean	Std. Deviation	Df	t	p-value	Effect Size
Reading	Male	13	13.00	6.71	21	4.563	.000	0.498
	Female	10	26.70	7.67				
Comprehension	Male	13	1.85	1.28	21	5.160	.000	0.559
	Female	10	3.90	.57				
Overall Reading Skills	Male	13	14.85	6.85	21	5.070	.000	0.550
	Female	10	30.60	8.04				

The study results shown in Table 11 reveal that mnemonic intervention generally causes relatively higher improvement in performance in overall reading ability and its component (reading and comprehension) in girls than in the boys. For example, while boys improved only by a mean of 14.9 with a standard deviation of 6.9, girls had improved by mean of 30.6 with a standard deviation of 8.0 in overall reading ability.

Equally, in both components of reading ability girls recorded higher improvement scores than their male counterparts. In reading, girls had an improvement mean of 26.7 (SD=7.7) while boys improved by a mean of 13.0 (SD=6.7) only; and in comprehension while girls had a mean improvement of 3.9 with a standard deviation of .57, boys recorded an improvement of 1.9 (SD=1.3) only after going through the mnemonic intervention.
Further, descriptive statistics above had to be interrogated to establish whether the differences in the scores between boys and girls are statistically significant. Independent samples t-tests results confirm the differences, as shown in Table 5.12. It shows that girls did better than boys in reading ability, the difference in their performance in overall reading ability and its two components were statically significant.

For example, the results of the independent samples t-test between boys and girls with dyslexia's reading showed that there was a statistical significant difference between the two genders. Exploring reading alone as a component of reading ability, the score of female learners (M=26.7; SD=7.7) was significantly higher than that of male learners (M=13.0; SD=6.7), t (21) = 4.563, p = .000 < .001. In addition, the magnitude of the differences in the means was fairly large (eta squared=.498), signifying a fairly big difference in means between gender. This suggests that there is statistically significant difference in reading between male and female learners among the intervention group. This indicates that there is a significant effect of gender in influencing enhancement of reading performance by mnemonic intervention, with the female learners having better scores than males.

Equally, comprehension as a component of reading skills, tested separately, reflected a statistically significant difference between gender, t (21) = 5.160, p = .000 <. 001. In addition, the magnitude of the differences in the means was very large as reflected by eta squared value of .559. This means that 55.9% of variance in reading comprehension among grade three LWD is explained by gender of the learner. The girls significantly outperformed their male counterpart in reading comprehension. Likewise, the results of the study indicate that there was statistically significant difference between boys and girls in improvement of overall reading ability. This was reflected by the fact that the average score of girls in improvement in reading score being 30.6 (SD=8.04) and that of boys being 14.9 (SD=6.7), were significantly different from each other, t (21) = 5.07, p = .000 < .001. This suggests that there is significant difference in in improvement overall reading

between boys and girls, with the latter recording higher scores than the former. The result suggests that boys seemed to have under performance in overall reading ability, suggesting that gender has influence on effectiveness of the mnemonic instruction reinforcement on enhancing of overall reading ability among the grade three learners with dyslexia. Gender accounted for 55.0% of the variance in effectiveness of the mnemonic intervention in enhancing overall reading ability among the grade three learners with dyslexia, as signified by size effect (eta squared=0.550).

Hence, it can be stated that gender differences significantly influence effectiveness of the mnemonic instruction reinforcement on enhancing of overall reading ability among the grade three LWD. Consequently, the null hypothesis was rejected, and it was concluded that there is significant gender influence on effectiveness of the mnemonic instruction reinforcement on enhancing of reading ability among the grade three learners with dyslexia. In conclusion, gender was found to play an important role in enhancing effectiveness of the mnemonic instruction reinforcement on reading ability among the grade three LWD.

5.6.3: Gender Differences on Effectiveness of Sub-Lexical intervention

The study sought to establish whether gender has influence on effectiveness of sub-lexical reinforcement in enhancing reading ability among the grade three LWD. The null hypothesis that, "*there is no statistically significant gender influence on effectiveness of the sub-lexical instruction reinforcement on enhancing of reading ability among the grade three LWD*" was tested. An independent-samples t-test was used to compare in the improvement in mean score in reading alone, comprehension and overall reading ability between boys and girls among the LWD who were taken through sub-lexical interventions. Effectiveness of sub-lexical instruction reinforcement was measured as the rise reading alone, comprehension and overall reading ability after the learners in the experimental group were taken through the sub-lexical instructions. An independent samples t-test was performed to compare these changes in male and female learners. Table 12 gives the summary of findings on effectiveness of the sub-lexical instruction reinforcement in enhancing reading alone, comprehension and overall reading ability among the grade three LWD given gender.

Table 11: ***Gender differences on effectiveness of sub-lexical interventions***

	Gender	N	Mean	Std. Deviation	Df	t	p-value
Reading	Male	13	25.15	15.52	21	2.79	.011
	Female	10	45.70	19.85		0	
Comprehension	Male	13	3.00	1.08	21	2.20	.039
	Female	10	3.80	0.42		7	
Overall Reading Skills	Male	13	28.15	15.77	21	2.889	.009
	Female	10	49.50	19.69			

The study results in table 12 revealed that girls had comparatively higher improvement in performance than the boys in the two components of reading ability (reading and comprehension) and in the overall reading ability, after having gone through sub-lexical intervention. For instance, whereas boys improved in reading, as a component of reading skills, by only a mean of 25.2 with a standard deviation of 15.5, girls improved by mean of 45.7 with a standard deviation of 19.9. Equally, girls had an improvement mean of 3.8 (SD=0.42) while boys improved only by a mean of 3.0 (SD=1.08) in comprehension. Similarly, in overall reading ability girls posted an improvement mean of 48.5 with a standard deviation of 19.7 compared to boys' improvement record of 28.2 (SD=15.8) only after going through the sub-lexical intervention.

Further, results of t-test comparisons drawn between males and females' reading performance in the descriptive statistics showed that there was a statistically significant difference between the groups involved. For instance, the score of girls in reading was significantly higher than that of boys, implying that there was statistically significant difference in reading, t (21) = .2.79, p = .011. This suggests that there is statistically difference in reading between boys and girls among the grade three LWD after having been taken through sub-lexical interventions. Equally, there was a significant difference in the comprehension scores for male (M= 3.00, SD= 1.08) and female (M=3.80

SD=0.42); t (21) = 2.207, p = .039. These results suggest that gender really does influence effectiveness of the sub-lexical instruction reinforcement on enhancing of reading ability among the grade three LWD. Specifically, the results suggest that sub-lexical instruction reinforcement on enhancement of reading ability more in girls with dyslexia than boys. This means that sub-lexical instruction has more influence in enhancing comprehension among girls with dyslexia than their male counterpart.

Overall, the results of the study indicate that there was statistically significant difference between boys and girls in overall reading. The overall reading skills scores of ten dyslexic girls who received the sub-lexical intervention (M = 49.5, SD = 19.7) compared to scores of the thirteen boys who also received the sub-lexical intervention (M = 28.2, SD = 15.8) demonstrated that girls had significantly higher scores than boys in overall reading ability, t (21) = 2.9, p = .009. This suggests that there is significant difference in overall reading ability between boys and girls who received sub-lexical intervention. This result implies that gender really does influence effectiveness of the sub-lexical instruction reinforcement on enhancing of overall reading ability among the grade three LWD. Specifically, the results suggest that sub-lexical instruction has higher influence in enhancing overall reading among girls with dyslexia than their male counterpart. Hence, it can be stated that gender differences significantly impact on the influence of sub-lexical instruction on overall reading ability among the grade three LWD. The null hypothesis was therefore rejected, and it was concluded that there is significant gender influence on effectiveness of the sub-lexical instruction reinforcement on enhancing of reading ability among the grade three LWD. The result has shown that when learners with dyslexia are taken through sub-lexical instruction, girls' overall reading ability improves more than their boys' counterparts. Therefore, gender was found to play an important role in enhancing effectiveness of sub-lexical instruction reinforcement on reading ability among the grade three LWD.

5.7: Age Influence on Effectiveness of the Mnemonic Instruction and Sub-Lexical Reinforcement on Enhancement of Reading Ability among Grade three LWD.

The last objective of the study sought to establish the differences in effectiveness of the mnemonic and sub-lexical instruction reinforcement on enhancement of reading ability based on ages of grade three LWD. This objective was addressed using both descriptive and inferential statistics. The descriptive statistics was used to explore the views of

parents on effectiveness of mnemonic and sub-lexical instruction reinforcement on enhancement of reading ability based on ages of LWD.

5.7.1: Parents' Views on Effectiveness of Mnemonic & Sub-Lexic Intervention Based on Age

The descriptive statistics was used to explore the views of parents on effectiveness of mnemonic and sub-lexical instruction reinforcement on enhancement of reading ability based on ages of dyslexic learners. Parents whose CWD were taken through mnemonics and sub-lexical intervention program for two terms were given ten-itemed Likert scaled questionnaire which sought their views on effectiveness of the interventions given the age of the LWD. The parents' respondents were to respond on the statements using a 5-point Likert scale of: strongly disagree (1), disagree (2), undecided (3), agree (4) and strongly agree (5). Their views were summarized in frequency percentages, mean and standard deviation, as tabulated in Table 13

Table 13: *Effectiveness of mnemonic & sub-lexic intervention on the basis of age (n=23)*

Items	1	2	3	4	5	Mean	SD
My child younger than 9 years was not able to tackle memorization of vocabulary words	0(0.0%)	3 (13.0%)	0 (0.0%)	17 (73.9%)	3 (13.0%)	3.87	0.81
I know that a child under the age of 9 might face problems in expressive vocabulary skills	0 (0.0%)	1 (4.3%)	1 (4.3%)	17 (73.9%)	4 (17.4%)	4.04	0.64
My child at 8 to 9 years old found it easier to memorize vocabulary definitions than younger children	1 (4.3%)	0 (0.0%)	4 (17.4%)	13 (56.5%)	5 (21.7%)	3.91	0.90
I know that phonics instruction helps my 8–9-year-old child to sound and to read new words.	1 (4.3%)	0 (0.0%)	1 (4.3%)	19 (82.6%)	2 (8.7%)	3.91	0.73
I believe that reading fluency improves reading comprehension on my grade 3 child	0 (0.0%)	0 (0.0%)	2 (8.7%)	15 (65.2%)	6 (26.1%)	4.17	0.58

My 8–9-year-old child preferred teacher provided mnemonics over learner-created ones	0 (0.0%)	0 (0.0%)	3 (13.0%)	16 (69.6%)	4 (17.4%)	4.04	0.56
My child at 8 to 9 years old was able to create mnemonics to memorize new information	0 (0.0%)	0 (0.0%)	4 (17.4%)	15 (65.2%)	4 (17.4%)	4.00	0.600
My 8-9-year-old child will tackle sound-spelling relationships easily	2 (8.7%)	0 (0.0%)	2 (8.7%)	16 (69.6%)	3 (13.0%)	3.78	1.000
Younger children find it easier to use these interventions than older ones in school	1 (4.3%)	0 (0.0%)	2 (8.7%)	18 (78.3%)	2 (8.7%)	3.87	0.760
Irrespective of age, these interventions work well to improve reading abilities of learners	1 (4.3%)	0 (0.0%)	0 (0.0%)	20 (87.0%)	2 (8.7%)	3.96	0.710
Mean average rating of effectiveness of mnemonics & sub-lexic interventions given age of the dyslexic learners						3.96	0.37

Key: 1-Strongly Disagree; **2**-Disagree; **3**- Neither Agree nor Disagree, **4**-Agree and **5**-Strongly Agree; ***M***-mean; ***SD***-Standard deviation.

Table 12: Source: Survey Data (2022)

The finding of the study has revealed that there is effect of age in the impact of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. The average overall efficiency of age in the application of mnemonic instruction and sub-lexical reinforcement on improving reading ability among grade three learners with dyslexia was scored at.96 on a scale of 1 to 5, with a relatively low standard deviation of 0.37, suggesting that older learners (9 years and above) performed better than the younger ones (below 9 years). This result was substantiated by the responses and ratings on various items that manifest effect of age in the use of mnemonic instruction and sub-lexical reinforcement to augment reading ability among grade three LWD. For instance, the findings of the study established that many LWD who were younger than 9 years were not able to effectively tackle memorization of vocabulary words.

This was reflected by an average mean rating of 3.87 with a standard deviation of 0.81, where majority 17 (73.9%) of the parents whose CWD had been taken through intervention agreed and 3 (13.0%) others strongly agreed that their children younger than 9 years were not able to tackle memorization of vocabulary words even after going through the intervention programme for two terms. Only 3 (13.0%) of the selected parents did not agree that their CWD younger than 9 years were not able to tackle memorization of vocabulary words like the older learners. This implies that LWD who are younger do not easily memorize vocabulary words even after going through the intervention programme for two terms compared to their older counterparts. Therefore, it can be argued that age influence the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. This result is in line with those of a study by Vlachos and Papadimitriou (2015), which found a significant age effect on reading performance, with older kids scoring higher in reading fluency, reading comprehension, and overall reading performance than younger learners.

Equally, the survey results show that most of the respondents held a common stand regarding influence of learners' age on their ability to use vocabulary which is an aspect of reading skills. For instance, the findings of the study have established that a child under the age of 9 might face problems in expressive vocabulary skills. This was reflected by an average mean rating of 4.04 with a standard deviation of 0.64, where 17 (73.9%) of the parents of LWD agreed and 4 (17.4%) others strongly agreed that children under the age of 9 usually face problems in expressive vocabulary skills and only 1 (4.3%) of them refuted the claim that children under the age of 9 usually face problems in expressive vocabulary skills. This implies that age influence the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

Conversely, the results of the survey revealed that although many learners with dyslexia aged 8 to 9 years found it easier to memorize vocabulary definitions than younger children, this was not true in all the cases. This was confirmed by the point that even though a significant majority 18 (78.2%) of the parents indicated that older children were able to memorize vocabulary definitions than the younger children, some 2 (8.7%) of them did not agree that older learners were better than younger learners in the effective use of mnemonics to memorize vocabulary definitions. Likewise, 4 (17.4%) of the

respondents remained undecided on these matters. However, this item attracted a mean response rate of 3.91 (SD=0.90), suggesting that that older learners are indeed able to easily memorize vocabulary definitions than younger children. This is an indication that age has influence on the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD.

Similarly, the study sought to establish whether age has a bearing on how phonics instruction helps LWD to sound and to read new words, which is a key aspect of reading skills. It emerged from the results of the survey that phonics instruction helps 8–9-year-old children to sound and to effectively read new words. This was shown by a mean rating of 3.91 (SD=0.73) with an overwhelming majority 21 (91.3%) of the parents agreeing that phonics instruction helped their 8–9-year-old children to effectively sound and read new words. Only 1 (3.4%) of the surveyed parents rejected the claim that phonics instruction helped their 8–9-year-old children to sound and read new words, while another 1 (4.3%) of the parents was undecided on this matter. Nevertheless, it is clear from the results that most of the surveyed parents agreed that phonics instruction helped all their 8–9-year-old children to sound and to effectively read new words. This is a sign that age of the LWD influences the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of their reading ability.

On the flip flop, the findings of the study established that sometimes age may not matter. For instance, the survey data revealed that reading fluency improves reading comprehension for all grade three LWD irrespective of age. This was shown by an average mean rating of 4.17 with a standard deviation of 0.58, where 15 (65.2%) of the selected parents agreed and 6 (26.1%) others who strongly agreed that reading fluency improves reading comprehension for all ages of grade 3 level. In fact, none of the parents who took part in the survey held a differing opinion, except some 2 (8.7%) of them were not sure whether reading fluency improves reading comprehension for all ages of grade 3. This implies that age although age is important, it does not fully influence the effect of mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability among grade three LWD. Therefore, in as much as age may play an important role in reading skills, it is not a solitary determinant of reading ability among the primary school LWD.

On the contrary, the results of the survey show that majority of the learners aged 8-9 years prefer teacher provided mnemonics to their own created mnemonics. This was indicated

by a mean rating of 4.04 (SD=0.56), with 16 (69.6%) of the parents of the CWD who participated in the survey agreeing that their children have preference to teacher provided mnemonics over learner created mnemonics and 4 (17.4%) others strongly agreeing that their children in that age group prefer teacher provided mnemonics over learner-created ones. None of the parent respondents refuted the assertion that learners aged 8-9 years prefer teacher provided mnemonics to their own created mnemonics, but 3 (13.0%) of the respondents were not sure on what their children like.

On whether the children aged 8 to 9 years old were able to create mnemonics to memorize new information after receiving the two terms intervention, the results of the study established that majority of LWD in this age bracket were able to create mnemonics to memorize new information. This was confirmed by a mean rating of 4.00 (*SD*=0.60) and supported by more than four out of every five 19 (82.6%) of the parents of the dyslexic learners who were selected to participate in the study. These parents confirmed that their children in this age bracket were able to easily create mnemonics to memorize new information. In fact, an overwhelming majority 20 (87.0%) of the parents whose CWD were taken through intervention confirmed that their younger children find it easier to use these interventions than older ones in school. This response was translated to a mean rating of 3.87 (SD=0.76), suggesting that use of mnemonics reinforcement techniques has positively enhanced reading abilities among the learners with dyslexia aged 8 to 9 years old. Therefore, age of a learner is an important determinant in acquisition of reading ability among the primary school LWD.

What came out clearly from the results of the study is that although there are differences in the degree effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability based on ages of grade three LWD, the interventions enhanced the reading ability among all the LWD irrespective of age. This means that the dyslexic learners who were taken through mnemonic instruction and sub-lexical reinforcement intervention improved in their reading abilities better than their counterparts who went through traditional method of teaching irrespective of their age. This was shown by the fact that when the parents of the selected CWD who were taken through mnemonics reinforcement techniques intervention were asked whether their children had improved in their reading ability to recall what they learn, more than nine out of every ten 22 (91.3%) of the selected parents confirmed that their children had

improved in their reading abilities. This was translated to a mean rating of 3.96 with a standard deviation of 0.71, suggesting that use of mnemonic instruction and sub-lexical reinforcement intervention effectively enhance reading abilities among grade three LWD in primary schools.

5.7.3: Effect of Age on Effectiveness of Mnemonics Instruction in Enhancing of Reading Ability

This section sought to investigate whether age has influence on effectiveness of the mnemonic instruction reinforcement in enhancing of reading ability among the grade three LWD. Age was conceptualized to be the number of years a child who took part in the study had lived. Given the small sample size, twenty-three LWD in the intervention group were divided into two age subgroups (the younger, below 9 years and the older, 9 years and above). Hence, the study investigated whether there was a significant difference in reading ability scores for younger and older learners who received mnemonic instruction reinforcement.

The null hypothesis that, "*there is no statistically significant age influence on effectiveness of the mnemonic instruction reinforcement on enhancing of reading ability among the grade three LWD*" was tested. An independent-samples t-test was used to compare the mean score in overall reading ability, reading and comprehension of younger and older learners who were taken through mnemonics interventions. Effectiveness of mnemonic instruction reinforcement was conceptualized as the improvement overall reading ability, reading and comprehension acquired through mnemonic interventions. Table 14 gives the summary of findings on scores in improvement in overall reading ability, reading alone and comprehension among the grade three LWD given age after receiving mnemonic intervention.

Table 14: *Age differences on effectiveness of mnemonics interventions*

	Gender	N	Mean	Std. Deviation	Df	t	p-value	Effect size
Reading	Younger	15	15.8	8.29	21	2.303	.032	0.201
	Older	8	24.9	10.27				
Comprehension	Younger	15	2.3	1.44	21	2..	.029	0.207

	Older	8	3.6	1.06		3.442		
Overall Reading Skills	Younger	15	18.1	8.94	21	.454	.023	0.223
	Older	8	28.5	11.10				

Key: Younger – Below 9 Years; Older-9 Years and Above

The results in Table 14 revealed that generally older children in the intervention group had relatively higher improvement in performance in overall reading ability and its two components (reading and comprehension) than the younger children in same group. This was shown by the fact that while older learners improved by a mean of 28.5 with a standard deviation of 11.0, younger learners had improved only by mean of 18.1 with a standard deviation of 8.9 in overall reading ability. Equally, in both components of reading ability older learners had higher improvement scores than their younger counterparts. In reading, older learners had an improvement mean of 24.9 (SD=10.3) while younger learners only improved by a mean of 15.8 (SD=8.3). Similarly, in comprehension, while older learners had a mean improvement of 3.6 with a standard deviation of 1.1, their younger counterparts recorded an improvement of 2.3 (SD=1.4) only after being taken through the mnemonic intervention.

Further, the study determined whether the means in reading ability and their components are statistically different between the age groups. This was achieved through independent samples t-test under the hypothesis that there is no significant difference in age influence on effectiveness of the mnemonic instruction reinforcement in enhancing of reading ability and its individual components among the grade three LWD. The results of the independent samples t-test between younger and older LWD's reading showed that there was a statistically significant difference between the two age groups involved. Isolating reading alone as a component of reading ability, the score of older learners (M=24.9; SD=10.3) was significantly higher than that of younger learners (M=15.8; SD=8.3), t (21) = 2.303, p = .032. The magnitude of the differences in the means was fairly large (eta squared=.201), signifying substantial of difference means given age. This suggests that there is statistically significant difference in reading between younger and older

children among the grade three LWD after having been taken through mnemonic interventions. This suggests that there is a significant effect of age in reading performance, with the older learners having better scores for reading than younger ones. This means that mnemonic instruction reinforcement is more effective in enhancing reading among the older grade three LWD than their younger counterparts.

Equally, there was a significant difference in the comprehension scores between the younger learners (M= 2.3, SD= 1.4) and older learners (M=3.6; SD=1.1); t (21) = 2.344, p = .029 with an eta squared value of 0.207 implying a fairly large effect of age. This result suggests that age has sizeable effect on effectiveness of the mnemonic instruction reinforcement in enhancing of comprehension ability among the grade three LWD. Precisely, the results suggest that mnemonic instruction reinforcement enhances of comprehension ability more in older (9 years and above) LWD than younger (below 9 years) learners. This means that with regards to improvement in overall reading ability, the results of the study indicate that there was statistically significant difference in improvement in overall reading scores between younger and older learners. The overall reading ability scores of fifteen LWD (M = 18.1, SD = 8.94) aged below 9 years who received the mnemonic instruction compared to scores of the eight learners (M = 28.5; SD = 11.1) aged 9 years and above who also received the same instruction revealed that older learners had significantly higher scores than younger learners in overall reading ability, t (21) = 2.454, p = .023. The magnitude of the differences in the means was large (eta squared=.223), representing a considerable of difference in means given age. This suggests that there is significant difference in overall reading ability between younger and older learners who received the intervention. This result denotes that age of a learner influences effectiveness of the mnemonic instruction reinforcement in enhancing overall reading ability among the grade three LWD. The results confirm that mnemonic instruction is more effective in influencing enhancement of overall reading ability among older LWD than their younger counterparts. Therefore, it is established that age has significant effect on the influence of mnemonic instruction on overall reading ability among the grade three LWD.

Consequently, the null hypothesis was therefore rejected, and it was concluded that there is significant age influence on effectiveness of the mnemonic instruction on enhancing

of overall reading ability among the grade three LWD. The result has shown that when learners with dyslexia are taken through mnemonic instruction, older learners' overall reading ability improves more than their younger counterparts. Therefore, age has proved to play an important role in enhancing effectiveness of mnemonic instruction reinforcement on reading ability among the grade three LWD.

5.7.4: Influence of Age on Effectiveness of Sub-Lexic Instruction in Enhancing of Reading Ability

This study sought to establish the influence of age on effectiveness of the sub-lexical instruction reinforcement in enhancing of reading ability among the grade three LWD. Twenty-three LWD in the intervention group were divided into two age subgroups (the younger, below 9 years and the older, 9 years and above). Hence, the study investigated whether there was a significant difference in reading, comprehension and overall reading ability scores for younger and older learners who received sub-lexical instruction reinforcement.

The null hypothesis that, "*there is no statistically significant age influence on effectiveness of the sub-lexical instruction reinforcement on enhancing of reading ability among the grade three LWD*" was tested. An independent-samples t-test was used to compare the mean score in reading, comprehension and overall reading ability between younger and older learners who were taken through sub-lexical interventions. Effectiveness of sub-lexical instruction reinforcement was conceived as the rise in reading, comprehension and overall reading ability scores acquired after receiving mnemonic treatment. Table 15 gives the summary of findings on effectiveness of the mnemonic instruction reinforcement in enhancing of reading, comprehension, and overall reading ability among the grade three LWD given age.

Table 13: *Gender differences on effectiveness of sub-lexical interventions*

	Age	N	Mean	Std. Deviation	Df	t	p-value	Effect size
Reading	Younger	158	21.99	9.98	21	7.383	.000	0.722
	Older		56.99	12.30				
Comprehension	Younger	158	3.33	1.09	21	.561	.581	0.014
	Older		3.53	0.53				
Overall Reading Skills	Younger	158	25.32	10.46	21	7.223	.000	0.713
	Older		60.44	12.34				

Key: Younger – Below 9 Years; Older-9 Years and Above

The results in Table 15 reveal that, after receiving sub-lexical interventions, older learners largely had comparatively higher improvement in performance in overall reading ability and its component (reading and comprehension), than the younger learners. For instance, while learners aged 9 years and above improved by a mean of 60.4 with a standard deviation of 12.3 in overall reading ability scores after going through sub-lexical intervention, learners aged below 9 years only improved by mean of 25.2 (SD=10.5) in overall reading ability after receiving the same treatment.

Likewise, when the reading ability was disintegrated into individual components (reading and comprehension) older learners had higher improvement scores than their younger counterparts in each component. For example, in reading, older learners had an improvement mean of 56.9 (SD=12.3) while younger learners only improved by a mean of 21.9 (SD=9.9). Similarly, while older learners had a mean improvement of 3.5 with a standard deviation of 0.53 in comprehension, after being taken through the sub-lexical intervention, their younger counterparts recorded an improvement of 3.3 (SD=1.1) only upon receipt of the same treatment.

However, the study sought to establish whether the means in scores between the age groups are statistically different. This was done by use of independent samples t-test under the hypothesis that there is no significant difference in age on effectiveness of the sub-lexical instruction reinforcement on enhancing of reading ability and its components

among the grade three LWD. In this regard, the finding of the study indicates that when the two components of reading ability were disintegrated, there were mixed findings. Exploring reading alone as a component of reading ability, the improvement score of older learners (*M*=56.9; *SD*=12.3) was significantly higher than that of younger learners (*M*=21.9; *SD*=9.9), t (21) = 7.383, p = .000 < 0.001. The magnitude of the differences in the means very large (eta squared=.722), representing a very large difference in means given age, signifies existence of a significant effect of age on reading performance. This means that there is statistically significant difference in reading scores between younger and older children among grade three LWD who received sub-lexical treatment, with older learners having higher scores than younger learners. This means that sub-lexical instruction reinforcement more effectively enhances reading in older children than in younger children among the grade three LWD.

On the contrary, there was no significant difference in the comprehension scores for younger learners (*M*= 3.3, *SD*= 1.1) and older learners (*M*=3.5; *SD*=0.53); t (21) = .561, p = .581. This result was further corroborated by a very low magnitude of the differences in the means as signified by eta squared of .014. This result suggests that age have no significant effect on the use of sub-lexical intervention in enhancing of comprehension ability among the grade three LWD. This finding reveals that although there is difference in degree of influence of sub-lexical intervention in enhancing comprehension between older (9 years and above) and younger (below 9 years) learners, the difference was not statistically significant. This means that influence of sub-lexical instruction on enhancing comprehension among LWD in grade three is almost the same between the two age groups.

On the other hand, regarding improvement in overall reading ability, the results of the study indicate that there was statistically significant difference between younger and older improvement in overall reading scores. The overall reading ability scores of older dyslexic learners (M = 60.4, SD = 12.3) who received the sub-lexical instruction compared to scores of the younger learners (M = 25.2; SD = 10.5) who received similar treatment indicate that older learners had significantly higher scores than younger learners in overall reading ability, t (21) = 7.223, p = .000 < .001. The magnitude of the differences in the means was quite large (eta squared=.703), representing a considerable of difference in means given age. This suggests that there is a statistically significant difference in overall reading ability between younger and older learners who received the

intervention, implying that age of a learner influences effectiveness of the sub-lexical instruction in enhancing overall reading ability among the grade three LWD. Subsequently, the null hypothesis was therefore rejected, and it was concluded that there is significant age influence on effectiveness of the sub-lexical instruction on enhancing of overall reading ability among the grade three LWD. The result has shown that when LWD are taken through sub-lexical, older learners' overall reading ability improves more than their younger counterparts.

Overall, age was found to influence effectiveness of the sub-lexical instruction reinforcement on enhancing of reading alone and overall reading ability but not comprehension among the grade three LWD. Sub-lexical instruction is more effective in influencing enhancement of reading alone and overall reading ability in older LWD than their younger counterparts.

5.8: Conclusion of the Chapter

This chapter presented the quantitative results on the bases of the research questions of the study and existing literature review. The hypotheses have been tested, compared, and contrasted with existing literature and the conclusions made. The next chapter presents the qualitative results of the study.

CHAPTER SIX

6.0: QUALITATIVE RESULTS

This chapter presents the qualitative results of semi-structured interview data obtained from three teachers, six parents, one deputy principal and the principal in the school that participated in the intervention of the research. The qualitative data from interviews was transcribed and examined using a process of identifying patterns or themes within qualitative data known as thematic framework. The themes obtained from the analysed data was in response to the effectiveness of mnemonic and sub-lexic reinforcement techniques to enhance the ability to decode written letters and words into their associated phonetic code among grade three LWD in government schools that enrol learners from age 5 in Mpumalanga Province. The study further analysed age and gender differences in the two interventions. The qualitative results are presented as follows:

6.2: Qualitative results on effectiveness of sub-lexic intervention technique in enhancement of reading abilities among Grade three LWD

The research examined the effectiveness of sub-lexic intervention technique in the improvement of the ability to decode written letters and words into their associated phonetic codes among Grade three LWD. Phonemic awareness is the ability to hear, identify, and manipulate sounds in spoken words (Milankov, et al., 2021). In the current study, the sub-lexic reinforcement technique as an intervention among learners, involved alphabet letter sounds and introduced phonemes, which are the smallest meaningful unit of sound by which one can differentiate one word from another. Before this intervention was implemented, a pre-test on reading that had been administered to the 23 Grade three learners indicated that all of them could not read the eighty words that were to be read by the learners as an end of term reading test. Moreover, in this intervention, students were able to read the eighty words in a minute, yet the words were challenging to them.

The qualitative findings of the study revealed that after the intervention, 19 out of 23 (83%) of the learners have improved in reading and have developed interest with schoolwork. The results also showed that there was general improvement among learners who were receiving intervention. Most of the learners could read three-letter words and could attempt to read bigger or longer words without assistance. Participants' interviews revealed that most of learners improved due to the use of the two teaching strategies, mnemonic and sub-lexic techniques. The results indicated that the themes that emerged

from the enhancement of reading through sub-lexic technique were increased word recognition, improved punctuality among learners, increased enthusiasm, increased development of attentive skills, increased spelling and word-building skills, improved performance in other subjects, increased development of phonemic skills, increased competency to read complex sentences and increased independent reading initiatives. The subject of talk/themes are given out and discussed as follows:

6.2.1 Theme 1: *Increased word recognition*

According to Snel et al. (2016), word recognition is the process of turning a string of letters into sounds to identify a word. One of the aspects of competence in reading ability among learners is to be able to recognize words, and this was reported in this study because of the intervention. Therefore, one of the skills that learners with dyslexia in grade three need to be cognisant of, include the awareness and ability to work with sounds in spoken language or the capacity to detect, exploit and analyse the auditory aspects of the language produced by articulate sounds or manual gestures including the ability to distinguish or segment words, syllables, and phonemes independent of their meanings (Snel, et al., 2016).

The qualitative results reported that there was remarkable improvement in word recognition among Grade three LWD. The qualitative results indicate that 19 out of 23 Grade three LWD developed word recognition because of exposure to the sub-lexic technique intervention in the experimental school. The interview excerpts from the teacher participants regarding improvement in word recognition among Grade three LWD include: "*Generally, most learners have improved. Some are now able to read words on their own* (Teacher, 1). Another teacher reported that: *''Most of the learners have generally improved in reading and have now developed interest with schoolwork*"

(Teacher 2). Two other teacher participants 3, and 4 also reported that: "*Most learners have developed word recognition. They know alphabet letter sounds and can now make at least three -letter words using syllables. There is general improvement among learners who were receiving intervention*" (Teacher, 3). Teacher 4 also reported that: "*I am happy with the help you rendered to the learners in my class. The learners can attack words now.*"

In addition, the findings from interview with deputy principal and principal also reported that most Grade three learners have recorded improvement in the word recognition. The

interview excerpt from the deputy principal is reported as follows: "*They are now able to pick up sounds… When you dictate or do spelling tests, I see improvement*". Moreover, the interview excerpt from the principal on word recognition indicated that:

"*As much as I discussed with the English teachers of grade three learners, I gathered that the selected twenty-three learners who participated in the intervention, have improved quite tremendously in reading. The learners can now read three-letter words and they can also attempt bigger words without assistance*".

Moreover, the qualitative findings from parents whose CWD participated in this intervention also agreed that sub-lexic technique intervention was effective in enhancing the word recognition among Grade three learners. The interview excerpts from the parents are reported as follows:

"He is just beginning to grasp phonics. Teaching using sounds has enabled my child to read three-letter words. Before the intervention, he did not know how to read but now due to practice, he can read letter sounds and syllables." (Parent, 1)

The qualitative results from parents 2, 3, 4, 5 and 6 on the improved word recognition among LWD after the intervention reported that: "*She can read letter sounds and three-letter words. She can read short words like boy, girl, mother, sister, house, fish, tin, book, and so on*" (Parent, 2). Another parent reported that: *"He can now read using phonics. He even teaches other children how to read*" (Parent, 3). Yet another parent participant, parent 4 reported that: "*He can read short words using sounds. Even when you give him a new word, he will try to read it on his own*". Another parent also reported that: "*He can read simple words independently but the big ones he can only read with assistance*" (Parent, 5). Moreover, results on word recognition for parent 6 were reported as follows: "*She has just begun to identify how to read using sounds*".

From the interview excerpts above, it is evident that improvement in word recognition was realized after the implementation of the sub-lexic intervention technique among Grade three LWD in the experimental group. The intervention acted as a positive reinforcement as it enhanced reading skills in learners from reading simple letters to more complex words. The implication of this finding is that, from early years, learners should have phonological awareness skills for them to be able to segment and blend words and automatically be able to read. This means that teachers should put more emphasis on practices, skills and interventions that would enhance word recognition among learners

in the early years of education. The next theme discussed is increased punctuality among learners.

6.2.2 Theme 2: *Improved punctuality among learners*

Punctuality can be considered as the fact of doing something in an appointed period (Thierry, 2018). Oporto (2018) argues that punctuality is the characteristic of being able to complete a required task or fulfil an obligation before or at a previously designated time. Punctuality is a sign of dependability, professionalism, reliability, trustworthiness and when a person is punctual, they display respect for people and time. In the present study, punctuality can be regarded as Grade three LWD reporting or coming to school in time. The qualitative results of the study indicated that before the intervention, some of the Grade three LWD used to arrive late for school, but they later changed their pattern to be punctual in school, after the intervention. Moreover, when the Grade three LWD would have an intervention English period in the afternoon, they would still come to the library early in the morning. Given the short period of intervention, it worked for the good of the grade three LWD to come earlier and do extra work before lessons started.

From the qualitative findings obtained from interviews, 6 of the 12 participants reported that the intervention led to increased punctuality among Grade three LWD. Here are some of the excerpts from the teachers on the theme of increased punctuality: One of the teacher participants, teacher 1 reported that: "*She used to come late, but now she comes early*". In addition, teacher 2, reported that: "*Most grade three learners in the intervention class now come to school early because they do reading, as morning work*". Teacher 3 also reported that: "*Most of the learners have improved in terms of punctuality. They now come early to school unlike before*". Furthermore, teacher 4 reported that: "*I arrive at around 0645 but most grade three learners in the intervention group would have arrived already*".

Moreover, the interview results obtained from deputy principal, and principal also concurred that the intervention has led to increased punctuality to school among Grade three LWD. The interview excerpts regarding this theme are presented as follows: The deputy principal reported that: "*Most of the grade three learners, especially those in the intervention class, now arrive very early at school*". Similarly, the principal reported that: "*Before the intervention, most of the learners used to absent themselves from school and used to arrive late at school*".

From the interview results above, it is evident that most of the Grade three LWD improved in terms of punctuality during and after the reading intervention. The researcher argues that the increased punctuality among Grade three LWD could have been attributed to increased interest that they obtained from the intervention which made them to have more interest in schoolwork. In addition, the feeling of accomplishment (of being able to read words) that most of the grade three LWD achieved, made them desire to come early to school to learn and achieve more. Furthermore, grade three LWD's punctuality might have increased due to the way the researcher strengthened the behaviour and encouraged the learners to keep coming early to do morning work, given the short period of time that was available for the intervention. The next theme discussed is increased enthusiasm.

6.2.3 Theme 3: *Increased enthusiasm*

Enthusiasm is defined as the effective experiences of enjoyment, excitement, and pleasure together with their expressive behaviours that are occurring and manifesting such experiences (Song, 2022). An individual with enthusiastic attitude is also regarded as having passionate interest, eagerness to do something, lively and ardent. From the findings of the present study, most of the Grade three LWD who participated in the intervention have developed increased enthusiasm in their work at school. Moreover, enthusiasm was evident among the learners because they showed effort in attending extra lessons. In addition, in the intervention group or class, the small pieces of cards on letter sounds used to make words, reading cards and charts attracted the Grade three LWD to come and lay their hands on them. The interview results from participants on increased enthusiasm among Grade three LWD are reported as follows: One teacher reported that: "*He now shows interest in schoolwork*" (Teacher 1). Similarly, another teacher reported that: "*He has developed interest in reading and writing*" (Teacher 2). Two teacher participants, 3 and 4 also agreed that: "*He has developed listening skills and interest to read*" (Teacher, 3). Teacher 4 reported that: "*When you come to fetch them (for intervention), they stand up, ready to go, before you even enter the classroom*".

The findings from the deputy principal and principal also reported that the Grade three LWD were enthusiastic after the intervention. Their interview excerpts are reported as follows: The deputy principal reported that: "*They have interest now*", while the principal, reported that "*The learners now like school*". In agreement, the parents of the Grade three LWD who participated in the intervention also reported that there was

increased enthusiasm in learners. The interview excerpts from parents 1, 3, 4, 5 and 6 are reported as follows: "*He likes the way you teach*" (Parent, 1). While parent 3 reported that: "*He can now read and really enjoys doing his homework*". Parent 4 reported that: "*He enjoys reading and writing. He enjoys learning at the library*". Similarly, parent 5 reported that: "*He sometimes does role playing with friends where he will be the teacher. He will be teaching them how to read*", and parent 6 also that: "*She can write spellings now and can sound letters until she is able to read a whole word*".

From the interview results above, it is evident that most Grade three LWD who were in the intervention group developed enthusiasm with schoolwork in general and reading, in particular. Therefore, it can be concluded that the sub-lexic intervention technique enhanced reinforced learning styles among Grade three LWD and this led to increased motivation and desire to learn. Therefore, the researcher argues that the intervention caused increased enthusiasm due to sense of pride, accomplishment, and excitement from being able to now read from scratch, all resulting to reinforcement of reading abilities among learners. The next theme discussed is theme 4, increased development of attentive skills.

6.2.4 Theme 4: *Increased development of attentive skills*

Attention is the intentional act of focusing attention on a particular source of auditory information in a specific multi-modal setting and it is crucial for linguistic, cognitive, and social development (Sahlen, et al., 2020). According to Gulec and Durmus (2015), paying attention is the ability to fully understand a message which a speaking or a loudly reading person desires to give. In the present study, paying attention is the ability of grade three learners with dyslexia to fully understand instructions from the teacher, given that LWD find understanding of messages when a person speaks or reads, difficult. The qualitative results of the study indicated that learners who participated in the intervention have increased development of their attentive skills, which could be attributed to the variety of interesting reading activities provided during the intervention. During intervention lessons, the learners would pay attention to the different activities happening, so that they understand every instruction being given. It is widely known that LWD have a very short attention span, but because of the various activities offered, the said learners would give their time to pay attention to what would be taking place in the classroom, from reading letter sounds, segmenting and blending words, to making words using given sounds on cards.

Interview results from seven participants on the increased development of attentive skills of learners are reported as follows: *"He has developed oral skills."* (Teacher, 1). Still on increased development of attentive skills, teacher 2 reported that: *"She has developed her attentive skills."* Another teacher also reported that: *"Learner 1 has developed attentive skills and interest to read*." (Teacher 3). Similarly, teacher 4 reported that: *"They listen attentively."*

In addition, results from deputy principal, principal and one parent also indicated that learners who were involved in the intervention displayed signs of improved attentive skills. For example, the deputy principal reported that: *"They also developed attentive skills."* Moreover, the principal also reported that: "*They can identify letters of the alphabet, segment and blend."* In agreement, one parent, parent 3, also reported that: *"Even when he is viewing television, he listens carefully and sometimes tries to read text coming up on television."*

From the results above, it is evident that most Grade three LWD in the intervention group, developed attentive skills and this could be due to reinforcement of the tasks learnt. This resonates with (Fletcher & Grigorenko 2017, p 930), who highlight that implications for practice indicate a need to move neuropsychological assessment away from a primary focus on systematic, comprehensive assessment of cognitive skills toward more targeted performance–based assessments of academic achievement, comorbid conditions, and intervention response that led directly to evidence-based treatment plans. The next theme is increased spelling and word-building skills.

6.2.5 Theme 5: *Increased spelling and word-building skills*

Spelling is a complex written language skill, which requires a learner to possess several language abilities, including phonological, morphological, visual memory skills, semantic relationships as well as adequate knowledge of spelling rules (DaCosta & Arias, 2021). Picture-word method is a simple activity that is great for consolidating children's visual recognition skills, and developing vocabulary recognition and spelling, particularly of vowels and consonants. This activity enables learners to remember words when they see pictures, thereby match them with the pictures. From the qualitative findings of the study, four participants, teachers 2,3,4 and the Deputy Principal revealed that the picture -word matching enhanced learners' reading ability, visual recognition,

spelling, word- making, sentence -making and dictation. The interview excerpts from the participants are reported as follows:

Teacher 2 reported that: *"The picture -sound and picture-word method helped the learners a lot during the intervention period."* In addition, teacher 3, reported that: *"Learner 5 has mastered sounds from the intervention they attained from the researcher, including picture- sound /word matching."* Teacher 4 also reported that: *"Learners benefitted from picture-word matching."* Similarly, the deputy principal reported that: *"They even read next to the objects, for an example: This is a girl. They learnt it when you were doing picture-word matching."*

From the interview excerpts above, it can be argued that some learners benefitted from the picture-sound and the picture-word method, and this made them to have improved in spelling and dictation. Therefore, the researcher argues that the use of pictures and words or sentences enhances recall of content, and this makes learners to retain lesson content. Thus, it can be concluded that the increased development of spelling and word-building skills could also have been enhanced by the variety of flash cards and sentence strips that were available for all the 23 learners in the intervention group. Furthermore, working on the activities (spelling, dictation, and word- building) on a regular basis, cultivated a reading culture among the learners in the intervention, hence the increased development of spelling and word-building skills. The next sub-theme is improved performance in other subjects.

6.2.6 Theme 6: *Improved performance in other subjects*

The qualitative results of this study also revealed that several learners who participated in the intervention programme have improved, not only in English, but also in other subjects like XiTsonga and Mathematics. As a result, when learners became aware of how to make words in English, they would use the same method to make words in their local language. The results indicated that the improved reading ability after the intervention made learners to do better in other subjects as well. The interview excerpts from participants on improved performance in other subjects are reported as follows: Teacher 1, 2, 3 and the principal shared the same sentiments, and teacher 1 reported that: *"Learner 3 has improved tremendously in reading, not only in English but also in other areas like the mother language, XiTsonga".* Similarly, teacher 2 went on to report that: *"So, he has improved in both languages (English and XiTsonga).*" while teacher 3

reported that: "*Interestingly, now she has also improved in XiTsonga."* In the same vein, teacher 4 pointed out that: "*There is a big difference between the learners you worked with and the rest of the grade three learners.* Similarly, the deputy principal reported that: *"They are now able to pick up word sounds."* In addition, the principal concurred that: "*Some of the learners' reading abilities have not only improved in English, but also in the local language, XiTsonga as well as in Mathematics."*

From the qualitative results above, it is evident that increased reading ability among learners with dyslexia, after the intervention made learners to be able to transfer the skills in other subjects and hence record improved performance in them. Therefore, it can be deduced that some learners improved not only in English but also in the local language as well as in Mathematics. The researcher argues that the grade three LWD improvement in English as well as in other subjects could be attributed to the idea that languages intertwine and, once one has mastered one of the languages, first or second language, it becomes easier for them to cope with the other language due to use of consonants and vowels. Therefore, the grade three LWD's confidence was boosted after the intervention, as a result they could easily manipulate learning styles across different subjects, hence the improved performance in other subjects. The next theme is increased development of phonemic skills.

6.2.7 Theme 7: *Increased development of phonemic skills*

Phonological skills refer to the ability to identify, process, and manipulate phonological units that compose spoken words of different complexity and size (Milankov, et al., 2021). It includes the understanding of different ways that the words in our spoken language can be broken into their various components which can be then manipulated. Phonological awareness has been pointed out as one of the most significant predictors of success in the process of learning to read (Verissimo, et al., 2021). In the present study, phonemic awareness is the ability of the grade three LWD in the intervention to recognize and make three-letter words using alphabet letter sounds. The qualitative results revealed that, most LWD's phonemic skills developed tremendously from the way they manipulated the symbol/sound relationship. Moreover, most learners in the intervention developed the knowledge of three-letter phonemes, and they could also attempt bigger and longer words independently.

Qualitative results from teacher participants (Teacher 1, 2 and 3) revealed that: *"Generally, most learners have improved. Some are now able to read words on their own."* (Teacher1). At the same time, teacher 2 reported that: *"Most of the learners have generally improved in reading and have now developed interest with schoolwork."* Moreover teacher 3 agreed that: *"Most learners have developed word recognition. They know alphabet letter sounds and can now make at least three -letter words using syllables. There is general improvement among learners who were receiving intervention."*

In agreement, the principal also reported that:

"As much as I discussed with the English teachers of grade three learners, I gathered that the selected twenty-three learners who participated in the intervention, have improved quite tremendously in reading. The learners can now read three-letter words and they can also attempt bigger words without assistance."

Furthermore, and again in agreement with teacher participants, parent participants' interview results revealed that:

"He is just beginning to grasp phonics. Teaching using sounds has made it easier for my child to at least read three-letter words. Before the intervention, he did not know anything in terms of reading but now due to practice, he can read letter sounds and syllables." (Parent 1)

Moreover, other parent participants reported the following: On one hand, parent 2 reported that: "*She can now read letter sounds and three-letter words. She can now read short words like boy, girl, mother, sister, house, fish, tin, book, and so on.*" Similarly, parent 3 reported that: "*He can now read using phonics. He even teaches other children how to read*." Moreover, parent 4 reported that: "*He can read short words using sounds. Even when you give him a new word, he will try to read it on his own."* Parent 5 also reported that: *"He can read simple words independently but the big ones, he can only read with assistance."* Finally, parent 6 also reported that: *"She has just begun to identify how to read using sounds*."

From the qualitative results presented above, it can be argued that learners' reading has improved due to the knowledge of phonemes they acquired during intervention because they could now read three-letter words. It can also be concluded that the improvement in the development of phonemic skills made by the different grade three LWD after the

intervention could be due to the researcher's insight as to beginning to instruct the learners from grassroots or from known to unknown and this led to tremendous improvement among the learners.

6.2.8 Theme 8: *Increased competence to read complex sentences*

A simple sentence can be said to be a basic unit of communication that makes sense whereas complex sentences are normally long. The qualitative results of the present study revealed that the sub-lexic method enabled many LWD to learn phonics and to segment and blend, then join letters to make words as well as to construct complex sentences. The findings of the study also indicated that most of the learners have mastered letter sounds and can now make simple words without assistance. For example, teacher participants (teacher 1, 2 and 3) agreed that the grade three LWD who were in the intervention improved in terms of being able to make simple and novel words. The following excerpts revealed that: *"Learner 7 has mastered letter sounds and can now make words both in the mother language (XiTsonga) and in English".* (Teacher1). Moreover, teacher 2 reported that: *"When learners drew pictures and wrote the words, it made them remember the words."* Similarly, teacher 3 reported that: *"She can make words, especially the simple ones."*

Teacher 4 also agreed with other participants and added:

"*In January, the learners could not read even a single letter, sight words or vocabulary words but now they can read a good number of words. The learners would then join the words to formulate sentences and they start from simple to complex. With the sound method, learners know that everything starts from segmenting and blending, then from there they join the letters to make words and finally join words to construct sentences*."

From the interview results above, it is evident that the grade three LWD who were in the intervention had their reading abilities enhanced from the sub-lexic reinforcement technique. The following excerpts revealed what the two participants (the deputy principal and the principal) reported that: *"When you start from the foundation, from simple to complex, from known to unknown, the learners will understand."* (Deputy Principal). The principal also agreed that: *"Moreover, when they learn phonics, they find it useful because when they read, spell, or make words, they find it easier to follow."*

The following excerpts clearly reveal these unanimous views from parent participants. Parent 1 reported that: "*Teaching using sounds has made it easier for my child to at least read three-letter words and short sentences."* Parent 2 also reported that*: "Sounds helped her because she can read several words now without assistance."* Similarly, parent 3 reported that: *If he is given a story book, he can read simple words and sentences."* In agreement, parent 4 reported that: *"Sometimes he uses sounds to read but fails to attack the whole word but finally, with our help, he will manage to read the words."* Moreover, parent 5 also reported that: *"Now if you ask him to read any word, he uses sounds to attack the word and to read sentences."*, then finally, parent 6 also reported that: *"She can write spellings now and can sound letters until she is able to read whole words and sentences".*

From the interview excerpts above, it is evident that the grade three learners with dyslexia's increased competence to read complex sentences improved due to the constant reading practice they had during the intervention using flash cards and sentence strips. Moreover, word-building using segmenting and blending enabled them to read longer sentences as they would slowly read word by word until they managed the whole sentences. The next theme is increased independent reading initiatives.

6.2.9: Theme 9: *Increased independent reading initiatives*

Learning to read is a key objective of early education and difficulties in learning to read can have serious adverse consequences (Hulme & Snowling 2015). The qualitative results of the study indicated that there has been great improvement in independent reading of grade three LWD using the sub-lexic technique. From the findings of the present study, all the participants, both teachers and parents acknowledged that learners in the intervention group benefitted from the intervention. They agreed that the sub-lexic technique as an intervention enabled the learners to be able to read at least three-letter words while some managed to read sentences or short stories from library books.

Three teacher participants (teacher 1, 2 and 3) reported on learner improvement in line with independent reading initiatives. Teacher 1 reported that: *"Generally, most learners have improved. Some are now able to read words and simple sentences on their own*." In agreement, teacher 2 reported that: "*Most of the learners have generally improved in reading. They can now read short story books."* In addition, teacher 3 reported that:

"*Most learners now know alphabet letter sounds and they can make three-letter words. Those who have been receiving intervention can now read short sentences and stories independently."*

The deputy principal and the principal, also in agreement with other teacher participants, revealed that the grade three LWD who received intervention, improved tremendously in reading. The deputy principal reported that:

"*Amongst the learners, I have realized their hidden talents after this intervention. Even in terms of handwriting, at first the learners were mixing, but now they are capable to write and read. They are now able to pick up word sounds. They also developed listening skills. When you dictate or do spelling tests, I see improvement. Those who were shy, have improved."*

Parent participants also reported their views on the performance of their children. Five parents (parent 2,3,4,5 and 6) agreed that their children had improved in reading from the intervention they received. Among the six parents interviewed, five of them (Parent 2,3,4,5 and 6), reported that the LWD had reported improvement after the intervention: Parent 2 reported that: *She has improved a bit this year. She can read letter sounds, three letter words and short sentences."* (Parent 2). In agreement, parent 3 reported that: "*He can now read independently, starting from around March when you started the intervention. He enjoys reading. Even when he is watching television, he listens carefully and sometimes tries to read the text coming up on the television."* In addition, parent 4 also reported that:

"*The boy can read some words, especially short ones. He now enjoys reading and writing on his own."*

Moreover, parent 5 also reported that*: "He can read simple words and sentences independently. He can read using sounds and memory techniques that you teach them at the library."* Finally, another parent reported that: *"She has just begun to identify how to read using sounds. From grade one and two, she was unable to read. It was only around March when she started to read short words and now, she has improved a lot as she can read short stories independently."* (Parent 6).

From the above interview excerpts, it is evident that the intervention enhanced the ability to spell and write short sentences during dictation, of which after one manages to spell, they subsequently learn how to read. Therefore, the learners in the intervention might have developed interest in reading short words because shorter words are better learned than longer words and reading books of their own choice meant that they would encourage themselves to read independently.

6.3: Qualitative results on effectiveness of mnemonic reinforcement intervention in enhancement of reading abilities among Grade three LWD

The study also examined the effectiveness of mnemonic reinforcement intervention in enhancement of decoding, fluency, vocabulary, and understanding sentences among Grade three learners with a learning disorder characterised by difficulty reading. The descriptive and conceptual findings collected through questionnaires, interviews, or observation indicated that the mnemonic reinforcement strategy adopted as the second intervention was successful in increasing the capacity to read, comprehend, interpret, and decode written language and texts among LWD in different ways. The themes which emerged on the effectiveness of mnemonic reinforcement intervention include increased recall of content taught, positive behaviour change in learners, increased motivation to attend school, improvement in reading of complex words, enhanced self-esteem of learners and increased retention of learnt content. The themes are discussed below.

6.3.1 Theme 1: *Increased recall of content taught.*

Memory recall is a system that senses, organizes, stores, and retrieves information (Gonzales, 2020). In other words, recalling refers to remembering information or events previously stored in the brain, or recalling something that was previously seen or experienced. Information collected from text, audio and images indicated that the mnemonic intervention enhanced recall of content taught among LWD. Improvement in performance of grade three LWD and increase in recall of content was recognised after intervention, indicating that participants had acquired associations between phonemic awareness and recalling of lesson content due to use of the mnemonic techniques. In addition, recognition of letter-sounds, three-letter-words, longer words as well as sentences, and recall performance was better after intervention, confirming that participants remembered some words and sentences over time. Among the participants,

both teachers and parents reported that the learners in the intervention improved in terms of recalling words from use of picture-sound/word matching, recalling words from audio -visual aids like charts and sentence strips, recalling words, weekdays and months of the year using memory rhymes and recalling sight and vocabulary words. Furthermore, the learners in the intervention group improved in spelling and dictation as well as enhancement of reading ability in general.

The following interview excerpts from teacher and parent participants reflect what transpired during the intervention, using memory techniques under the theme, recalling content taught. Teacher 1 had this to say, "*Learner 7 has mastered letter sounds and can now make words both in the mother language (XiTsonga) and in English. He has improved*." In agreement, Teacher 2 said,

"When learners drew pictures and wrote words, it made them remember the words. The picture-sound, picture-word and word-to-word matching (words on flashcards and words on chalkboard) also helped the learners to remember the words they would have learnt. Learners would not forget the words that they would have read, especially now that they kept on seeing the pictures. One other thing is that when they were learning using picture-word method, they would see and recognize the word for a long time (as they continue to see the pictures and the words every day). As a result, they would not forget the words anymore."

In concurrence, another teacher reported that:

"The use of music in teaching learners helps to make them understand easily and it improves learners' listening skills. When learners sing songs, they can catch up something. They remember what they are taught, and master sounds and words. The learners benefit through singing, and they will remember what they have learnt. When they recite days of the week, they would want to know how to write weekdays: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, theoretically. When learners wrote dictation, they would not forget the sounds, the words as well as sentences as these would stick in their minds (Teacher 3)

Moreover, the deputy principal also agreed that selected grade three LWD recalled content taught because of use of music mnemonics that was implemented in the intervention. The interview excerpt from the deputy principal is presented as follows:

"Memory strategies really work! Learners can remember what they have learnt and would also be able to spell the words. The song that you taught learners: Hey diddle, diddle, the cat and the fiddle, learners sang it and then you introduced those words for each week, "sibling, brother, sister, young, older, youngest….", they will never forget the song and the words. They will remember the words relating to their siblings. The 23 learners whom you were working with have improved a lot. Memory strategies do help in that when the learners learn a song or rhyme, then use it to learn to recite words, they would not forget what they have learnt. The learners' language also develops. Vocabulary words learnt would be stored in their "word bank".

In addition, the principal also reported that the mnemonic intervention is effective and the interview excerpt on this is reported as follows:

"Learners find memory techniques helpful in that once they learn a concept, some words, or sentences, they will not forget. Music mnemonics are very interesting as they keep learners active and make them remember all that they have learnt. Once someone practices and masters a piece of music, rhyme, or poem, they will remember it for the rest of their lives. At the same time, they will remember words and sentences that they would have learnt. They can remember days of the week and a variety of words that they would have learnt using music mnemonics. When asked to read words that they did like sibling, brother, sister, young, older, youngest, oldest, annoyed, furious, anger, and so on, they begin by singing the song "Hey diddle, diddle,". After that they sing the words along. As such, they can identify the words and are able to spell and write the words learnt. When asked to read words that they did using music mnemonics during the intervention period, most of the learners could now read without assistance. They all still remembered the songs as well as words that they learnt during intervention."

From the qualitative results obtained from the teachers, deputy principal and the principal, it is evident that the use of music mnemonics, in the form of rhymes, poems and songs, increased learners with dyslexia's recognition and mastering of words for a long time. Moreover, music mnemonics, through recitation and use of audio-visual aids, enhanced learners' ability to spell, read and write words as well as independent reading. Furthermore, learners in the intervention group's morale were boosted, and music mnemonics kept them active and eager to learn.

Similarly, parent participants 1, 3, 4, 5 and 6 also agreed that their grade three LWD managed to recall content taught through use of music mnemonics. For example, parent 1 said,

"If you ask him about the song and the words after some time, he still remembers. Sometimes you hear him teaching his sister the song (Hey diddle, diddle). Although some of the words are not audible enough, he likes to sing and recite words. He will remember the songs for a long time or for life."

Furthermore, parent 3 had this to say,

"*He can read some words today, the next time he reads, he still remembers. He can memorise new information using songs they learnt at the library during intervention. He can use different songs and rhymes that they learnt during intervention to recite new words."*

In addition, parents 4, 5 and 6 reported positively on their children. Parent 4 said that:
"*He is now able to memorize some words you taught them. He can sing the song, "Hey diddle, diddle, the cat and the fiddle…." then later recite words, "sibling, brother, sister, young, older, youngest..." If you then ask him to read words on the cards, he can read some of the words".*

In addition, parent 5 said that: *"Using mnemonics has greatly improved my son's reading ability. When he sings the song, you taught them and then recite the words, "sibling, brother, sister", it makes him remember what he has learnt.* "Furthermore, parent 6 reported that: *"Use of mnemonics has helped my child to improve her reading ability. When she sings a song followed by words, it makes her to be able to read and remember both the song and words for the rest of her life."*

From the interview excerpts, it is evident that memory techniques enable LWD to access their memory on what was taught previously. Moreover, music mnemonics help learners encode and retrieve information in the long-term memory, hence all content taught would be recovered. The next theme is positive behaviour change among learners.

6.3.2. Theme 2: *Positive Behavior Change*

Behaviour change was reported as one of the major positive effects of the mnemonic reinforcement technique among LWD. The qualitative results indicated that some LWD changed their behaviour for the better after the intervention. For example, some LWD who initially used to absent themselves from school in most cases changed and attended school regularly. The findings also revealed that another learner who was initially discovered to be involved in theft cases changed and was now very honest. From the qualitative results, some teacher participants gave their views on what was taking place in terms of positive behaviour change among the 23 learners receiving intervention, as reflected in the following excerpts: Teacher 1 said that *"She used to come late, but now she arrives early. No more absenteeism."*

In agreement, teacher 2 said that:

"Beginning of year, Learner 1 was stealing from teachers' cars. At one time, he stole sanitizer from the lady teachers' toilet. His mother reported him, and we counselled him. Now he has stopped stealing. He is becoming a good boy may be because he can now read. He has developed interest in reading and writing. He can make words on his own."

The deputy principal also agreed and said that *"Those who were shy, have improved. They have developed self-confidence and self-esteem. They now have interest in school."*

In addition, the principal said that:

"*The learners now like school. Before the intervention, most of the learners used to absent themselves from school and used to arrive late at school. Presently, they enjoy learning. Their self-esteem has developed. Those who used to sit at the back, now enjoy sitting in front because they no longer fear being nominated to participate. They are no longer shy to participate. It was reported by one of the teachers that there was a learner who used to steal from teacher's cars but now the said learner no longer does such a thing. The learner has changed for the better. He can now read several words. His self-esteem has developed and now prefers to sit in front because he is no longer shy."*

From the interview excerpts, it is evident that positive behaviour changes among some of the learners who were in the intervention group were due to the improvement they had acquired from the intervention.

Similarly, parent participants agreed that there was behaviour change among grade three learners who were in the intervention group. Parent 1 and parent 2 had the same sentiments in terms of behaviour change of their children. Parent 1 said that "*At home he sometimes talks about you. He enjoys singing and reciting words. It has made him improve a bit and he now enjoys going to school."* while parent 2 said that "*Before the intervention, she could not read even letter sounds. She has improved even in terms of being able to answer questions orally and as written work."* Parent 3 said that:

"The boy is slowly changing for the better. He used to steal from peers, teachers, at school and even from us here at home. Once you left cash in the open, you would not find it again. His grandmother keeps her wardrobe keys on her because she is afraid that the boy will steal money. These days, he is changing. He still steals but not as much as before. He was like possessed with a demon. He has changed.

Lastly, parent 6 reported that:

"She has just begun to identify how to read using sounds. From grade one and grade two, she was not able to read. It was only around March when she started to read short words and now, she has improved a lot. She promises to improve if she keeps on practising. She now accepts help from her brother when doing homework.

From the interview excerpts above, it is evident that there was general positive behaviour change among most of the grade three learners who were in the intervention group. From the results, it is evident that after the intervention, negative behaviour among LWD such as absenteeism, coming late to school, shyness, and theft, to regular attendance, being punctual, development of self- esteem and being innocent, respectively. The next theme is increased motivation to attend school.

6.3.3 Theme 3. *Increased motivation to attend school*

Attendance is the action or state of going regularly to or being present at a place or event. The information collected from text, audio and images results indicated that the

mnemonic intervention also resulted in increased motivation to attend school among LWD. The participants argued that increased motivation to attend school could have been due to the use of mnemonics as an intervention. The interview excerpts from teacher 1, teacher 2 and the principal reported on increased motivation to attend school by learners. For example, the interview excerpt from one teacher reported that "*Most of them now come to school regularly and early*" (Teacher 2). In addition, the principal reported that "*Before intervention, most of the learners used to absent themselves from school and used to arrive late at school. Presently, they enjoy learning*." Moreover, another teacher, teacher 1, also agreed and reported about different learners in her class who also attended the intervention class that:

"She now enjoys reading and comes to school clean and presentable, He now knows all the sounds and his punctuality has improved." She also said*, "He used to come late to school but now he comes early to read sounds and words with friends as morning work.", "He used to absent himself from school but now he comes regularly*." and that, "*He used to absent himself from school and to come late but now he comes regularly and always early for reading practice sessions in the morning*".

From the results above, it can be argued that learners tended to be intrinsically motivated to attend school when the class activities were enjoyable and varied, as depicted by the learners' regular attendance compared to how much they used to absent themselves. It can further be argued that the grade three learners in the intervention enjoyed the morning sessions as well as the music mnemonics that kept them active and busy. The next theme is theme 4, improved reading of complex words.

6.3.4 Theme 4: *Improved reading of complex words*

Reading is a constructive process, which is fluent, strategic, requires motivation and is a continuously developing skill (Frankel, et al., 2016). Information that is innumerable, immeasurable, or easily expressed using numbers revealed that learners in the intervention group have improved in terms of reading ability of complex words. The qualitative results from participants indicated that most of the learners with dyslexia showed improved reading abilities of complex words as compared to before the intervention. The teacher participants reported that the individual learners in their classes who received intervention had shown improved abilities in reading complex

words and this was attributed to the intervention. One teacher participant, teacher 1, reported that:

"Learner 3 has improved tremendously on reading, not only in English but also in other subjects like the mother language, XiTsonga.", "Learner 4 has improved a lot. The learner can now read in both English and XiTsonga.", "Learner 5 has improved in terms of reading.", "Learner 6 has improved from first term, although he still requires a lot of help for him to master reading fully.", "Learner 7 has mastered letter sounds and can now make words both in the mother language (XiTsonga) and English. He has improved." And finally, that "Learner 8, like most of his classmates, has improved in reading. He can read three-letter words like ***cat, bag, beg, dog, big, boy.*** *He could also identify and read the words:* ***fish, boy, girl*** *on the chalkboard.*

In addition, another teacher participant, teacher 2, reported that:

"Most learners have generally improved in reading and have now developed interest with schoolwork. "Teacher 2 went on to say that "Learner 1 has improved in reading, although his handwriting has not improved., Learner 2 has improved in English because of the sounds and music mnemonics they learnt during the intervention, Learner 3 has improved a great deal in reading. Learner 5 has improved. His English reading has improved due to the sounds and music mnemonics they were learning at the library. He can read and write well., Learner 6 can read and write three-letter words using phonics. There is a bit of improvement on learner 6, Learner 7 has improved a bit. She started school (grade 1 and 2) at another school. When she came to the present school, she could not read and write. Finally, learner 8 has improved a bit. He can read three-letter words as well as words like rice, milk, mealie-meal, water, and sugar. The learner can now make words on his own using the knowledge from sounds and music mnemonics they learnt at the library."

Another teacher participant, teacher 4, also reported that:

"Generally, learners are happy with your work. There is a great improvement! Generally, there is good progress. When I read a story to the learners, they can listen attentively. In January and in February, they could not read but immediately when you came, I saw a great change. Soon after you came, the learners you selected gradually improved. There is a big difference between the learners you worked with and the rest of

the grade three learners. Learners can catch up. When you use music mnemonics, the learners become "mad". They dance with understanding. The actions show you that they understand what they are singing. They can read without assistance. They listen attentively. They move with the song. They remember what they have been taught for a long time. Music is interesting. So, they will remember until they grow old. They read better, read with understanding and they will remember almost everything that they learn."

From the above interview excerpts, it is evident that the improvement among most learners was because of the music mnemonics that were used during intervention. The grade three LWD apparently could not read during term one, but after the intervention, there was remarkable improvement when compared to their counterparts who did not receive any experimental treatment.

The qualitative results from both the deputy principal and the principal also reported increased abilities among LWD to read complex words. For example, the deputy principal and the principal reported that:

"Even in terms of handwriting, at first the learners were mixing, but now they are capable to write and read. They are now able to pick up word sounds. They also developed listening skills. When you dictate or do spelling tests, I see improvement. Those who were shy, have improved. They have developed self-confidence and self-esteem. They have interest now. Memory strategies really work. Learners can remember what they have learnt and would also be able to spell the words. Through using music, rhymes, poems and stories, the memory strategies work very well." (Deputy Principal)

The qualitative results from parent participants of grade three LWD also indicated that there was remarkable improvement in reading complex words. The interview excerpts from parents' participants were reported as follows:

"In terms of reading, he can read letter sounds but cannot read whole words. Teaching using memory techniques has made it easier for my child to read. At home when his sister teaches him to read, he enjoys it. Now he can read many words with his sister's help." (Parent 1).

In agreement, parent 3 also reported that:

"He can read independently, starting from around March when you started the intervention. He enjoys reading. Even when he is viewing television, he listens carefully and sometimes tries to read text coming up on television. He has also improved in XiTsonga and in Mathematics. He is becoming very confident because he can now read. He teaches his young brother the song and the words. It has improved his vocabulary.

Furthermore, parent 4 reported that:
"The boy can read some words, especially short ones. He enjoys reading and writing. He sings songs and recites words learnt at school. He always sings and recites words from memory. His vocabulary is improving because of singing songs and reciting words. My son is now able to read because of the methods you used. He can use songs to read different words."

From the qualitative results above, it is evident that the grade three learners with dyslexia saw a remarkable improvement in reading of complex words perhaps due to constant practice through recitation and use of music mnemonics, both at school and at home. The next theme is enhanced self-esteem of learners.

6.3.5 Theme 5: *Enhanced self-esteem of learners*

Self-esteem refers to confidence in one's own worth or abilities, self-respect. The qualitative results of this study revealed that several learners with dyslexia have improved in terms of self-esteem after the intervention. The participants reported that learners with dyslexia showed improved self-esteem in different ways after the intervention. The results also indicated that some of the LWD could also teach their peers and friends and others who could not read a single word. They could also now write correct spelling and dictation after the intervention.

The interview excerpts by some teachers and parents are reported as follows: One teacher participant reported that: "*The learners have developed self-confidence and they can remember the words*." (Teacher 1). Moreover, teacher 2 reported that *"Their self-esteem was developed to a greater extent. Most of them now come to school regularly and early. Those who had bad behaviour have changed to be good, well-behaved children."* The deputy principal reported that: *"Those who were shy, have improved. They have developed self-confidence and self-esteem. They have interest now."* In addition, the principal reported that: *"Their self-esteem has developed. Those who used to sit at the*

back, now enjoy sitting in front because they no longer fear being nominated to participate. They are no longer shy to participate."

One of the learners reported to be involved in theft cases has changed to be a well-behaved boy: *"His self-esteem has developed and now prefers to sit in front because he is no longer shy."*

From the above interview excerpts, it can be concluded that the grade three LWD acquired the ability to read from songs and rhymes, hence development of self confidence and self-esteem. Two out of the 6 parents (parent 3 and parent 6) gave reports on their children's self-esteem. For example, parent 3 reported that: *"But now he feels good, and his self-esteem has developed. He even teaches his siblings and friends how to read."* Moreover, another parent reported that: *"When a child can read, he or she becomes confident with what he or she does. My child is now able to spell words. Last year she could not read anything but now she has improved tremendously."* (Parent 6).

From the qualitative results from parents above, there is an indication of a big change in the children's advancement in their reading ability and general class performance, hence they have developed self-confidence and self-esteem. The researcher argues that the activities adopted in the intervention assisted to develop self-esteem among LWD. The next theme is increased retention of learnt material.

6.3.6 Theme 6: *Increased retention of learnt material*

One of the themes which emerged from the qualitative data because of the intervention is increased retention of learnt material. Chen and Yang (2020) argue that repetition learning is an effective way to enhance memory performance in our daily lives and educational practice. The qualitative results indicated that given that the grade three LWD were still young and could not read, memory techniques to assist the learners to retain information and words taught were used in the intervention. The results show that the learners with dyslexia reported improved retention of learnt content in reading after the intervention period. To support this, the interview excerpts of some participants reported that:

"It helps learners to remember what they have been taught. It helps them to learn to read words in both languages. Memory strategies help learners to store information learnt. They will also be able to answer comprehension questions and to write short essays." (Teacher 1)

In addition, another teacher reported that: *"Learners can catch up. They can read without assistance. They listen attentively. They move with the song. They remember what they have been taught for a long time. Music is interesting. So, they will remember until they grow old. Memory techniques make learners remember content taught. They won't forget."* (Teacher 4)

In addition, the deputy principal reported that: *Memory strategies do help in that when the learners learn a song or rhyme, then use it to learn to recite words, they would not forget what they have learnt. They would remember the song and the words for the rest of their lives. The learners' language also develops. Vocabulary words learnt would be stored in their "word bank".*

Finally, the principal also reported that:
"Learners find memory techniques helpful in that once they learn a concept, some words, or sentences, they will not forget. Music mnemonics are very interesting. They keep learners active and make them remember all that they have learnt. Once someone practices and masters a piece of music, rhyme, or poem, they will remember it for the rest of their lives. At the same time, they will remember words and sentences that they would have learnt.
From the qualitative results above, it can be concluded that most learners that were in the intervention have improved in retaining content learnt because of constant recitation of concepts and content. The intervention enhanced increased addition of learnt material from short term to long term memories of LWD.

6.4: Gender influences on the effectiveness of sub-lexic technique on enhancement of reading abilities of grade three LWD

The study also examined gender differences on effectiveness of sub-lexic technique on enhancing reading abilities of grade three LWD. The qualitative data reported that girls outperform boys in several aspects including reading for fluency, reading for pleasure, guided and peer reading as well as reading for comprehension. Moreover, it was reported that girls outperform boys in terms of word recognition, grasping of concepts, cognitive development, and retention of memory, self-confidence and self-esteem and being inquisitive.

6.4.1 Theme 1: *Girls outperform boys in reading.*

As explained earlier in another theme, reading refers to looking at and comprehends the meaning of (written or printed matter) by interpreting the characters or symbols of which it is composed. Reading is a constructive process, reading must be fluent, reading must be strategic, reading requires motivation and reading is a continuously developing skill (Frankel, et al., 2016). Maatta and Uusiautti (2020) argues that the self-esteem of girls who are known to be talented decreases especially during their adolescence and that they realize that they are expected to possess certain traditional female characteristics such as passiveness, adjustment, sensitivity to others' expectations, and altruism. Girls' self-esteem only decreases during their adolescence (Maatta &Uusiautti, 2020) but, according to the present study, at grade three level, girls outperform boys as they are talented and still very young and possess self-confidence, being inquisitive and have characteristics of competitiveness.

The qualitative results indicate that girls outperform boys from Reception Year to around the exit level of the Intermediate Phase and majority of the participants argued that naturally girls develop faster than boys in the way they do things as indicated in the following interview excerpts:

Teacher 1 reported that:

"Female children achieve better results in reading than male children. Girls' memory is active, and they mature earlier and faster than boys. Girls also perform better than boys in other different activities like household chores. Girls have confidence from an early age, and they want to show-off to their counterparts that they are better in most aspects than boys. From grade R to grade 5, girls are dominating, and then boys take over from grade 6. Boys improve from grade 6 to high school. They mature late but once they pick, they improve very well in their education.

In addition, another teacher reported that:

"It is girls who perform better than boys. They are very active. If you ask the learners to come in front to join the cards to make words. The girls will be fast to jump and do it. I do not know what is happening to boys. They are slow; they work in a tortoise' pace. Maybe it is natural. Apart from reading, even in other areas like writing, household

chores, cleanliness, arranging books in order, girls do perform better than boys." (Teacher 4)

The deputy principal also reported that:

"Girls perform better than boys. This is because girls are very active in almost everything. If you ask if anyone can join letters to form words, girls will jump. They participate actively. Girls do quickly grasp concepts. On the contrary, boys are very slow. Boys do their things in a tortoise' pace. I do not know why boys are so slow. Maybe it is natural. If you look at other things like household chores, girls perform better than boys. Girls also perform better in handwriting, cleaning the house, washing, eating, and spreading the bed, taking care of younger siblings and many other things."

Then lastly, the principal also reported that:

"Girls read better than boys at grade three levels. It maybe because their intellectual development develops faster than that of boys at grade three levels. Generally, girls develop faster than boys in almost all areas including household chores: washing clothes, bathing, packing clothes, washing dishes, cooking, taking care of a younger sibling, to clean the house and so on, they cannot be compared with older boys. Girls surpass boys in almost every aspect. Naturally, girls develop faster than boys in the way they do things. Girls also mature faster physically than boys. Boys are slower and will only start developing in the same areas that girls develop earlier, when they are eleven to twelve years old. Boys' reading gradually improves as they grow older. Boys begin to grasp concepts faster than girls when they are in their teens."

From the interview excerpts above, it is evident that female students perform better than male students in reading and other areas as seen from their end of year performance, early intellectual maturity, physical development and in different household chores. This confirms why in the foundation phase, girls are at the forefront on the end of term or year performance class list.

The qualitative results from some parents of grade three learners with dyslexia also reported that female students performed better than male ones in different aspects. The following interview excerpts revealed this. Parent 1 reported that: "*Girls perform better than boys. Maybe it is because their cognitive development happens faster than that of boys. Girls are sharper than boys, they write neatly, and they do their things more perfectly compared to boys. From grade R up until grade 5, boys lag."*

Parent 3 and 5 shared the same sentiments that there was uniformity between the performance of male students and female ones. Between the two participants, parent 3, on one hand elaborated that:

"It is the girls who read better than boys although some boys begin grade one as good as girls and continue like that. I have one boy, my third born was good in grade one and even now. However, most children who perform better than the other gender are girls.

On the other hand, parent 5 reported that:

"It is the girls because most of the top twenty learners on end of term class list are normally girls. When it comes to reading and other aspects, girls perform better than boys. Of course, there are some boys who can perform the same as girls, but they are only few. My child is good since he can clean his room, wash his socks, spread the bed, pack his clothes, and read and write well, like most girls, but maybe he is one in five girls."

Finally, parent 6 also reported that:

"I am somehow confused because my first-born child is a boy, and he has been doing well from grade R up to now (in grade 5). So, I can say boys can be better than girls but in other areas like grooming, washing, cleaning, making their beds, girls do perform better than boys. Maybe it depends on the child."

From the formal semi-structured interview held, it can be deduced that girls generally perform better than boys. It can, therefore, be concluded that girls outperform boys during the early years of primary schooling while boys then improve and outperform girls at adolescence. This could be attributed to girls developing faster both physically and intellectually in comparison to boys, and thus enabling girls to be ahead of their counterparts in every aspect, including reading. The next theme is girls have faster cognitive development than boys.

6.4.2 Theme 2: *Girls have faster cognitive development than boys*

Cognitive development refers to how children think, explore and figure things out. Cognitive development is the growth of a child's ability to think and reason (Ahmad, et al., 2016). Ullah and Ullah (2019) argue that young girls have been dominating boys in terms of educational performance across the globe. Boys are being dominated by girls in educational performance, both in the developed as well as developing countries.

Furthermore, play contributes to cognitive development through imaginary and memory, essential for thinking about past, present and future. In the present study, use of music mnemonics as children sang and recited reading words to be tested at the end of the term, helped grade three LWD develop cognitively as they imagined words they had learnt. Moreover, girls outperform boys in education and the gap between boys' and girls' educational attainment arises with every level and grade (Ullah & Ullah, 2019).

The following interview excerpts from teacher participants revealed that: "*Learners learn through playing. Moreover, girls develop faster in terms of literacy development, grooming skills, cleaning and caring."* (Teacher 2). Teacher 3 reiterated that: "*When learners sing songs, they catch up something, remember what they are taught, master sounds and words. They sing, learn, and play at the same time. In all this, girls are superior to boys."* Interestingly, teacher 4 and the principal agreed that it is natural that female learners perform better than males in problem-solving and decision-making. The principal went on to say that: *"Girls outperform boys, maybe because their intellectual development develops faster than that of boys."* In agreement with the principal, parent 1 pointed out that: *"Girls perform better than boys because their cognitive development happens faster than that of boys. Girls are sharper and they do their things more perfectly compared to boys."*

From the above excerpts, it can be concluded that girls' cognitive development is faster than that of boys as they are quicker at taking up new skills and knowledge. The researcher argues that children often seem to be more capable of learning and retaining new information than adults, and similarly, girls outperform boys at grade three level and especially among learners with dyslexia. Furthermore, girls are smarter and show better academic performance compared to their counterparts. The next theme is Girls have High Speed of performing tasks than boys.

6.4.3: Theme 3: *Girls have high speed of performing tasks than boys*

Task performance is the employee's behaviour in pursuing the objective set-in advance. This performance is notably affected by the individual strategy to achieve these objectives (Juyumaya, 2022). In relation to the present study, task performance means grade three LWD's behaviour in pursuing and achieving the objective of being able to

read. Girls have high speed of performing tasks like reading aloud, reading for fluency, identifying words, copying words on the chalkboard, writing sentences, answering comprehension questions, remembering what has been taught, saying out letters of the alphabet, spelling, and dictation, to mention some of the tasks expected at grade three level.

Qualitative results revealed that girls performed tasks at a high speed compared to boys. The following interview excerpts revealed this. Participant Teacher 4 and the principal had this to say: To begin with, Teacher 4 reported that: *"Girls are active. If you ask learners to join cards and make words, girls do it very fast."* The principal echoed teacher 4's view and reported that*: "Girls read and write better than boys at grade three level. Generally, girls develop faster than boys in a variety of areas including household chores."* In addition, two parents also reported that: "*Girls can read and write neatly compared to their male counterparts."* (Parent 1). In addition, another parent also reported that: *"Girls are faster and better in their performance in many aspects, including reading, writing, bathing, washing dishes, cooking, taking care of siblings, spreading their beds and washing clothes."* (Parent 2).

From the extract above, it can be deduced that girls have high speed of task performance in relation to boys, among grade three LWD. It is generally evident across all grade levels that girls earn higher grades than boys. Girls also succeed over boys in school because they plan ahead and put effort into achieving those goals. The next theme is girls grasp concepts taught more than boys.

6.4.4 Theme 4: *Girls grasp concepts taught more than boys.*

In the present study, LWD grasped concepts due to use of memory strategies that were adopted as interventions. When they used music mnemonics, it made them remember the concepts learnt for a longer period. When it comes to memorising information or having to remember what must be done, literature says that women remember better than men. Niedzwienska and Zielinska (2021) postulates that prospective memory or ability to remember to do something in the future is strongly linked to gender stereotypes. Niedzwienska and Zielinska (2021) further highlight that women are involved in playing a mnemonic role in romantic heterosexual couples and be successful in prospective

memory tasks. Moreover, the same authors further point out that according to gender stereotypes, women are more communal than men, that is, more socially connected, helpful, nurturing, and selfless.

Some studies affirm biological and neurological, as well as environmental causes for differences between girls and boys while others argue that the performance gap is exaggerated or imaginary (Nasser 2016). Nasser (2016) further argues that girls and boys are wired differently due to their brain structure and functions. Another reason given by Nasser (2016) is that the corpus callosum, which is a large bundle of nerve fibres that connect the two brain hemispheres and that the neural cable connecting the two hemispheres of the brains is much thicker in girls, explaining that girls are better at connecting both hemispheres and using them together in cognitive processes. Furthermore, language areas in girls' brains are thicker than in the brains of boys. In the present study, girls who participated in the intervention showed better grasping of concepts than boys due to the sub-lexic reinforcement technique used. Moreover, grade three girls with dyslexia were able to capture and understand concepts taught better than boys, as supported further by Nasser (2016) who argues that the hippocampus, responsible for changing memory into a more stable, long-lasting form, grows more in girls than boys during the phase between childhood and adulthood (from ages 10 to 19). In the present study, the findings indicate that girls grasp concepts faster as compared to boys. For example, one teacher participant reported that: *"Girls perform better than boys in many aspects at grade three levels. Girls' memory is better than that of boys. They grasp concepts faster than boys."* (Teacher, 2)

The interview excerpts indicated that at grade three, girls grasp concepts more than boys and on the contrary, boys are slower. The researcher argues that it is natural that females perform better than males in most areas in life, and that when it comes to making new words in class, females perform better. Girls read and write better than boys from lower grades. Moreover, even their understanding and participation is better than that of boys, and that boys tend to comprehend slowly compared to girls.

Both teacher and parent participants argue that generally girls have active memory, they mature earlier and faster, they develop confidence from an early age, they participate actively, outperform boys and that it is natural, perhaps because of gender disparities. Moreover, to keep the gender gap wide, girls retain higher average memory performance

than boys. The following extract presents what some teacher and parent participants (from the present study) say about grasping of concepts. Teacher 1 and 3, deputy principal and principal as well as parent 3 gave their views on grasping of concepts.

"*Girls' memory is active, and they mature earlier and faster than boys. Girls perform better than boys in other different activities like household chores. Girls have confidence from an early age, and they want to show-off to their counterparts that they are better in most aspects than boys. From grade R to grade 5, girls are dominating then boys take over from grade 6."* (Teacher 1).

Teacher 3 also argued that:

"Girls perform better than boys, at grade three. Of course, there are some boys who perform very well, but there are more girls than boys, who perform extremely well. It seems God made it like that. Girls top in classes. They ask questions while boys keep quiet. It is natural that you find girls performing better than boys in most areas in life. Household chores, cleanliness, hard work, participation in class, reading and writing seem to be for girls. Boys may try, but they lag."

The deputy principal, principal, and parent 3 also reported that among grade three LWD who participated in the intervention, girls participated more actively, grasped concepts quickly, had faster physical development, read and comprehended faster and better than boys, and this could perhaps be due to natural gender differences in cognitive ability. The interview excerpt from the deputy principal is presented as follows:

"*It is the girls. This is because girls are very active in almost everything. If you ask if anyone can join letters to form words, girls will jump. They participate actively. Girls do quickly grasp concepts. On the contrary, boys are very slow."* Deputy Principal.

The principal also reported that: *"Boys begin to grasp concepts faster than girls when they are in their teens. They are fast to grasp computer education, driving and other skills like motor mechanics, carpentry, drawing, and many other skills*. On the part of parents, only parent 3 gave opinion on grasping concepts.

Parent 3 also reported that:

"*It's girls because they are the ones we often see at the top during end of term and end of year examinations. Girls read and write better than boys from lower grades. Even their understanding and participation is better than that of boys. Boys tend to comprehend slowly compared to girls. Girls develop even faster physically than boys."*

From these findings, it can be concluded that girls comprehend and grasp concepts better than boys at grade three level whereas boys begin to grasp concepts at adolescence stage. Nevertheless, young grade three girls with dyslexia managed to grasp the eighty (80) reading words that they were supposed to master, during and after the intervention. Therefore, the researcher argues that among the grade three LWD, girls outperformed boys in terms of grasping concepts perhaps because of their neural cable which is thicker than that of boys, and which enables them to capture and understand words and pictures and store them in their short- and long- term memory.

6.5: Qualitative results on effectiveness of gender influences on mnemonic techniques on the enhancement of reading abilities among grade three LWD

The study examined gender influences of mnemonic intervention on the improvement of the potential to read among grade three learners with reading difficulties. Qualitative findings indicated that gender influences on mnemonic intervention was successful in increasing potential to read among LWD. There has always been a gender disparity among men and women, boys, and girls, whether educationally or on the social arena. Studies have shown that males and females differ in memory associated with gender stereotyped objects and that mnemonic strategy differs in the ability to recall information (Osuh & Mwankon 2022). Even before attending school, young boys' evidence more problems in learning how to read than girls. Moreover, the sexes are hard wired differently for literacy. Qualitative results revealed that girls participated more actively than boys in the experimental class and they were more inquisitive in class than boys. Among the 23 grade three LWD, girls fared better than boys in memory recall, class participation and being inquisitive in class.

6.5.1 Theme 1: *Girls recall information more than boys.*

Recall means testing oneself on newly taught word associations (Krishnan, et al., 2017). In terms of recalling information, Graves, et al., (2017) point out women outperform men on verbal episodic memory tests. The qualitative findings of the present research indicated that girls' memory is better than boys. In the interviews carried out among grade

three teachers, teacher participants reported that girls recall information taught compared to boys. Teacher 1, teacher 2, deputy principal and principal gave their views on the ability to recall content taught in the following excerpts:

"*Girls perform better in reading than boys. Girls' memory is active, and they mature earlier and faster than boys. Girls also perform better than boys in other different activities like household chores. Girls have confidence from an early age, and they want to show-off to their counterparts that they are better in most aspects than boys."* (Teacher 1)

"*Girls' memory is better than that of boys. They grasp concepts faster than boys."* Teacher 2. The deputy principal also reported that *"Girls do quickly grasp concepts. On the contrary, boys are very slow. Maybe it is natural."* (Deputy Principal)

The principal also reported that:

"*Boys' reading gradually improves as they grow older. When boys have matured, they then surpass girls. Boys begin to grasp concepts faster than girls when they are in their teens. They are fast to grasp computer education, driving and other skills like motor mechanics, carpentry, drawing, and many other skills."*

From the extract above, it can be deduced that girls are able to recall content taught, and for a long period, compared to boys, at grade three. It can be argued that girls grasp concepts better than boys and their memory is sharper than that of boys. However, later, boys become sharper from age 12 upwards (at adolescence stage). The other reason why girls recall information better than boys is because the neural cable in the girls' brains is thicker than that of boys, hence girls can retain information in both their short and long-term memory as well as recall the information when they want to use it. Furthermore, girls are naturally sharper, and language areas in girls' brains are thicker than in the boys (Nasser 2016), hence girls can store a lot of information in their memory and thereby score high in language skills and in reading. In the present study, girls were seen to be able to recall content taught as seen during oral reading and writing. The next theme is girls are active in class participation than boys.

6.5.2 Theme 2: *Girls are more active in class participation than boys.*

Participation refers to involvement or engagement or taking part (Bobbio, 2019). Moreover, participation is a loose concept: involved citizens can be few or many, poorly or highly empowered, and their participation can be on- site or online, for short or long

periods of time, on high or – or low-stake issues. In the present study, participation refers to taking part in classroom activities, for instance reading, writing, recalling information, responding to question-answer sessions and so on. The qualitative analysis indicated that girls' memory is active, and they mature earlier and faster than boys. They participate actively and more than boys in class. Girls have confidence from an early age. Girls top in classes and are very active and if you ask them to participate or to join cards to make words, girls will be fast to do it. Perhaps the reason why girls participate more actively compared to boys is that it is natural. In an article by Bailey, et al., (2020), it was reported that females participated more in classes with a female instructor or with a female student majority.

The participants, teacher 1, 2, 3, 4 and deputy principal gave their views on active participation of girls. Teacher 1 reported that "*Girls' memory is active, and they mature earlier and faster than boys. Girls also perform better than boys in other different activities like household chores. Girls have confidence from an early age, and they want to show-off to their counterparts that they are better in most aspects than boys."* Teacher 2 also reported that *"Girls perform better in terms of reading, handwriting, listening skills, word recognition and participation. In terms of reading for fluency, reading for pleasure, peer reading, guided reading and reading for understanding, girls dominate."* Moreover, teacher 3 reported that: "*It is natural that you find girls performing better than boys in most areas in life. Household chores, cleanliness, hard work, participation in class, reading and writing seem to be for girls. Boys may try, but they lag.* "In addition, teacher 4 also reported that *"They are very active. If you ask the learners to come in front to join the cards to make words, the girls will be fast to do it."* Finally, the deputy principal also reported that "*This is because girls are very active in almost everything. They participate actively."*

From the interview results above, it can be argued that girls participate actively in class at grade three level. Moreover, it can be concluded that girls perform better in terms of, reading, handwriting, attention skills, word recognition and participation. In terms of reading for fluency, reading for pleasure, peer reading, guided reading and reading for understanding, girls dominate. Boys only begin to participate actively at adolescence. The next theme is girls are more inquisitive in class than boys.

6.5.3 Theme 3: *Girls are more inquisitive in class than boys*

According to Wade and Kidd (2019), curiosity is considered a strong motivator of learning, and that curiosity is associated with better measurable skills, abilities, knowledge, or values. The qualitative results of the current research revealed that if one must compare boys' and girls' learning in class, it would be found that girls are more inquisitive than boys at grade three. In the present study, among the grade three learners with dyslexia, girls were more inquisitive in class than boys as portrayed in the following interview excerpts.

One of the participants, teacher 3 reported that *"Girls ask questions while boys keep quiet. It is natural that you find girls performing better than boys in most areas in life."* In addition, the principal reported that: *"It maybe because their intellectual development develops faster than boys. Generally, girls develop faster than boys in almost all areas including household chores."* In agreement, parent 3 added that: *"Even understanding and participation of girls is better than that of boys."*

From the qualitative results above, it is evident that girls are more inquisitive than boys and that girls' intellectual development develops faster than that of boys at grade three level. It can, therefore, be inferred that girls have an upper hand during the foundation phase. Thus, girls at this level of schooling lead boys in reading, writing, intellectual development, being inquisitive and in terms of household chores.

6.6: Qualitative results on age influences on effectiveness of sub-lexic technique on the enhancement of reading abilities of grade three LWD

Acquiring new skills is significantly more effective until early adolescence than later in life (Janacsek, et al., 2012). This resonates with what the current research says in terms of young learners and their overall performance. The qualitative results of the present study revealed that younger learners grasp concepts than older ones, young learners have faster language development, and that young learners have flexible brain. The themes are discussed as follows.

6.6.1 Theme 1: *Younger learners grasp concepts than older ones*

As explained in theme four on age influences on the mnemonic technique, to grasp is to grip or to hold firmly. The qualitative results of the present study revealed different views on what age grasps concepts faster than the other and these were given by different

participants as depicted in the following excerpts. Two of the participants (Teacher 1 and teacher 3) pointed out that ages 8 to 9 grasp concepts faster than other ages. Two participants again (Teacher 4 and deputy principal) reported that ages 6 to 9 grasp concepts faster compared to others. One participant (Teacher 2) highlighted that ages 6 to 12 grasp concepts faster while another participant (the principal) gave the view that children aged 11 years and below find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults. The participant (the principal) who gave views on children's brain (those under 11) being flexible and cognition develops faster than older children.

For example, Teacher 1, teacher 4 and the principal had this to say on grasping of concepts: *"Grade ones learn sounds and memory strategies but without understanding. Grade threes (8-9-year-old learners) can read and write words, answer comprehension questions, summarize and write short essays"* (Teacher 1). Moreover, teacher 4 reported that: *"6-9-year-old learners find memory strategies and sounds helpful. If these methods were to be used effectively from grade one, learners would benefit a lot. From 6 to 9 years, learners are still very young, and can easily grasp concepts."* Finally, the principal reported that: *"Children, especially those below the age of 11 years find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults."*

Teacher 2 reported that:
"From 6-12 years, learners find memory strategies and sound helpful. Those who are backward (even at grade seven) will find sounds and mnemonic techniques helpful. There are a lot of individual differences among learners. As a result, some are slow to learn, and they will lag. Most learners find it very helpful to use memory and phonemic strategies. I discovered this when I was teaching grade seven. Some grade seven learners would benefit from the sounds when I kept on repeating them. They would end up grasping the sounds and begin to read. It is also at this stage that most learners (6 to 12 years) can learn and grasp different languages quickly compared to adults." (Teacher 2)

In agreement, teacher 3 also emphasized that:
"*When learners are still young, they find memory strategies and sound helpful, unlike when they get older. Ages 8 to 9 (grade three learners) would find it very beneficial to*

learn sounds. When they reach grade four (10-11 years) without knowing sounds and how to read words, then it is over for them. They will not be able to change any more. Otherwise, it would be by the grace of God for them to be able to read after grade four."

Also, in agreement, the deputy principal reported that:
"6 to 9 years. From grade one to three, learners find memory strategies and sounds very helpful. It is the stage at which they develop phonemic awareness, and they are still young. It is very easy for young children to master concepts and their language development is still developing. If a young child mixes and plays with his/her peers for a month, they easily catch up speaking their friends' language. Unlike older learners and elderly people, 6- to 9-year-olds find it very easy to develop a new language. They may develop more than one language at the same time compared to older people."

From the interview excerpts above, it can be deduced that generally learners aged 6 to 12 find memory strategies and sounds very helpful. It can also be inferred that learners aged 6 to 12 may develop more than one language at the same time compared to older people. This may be due to the elasticity of young people's brains. Contrastingly, older learners or older people find it difficult to grasp content or to develop a new language because their brain is no longer as elastic as when they were young. The researcher argues that the young learners were able to grasp concepts most effectively during the intervention. The next theme is younger learners have faster language development.

6.6.2 Theme 2: *Young learners have faster language development.*

Language development in children is an important part of child development as it supports children's ability to communicate, express and understands feelings, think, and learn, solve problems as well as develop and maintain relationships. Moreover, learning to understand, use and enjoy language is the first step in literacy, and the basis for polishing our speech skills by improving the ability to construct and structure sentences as we write them down. Yang, et al., (2021) highlight that vocabulary is critical for learners to develop a system of communication and literacy in their early years. By age 5 young children have a vocabulary of thousands of words; create sentences with complex grammatical features; different literal from non-literal meanings, such as humour or metaphor; observe the social conventions of conversation; and apply language skills in the service of learning to read. By age 8 years, their speech sound inventory is

mature (Feldman, 2019). In the present study, by age 8 years most learners are in grade three and their language has developed.

In the present study, grade three LWD would learn from peer and teacher facilitation, and they would continue to learn as they grow and by the time, they reach age 12, they may have improved. Scaffolding, as proposed by Vygotsky, would assist learners to learn more content from the More Knowledgeable Others (who are teachers, and other learner peers). The qualitative findings of the present research indicated that engagement with learners to enable their understanding as well as acquisition of knowledge or skills through study using sub-lexic technique needs to be ongoing because learners have individual differences. Some learners are fast, while others are slow. So those who are slow would benefit if teachers continue teaching reading to learners beyond grade three. It was also revealed that some learners reached as far as grade seven, but they still could not read fluently. Therefore, there is need for continuous and regular teaching of phonemes.

Teacher 1, teacher 2, deputy principal and principal gave their views on continuous teaching of phonemes. Teacher 1 reported that *"Grade ones learn sounds and memory strategies but without understanding. Grade threes (8 to 9-year-old learners) can read and write words, answer comprehension questions, summarize and to write short essays".*

In agreement, teacher 2 reported that:

"Those who are backward (even at grade 7 level) will find sounds and mnemonics helpful. There are a lot of individual differences among learners. As a result, some are slow to learn, and they will lag. Most learners find it very helpful to use memory and phonemic strategies. I discovered this when I was teaching grade seven. Some grade seven learners would benefit from the sounds when I kept on repeating them. They would end up grasping the sounds and begin to read. It is also at this stage that most learners (6 to 12 years) can learn and grasp different languages quickly compared to adults. With time, the learners automatically and gradually grasp reading skills if the teacher continues to use memory and sound strategies."

Furthermore, the deputy principal also reported that: "

"*From grade one to three, learners find memory strategies and sounds very helpful. It is the stage at which they develop phonemic awareness, and they are still young. Children*

in the period of early childhood development, from birth to around age 8 find it very easy to master concepts, and at that stage, language development is still developing. If a young child mixes and plays with his/her peers for a month, they easily catch up speaking their friends' language. Unlike older learners and elderly people, 6- to 9-year-olds find it very easy to develop a new language. They may develop more than one language at the same time compared to older people.

Finally, the principal also reported that:
"As soon as learners begin grade one and start learning letters of the alphabet, memory strategies and sounds, they find them helpful. Memory strategies like music, rhymes, games, poems, and role playing enable learners to grasp and remember what they have learnt. Moreover, when they learn phonics, they find it useful because when they read, spell, or make words, they find it easier to follow. Children, especially those below the age of 11 find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults."

From the results of the research, it can be finalised that learners from ages 6 to 12 can learn how to read and can grasp more than one language due to the elasticity of their brain, given their young age. This is why people who learn a language at a very young age have the accent of a native speaker. It can also be concluded that if teachers continue teaching and testing reading from foundation phase to grade seven and beyond, no learner would be left behind. Every learner would be able to read, including learners with dyslexia. The next theme is young learners have flexible brain.

6.6.3 Theme 3: *Young Learners have flexible brain.*

Flexibility is typically thought to compromise both cognitive and behavioural components. "Cognitive flexibility" is widely defined as the mental ability to change between thinking about two different objects according to the context of a situation while "behavioural flexibility" refers to the changes made to address challenges (Uddin, 2021). In the present study, flexibility refers to both mental ability and adaptive change of behaviour of grade three LWD. The qualitative findings from the current study indicated that memory and phonemic strategies helped learners to enhance their reading abilities since they (6- to 12-year-old learners) are still young and hence their brains are still flexible. The results also revealed that young learners gradually and automatically grasp

concepts and through repetition, they end up grasping the sounds and begin to read. Moreover, the results showed that young learners grasp and develop language fast, and that children, especially those below the age of 11 years find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults, as reflected in the following 6 excerpts from different teacher participants about flexibility.

Teacher 1,2,3,4, deputy principal and principal gave their views on young learners' flexibility of brain. Teacher 1 reported that:
"*Memory strategies and sounds mostly help ages 8 and 9. Grade ones learn sounds and memory strategies because they are still young. Grade threes (8 to 9 -year-old learners) can read and write words, answer comprehension questions, summarize and to write short essays. They can also give a title to a story. The two techniques generally help learners to read and write words."*

In concurrence, teacher 2 reported that:
"*Those who are backward (even at grade seven (7) level) will find sounds and mnemonic techniques helpful. There are a lot of individual differences among learners. As a result, some are slow to learn, and they will lag. Most learners find it very helpful to use memory and phonemic strategies. I discovered this when I was teaching grade seven. Some grade seven learners would benefit from the sounds when I kept on repeating them. They would end up grasping the sounds and begin to read. It is also at this stage that most learners (6 to 12 years) can learn and grasp different languages quickly compared to adults. With time, the learners automatically and gradually grasp reading skills if the teacher continues to use memory and sounds strategies.*

Teacher 3 also reported that "*When learners are still young, they find memory strategies and sounds helpful, unlike when they get older. Ages 8 to 9 (grade three learners) would find it very beneficial to learn sounds."* In agreement, teacher 4 also reported that "*From 6 to 9 years, learners are still very young, and can easily grasp concepts."*

On the other hand, the deputy principal reported that:
"It is very easy for young children to master concepts, and language is still developing. If a young child mixes and plays with his/her peers for a month, they easily catch up

speaking their friends' language. Unlike older learners and elderly people, 6- to 9-year-olds find it very easy to develop a new language. They may develop more than one language at the same time compared to older people."

Lastly, the principal also reported that *"Children, especially those below the age of 11 years find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults."* (Principal)

From the findings above, it is evident that young learners have flexible minds, and they can develop different languages quickly compared to older learners. In the present study, grade three LWD's reading abilities managed to improve because they are still young and their brain is still flexible, when compared to older learners in high school. It can also be concluded that if the teaching of reading, in this case, use of memory and phonemic strategies, is taken seriously by foundation phase teachers, young learners would benefit and most of them would be able to read by the end of their primary education. The next objective is age influences on mnemonic techniques on the effectiveness of mnemonic techniques on the enhancement of reading abilities of grade three LWD.

6.7: Qualitative Results on Age Influences on the Effectiveness of Mnemonic Techniques on the Enhancement of Reading Abilities of Grade Three LWD

The study also examined age influences on effectiveness of mnemonic techniques on the improvement of the ability to read of grade three LWD. Qualitative results from the present study revealed that young grade three LWD have better reading readiness than older ones, that they do have firm grasp of letter-sound correspondence than older ones and that they have increased interest in learning (Emergent Literacy).

6.7.1 Theme 1: *Young learners have better reading readiness than older ones.*

Reading readiness is described as the act of preparing, or ability to respond to, for systematic instruction or any other reading activity or task to ensure good progress. Ability to identify alphabet letter names is key to reading readiness. Some children may be ready to read by age four or five, while others may be ready by age six. According to Du Plessis (2016), reading readiness starts from Grade R. The Curriculum Assessment Policy Statement (CAPS) document bases language learning in Grade R on principles of

integration and play-based learning in a setting that promotes emergent literacy through incidental learning rather than formal learning. Du Plessis (2016) further highlights that the CAPS document says literacy is developed through a daily programme that is rich in language opportunities and reading skills including phonics, emergent reading skills, shared reading as a class with a teacher and independent reading. Evaluation in reading must be a continuous process. The assessment of readiness, progress, and mastery in the development of skills, concepts and behaviours must be an ongoing process if the best decisions are to be made for each learner. Language development and reading readiness are interlinked. Students' comprehension of spoken language is a determining factor of their reading comprehension and later reading development. Spoken language skills, especially phonological awareness and listening comprehension, are fundamental precursors to later successful reading (Duff & Tomblin, 2018). Therefore, for grade three learners with dyslexia to be successful in reading, they just need to have a strong starting point of spoken language skills, developed from a young age (as early as 4 to 5 years).

In terms of reading readiness, in the present study, qualitative results from four participants, teacher 1, 2, deputy principal and principal revealed what age learners begin to read. On one hand, teacher 1 reported that "*Memory strategies and sounds mostly help ages 8 to 9*. On the other hand, teacher 2 reported that *"From 6 to 12 years, learners find memory strategies and sounds helpful. Those who are backward (even at grade seven (7) level) will find sounds and mnemonic techniques helpful"*.

Furthermore, the deputy principal also reported that:

"*From grade one to three, learners find memory strategies and sounds very helpful. It is the stage at which they develop phonemic awareness, and they are still young. It is very easy for young children to master concepts, and language development is still developing. Unlike older learners and elderly people, 6- to 9-year-olds find it very easy to develop a new language. They may develop more than one language at the same time compared to older people."* (Deputy Principal)

Moreover, the principal also gave his views on reading readiness. He reported that:

"As soon as learners begin grade one and start learning letters of the alphabet, memory strategies and sounds, they find them helpful. Memory strategies like music, rhymes, games, poems, and role playing enable learners to grasp and remember what they have

learnt. Moreover, when they learn phonics, they find it useful because when they read, spell, or make words, they find it easier to follow. Children, especially those below the age of 11 years find it very easy to learn a new language because their brain is flexible, and their cognition develops faster than that of older children and adults.

From the findings above, it is evident that reading readiness may begin to develop as early as five years, once the learners are exposed to phonemic awareness and if teachers use memory strategies to enable learners to recall content taught. The qualitative results for this study have shown that different participants gave different opinions on what age finds memory and sound strategies helpful. The results above conclusively reflect that young ages in general have better reading readiness than older ones. The next theme is young learners have a firm grasp of letter-sound correspondence than older learners.

6.7.2 Theme 2: *Young learners have a firm grasp of letter-sound correspondence than older learners.*

Clayton, et al., (2020) suggests that learning to read depends on whether one has mastered the alphabetic principle: that written letters represent speech sounds. Learning to read continues in phases from visual content between printed letters and word pronunciations to later more complicated use of information on sounds to improve word recognition processes. In addition, it is now generally approved that the ability to recognise and manipulate the spoken parts of sentences and words is a critical foundation for learning to read (decode). Furthermore, automatic letter-sound associations are established early, while phoneme awareness, letter-sound knowledge and alphanumeric (Random Automatized Naming) RAN are strong independent variables of reading progress (Clayton, et al., 2018). From this, we can deduce that grasping of letter-sound correspondence is favourable to young learners and that reading development needs to begin early compared to later in life.

Qualitative results of the current study indicated that young learners would remember and be able to read and grasp alphabet letters and their sounds from A to Z. The participants of the study, teachers 2, 3, 4, Deputy Principal and the Principal reported in the following excerpts: Teacher 2 said that: *Songs, poems and rhymes help learners to remember what they have been taught. They remember alphabet letters and the sounds they make*. In agreement teacher 3 also reported that: *The use of music in teaching*

learners helps to make them understand easily and it helps learners to master letters and sounds. Moreover, teacher 4 reported that: *When you use music mnemonics, learners remember content taught until they grow old*. Finally, the Principal reported that: *Once a child practises and masters a piece of music, rhyme, or poem, they would remember it for the remaining part of their lives. Simultaneously, they will remember alphabet letters, their sounds, words, and sentences.*

From the findings above, it is evident that young individuals grasp concepts more easily compared to older learners. In the current study, it can be deduced that the grade three LWD, since they are still young, managed to grasp letters of the alphabet and their sounds with ease. The next theme is young learners have increasing interest (emergent literacy) in reading.

6.7.3 Theme 3: *Young learners have increasing interest (emergent literacy) in reading.*

Emergent literacy is a period of development of skills, knowledge, and behaviours that increasingly approximate conventional literacy and it begins at birth and continues into early schooling (Hudson, et al., 2017). In other words, early literacy refers to the stage at which children learn the crucial skills that lead to reading and writing. Starting children on the path to reading begins early. Children learn about the purpose and how to read long before they can take up a book and translate the text (Rohde, 2015). Rohde (2015) further posits that these early skills known as Emergent literacy (EL), comprise a child's knowledge of reading and writing skills before they learn how to read and write words, starting at birth.

Therefore, on one hand, children who are experienced in the basic skills of early literacy at the beginning of primary school, acquire understanding of reading and writing more quickly and thus are fully furnished for academic achievement (Majorano, et al., 2021). On the other hand, reading or early literacy outcomes for CWD, particularly those with severe- to-profound reading difficulties lag those with normal language and literacy development. The qualitative results of the present study revealed that grade three LWD in the intervention group improved in terms of emergent literacy, compared to their counterparts in the control group.

The qualitative results from teacher participants were reported as follows: Teacher 1 said that: *Memory strategies help learners to read in both English and the local language.* In

agreement, teacher 2 reported that: *When teachers use songs, poems, and rhymes, it improves learners' reading because they remember what has been taught. They will learn through play when they sing and dance*. Similarly, teacher 3 reported that*: Learners at grade three can recite alphabet letters (when they sing A, B, C, /D, E, F, G…. or A for apple, B for boy, C for cat…), weekdays and months of the year*. On the other hand, teacher 4 reported that: *At ages 6 to 9, learners can recite alphabet letters, read sight and vocabulary words. They also develop phonemic awareness*. Finally, the principal reported that: *Learners remember alphabet letters, words, and sentences, and through phonics, they learn to read, spell, and make words*.

From the foregrounding results, it is evident that young learners have increased interest (emergent literacy) in reading in comparison to older learners in high school or at tertiary level. In the present study, grade three LWD, young as they are, exhibited higher interest in emergent literacy compared to older learners in secondary school, as reflected in the interviews with teachers that from ages 6 to 12, they are transforming from having no knowledge to developing basic literacy skills. The grade three LWD learnt how to recite, read alphabet letters, sight and vocabulary words, sentences, spell and make words and they did this out of enthusiasm.

6.8: Conclusion of the Chapter

This chapter introduced the qualitative findings of the study on the bases of the themes from data. The next chapter presents the summary of results, discussions, conclusions, and the study recommendations. Moreover, the implications for future research and the limitations of the study are also presented.

CHAPTER SEVEN
7.0: SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This final chapter presents the brief overview of the main points of this research paper. Firstly, the chapter presents the summary of the thesis followed by the summary of the study findings, then the discussion of the findings. Thereafter, the conclusions of the research in terms of the research objectives were discussed. Furthermore, the contributions of the study, education policy and practice recommendations were presented. Lastly, the chapter presents the limitations of the study, suggestions for further research and the concluding remarks.

7.2 Overview of the Thesis

This doctoral study examined the effectiveness of the mnemonic and sub-lexic reinforcement techniques on enhancement of reading abilities among grade three LWD in two public schools in Mpumalanga Province, South Africa. Within the pragmatic research paradigm, a mixed methods approach was adopted. Chapter one presented an introduction to the study which comprised the rationale, aim, objectives, hypotheses as well as the research questions for this study. Chapter Two provided the literature review followed by the theoretical framework that guided this study presented in Chapter three. A discussion of the research design and methodology employed in the study is presented in Chapter Four. Chapter five presented the quantitative results of this study. Chapter six presented a discussion of qualitative results. Finally, chapter seven presents the summary of the study findings, conclusions, recommendations, limitations of the study and finally, suggestions for further research.

Research questions.

The research questions for this study were:

a). How effective is mnemonic instruction in enhancing of reading ability among grade three LWD?

b). How effective is sub-lexical reinforcement in enhancing of reading ability among grade three LWD?

c) What is the gender influence on effectiveness of the mnemonic instruction and sub-lexical reinforcement on improvement of the ability to read and write among grade three LWD?

d). What are the differences in effectiveness of the mnemonic instruction and sub-lexical reinforcement on enhancement of reading ability based on ages of grade three LWD?

The key implications of the results are discussed below.

Summary of the research findings is presented below:

7.3.1: Effectiveness of mnemonic instruction in enhancing of reading ability among grade three LWD.

The quantitative findings indicated that the use of mnemonic reinforcement techniques to enhance the ability to read among grade three LWD in primary schools is highly effective. The quantitative findings established that, after being taken through mnemonic reinforcement techniques, many children preferred using mnemonics to memorize vocabulary words, thereby confirming that the participants found use of mnemonics helpful as it helped them to recall many words for prolonged periods. Similarly, the qualitative findings indicated that the mnemonic reinforcement strategy was successful in improving reading proficiency among LWD in different ways including that the intervention enhanced recall of content taught among learners. Improvement in performance of grade three LWD and increase in recall of content was recognised after intervention, indicating that participants had acquired associations between phonemic awareness and recalling of lesson content due to use of the mnemonic techniques. In addition, recognition of letter-sounds, three-letter-words, longer words as well as sentences, and recall performance was better after intervention, confirming that participants remembered some words and sentences over time.

Among the participants, both teachers and parents reported that the learners in the intervention improved in terms of recalling words from use of picture-sound/word matching, recalling words from audio -visual aids like charts and sentence strips, recalling words, weekdays and months of the year using memory rhymes and recalling sight and vocabulary words. Furthermore, the learners in the intervention group improved in spelling and dictation as well as enhancement of reading ability in general. This is an indication that mnemonic techniques can play a pivotal role in the recalling of content and an increase of the ability to read among LWD.

The quantitative findings on how easy the learners found it to memorize vocabulary definitions when using mnemonics after going through the intervention programme, revealed that it was now quite easy for many of the LWD to memorize the vocabulary. This finding implies that use of mnemonic reinforcement techniques in enhancing reading skills among grade three LWD in primary schools is effective among most of the learners. Equally, from the qualitative results obtained from the experimental school participants, it is evident that the use of music mnemonics, in the form of rhymes, poems and songs, increased LWD's recognition and mastering of words for a long time. Similarly, the qualitative results indicated that behaviour change was reported as one of the major positive effects of the mnemonic reinforcement technique among LWD. The qualitative results indicated that some LWD changed their behaviour for the better after the intervention. For example, some LWD who initially used to absent themselves from school in most cases changed and attended school regularly. The findings also revealed that another learner initially involved in theft cases changed and was now very honest. From the results, it is evident that after the intervention, negative behaviour among LWD such as absenteeism, coming late to school, shyness, and theft, changed to regular attendance, being punctual, development of self- esteem and being innocent, respectively.

In addition, the researcher argues that interest in school, increased participation, improvement in reading, ability to answer questions and general positive behaviour change among LWD may be attributed to the mnemonic reinforcement technique as an intervention. Thus, mnemonic-enhancing strategies can bring positive effects like behaviour change due to the use of visual or auditory clues to assist students to link their own prior knowledge and current information. This is because for many students with learning disabilities like dyslexia, retaining and recalling information is often a difficult task. Therefore, when an individual can achieve what they could not before, they find it exciting, and this may lead them to change their awkward behaviour for the better to please the teacher or parent.

In addition, the qualitative findings of this research indicated that the mnemonic intervention also resulted in increased motivation to attend school among LWD. Learners tended to be intrinsically motivated to attend school when the class activities were

enjoyable and varied, as depicted by the learners' regular attendance compared to how much they used to absent themselves. This implies that the grade three learners with dyslexia had established a good rapport with the researcher and were occupied with morning work that was arousing their interest.

Likewise, the quantitative results on reading words and comprehension revealed that the intervention group showed comparable abilities in all aspects of skills in reading than the control group. The mean scores in examinations that were administered for the intervention group exceeded that of the post-test mean score for the control group and this rise in mean score excludes the influence of pre-test procedure on the score, hence it follows that the measurement system was capable of detecting a difference and was mainly attributed to treatment effect, which means that mnemonic teaching strategy has a significant impact on primary school grade three LWD's reading skills. On the contrary, the control group had lower post-test mean score because they continued to receive traditional teaching methods of reading as compared to the intervention group, pointing to how the mnemonic teaching strategy helped the grade three LWD to improve in their reading test scores.

The qualitative results also revealed that the adoption of the two interventions enhanced self-esteem of learners. The grade LWD acquired the ability to read from songs and rhymes, hence development of self confidence and self-esteem. Finally, the qualitative results on mnemonic teaching strategies revealed that most learners that were in the intervention have improved in retaining content learnt because of constant recitation of concepts and content. The intervention enhanced increased addition of learnt material from short term to long term memories of LWD. Conclusively, both quantitative and qualitative findings revealed that mnemonic instruction is a very effective teaching strategy to use when teaching LWD in schools. It can also be used in high school, to teach learners with or without disabilities, depending on the type of mnemonics chosen by the teacher.

7.3.2 Effectiveness of Sub-lexic Reinforcement technique in enhancing of reading ability among grade three LWD

The quantitative results indicated that most of the parents of LWD who were selected for the study held a common stand regarding use of sub-lexical techniques to teach reading which they generally felt was effective. The qualitative findings also showed that after

the intervention, most of the learners had improved in reading and had developed interest with schoolwork. The qualitative results also provided evidence that there was general improvement among learners who were receiving intervention. Furthermore, most of the learners could read three-letter words and could attempt to read bigger or longer words without assistance. The qualitative results also indicated that the themes that emerged from the enhancement of reading through sub-lexic technique were increased word recognition, improved punctuality among learners, increased enthusiasm, increased development of attentive skills, increased spelling and word-building skills, improved performance in other subjects, increased development of phonemic skills, increased competency to read complex sentences and increased independent reading initiatives.

The quantitative results indicated that learners with dyslexia who had been taken through the sub-lexical intervention developed strong awareness of the differences between phonemes and graphemes, which is an important aspect of reading skills. The qualitative results revealed that most of the Grade three LWD developed word recognition because of exposure to the sub-lexic technique intervention in the experimental school. Moreover, the qualitative findings of the study indicated that before the intervention, some of the Grade three LWD used to arrive late for school, but they later changed their pattern to be punctual in school, after the intervention.

Conversely, the qualitative findings indicated that most of the Grade three participants in the intervention developed increased enthusiasm in their work at school. Additionally, enthusiasm was evident among the learners because they showed effort in attending extra lessons. The qualitative findings of the study revealed that the participants in the intervention had increased development of their attentive skills, which could be attributed to the variety of interesting reading activities provided during the intervention. Although it is widely known that LWD are easily distracted but because of the various activities offered, the grade three LWD would give their time to pay attention to what would be taking place in the classroom, from reading letter sounds, segmenting and blending words, to making words using given sounds on cards.

The quantitative findings revealed that majority of LWD who had been taken through phonics instruction as a form of sub-lexical reinforcement were able to effectively comprehend texts. At the same time, the quantitative study findings indicated that phonics instruction helped LWD in the development of word recognition. Correspondingly, the qualitative findings revealed that some learners benefitted from the picture-sound and the picture-word method, and this made them to improve in spelling

and dictation. Moreover, increased development of spelling and word-building skills could also have been enhanced by the variety of flash cards and sentence strips that were available for all the 23 learners in the intervention group. Furthermore, working on the activities (spelling, dictation, and word- building) on a regular basis, cultivated a reading culture among the learners in the intervention, hence the increased development of spelling and word-building skills. The qualitative findings further revealed that several learners who participated in the intervention programme improved, not only in English, but also in other subjects like XiTsonga and Mathematics. The results indicated that the improved reading ability after the intervention made learners to do better in other subjects as well, as they transferred skills in English to other subjects.

The quantitative results further revealed that repeated reading as a form of sub-lexical reinforcement techniques is effective in increasing the ability to read among LWD. Conversely, the qualitative results revealed that learners' reading improved due to the knowledge of phonemes they acquired during intervention because they could now read three-letter words. The qualitative results also revealed that the grade three LWD's increased competence to read complex sentences improved due to the constant reading practice they had during the intervention using flash cards and sentence strips. Moreover, word-building using segmenting and blending enabled them to read longer sentences as they would slowly read word by word until they managed the whole sentences.

Finally, the qualitative results also revealed that the intervention enhanced the ability to spell and write short sentences during dictation, of which after one manages to spell, they subsequently learn how to read. Furthermore, the learners in the intervention developed interest in reading short words because shorter words are better learned than longer words and reading books of their own choice meant that they would encourage themselves to read independently.

7.3.3 Gender influences on the effectiveness of mnemonic reinforcement technique on enhancement of reading abilities of grade three LWD

The quantitative findings indicated that mnemonic intervention generally caused relatively higher improvement in performance in overall reading ability and its components (reading and comprehension) in girls than in the boys. The quantitative results thus revealed that there is a notable result of gender in influencing enhancement

of reading performance by mnemonic intervention, with the female learners having better scores than males. The quantitative results provided evidence that boys under performed in reading, comprehension, and overall reading ability, suggesting that gender has influence on effectiveness of the mnemonic instruction reinforcement on enhancing of overall reading ability among the grade three LWD. Correspondingly, qualitative results revealed that girls participated more actively than boys in the experimental class and they were more inquisitive in class than boys. In addition, the qualitative results revealed that girls were able to recall content taught, and for a long period, compared to boys, at grade three level. Furthermore, the qualitative results also revealed that girls grasped concepts better than boys and their memory was sharper than that of boys at grade three. Moreover, in the qualitative study, girls were seen to be able to recall content taught as seen during oral reading and writing.

Additionally, quantitative findings revealed that girls significantly outperformed their male counterparts in reading comprehension. Furthermore, the quantitative findings indicated that there was notable outcome in improvement of overall reading between boys and girls, with the girls recording higher scores than the boys. It was also disclosed that there was notable contrast between gender in reading alone, comprehension alone and overall reading. Then the qualitative findings indicated that girls were more active in class participation than boys during the intervention at grade three level. Moreover, the qualitative findings indicated that girls performed better in terms of, reading, handwriting, attention skills, word recognition and participation. In terms of reading for fluency, reading for pleasure, peer reading, guided reading and reading for understanding, the qualitative findings revealed that girls dominated. Furthermore, from the qualitative results above, it was revealed that girls were more inquisitive than boys and that girls' intellectual development developed faster than that of boys at grade three level.

7.3.4 Gender influences on the effectiveness of sub-lexic reinforcement technique on enhancement of reading abilities of grade three LWD.

The quantitative findings indicated that girls had comparatively higher improvement in performance than the boys in the two components of reading ability (reading and comprehension) and in the overall reading ability, after having gone through sub-lexical intervention. Moreover, the quantitative results suggested that sub-lexical instruction had

more influence in enhancing comprehension among girls with dyslexia than their male counterparts. In contrast, the qualitative findings indicated that girls outperformed boys during the early years of primary schooling while boys then improved and outperformed girls at adolescence. The quantitative findings indicated that when LWD were taken through sub-lexical instruction, girls' overall reading ability improved more than their boys' counterparts. Equally, the qualitative findings indicated that girls' cognitive development was faster than that of boys as they were quicker at taking up new skills and knowledge. The qualitative findings further indicated that girls outperformed boys at grade three and especially among LWD. Furthermore, girls were smarter and showed better academic performance compared to their counterparts. The qualitative findings revealed that girls performed tasks at a high speed compared to boys. Moreover, the qualitative findings indicated that girls comprehended and grasped concepts better than boys at grade three whereas boys began to grasp concepts at adolescence stage.

7.3.5: Age influences on the effectiveness of mnemonic techniques on the enhancement of reading abilities of grade three LWD

The numerical findings indicated that most of the parents of CWD who were selected for the study agreed that age has effect on the employment of mnemonic instruction to improve reading ability among grade three LWD. The quantitative findings indicated that generally older children in the intervention group had relatively higher improvement in performance in overall reading ability and its two components (reading and comprehension) than the younger children in same group. Moreover, the quantitative results revealed comparison of scores on the same variable but for two different groups between younger and older LWD reading revealed that there was measurable difference between the two age groups involved. The qualitative findings indicated that different participants gave different opinions on what age finds memory and sound strategies helpful. The qualitative results conclusively reflected that young ages in general have better reading readiness than older ones. Furthermore, the qualitative findings indicated that reading readiness may begin to develop as early as five years, once the learners are exposed to phonemic awareness and if teachers use memory strategies to allow learners to recall information taught. In addition, the qualitative results revealed that young learners will remember and be able to read and grasp alphabet letters and their sounds from A to Z. Moreover, the qualitative results revealed that young individuals grasp

concepts more easily compared to older learners and that these children grasp concepts faster compared to adults.

The quantitative results revealed that there was measurable result of age in reading achievement, with the older grade three learners having greater scores for reading than junior ones. The quantitative findings indicated that mnemonic instruction is more effective in enhancing reading among the older grade three LWD than their younger counterparts. Additionally, the quantitative findings indicated that mnemonic instruction reinforcement enhances of comprehension ability more in older (9 years and above) LWD than younger (below 9 years) learners. Moreover, the quantitative findings indicated that mnemonic instruction is more effective in influencing enhancement of overall reading ability among older grade three LWD than their younger counterparts. Furthermore, the quantitative findings revealed that when LWD were taken through mnemonic instruction, older learners' overall reading ability improved more than their younger counterparts. Conclusively, age has proved to influence positively in enhancing success of mnemonic instruction reinforcement on reading ability among the grade three LWD. The qualitative findings indicated that young learners have increased interest in reading in comparison to older learners in high school or at tertiary level. The qualitative findings further indicated that grade three LWD, young as they are, exhibited higher interest in emergent literacy compared to older learners in secondary school. In addition, the qualitative results indicated that the grade three LWD learnt how to recite, read alphabet letters, sight and vocabulary words, sentences, spell and make words and they did this out of enthusiasm.

7.3.6 Age influences on the effectiveness of sub-lexic techniques on the enhancement of reading abilities of grade three LWD.

The quantitative findings revealed that after receiving sub-lexical interventions, older grade three LWD largely had comparatively higher improvement in performance in overall reading ability, in reading and in comprehension, than the younger learne rs. Moreover, the quantitative findings indicated that there was a big difference in reading scores between younger and older children among grade three LWD who received sub-lexical treatment, with older learners having higher scores than younger learners. The quantitative findings further indicated that sub-lexical instruction reinforcement more

effectively enhanced reading in older children than in younger children among the grade three LWD, indicating that young children's reading, reading comprehension and overall reading ability was influenced by sub-lexical reinforcement compared to older learners and adults.

The qualitative findings indicated that younger learners grasped concepts better than older ones in high school. Furthermore, younger learners had faster language development and had flexible brain compared to older learners or adults. The qualitative results also indicated that generally learners aged 6 to 12 find memory strategies and sounds very helpful and that learners aged 6 to 12 may develop more than one language at the same time compared to older people. This may be due to the elasticity of young people's brains. The quantitative findings indicated that that number of years has no notable result on the use of sub-lexical intervention in enhancing of comprehension ability among the grade three LWD. The numerical results also indicated that although there is difference in degree of influence of sub-lexical intervention in enhancing comprehension between older (9 years and above) and younger (below 9 years) learners, the difference was not statistically significant. The quantitative findings revealed that influence of sub-lexical instruction on enhancing comprehension among LWD in grade three is almost the same between the two age groups.

The qualitative results indicated that these young learners have flexible minds, and they can develop different languages quickly compared to older learners. The qualitative results further revealed that grade three LWD's reading abilities managed to improve because they are still young and their brain is still flexible, when compared to older learners in high school. Overall, age was found to influence effectiveness of the sub-lexical instruction reinforcement on enhancing of reading alone and overall reading ability but not comprehension among the grade three LWD. Generally, sub-lexical instruction is more effective in influencing enhancement of reading alone and overall reading ability in older LWD than their younger counterparts.

7.4 Discussion of Findings

This section presents discussion of findings for the study.

7.4.1: Effectiveness of mnemonic instruction in enhancing of reading ability among grade three LWD

The study demonstrated that mnemonic reinforcement was successful in improving the reading skills of grade three LWD. The quantitative findings indicated that use of mnemonics was effective and that many grade three LWD preferred using mnemonics to memorise vocabulary words. Since mnemonics are an efficient memorization technique which helps individuals to learn, retain and recall information easily, many grade three LWD in the intervention group preferred using them and found them very effective. In addition, mnemonics help improve an individual's long-term memory. This finding agrees with Miller (1956) argument on the Information Processing Theory (IPT) which reports that the Long-Term Memory (LTM) keeps all that one regards and understands after learning. This enabled grade three LWD to read given vocabulary words even at the end of the time limit when they were examined on their reading. This finding agrees with Lutz and Huitt (2018) who suggested that there are several categories of LTM, and that the way information is kept is very important and knowledge that is provided in picture form is saved better than that given verbally.

Similarly, the results of the qualitative data also agree that the mnemonic strategy was effective as seen from the improvement in performance and increase in recall of content by the grade three LWD, which was recognised after the intervention. Again, the qualitative data results revealed that after the intervention, the grade three LWD had acquired associations between phonemic awareness and recalling of lesson content due to use of the mnemonic technique. Furthermore, the qualitative data results also indicated that recognition of letter sounds, three-letter- words, longer words as well as sentences and recall performance improved after the intervention. Therefore, constant recitation of rhymes and songs that are linked to content learnt, is vital for learners, let alone those with dyslexia, to grasp content for longer periods. This finding agrees with Skinner's (1953) theoretical assertion that to shape behaviour, one identifies what a learner knows currently, identify the desired behaviour and possible rewards, and break the desired behaviour into minor steps until the learner improves.

In agreement, Scruggs, et al, (2010) reported that a significant amount of research on mnemonic support practice and its effect on vocabulary retention and recall showed that mnemonic devices can improve vocabulary learning, boost memory, and increase creativity. Similarly, this finding is in line with recent research (Khawaldeh and Khasawaneh, (2019); Othman, (2019); Metsala and David, (2017); Whitescarver, (2018),

Marthila, (2019); Fatima (2020) which reported that the application of the mnemonic techniques can improve students' vocabulary learning, retention, and mastery and that non-native English speakers will keep what has been taught in memory for a long time.

Furthermore, while Lubin and Polloway (2016); Siegel (2017) and Mahdi and Gubeily (2018) agree that mnemonic is effective with learning problems, Prater (2021) adds that combining the keyword and peg-word methods can be highly effective for remembering numbered or sequential pieces of information that are unfamiliar. In agreement, Mahmood and Khalaf (2022) reported that the experimental group had the ability to remember the information in the novel material while the control group was not able to retain the important information in a written test. The implication of this is that teachers should use mnemonic techniques that align with learners' different reading abilities. As such, there is need for the Department of Basic Education to organize workshops that train teachers in various methods on how to increase reading of learners with reading deficits.

The quantitative study revealed that it became quite easy for many of the learners with dyslexia to memorize vocabulary definitions using mnemonic techniques. Furthermore, the quantitative findings of the research further indicated that majority of the learners preferred teacher- provided mnemonics to their own created mnemonics. Equally, the categorical study indicated that the use of music mnemonics, in the form of rhymes, poems and songs, increased LWD's recognition and mastering of words for a long time. Moreover, the qualitative study also revealed that music mnemonics, through recitation and use of audio-visual aids, use of picture/ sound/ word matching, enhanced learners' ability to read and write words, recalling of words, weekdays, months of the year, and recalling sight and vocabulary words, as well as independent reading. Further still, the qualitative study indicated that learners in the intervention group's morale were boosted, and music mnemonics kept them active and eager to learn. The qualitative study further indicated that enhancement of reading and improvement in spelling and dictation was made possible through the pivotal role played by mnemonic techniques. This finding agrees with Skinner's (1953) theoretical assertion on chaining as a behavioural change, which is a process of simplifying problems. In the same vein, a grade three learner with dyslexia would learn reading words and sentences through music mnemonics whereby they start by learning a rhyme or song then use the rhyme or song to 'recite' words or sentences to be learnt.

This finding agrees with Fasih, et al., (2017) study which reported that mnemonic technique increased the degree of student attention towards progress. In agreement, studies by Marthila (2019) and by Othman, et al., (2019) both revealed that there was considerable successfulness of using mnemonic technique in teaching the number of words someone knows and that students were optimistic towards the mnemonic keyword method that was used to teach vocabulary. The implication of this is that teachers must use mnemonic instruction that improves recalling of sight, vocabulary words and definitions as well as improve spelling and dictation. Hence, principals should organize demonstration lessons at school level that are led by knowledgeable colleagues or external resource persons who are well- versed with mnemonic techniques.

This finding agrees with Keeffe and Nadel (2016) that had shown that teaching mnemonics is effective as students can recollect vocabulary; Romania, Cioca and Nerisanu (2020) also asserted that use of visual mnemonic devices on creative performance, is effective and Whitescarver (2018) observed that mnemonic devices are a useful tool for enhancing learning and facilitating remembrance. These studies show that mnemonics have proven an effective strategy for students to obtain new vocabulary, and mnemonics have been proven to be an effective tool for students with disabilities. In the same vein, Whitescarver (2018) had observed to improve comprehension, efforts should be made to improve the students' vocabulary and that one effective method to improve and retain a student's vocabulary knowledge base is using mnemonic teaching strategies. On the contrary, the finding is invariance with that of Bridge (2016) which showed that prompting in reading comprehension in book clubs did not make any significant improvement in development of reading comprehension.

The qualitative findings revealed that behaviour change was reported as one of the major positive effects of the mnemonic reinforcement technique among learners with dyslexia. The qualitative results further indicated that some LWD changed from negative behaviour to positive behaviour after the intervention. The negative behaviour among LWD such as absenteeism, coming late to school, shyness, and theft, changed to regular attendance, being punctual, development of self- esteem and being innocent, respectively. This finding agrees with Skinner's (1963) assertion which argues that we acquire the behaviour of seeing under stimulation from actual objects, but it may occur in the absence

of these objects under the control of other variables and those variables are not necessarily outside the body. Therefore, for grade three LWD, audio-visual teaching and learning aids were provided to help learners to improve their reading abilities. In agreement, Dwarika (2019) reported that participants had developed new insights about ecosystem challenges that impact behaviour and were critically reflexive about their changed practices resulting from their participation in the IC positive behaviour support model. Furthermore, this finding agrees with Huang, et al., (2021) who indicated that the proficiency, demand, and self-identity in the group of learners with dyslexia were significantly lower than those in the control group, indicating that children with dyslexia lack self- concept compared to normally developing children. This research suggests that learners can develop positive behaviour through use of mnemonic instruction. Thus, mnemonic-enhancing strategies can bring positive effects like behaviour change due to the use of visual or auditory clues.

The quantitative findings of the research, on one hand, indicated that parents of grade three learners with dyslexia confirmed that their children enjoyed using mnemonics as a technique of memorization strategy both at home and at school. On one hand, the qualitative findings of this study revealed that the mnemonic intervention also resulted in increased motivation to attend school among LWD. These findings concur with Skinner's reinforcement principles (Rafi, et al 2020) that can be used to implement evidence-based practice and policy regarding improving the desired behaviour in the classroom. In the case of grade three LWD, Skinner's operant learning principle of increased desired behaviour, which was enhancing reading abilities which came about because of the use of mnemonic instruction. This finding agrees with Almekhlafy and Alqahtani's (2020) study which reported a measurable difference in students' motivations after the help administered. Moreover, Izadpanah and Rezaei (2022), study showed that positive relationship, academic self-control, and academic participation are related to students' academic achievement. The current study provided evidence that most of the Grade three LWD who participated in the intervention had developed increased enthusiasm in their work at school. Moreover, enthusiasm was evident among the learners because they showed effort in attending extra lessons in the form of morning work. Furthermore, the intervention caused increased enthusiasm due to sense of pride, accomplishment, and excitement from being able to now read from scratch, all resulting to reinforcement of reading abilities among learners. The implication of this is that

teachers should adopt memorization strategies like mnemonic instruction that make LWD to remember content learnt and therefore become motivated to attend school, unlike traditional methods that do not make learners to be eager to attend school and to work hard and be successful.

The quantitative findings of the research also revealed how the intervention group indicated relatively higher abilities in all aspects of reading skills including reading words, vocabulary, and comprehension, than their counterparts who did not receive treatment. The qualitative findings of the research also indicated that most of the LWD showed improved reading abilities of complex words as compared to before the intervention. In agreement, Keeffe and Nadel (2016) showed that teaching mnemonics is effective as students can recollect vocabulary; while Cioca and Nerisanu (2020) asserted that use of visual mnemonic devices on creative performance, is effective and Whitescarver (2018) observed that mnemonic devices are important for improving recall of content taught. The finding suggests that mnemonic teaching strategies are a successful method to increase and keep students' terminology and knowledge of words and word meanings and ability to read complex words. Hence, this implies that teachers should take memorization strategies seriously in delivering lessons across subject areas.

The qualitative findings also indicated that there was an indication of a big change in the children's advancement in their reading ability and general class performance, hence they developed self-confidence and self-esteem. These findings are in line with the Information Processing Theory (IPT) as highlighted by Lutz and Huitt (2018) who stated that teachers are concerned about how people acquire knowledge and how keeping prior knowledge helps to choose learning objectives and successful teaching strategies that have long-term goals. In agreement, Huang, et al., (2021), in China, indicated that the academic expertise, approval, and how one views their personality traits in the group of LWD declined than those in the group that comprises participants who do not receive the experimental treatment, indicating that CWD judge themselves to be inferior compared to other progressing children. This implies that the Department of Basic Education should develop a policy that reading is tested from grade one, instead of grade three, and that those who are not able to read do not proceed until and unless they are able to read.

The qualitative findings of the research also revealed that the intervention enhanced retention of learnt material memories of LWD. This finding agrees with Miller's (1956) IPT theory which explains how information comes in, gets processed and then gets stored and retrieved. According to Zhou and Brown, (2015) Information Processing Theory is concerned with how people view their environment, how they put information into memory, and how they retrieve that information later. The finding on retention of learnt material is in agreement with Scruggs, et al., (2010); Lubin and Polloway, (2016); Fatima, (2020); Al-Khawaldeh and Al-Khasawneh, (2019); Othman, et al., (2019); Metsala and David, (2017), Mahmood and Khalaf, (2022); Whitescarver, (2018); Marthila, (2019); Avci and Gumus (2020); Prater, (2021) Ehsanpur and Razavi, (2020), who all concur that there is significant effectiveness of using mnemonic technique in teaching vocabulary retention and recall as well as skills for language competency among students.

In addition, the study by Lubin and Polloway (2016) reported that learners with varying learning problems acquired and retained concepts when taught using mnemonic instruction. The implication of this is that teachers should provide struggling learners more opportunities to grasp concepts using mnemonic instruction to learn, retain and recall concepts taught in subject areas and that subject teachers particularly in the science and social studies, may use mnemonic strategies to promote gains in academic achievement for learners who have difficulty acquiring basic skills. Hence, the Department of Education should organize in-service staff development workshops to enhance the guiding of students in reading in both English and local / home languages.

7.4.2 Effectiveness of sub-lexic instruction in enhancing of reading ability among grade three LWD

The quantitative findings revealed that many LWD who had been put on sub-lexical intervention for two terms generally had strong idea of sound-spelling relationships and that they developed a strong awareness of the differences between graphemes and phonemes. Similarly, the qualitative findings also showed that after the intervention, the learners had improved in reading and had developed interest with schoolwork. The qualitative results also showed that there was general improvement among learners who were receiving intervention and that the learners could read three-letter words and could

attempt to read bigger or longer words without assistance. This finding agrees with previous studies of Wright, et al (2011); Metsala & David, (2017); Smith, (2016); which all reported that learners with either Aspergers, Attention Deficit Hyper Disorder (ADHD) or dyslexia can be taught using phonological skills including phonemic awareness, letter-sound knowledge and letter-sound fluency and improve.

The finding also agrees with more recent literature by Canizo, et al, (2018); Paris, (2019); Bowers, (2020); Odo, (2021); Larsen, et al (2020) which all reported that causing someone to acquire skills in English should begin with phonemic awareness instead of whole word instruction. The implication is that teachers should begin teaching reading using phonemic awareness skills. This is because starting from grassroots or from the grapheme-phoneme correspondence (GPC), (graphemes that is letters of the alphabet to phonemes /sounds) instead of adopting whole language instruction will enable individual learners to decode and blend words more easily, as well as making them more fluent readers. Hence, Foundation -phase learners should drill letter-sound awareness or phonics instruction into learners from the beginning.

The results revealed that most of the Grade three LWD developed word recognition because of exposure to the sub-lexic technique intervention in the experimental school. Furthermore, the qualitative findings of the research indicated that before the intervention, some of the Grade three LWD used to arrive late for school, but they later changed their pattern to be punctual in school, after the intervention. This finding agrees with prior research by Borleffs (2019) which reported that assuming lexical and sub lexical processing routes for reading acquisition have been developed, describing types of reading difficulties depending on the component of the skill being most affected. The implication of this is that teachers should use phonemic awareness skills to assist learners to be able to decode pseudo words in English. Hence, the Department of Basic Education should monitor the standards of provision, delivery, and performance of education where they would also investigate the reading performance of learners and put things into action at provincial and national levels.

While the quantitative results revealed that LWD were able to make meaning from text and to map sound onto spellings after intervention, the qualitative results indicated that most of the Grade three learners who have reading problems and who received support developed increased enthusiasm in their work at school. The qualitative results also indicated that learners who participated in the intervention had increased development of

their attentive skills. These current findings conform to Skubic, et al., (2021) which reported that there was a numeric measurable difference in phonemic analysis between the treatment and critical comparison groups in favour of the treatment group.

The findings also agree with Wahyuni, et al (2016); Izadpanah and Rezaei (2022); Niolaki, et al., (2022) who reported that students showed much eagerness in following the programme, that they were keen to participate more in classroom activities and that academic enthusiasm depends on the effort put by both the teachers and learners under investigation. The implication of this is that there is need for both stakeholders (teachers and learners) to work very hard towards achieving reading ability at the end of the day. Furthermore, the Department of Basic Education (DBE) should assess compliance with the provisions of the Constitution of the Republic of South Africa.

The quantitative results showed that majority of LWD who had been taken through phonics instruction as a form of sub-lexical reinforcement were able to effectively comprehend texts and that phonics instruction helped learners with dyslexia in the development of word recognition. The qualitative findings revealed that some learners benefitted from the picture-sound and the picture-word method, and this made them to improve in spelling and dictation. The qualitative findings further revealed that several learners who participated in the intervention programme improved, not only in English, but also in other subjects like XiTsonga and Mathematics. These findings support the Information Processing Theory's (Howard 2015) claim that visual imagery is easier to recall than abstractions. These findings conform with Boyes, et al., (2017) which indicated that many parents acknowledged the assistance they received from the workshop on how to train their children in reading and spelling and the likelihood of them having to attend future workshops. The findings are also consistent with Gumede (2020) which showed that the reading comprehension level of private school learners was better than that of the government learners. The implication of this is that the DBE should work towards developing a reading culture among learners in schools and in homes.

The quantitative results further revealed that repeated reading as a form of sub-lexical reinforcement techniques is effective in enhancing reading proficiency among learners with reading difficulties. The qualitative results revealed that learners' reading improved due to the knowledge of phonemes they acquired during intervention because they could now read three-letter words and that their competence increased to read complex

sentences. These findings conform with old and current research that discuss the effectiveness of phonological decoding skills and increased competence to read complex sentences on enhancing reading abilities (National Reading Panel (NRP), (2000); Wright et al, (2011); Olubusula, (2014)[; Amadi and Offoma, (2019); Tshililo, (2016); Smith, (2016); Metsala and David, (2017), Gellert and Elbro (2017); Baron, et al, (2018); Canizo, et al (2018); Borleffs, et al, (2019); Paris, (2019); Bowers, (2020); Borghesani, et al., (2020); Glazzard and Stones, (2020); Larsen, et al, (2020); Sun and Xie, (2021), Ramirez-Avilla, (2021); Pallathadka, (2022); Monster, et al, (2022); Niolaki, et al, (2022); Viersen, et al (2022).

The research findings support Skinner's (1953) reinforcement theory, which argues that repeated learning of phonological skills and the subsequent motivation and reinforcement go a long way in enhancing reading abilities among LWD. This implies that teachers should take phonological awareness seriously since it is crucial for learning to read a system which requires some degree of awareness of linguistic form.

7.4.3 Gender influences on the effectiveness of the mnemonic reinforcement technique on enhancement of reading abilities of grade three LWD

The quantitative findings indicated that mnemonic intervention generally caused relatively higher improvement in performance in overall reading ability and its components (reading and comprehension) in girls than in the boys and that there was a noticeable outcome of gender identity in influencing enhancement of reading performance by mnemonic intervention, with the female learners having better scores than males. Correspondingly, qualitative results revealed that girls participated more actively than boys in the experimental class and they were more inquisitive in class than boys. Previous studies have shown that males and females differ in memory associated with gender-stereo-typed objects and that mnemonic strategy differs in the ability to recall information. Considering these findings, there is consistency with results found by previous studies that revealed that there were significant gender influences on the effectiveness of the mnemonic instruction. Generally, female participants were considered to perform better than males in several contexts, including achievement of higher percentage scores, Goh & Foong (1997); Tabatabei & Hejazi, (2011); Osuh & Mwankon, (2022).

However, this discovery opposes some prior collections of research which pointed out that there were no measurable serious differences due to gender (Musa, et al (2016); Dakhiel & Abu Al Rub, (2017); Oyundoyin & Bolaji, (2018); Funmilayo, (2022) & Okenyi (2022). Furthermore, specific findings have been inconclusive regarding the specifics of these differences. The implication of these findings is that the DBE should regularly organize workshops on methods to enhance reading abilities like mnemonic instruction so as to develop teachers since these methods facilitate access to the goals and objectives defined by the public agency by giving students the tools, they need to better transfer information into a memory system so that it will be much easier to get it back from memory at later points.

The quantitative findings, on one hand, revealed that girls notably performed better than their male counterparts in reading comprehension and that there was important difference between gender in reading alone, comprehension alone and overall reading. On the other hand, the qualitative findings indicated that girls were able to grasp concepts better than boys, their memory was sharper than that of boys and were seen to be able to recall content taught as seen during oral reading and writing than boys at grade three. The qualitative results also indicated that girls performed better in terms of, reading, handwriting, attention skills, word recognition and participation. In terms of reading for fluency, reading for pleasure, peer reading, guided reading and reading for understanding, the qualitative findings also revealed that girls dominated. These findings conform to previous research that found that females perform better than males in both word stock and storing (Goh & Fong (1997); Tabatabei and Hejazi (2011) and that female student recalled more and performed better on mental image mnemonic and sentence mnemonic than male students (Osuh & Mwankon 2022). However, Musa, et al., (2016); Dakhiel & Abu Al Rub (2017); Oyundoyin & Bilaji (2018); Funmilayo (2022) & Okenyi (2022) all concur that there were no numerical outstanding contrasts due to gender.

From these findings and from various studies, one may deduce that gender may affect reading comprehension at early stages, for example boys and girls between the ages 10-15, but not necessarily on genetics or because girls are more intelligent, but more on boys' attitude toward reading at their early ages. Therefore, boys should be encouraged to have positive attitudes towards school from a tender age both from home and school.

These findings highlight the necessity of all-inclusive intervention during pre-school and grade one to ensure that all learners are on the right track for learning through the school years.

7.4.4 Gender influences on the effectiveness of the sub-lexic reinforcement technique on enhancement of reading abilities of grade three LWD

7.4.5 Age influences on the effectiveness of the mnemonic reinforcement technique on enhancement of reading abilities of grade three LWD

The quantitative findings indicated that generally older children in the intervention group had relatively higher improvement in performance in overall reading ability and its two components (reading and comprehension) than the younger children in the same group. The qualitative findings reflected that young ages in general have better reading readiness than older ones. Furthermore, the qualitative findings indicated that reading readiness may begin to develop as early as five years, once the learners are exposed to phonemic awareness and that young learners will remember and be able to read and grasp letters of the alphabet and their sounds. The results are in line with previous findings regarding age influences where some of the studies revealed that third graders showed higher associations between judgements of learning ease and actual study time than first graders (Naumann, 2019).

This finding is also in accordance with previous findings that the youngest group of participants showed better outcomes on measures of word and pseudo reading, and that the young showed an immediate near transfer effect on a word-association task (Metsala & David, 2017; Brathen, et al, 2022). In agreement, Miller's (1956) Information Processing Theory (IPT) regarding short-term memory, presented the idea of chunking where a chunk is any meaningful unit, for example when learners begin reading, they must be well-versed with the alphabetic principle and phonemes for them to be ready for formal reading instruction. The implication of this finding is that there is need for school management to develop training programmes for parents to enlighten them with basic reading tips, including reading together every day and exposing children to different cultures and experiences as well as enhance their vocabulary through rich conversations with others.

The quantitative results revealed that there was significant effect of age in reading performance, with the older grade three learners having better scores for reading than younger ones, that mnemonic instruction is more effective in enhancing reading among the older grade three LWD than their younger counterparts, that mnemonic instruction reinforcement enhances of comprehension ability more in older (9 years and above) LWD than younger (below 9 years) learners, that mnemonic instruction is more effective in influencing enhancement of overall reading ability among older grade three LWD than their younger counterparts and that older learners' overall reading ability improves more than their younger counterparts. These findings are in accordance with (Jacobs, et al., (2001); Roy & De Haan, (2003); Kirchhoff et al., (2014); Metsala & David, 2017; Husa et al., 2017; Yu, et al., 2018; Bobby, 2022; Bråthen, et al., 2022) who all reported age-associated increase in use of a variety of reading tasks and concurred that young learners benefitted from use of mnemonics instruction in comparison with older people.

In this regard, studies by Sandberg, et al (2021) revealed that younger and young-old participants showed the highest level of proficiency and that studies by Radovic & Manzey (2019) showed that mnemonic acronyms could be used to improve the resilience toward detrimental effect of interruptions. Since reading is the most important pointer of achievement in life and school, learners must acquire reading proficiency and as such, reading tests must start as soon as children enter formal schooling to enable them to be phonemically aware, understand the alphabetic principle, apply these skills in a rapid and fluent manner, possess strong vocabulary and grammatical skills, and relate reading to their own experiences, to ensure sufficient levels of fluency, automaticity and understanding (Phala & Hugo, 2022). Furthermore, failure to master the basic skills in learning to read can create many problems for learners and affect their academic success (Phala, 2019). The implication of this finding is that the DBE should reconsider testing reading from grade one and not introduce reading tests at grade three level. It is crucial to introduce reading tests at grade one level because at grade three, it is not only too late, but it also increases the risk of reading failure and school dropouts. The national progression policy which allows Grade two learners to progress to Grade three without the required reading competency (Phala & Hugo, 2022) should, therefore, be revised.

The qualitative findings indicated that young learners have increased interest in reading in comparison to older learners in high school or at tertiary level, that they exhibited higher interest in emergent literacy compared to older learners in secondary school and

that they learnt how to recite, read alphabet letters, sight and vocabulary words, sentences, spell and make words and they did this out of enthusiasm. These research findings support previous findings that mnemonic acronym or keyword method enhance vocabulary learning (Radovic & Manzey, 2019; Othman, et al, 2019). In this regard, studies by Jacobs, et al., (2001); Roy & De Haan, (2003); Sandberg, et al (2021); Bobby (2022) and Brathen (2022) also revealed that mnemonic usage or memory training is very effective on learners of all ages from grade R up until tertiary level.

In agreement, Miller's (1956) theoretical assertion noted strategies for assisting encoding including chunking, rehearsal, imagery, mnemonics, schema activation, and level processing, of which teachers can choose any of the strategies to develop and enhance vocabulary learning and development of interest to learn English as a first language. Based on the results of this study, it is concluded that since mnemonic instruction gives space to new opportunities for learners to develop emergent literacy, alphabetic fluency, words and patterns, intermediate reading, and advanced reading, implementing the various mnemonic reinforcement techniques is more effective on students' attitudes than traditional ways of presenting literacy development. The implication of this is that teachers should be trained on different mnemonic instruction strategies so that they have the knowledge of how to teach the diverse learners in their classes.

7.4.6 Age influences on the effectiveness of sub-lexic techniques on the enhancement of reading abilities of grade three LWD.

The quantitative findings revealed that after receiving sub-lexical interventions, older (9 years and above) grade three LWD largely had comparatively higher improvement in performance in overall reading ability, in reading and in comprehension, than the younger 8 to 9 years) learners and that sub-lexical instruction more effectively enhances reading in older children than in younger children among the grade three LWD. This suggests that age influences on the effectiveness of the sub-lexic techniques on the enhancement of reading abilities of grade three LWD is dependent on maturity of a learner, with those who are 9 years and above having comparatively higher improvement in performance than those who are below 9 years.

In agreement, O'Brien, et al., (2011) study indicated that orthographic recognition performance for first graders was slower compared to second graders and that for second graders was slower than that of third graders. This research also supports previous findings that studies with younger learners report more positive outcomes in terms of closing the reading-achievement gap than do studies with older readers (Metsala & David 2017), that language learning processes of younger learners are less stressful, that younger learners are more skilful in language learning and that younger learners have increasing interest or emergent literacy in reading (Clark,et al, 2015; Metsala & David, 2017; Ozfidan & Burlbaw, 2019; Alfian, 2020; Azudin,et al, 2020; Alsubaei, 2022) (Rashotte, et al, 2001; Vlachos and Papadimitriou, 2015). In addition, Higuchi,et al, 2021also revealed that they support the notion of introducing letter-sound knowledge to young learners.

However, some literature has opposing views that even older learners develop language just as the younger ones, that older children had better scores than younger ones for reading fluency, reading comprehension, the total reading performance (Rashotte, et al, 2001; Vlachos and Papadimitriou, 2015) and that there was no significant relationship between age, gender, education, or family size (Strauss & Bipath 2021). This suggests that language develops not only among the young children but as a child grows into adulthood out of repeated exposure to new words where children form orthographic representations that allow them to read the words faster and more fluently (Alvarez-Canizo, et al., 2018).

The qualitative data further revealed that younger learners have faster language development and have flexible brain compared to older learners or adults. The qualitative results also indicated that generally learners aged 6 to 12 find memory strategies and sounds very helpful and that learners aged 6 to 12 may develop more than one language at the same time compared to older people. This may be due to the elasticity of young people's brains. This study finding is consistent with Eslick, et al., (2020) and Hasenacker and Scroeder (2022) which point out that reading a word requires processing of visual, orthographic, phonological, and semantic information and that phonemic awareness skills should develop during grade R (age 6) and grade 1 (age 7) for language development to be successful. This study finding is also supported by Odo (2021) who asserted that phonics instruction supports the development of word decoding ability of English learners.

The findings of the study that young learners grasp concepts and develop language faster than their older counterparts supports previous findings that early phonics interventions effectively promote reading development and that phonemic awareness at early ages has moderate correlations with later literacy. This is because reading is one of the most significant language skills that must be mastered by grade three and it is a skill that permits learners to understand the meaning of written and printed material as well as a means of communication and language acquisition, sharing ideas and information (Phala & Hugo 2022). Therefore, since reading is the most important pointer of achievement in life and school, learners must acquire reading proficiency and as such, reading tests must start as soon as children enter formal schooling to enable them to be phonemically aware, understand the alphabetic principle, apply these skills in a rapid and fluent manner, possess strong vocabulary and grammatical skills, and relate reading to their own experiences, to ensure sufficient levels of fluency, automaticity and understanding.

The implication of this finding is that first and second years of schooling should be devoted to teaching and testing of reading and, therefore, less tests related to the learners' academic achievement, cognitive ability, and creativity development. Therefore, the DBE should develop a policy that testing of reading starts at grade one from term two, and not to wait until learners are in grade three, where the workload becomes even more.

7.5. CONLUSIONS OF THE STUDY

This section presents the conclusions derived from the findings of this study.

7.5.1 Effectiveness of mnemonic instruction in enhancing of reading ability among grade three LWD.

This PhD study concluded that the use of mnemonics was effective and that many grade three learners with dyslexia preferred using mnemonics to memorise vocabulary words since mnemonics are an efficient memorization technique which helps individuals to learn, retain and recall information easily. The study also concludes that mnemonics help improve an individual's long-term memory since Long -term memory (LTM) stores all previous perceptions, knowledge and information learned by the individual and enables learners with dyslexia to read given vocabulary words even at the end of the term when they are tested on their reading. In addition, the study concludes that LTM offers extremely important information, including that if the knowledge is pictorial rather than

verbal, it would seem to make sense that images would be more easily and readily stored in memory.

The study concludes that the mnemonic strategy is effective as seen from the improvement in performance and increase in recall of content by the LWD and that the LWD acquire associations between phonemic awareness and recalling of lesson content due to use of the mnemonic technique. It can also be concluded that the fact that the researcher started from grassroots through beginning teaching alphabet letters, introducing phonemic awareness, introducing three-letter words, longer words, and subsequently short sentences, made the LWD to be able to read. Additionally, it is concluded that constant recitation of rhymes and songs that are linked to content learnt, is vital for learners.

The study also concludes that it became quite easy for many of the LWD to memorize vocabulary definitions using mnemonic techniques, the learners preferred teacher-provided mnemonics to their own created mnemonics and the use of music mnemonics, in the form of rhymes, poems and songs, increased LWD's recognition and mastering of words for a long time. Also, the study concluded that music mnemonics, through recitation and use of audio-visual aids, use of picture/ sound/ word matching, enhanced learners' ability to read and write words, recalling of words, days of the week, months of the year, and recalling sight and vocabulary words, as well as independent reading. Another conclusion drawn from the study findings is that enhancement of reading and improvement in spelling and dictation was made possible through the pivotal role played by mnemonic techniques. This study concluded that LWD would learn reading words and sentences through music mnemonics whereby they start by learning a rhyme or song then use the rhyme or song to 'recite' words or sentences to be learnt.

The study concludes that behaviour change was reported as one of the major positive effects of the mnemonic reinforcement technique among LWD as they changed from negative behaviour to positive behaviour after the intervention. Furthermore, it is concluded that audio-visual teaching and learning aids were provided to help learners to improve their reading abilities. The study concludes that the intervention group showed relatively higher abilities in all aspects of reading skills including reading words, vocabulary, and comprehension, than their counterparts who did not receive treatment that most of the LWD showed improved reading abilities of complex words as compared

to before the intervention. The study also concludes that there was an indication of a big change in the children's advancement in their reading ability and general class performance, hence they developed self-confidence and self-esteem. It also concluded that the intervention enhanced increased retention of learnt material from short term to long term memories of LWD.

7.5.2 Effectiveness of sub-lexic instruction in enhancing of reading ability among grade three LWD.

The study concludes that many LWD who had been put on sub-lexical intervention for two terms generally had strong idea of sound-spelling relationships and that they developed a strong awareness of the differences between graphemes and phonemes. The study also concludes that after the intervention, the learners improved in reading and developed interest with schoolwork. The study concludes that the LWD were able to make meaning from text and to map sound onto spellings after intervention and that most of the Grade three LWD who participated in the intervention developed increased enthusiasm in their work at school. It is concluded that learners who participated in the intervention had increased development of their attentive skills. The study concludes that some learners benefitted from the picture-sound and the picture-word method, and this made them to improve in spelling and dictation. The study also concludes that several learners who participated in the intervention programme improved, not only in English, but also in other subjects like XiTsonga and Mathematics. The study also concludes that learners' reading improved due to the knowledge of phonemes they acquired during intervention because they could now read three-letter words and that their competence increased to read complex sentences.

7.5.3 Gender influences on the effectiveness of the mnemonic reinforcement technique on enhancement of reading abilities of grade three LWD.

The study concludes that mnemonic intervention generally caused relatively higher improvement in performance in overall reading ability in girls than in the boys and that there was a significant effect of gender in influencing enhancement of reading performance by mnemonic intervention, with the female learners having better scores than males. In addition, the study concludes that girls participated more actively than boys in the experimental class and they were more inquisitive in class than boys. The

study also concludes that girls significantly outperformed their male counterparts in reading comprehension and that there was significant difference between gender in reading alone, comprehension alone and overall reading.

The conclusion drawn from this study is that girls were able to grasp concepts better than boys, their memory was sharper than that of boys and were seen to be able to recall content taught as seen during oral reading and writing than boys at grade three level. This study concludes that girls performed better in terms of, reading, handwriting, attention skills, word recognition and participation. In terms of reading for fluency, reading for pleasure, peer reading, guided reading and reading for understanding, the qualitative results also indicated that girls dominated.

7.5.4 Gender influences on the effectiveness of the sub-lexic reinforcement technique on enhancement of reading abilities of grade three LWD

To reiterate, the study concludes that girls had comparatively higher improvement in performance than the boys in reading, comprehension and in the overall reading ability, after having gone through sub-lexical intervention. The study also concludes that girls outperform boys during the early years of primary schooling. The study further concludes that when LWD were taken through sub-lexical instruction, girls' overall reading ability improved more than their counterparts. The study also concludes that girls' cognitive development was faster than that of boys as they were quicker at taking up new skills and knowledge and that these girls were smarter and showed better academic performance compared to their counterparts.

7.5.5 Age influences on the effectiveness of the mnemonic reinforcement technique on enhancement of reading abilities of grade three LWD

The study concludes that generally older children in the intervention group had relatively higher improvement in performance in overall reading ability than the younger children in the same group. The study concludes that young ages in general have better reading readiness than older ones, thus reading readiness may begin to develop as early as five years, once the learners are exposed to phonemic awareness. The study concludes that young learners have increased interest in reading in comparison to older learners in high school or at tertiary level, that they exhibited higher interest in emergent literacy

compared to older learners in secondary school and that they learnt how to recite, read alphabet letters, sight and vocabulary words, sentences, spell and make words and they did this out of enthusiasm.

7.5.6 Age influences on the effectiveness of sub-lexic techniques on the enhancement of reading abilities of grade three LWD.

The study concludes that younger learners grasp concepts better than older ones in high school. The study also concludes that younger learners have faster language development and have flexible brain compared to older learners or adults. The study further concludes that generally learners aged 6 to 12 find memory strategies and sounds very helpful and that such learners may develop more than one language at the same time compared to older people. The study concludes that young learners grasp concepts and develop language faster than their older counterparts supports previous findings that early phonics interventions effectively promote reading development and that phonemic awareness at early ages has moderate correlations with later literacy.

7.6 CONTRIBUTIONS OF THE PhD STUDY

This PhD study adds to the body of knowledge on understanding of the effectiveness of mnemonic and sub-lexic reinforcement techniques in the enhancement of reading abilities among grade three LWD. Firstly, the findings of this PhD study have strong contribution because they are very comprehensive since it adopted a mixed methods research paradigm hence it has both quantitative and qualitative results on the effectiveness of the mnemonic and sub-lexic reinforcement techniques on enhancing reading abilities among grade three LWD. Unlike studies that exist in literature which examined one reinforcement technique on a single paradigm, the present study employed a combined paradigm. Therefore, the weaknesses of both paradigms are addressed by counter research approaches making this study very strong.

Secondly, from literature review, there is no such a study that has been done on the effectiveness of methods of enhancing reading abilities among LWD on two interventions as this study. Therefore, this PhD thesis contributes immensely to the development of literature on effectiveness of mnemonic and sub-lexic reinforcement techniques, as some of the methods of enhancing reading abilities among grade three learners with dyslexia

in primary schools. This is because most studies that exist in literature either focused on either mnemonic or sub-lexic reinforcement techniques only but very few had combined approach of both. Moreover, of the few that had combined aspects, none of them investigated the effectiveness of methods of enhancing reading abilities but focused on problems encountered by LWD in schools. Therefore, the investigation of the effectiveness of mnemonic and sub-lexic reinforcement techniques elevates this PhD study to a higher level as compared to studies that exist in literature.

Thirdly, this PhD thesis has contributed to the extension of Skinner's (1953) reinforcement theory which involves strengthening behaviour or increasing the likelihood of behaviour to reoccur. Using shaping and chaining, reading abilities of LWD, would be enhanced. This is because the study revealed that LWD can improve in reading due to positive reinforcement in the form of verbal praise by the teacher, getting rewards in the form of stickers, tokens, or badges.

In addition, this thesis has also contributed to the extension of the Information Processing Theory (IPT), spearheaded by Miller (1956) on how information is filtered from sensory into short-term or working memory, where some of the information is discarded or filtered away once again, and a portion of it is encoded or stored in the long-term memory. This is because in this thesis, it was revealed that grade three LWD were able to recall content (words/sentences) learnt due to use of mnemonics in the form of music, rehearsals, rhymes, and songs which they recited then incorporated words to be learnt. Thus, this PhD study provides information on how memory is enhanced among LWD by adopting the two interventions.

7.7 RECOMMENDATIONS

This section presents recommendation for education policy and recommendation for further study. These recommendations are based on the findings of this study for the purpose of comprehending the effectiveness of mnemonic and sub-lexic reinforcement techniques on enhancing reading abilities among grade three LWD in primary schools in Mpumalanga.

Education policy and practice recommendations

From the study findings and conclusions, the following specific recommendations are suggested for practice:

7.7.1: Need for DBE to organize workshops to train teachers on how to improve reading among learners with reading problems in both English and home language.

The study recommends that the Department of Basic Education should organize workshops that train teachers in various approaches on how to improve reading of learners with reading problems. This is because the workshops would help teachers by equipping them with the most widely used approaches to reading instruction to enhance learners' reading abilities of learners in early years. This is because the findings of this study reported that some of the LWD were not able to read most words both in the pre- and post- tests administered by the researcher. As a matter of fact, if pre- and post-reading tests were to be conducted on all learners from grade one to seven at district level, then the data compiled, this would improve curriculum efficacy since data-driven decisions are important in education.

7.7.2: Need for DBE to revise the teaching and testing of reading to begin from grade one.

The study recommends that the Department of Basic Education should revise the policy that reading is tested from grade one, instead of from grade three, and that those who are not able to read do not proceed until and unless they are able to read. It is essential that testing of reading is done from as early as grade one for early identification and subsequently successful intervention methods for young, normally developing readers and children who struggle to read in the initial stages of reading development. Furthermore, reading early gives a child a head-start on expanding their vocabulary and building independence and self- confidence.

This is because the study revealed that results from the screening tests and pre-tests administered to all grade three learners from both the control school and experimental school, a significant number of the grade three learners showed that the trend was that they struggled with reading and that young learners had increased interest (emergent

literacy) in reading in comparison to older learners in high school or at tertiary level. Therefore, testing of reading becomes a norm for grades one and two that at the end of each school term, the learners are tested reading from 10 words (grade 1) to 20 words (grade 2), instead of the eighty (80) words per minute that would just surface at grade three level.

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7.7.3: Need for Foundation phase teachers to drill Grapheme -phoneme correspondence (GPC) or letter-sound awareness/ phonics instruction into learners from the beginning

The study recommends that foundation phase teachers should begin teaching reading using grapheme-phoneme correspondence. This is because starting from grassroots would enable individual learners to decode and blend words more easily, as well as making them more fluent readers. Furthermore, learners must, from an early age, acquire reading proficiency, be taught phonemic awareness, understand the alphabetic principle, possess strong vocabulary, syntax, and grammatical skills, and relate reading to their own experiences to ensure sufficient levels of fluency, automaticity and understanding.

Further still, phonological skills have been found to be strongly related to early reading and writing development. This is important because the findings of the study had reported a significant difference between pre- and post-tests of grade three learners with dyslexia who received intervention, thereby portraying the effectiveness of the sub-lexic technique. On the contrary, teaching using whole language instruction may cause more harm than good as it may confuse LWD. Worse still, using whole language instruction may only help a few normally developing readers as was the case with one of the classes at the intervention school where only three learners were excellent readers, yet the rest of the class struggled with identifying simple words.

7.7.4: Need for DBE to monitor the standards of provision, delivery, and performance of education, backed by the National Education Policy Act of 1996

The study recommends that the Department of Basic Education should monitor the standards of provision, delivery, and performance of education by deriving its mandate

from the National Education Policy Act of 1996. This would inscribe into law the policies, legislative and monitoring responsibilities of the Minister of Education, and the formal relations between national and provincial authorities, where they would also investigate the reading performance of learners and put things into action at provincial and national levels.

Monitoring performance of education would present the DBE with data on how many learners struggle with reading and thereby map the way forward on what approaches should be used to promote academic achievement through the enhancement of reading abilities as well as ways to remediate those learners lagging. Therefore, constant monitoring of reading performance of foundation phase learners in a province or nationwide would alert the DBE on the number of learners needing assistance on reading and ways and strategies to ameliorate reading abilities of learners with and those at risk of dyslexia. The DBE would thereby act at provincial and national levels in terms of promoting academic achievement whereby it would legislate policies like the "bottle-neck" system on reading achievement and enforce a law that no grade one or grade two learner proceeds to the next grade without the required reading competency. This is because the study indicated that before the intervention, some of the Grade three LWD used to arrive late for school, but they later changed their pattern to be punctual in school, after the intervention.

7.7.5: The DBE should train all Foundation phase level teachers on how to use mnemonic and sub-lexical instruction to learners.

The study recommends that the DBE should train teachers on using both interventions to teachers so that they have the knowledge of how to teach the diverse learners in their classes. This is because the study revealed that a significant number of grade three learners struggled with reading. On one hand, mnemonics can be a useful tool in any classroom, especially for students with special needs and learning disabilities. Mnemonics are effective memory aids that rely upon information that a student already knows to help that student to retain newly acquired information. The current study findings revealed that the intervention caused the learners in the intervention group to prefer using mnemonic strategies to memorize vocabulary words and that the reading

abilities of the learners in the experimental group were enhanced, hence they developed self- confidence and self-esteem. The intervention also led the grade three LWD's retention of learnt material from short-term to long-term memory to develop.

On the other hand, for the sub-lexic reinforcement technique, the current study revealed that many LWD who had been in the intervention for two terms generally had a strong idea of sound-spelling relationships and that they developed a strong awareness of the differences between graphemes and phonemes. It is important to note that both interventions, the mnemonic and su-blexic reinforcement techniques, are effective in enhancing reading abilities of LWD.

7.7.6: Need for DBE to develop early assessment for boys with dyslexia in the early years of education.

7.8 Limitations of the study

In any study of this nature, it is inevitable to encounter limitations. Below, follows a discussion of the limitation experienced during the data collection of this mixed methods study.

7.8.1 Language barrier

One of the limitations was language barrier since effective communication was limited. The researcher had a tough time in trying to communicate with both the intervention and control groups of LWD as they could not communicate in English. The parent participants, who took part in interviews as well as those who responded to questionnaires, could not also communicate using English used by the researcher. To curb this limitation, the researcher resorted to using the local language, XiTsonga since she at least was able to use it for communication purposes. The researcher would interpret the semi-structured interviews in the language that the participants understood.

7.8.2 Transport to and from the research site

The researcher also had a difficult time commuting to and from the research site as there was no direct transport and one had to board a taxi to the shopping mall first to get direct transport back home. Moreover, the intervention school was a kilometre off the road and the researcher had to walk every day to and from the research site.

7.9 Suggestions for further research

On the bases of the study findings, conclusions, and limitations of the study**,** the following suggestions are proposed for future research:

- As this study was limited to the Bohlabela District of Mpumalanga province, future research could include a larger sample of schools from a wider cultural, regional, and geographic area of South Africa as variables to be investigated further in relation to using mnemonic and sub-lexic reinforcement techniques to enhance reading abilities of grade three LWD in primary schools. Including a larger sample size to acquire more extensive data would also be useful in achieving this.
- Other research might focus on using mnemonic and sub-lexic reinforcement techniques in the enhancement of reading abilities among primary school learners with autism.
- Future studies could also investigate the effectiveness of phonemic awareness and synthetic phonics as skills that students need to decode words when reading and encode words when writing quickly and efficiently as this study used the term sub-lexic technique.
- A study of this nature could also be expanded to include private schools and those in neighbouring towns, with a focus on using mnemonic and sub-lexic reinforcement techniques on enhancing reading abilities among learners who struggle with reading.

7.10 CONCLUDING REMARKS

This PhD study examined the effectiveness of mnemonic and sub-lexic reinforcement techniques in enhancing reading abilities among grade three LWD in primary schools in Mpumalanga. This study revealed that mnemonics and sub-lexic reinforcement techniques were found to be effective in enhancing reading abilities among grade three LWD in primary schools in Mpumalanga. This study indicated that use of mnemonics can bring a turnaround to the alleviation of reading problems among learners. Skinners'

operant conditioning theory which provides a framework for positive reinforcement and adding a desirable stimulus to increase the likelihood of behaviour to reoccur could support the study's conclusions.

The other theory that guided the study, the Information Processing Theory, which provided a framework for using chunking and use of sensory registers which receives all information a person senses, short-term which hold information temporarily and long-term, which is part of the memory with an unlimited capacity and can hold information indefinitely, also supported the study's conclusions. The study also revealed the influence of gender on both mnemonic and sub-lexic interventions on enhancing reading abilities among grade three LWD in primary schools in Mpumalanga. The study indicated that mnemonic intervention generally caused relatively higher improvement in performance in overall reading ability, reading and comprehension in girls than in the boys, that girls participated more actively, grasped concepts better than boys and recalled content taught better than boys. Furthermore, the study also revealed that girls had comparatively higher improvement in performance than the boys in the two components of reading ability, reading and comprehension and in the overall reading ability, after having gone through sub-lexical intervention and that girls performed tasks at high speed, comprehended and grasped concepts compared to boys.

In addition, the study also revealed that age influenced the effectiveness of mnemonic and sub-lexic reinforcement techniques generally in that older children in the intervention group had relatively higher improvement in performance in overall reading ability and its two components, reading and comprehension than the younger children in the same group, that young ages in general have better reading readiness than older one and that mnemonic instruction reinforcement enhances of comprehension ability more in older (9 years and above) LWD than younger (below 9 years) learners.

Moreover, the study also revealed that younger learners have increased interest/emergent literacy in reading in comparison to older learners in high school or at tertiary level. Finally, the study also revealed that these younger learners grasp concepts better than older ones in high school. Furthermore, younger learners have faster language development and have flexible brain compared to older learners or adults and that generally learners aged 6 to 12 find memory strategies and sounds very helpful and that learners aged 6 to 12 may develop more than one language at the same time compared to

older people. Finally, the current study revealed that mnemonic and sub-lexic techniques were effective and helped the grade three LWD who received intervention to improve in overall reading.

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.APPENDICES

APPENDIX I: PARTICIPANT INFORMATION SHEET



My name is Lilian Zindoga, a PhD student in Inclusive Education at the Wits School of Education, University of the Witwatersrand, Johannesburg. My topic of the PhD research project that am undertaking is "*Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities Among Grade Three Dyslexic Learners in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences".* My supervisor is Dr Peter Aloka.

I Kindly request you to take part in this PhD research project by completing questionnaires (for parents only) and interview (for parents and teachers) after the completion of the two interventions that are to be implemented by the researcher. It will take about 45 minutes to complete questionnaires while interviews will take approximately one hour. I would wish to request for the permission of the parents and teachers who will be interviewed to allow me to record the interviews.

There will be no personal costs to you if you participate in this project, you will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to. The questionnaire and interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the University library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). The data collected from this research project will be stored in a password protected computer and will be kept for 5 years. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0)11 717 1408, emailhrecnon-medical@wits.ac.za

Regards,
Lilian Zindoga
Researcher: Lilian Zindoga, (2291553@wits.ac.za)-0652947725
Supervisor: Dr Peter Aloka (peter.aloka@wits.ac.za)- 0117173098

APPENDIX II: CONSENT FORM FOR PARENTS

Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities Among Grade Three Learners with Dyslexia in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences

Lilian Zindoga

I,…….., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous.	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report.	YES	NO
I agree that the interview may be audio recorded.	YES	NO

…… (Signature)
…… (Name of participant)
…… (Date)

…… (Signature)
…… (Name of person seeking consent)
…… (Date)

APPENDIX III: ASSENT FORM FOR PARENTS

Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities Among Grade Three Learners with Dyslexia in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences

Lilian Zindoga

I,…….., agree that my child……. (Child's name) may participate in this research project. The research has been explained to me and I understand what my child's participation will involve. I agree to the following:

(Please circle the relevant options below).

Informed Consent

I understand that:

- My child's name and information will be kept confidential and safe and that my child's name and the name of the school will not be revealed.
- s/he does not have to answer every question and can withdraw from the study at any time.
- s/he can ask not to be audiotaped.
- all the data collected during this study will be destroyed within 3-5 years after completion of the project.
- I agree that the researcher may use my child's quotes that are anonymised in the research report/publications.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0)11 717 1408, email hrecnon-medical@wits.ac.za

…… (Signature)
…… (Name of participant)
…… (Date)

…… (Signature)
…… (Name of person seeking consent)
…… (Date)

APPENDIX IV: CONSENT FORM FOR TEACHERS (INTERVIEW)

Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities Among Grade Three Learners with Dyslexia in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences

I,…….., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

Permission to be interviewed.

I agree to be interviewed

YES/NO

I agree to be audiotaped during the interview

YES/NO

I know that the audiotapes will be used for this project only

YES/NO

I know that I can withdraw from the interview at any time

YES/NO

Consent form

I understand that:

- my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
- I do not have to answer every question and can withdraw from the study at any time.
- I can request not to be audiotaped.
- all the data collected during this study will be destroyed within 3-5 years after completion of the project.
- I agree that the researcher may use direct quotes that are anonymised in the research report/publications.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0)11 717 1408, email hrecnon-medical@wits.ac.za

…… (Signature)
…… (Name of participant)
…… (Date)

…… (Signature)
…… (Name of person seeking assent)
…… (Date)

APPENDIX V: QUESTIONNAIRE FOR PARENTS

My name is Lilian Zindoga, (email address 2291553@students.wits.ac.za). I am a female PhD student at the University of Witwatersrand, and I am carrying out a study on the "*Using Mnemonic and Sub-lexic Reinforcement Techniques to Enhance Reading Abilities Among Grade Three Dyslexic Learners in Primary Schools in Mpumalanga: Analysis of Age and Gender Differences*". Your child has been selected to participate in this study, and he/she will be placed a reading intervention programme for two terms. The intervention involves both mnemonic and sub lexical reinforcement techniques which are meant to enhance the reading ability. There are four sections in this questionnaire. All data and information generated from this study will be treated as strictly private and confidential. You are therefore kindly requested to complete the questionnaire as honest as possible based on the effectiveness of the interventions. Thank you for participating in this study.

1. **What is the age of your child? ----------**
2. **Gender? ----------**

Please, indicate the extent to which you agree with the following statements. The response format is in a 5-point Likert scale: SA-Strongly Agree, A-Agree, N-Neutral, D-Disagree and SD-Strongly Disagree.

PART I: Effectiveness of Memonics Interventions

	Items	Strongly disagree	disagree	Undecided	Agree	Strongly agree
1	My child prefer using mnemonics to memorize vocabulary words					
2	My child sees it easier to memorize vocabulary definitions when using mnemonics					
3	I think my child will be able to easily create mnemonics to memorize new information					
4	My child prefer teacher provided mnemonics over					

	learner created mnemonics					
5	My child enjoyed using this memorization strategy					
6	my child prefers to use this Strategy at home always					
7	My child is now able to remember more when using mnemonics.					
8						

PART II: Effectiveness of Sub Lexic Reinforcement Intervention

	Items	**Strongly disagree**	**disagree**	**Undecided**	**Agree**	**Strongly agree**
1	My child has the idea of sound-spelling relationships					
2	My child is aware of the difference between phonemes (sounds)and graphemes (letter or number of letters that spell a sound)					
3	My child is able to make meaning from text					
4	Phonics instruction helps my child to map sounds onto spellings					
5	Phonics instruction plays a key role in helping my child to comprehend text					
6	Phonics instruction helps in the development of word recognition by providing my child with an important and useful way to figure					

	out unfamiliar words while reading					
7	Reading fluency in my child improves their reading comprehension					
8	By end of grade 3, my child will be conversant with the majority of phonics skills					
9	Repeated readings of texts are helpful to my child					

PART III: Gender Differences on Effectiveness of Mnemonics & Sub Lexic Interventions

	Items	**Strongly disagree**	**disagree**	**Undecided**	**Agree**	**Strongly agree**
1	Girls find memorizing words easier than boys					
2	Boys were able to use mnemonics to memorize vocabulary definitions compared to girls					
3	Boys have the idea of the difference between phonemes (sounds) and graphemes (letters or groups of letters that spell a sound) compared to girls					
4	A girl child has the idea of sound-spelling relationship compared to a boy child					
5	I understand that reading fluency improves reading comprehension for both boys and girls					
6	Both boys and girls were able to create					

	mnemonics to memorize new information					
7	Both boys and girls enjoy using the memorization strategy					

PART IV: Effectiveness of Mnemonic & Sub Lexic Intervention on the Basis of Age

	Items	**Strongly disagree**	**disagree**	**Undecided**	**Agree**	**Strongly agree**
1	My child younger than 6 years was not able to tackle memorization of vocabulary words					
2	I know that a child under the age of 6 might face problems in expressive vocabulary skills					
3	My child at 6 to 7 years old found it easier to memorize vocabulary definitions than younger children					
4	I know that phonics instruction helps my 6–7-year-old child to sound and to read new words.					
5	I believe that reading fluency improves reading comprehension on my grade 3 child					
6	My 6–7-year-old child preferred teacher provided mnemonics over learner-created ones					
7	My child at 6 to 7 years old was able to create mnemonics to					

	memorize new information					
8	My 6–7-year-old child will tackle sound-spelling relationships easily					
9	Younger children find it easier to use these interventions than older ones in school					
10	Irrespective of age, these interventions work well to improve reading abilities of learners					

APPENDIX VI: DYSLEXIA SCREENING TEST

This is a screening tool, not a diagnostic test. The dyslexia Screening Test will give you indications of dyslexia. If your student scores within the ranges that indicate dyslexia, it is advised that you seek professional help for the student.

Independent Activities:

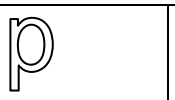
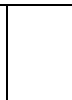
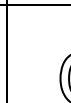
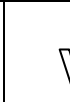
You may need to read the instructions to the student.

1. **Print the alphabet below in lower case letters:**

2. **Circle all of the b's:**

b	d	b	q	d	b	p	d	b	b	q	q
p	d	q	b	d	d	b	b	d	p	q	b
q	b	d	b	p	p	d	b	p	b	d	p

3. Circle each reversed letter:

4. Look at the first figure in the column. Circle the matching figure to the right of the line.

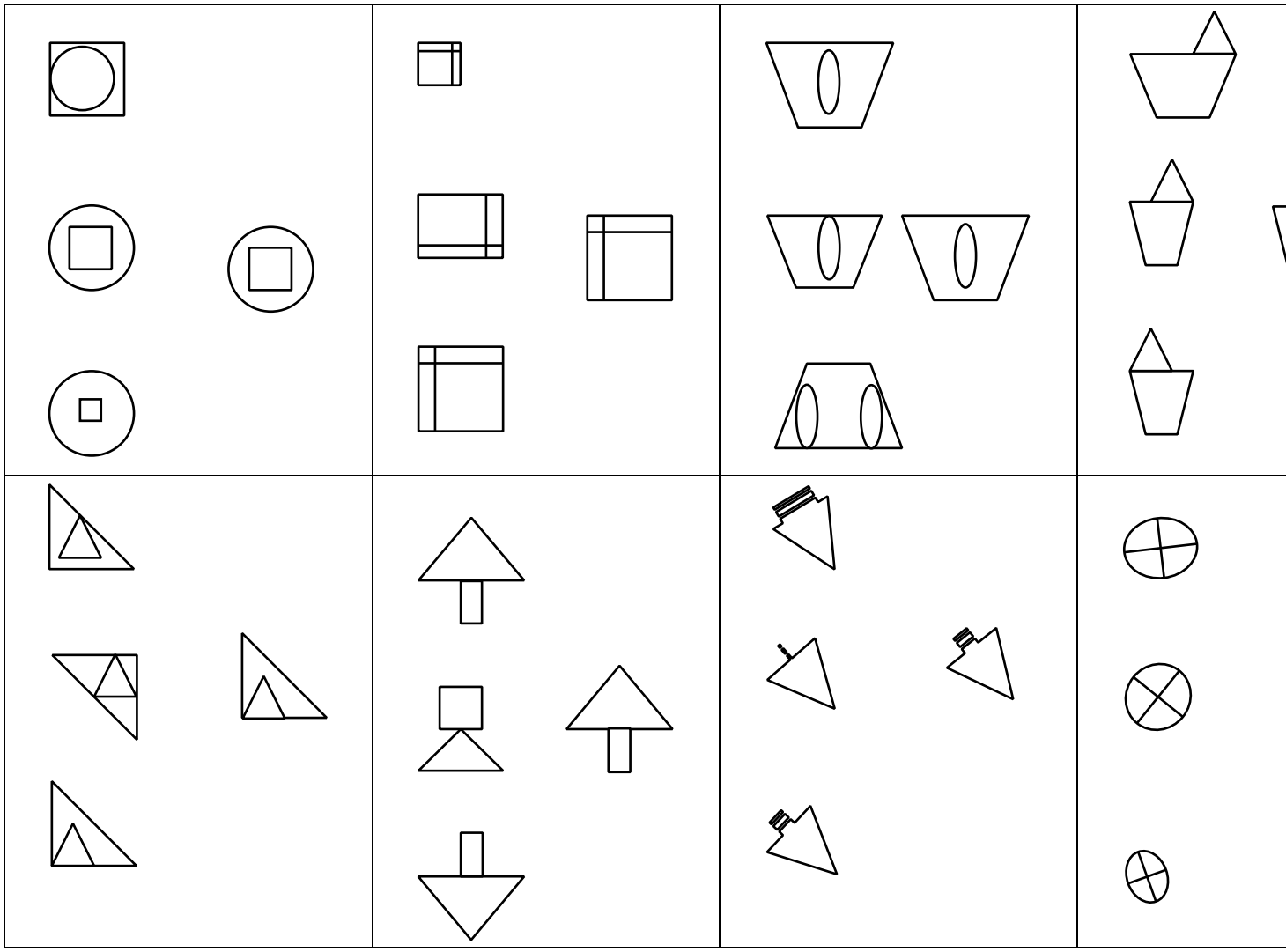
5. Look at the word on the left and circle the word on the right that matches.

	the		them
the	ərt	then	nərt
	ten		then

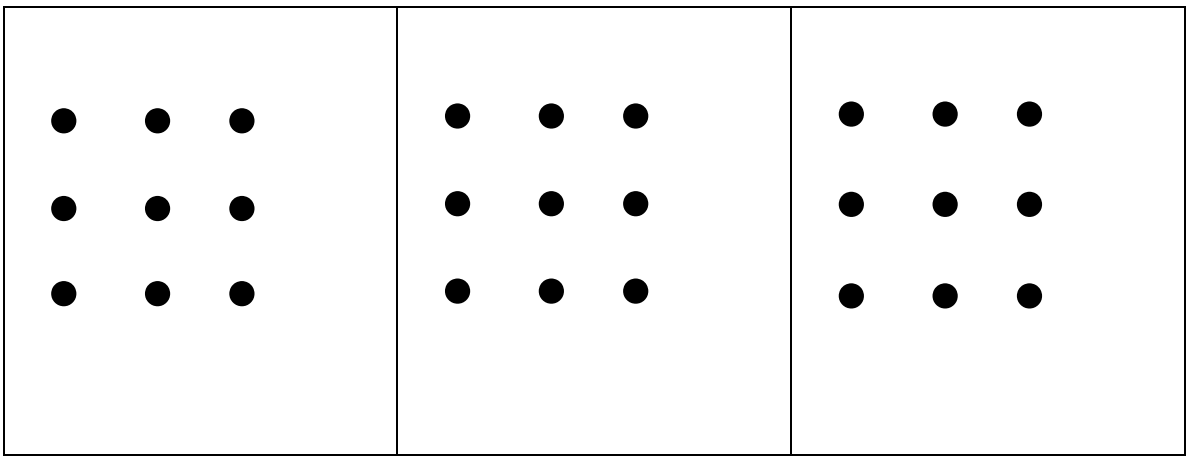
6. Circle each was.

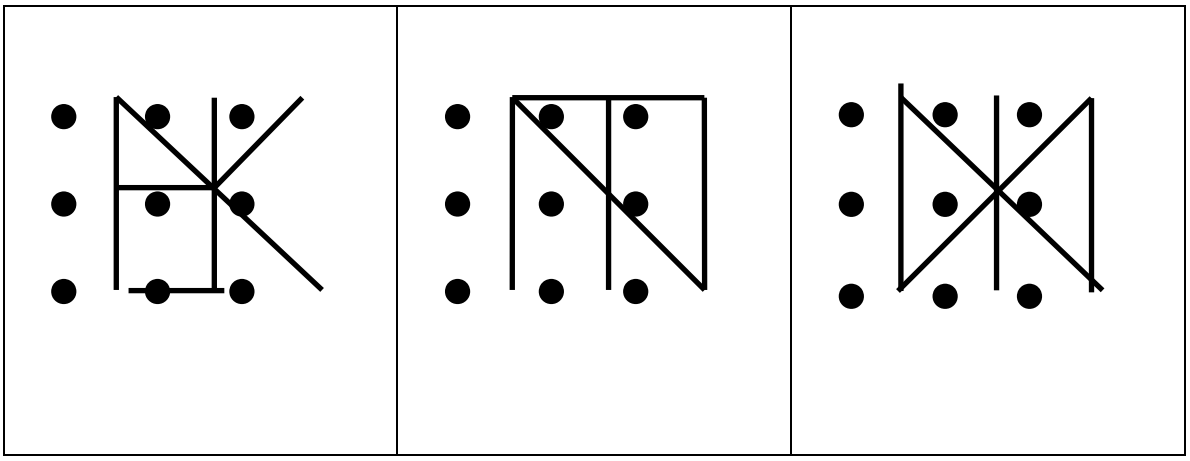
		saw	way			
was	raw	was				saw
saw	was	way	saw	win		war
was	why	saw	was			was
		saw				

7. Look at the figure on the right and circle the one on the left that matches.



8. Have the student copy the figures from the bottom to the dots on top.





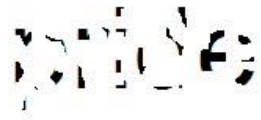
9. Look at each word and figure out what it is. Write the word on the line.



_____



_____



_____

10. Look at the letters at the left. Cover them up and copy them from memory on the line.

b p d p _____

q q b g d _____

d g b d p q

_____

11. Circle each reversed letter within the word

h e r	l i t	d o g	l a g	n o t
n o w	h i m	m a b	d o w	m a l l
o w l	n u t	q e n	r s n	s a t

12. Circe each reversed word.

own	got	bat	too	sip
nst	can	tip	pan	bsd

Teacher or Parent Directed Activities:

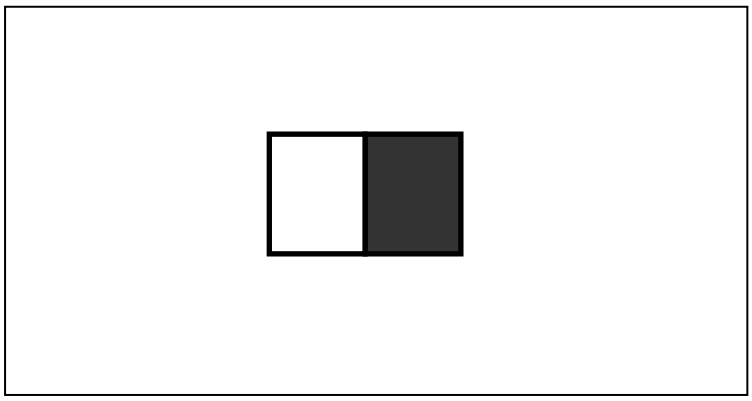
Follow the given instructions for the student to perform.

13. **Read each word out loud and have the student circle the words that rhyme with the word <u>gut</u>. (4words will rhyme).**

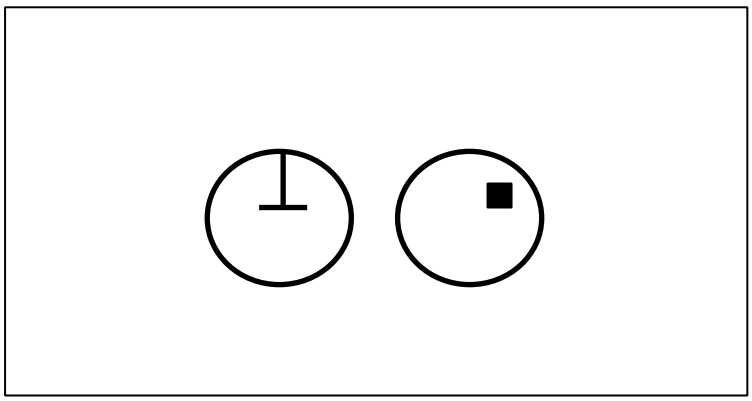
cut	bun	but	bud
sun	rut	tub	nut

14. **Hold card #1 up to the student for 5 seconds. Take it away and have the student reproduce it on one of the blank cards. Do the same with card #2, holding up for 10 seconds. Do the same for card #3 for 15 seconds.**

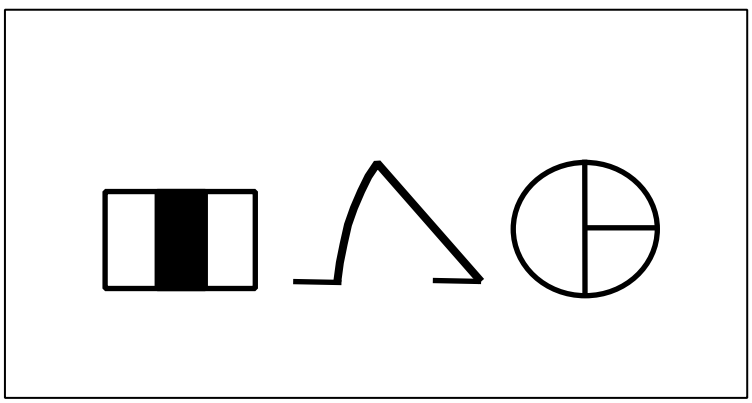
#1



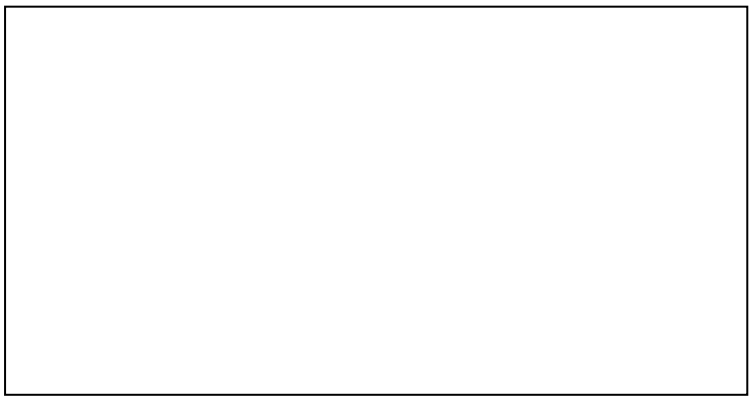
#2

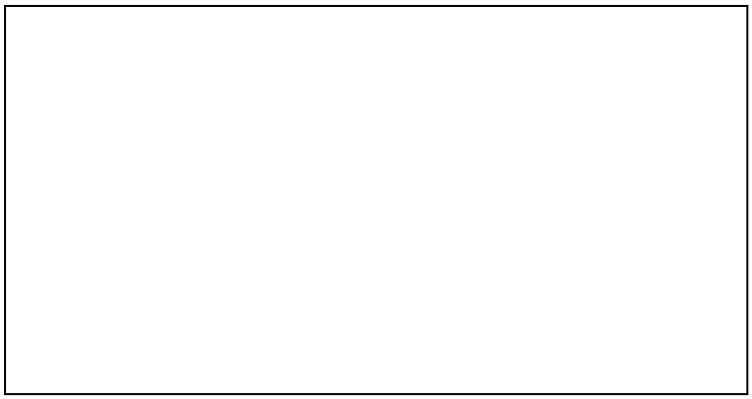


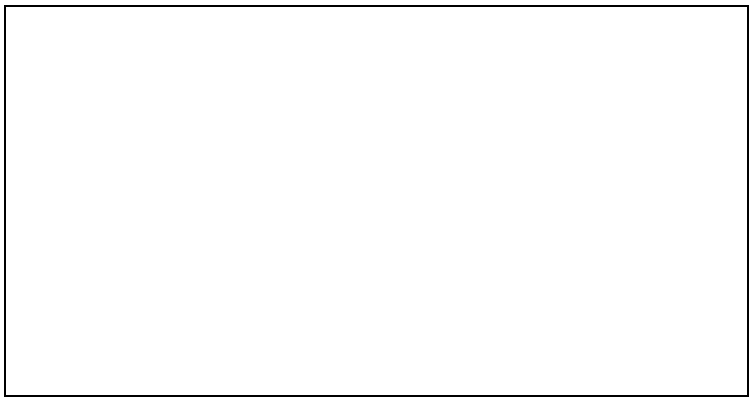
#3



Blank Cards





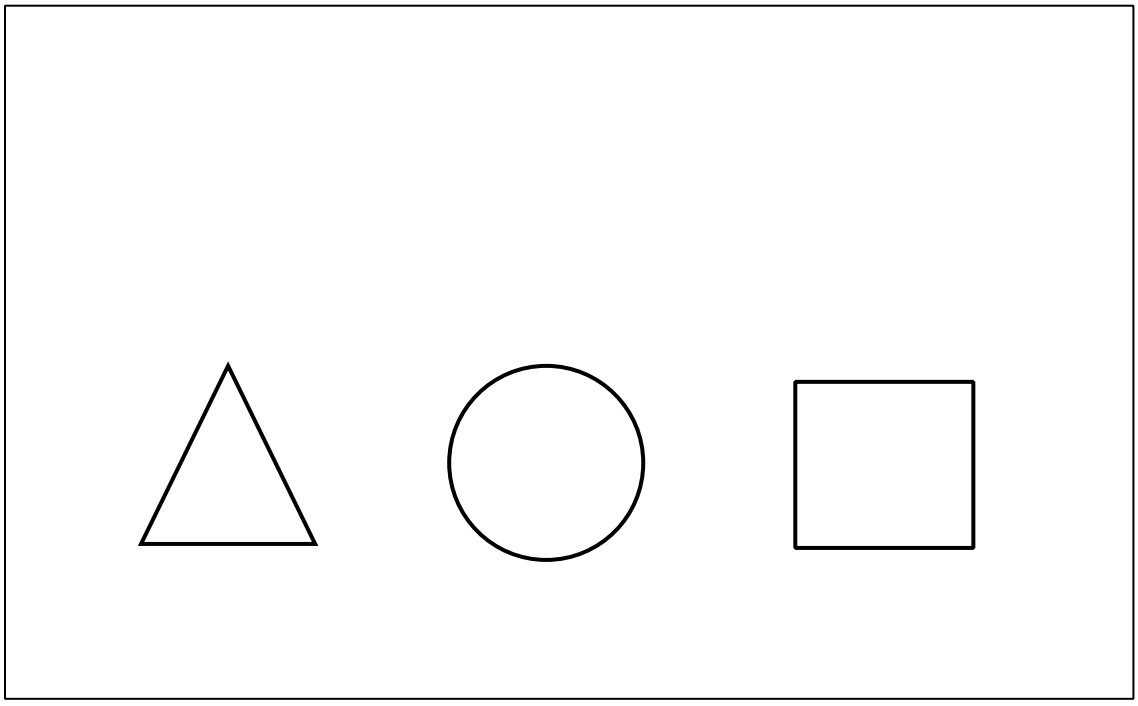


15. Read the following words out loud. Mark the words the student misses.

dad	bad	bib	did	bid	dip	bed
dab	**dob**	**dib**	**bop**	**pod**	**dap**	**pad**

16. **Have the student**:

Draw a vertical or up and down line on top of the triangle.
Draw a horizontal or sideways line under the circle.
Draw a diagonal or slanted line through the square.



17. **Say each group of words out loud and have the student repeat them back to you in the exact same order: (Say the words slowly and clearly.)**

1. dog - snake- moon

2. please- simple- bringing- supple

3. design – frighten- glistening- production –desperate

18. Read the following sound segments out loud. Have the student repeat them to you. Mark those sounds the student misses.

og	in	eep	one	ib	ort
fuh	yuh	esp	unk	ab	esk
ert	wuh	ane	oon	ut	osk

19. Have the student repeat these words exactly back to you. Mark yes or no.

vacationing in Venice _____

curiously courteous _____

animals in aluminum _____

suspicious suddenly _____

arguable announcing _____

conscientious candidate _____

Answer Key:

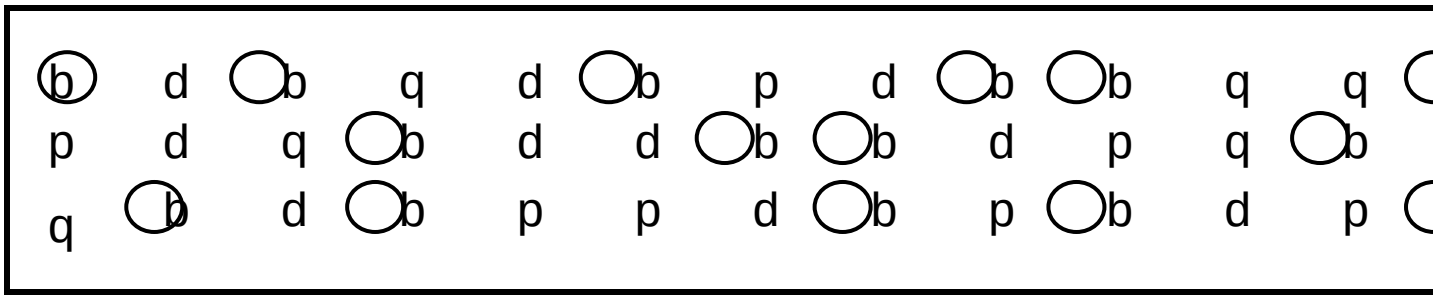
1. **Print the alphabet below in lower case letters:**

a b c d e f g h i j k l m n o p

q r s t u v w x y z

-the alphabet should be in lower case letters and in the correct order. -it should take no longer than three minutes for the student to complete the alphabet
-there should be no reversed or improperly formed letter
-count each letter as a point Total wrong:_____

2. **Circle all of the b's:**



-count each letter as a point
Total wrong:_____

3. **Circle each reversed letter:**

p	h	x	o	t	ɔ
w	m	t	k	ƨ	q
r	ɳ	g	w	ɘ	ɒ
d	ɾ	h	s	ƨ	ɟ

-if the student circles a correct letter, mark it wrong

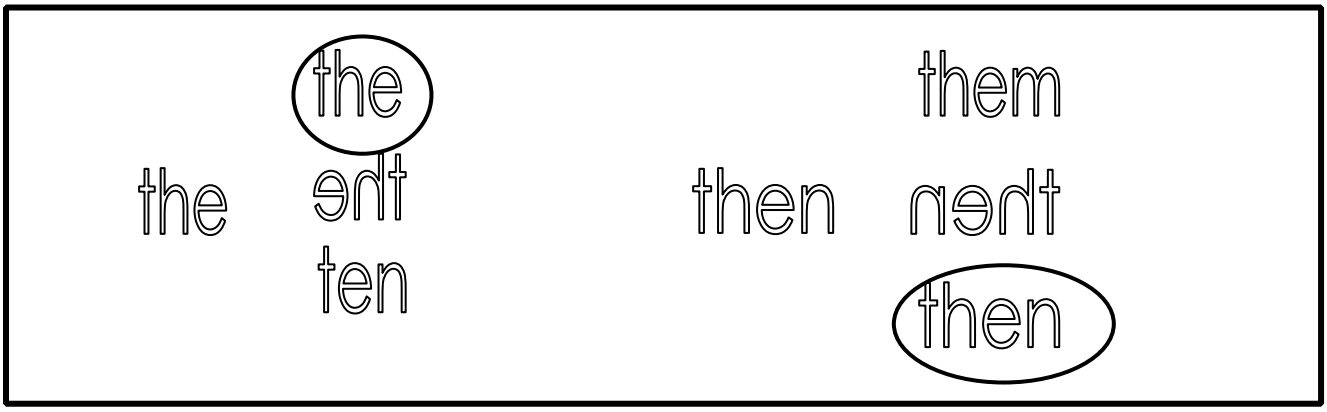
Total wrong:_____

4. Look at the first figure in the column. Circle the matching figure to the right of the line.

⇩	⇦	⇧	⇩	⇨
⇦	⇦	⇩	⇧	⇨
◁	▷	△	◁	▽
b	d	b	q	p
d	q	p	d	b

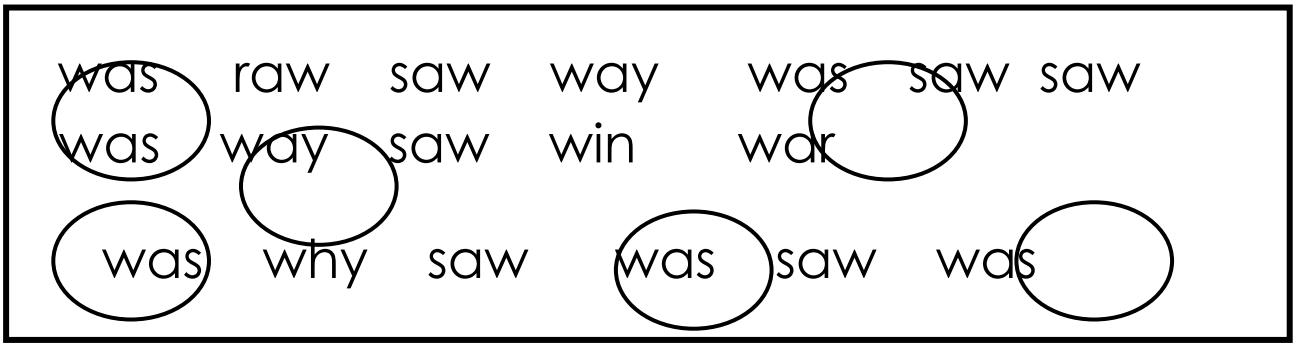
Total wrong:_____

5. Look at the word on the left and circle the word on the right that matches.



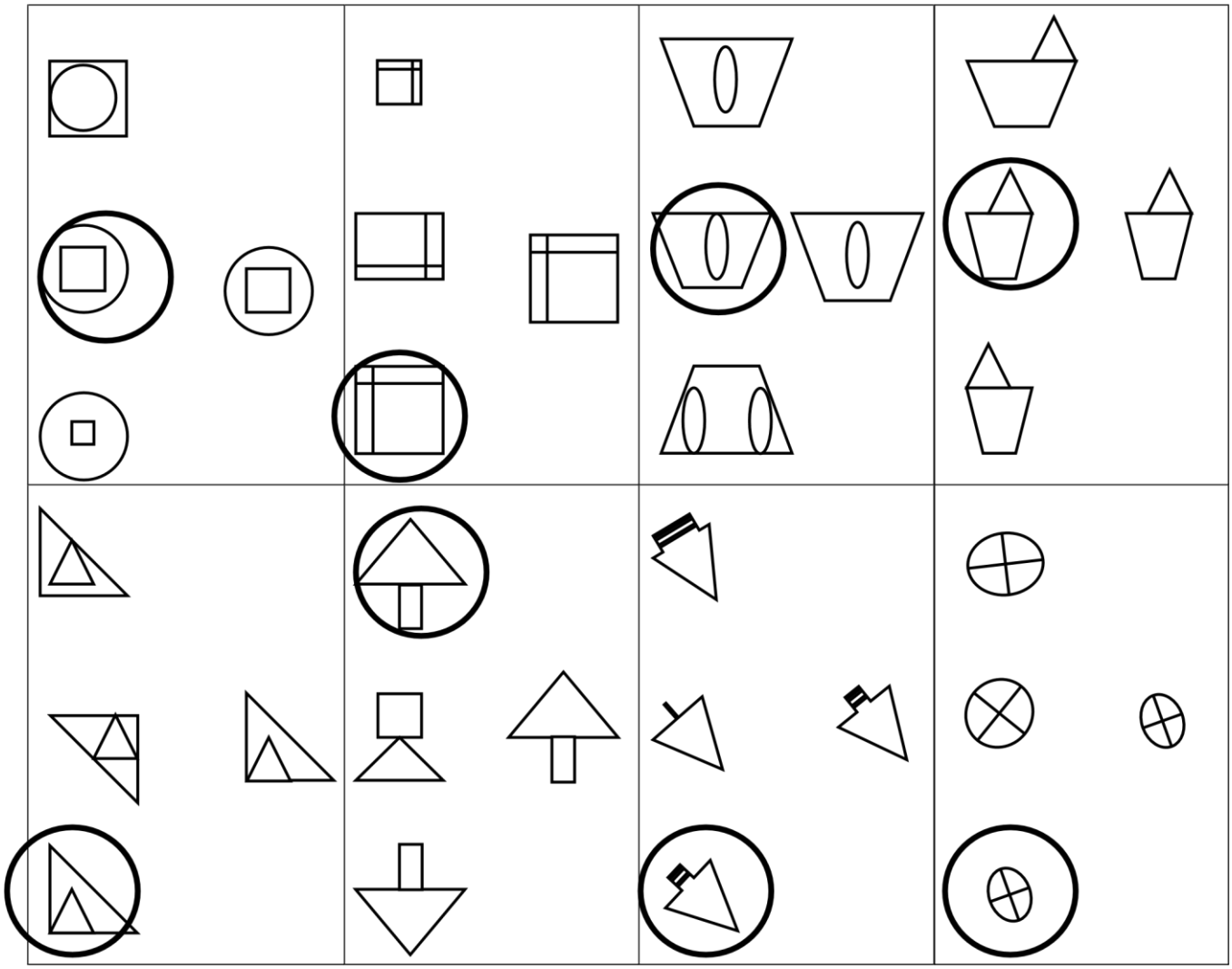
Total wrong:_____

6. Circle each was.



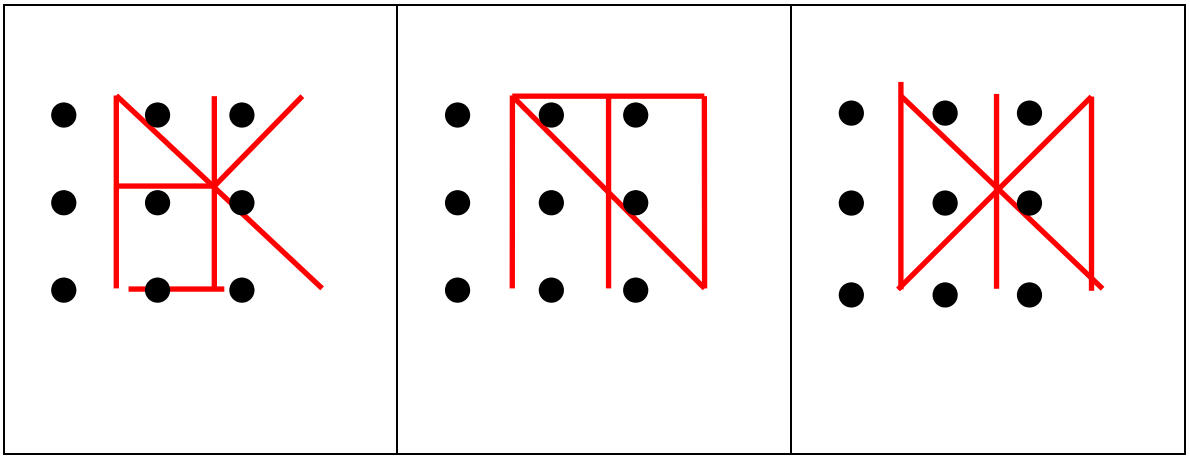
Total wrong:_____

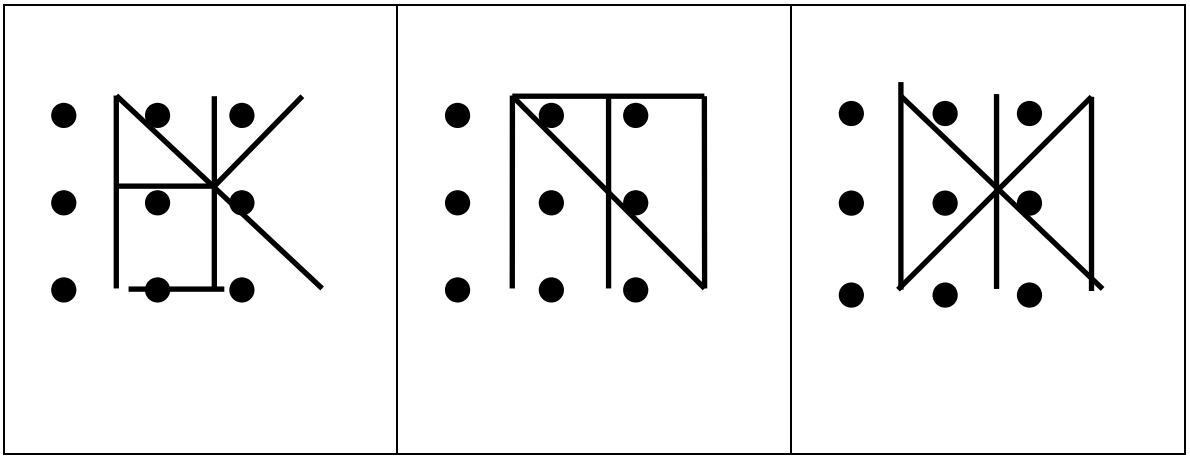
7. Look at the figure on the right and circle the one on the left that matches.



Total wrong:_____

8. **Have the student copy the figures from the bottom to the dots on top.**





-count each square as one total answer

Total wrong:_____

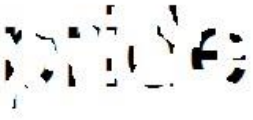
9. Look at each word and figure out what it is. Write the word on the line.



quake



tribe



pride

Total wrong:_____

10. Look at the letters at the left. Cover them up and copy them from memory on the line.

b p d p b p d p

_____

q q b g d q q b g d

_____

d g b d p q d g b d p q

_____

-count each line as one total answer

Total wrong:_____

11. Circle each reversed letter within the word

her	lit	dog	lag	not
now	him	mab	dow	mall
owl	nut	qen	rsn	sat

-mark it wrong if the student circles a correct letter

Total wrong:_____

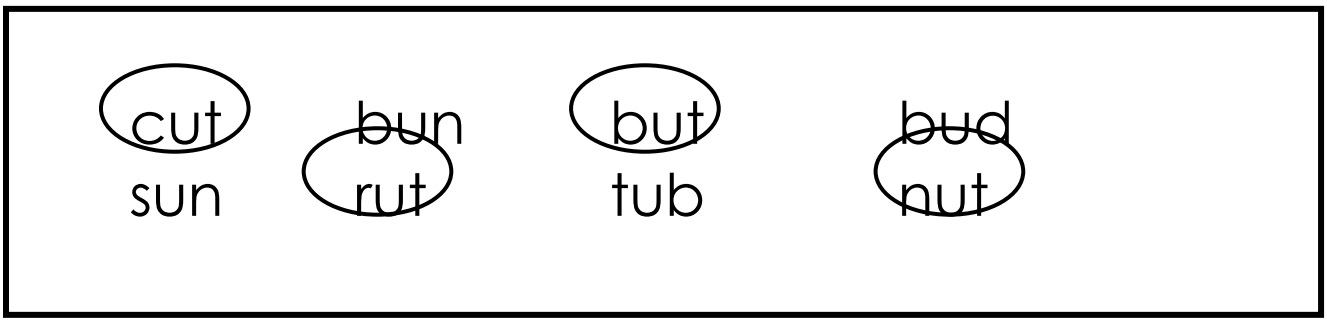
12. Circe each reversed word.

own	got	bat	too	qis
nst	can	tip	pan	bsd

-mark it wrong if the student circles a correct word

Total wrong:_____

13. Read each word out loud and have the student circle the words that rhyme with the word <u>gut</u>. (4words will rhyme).

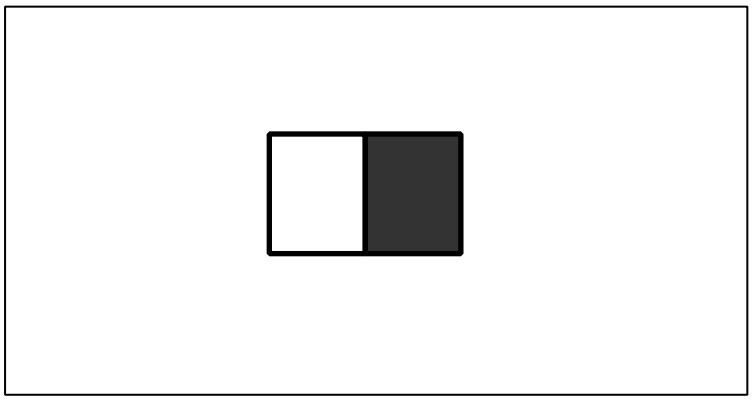


-mark it wrong if the student circles a non-rhyming word

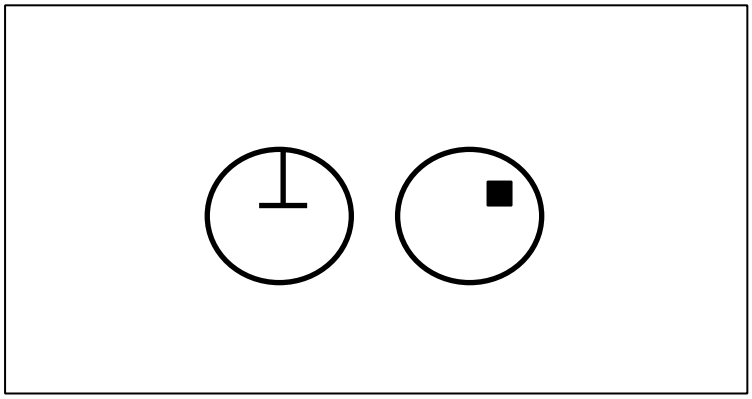
Total wrong:_____

14. Hold card #1 up to the student for 5 seconds. Take it away and have the student reproduce it on one of the blank cards. Do the same with card #2, holding up for 10 seconds. Do the same for card #3 for 15 seconds.

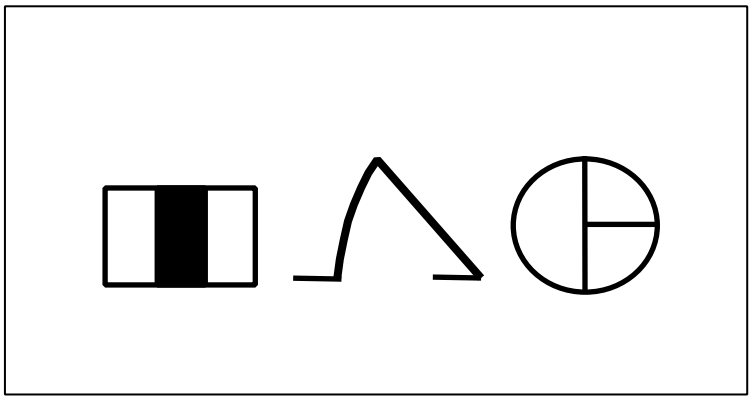
#1



#2

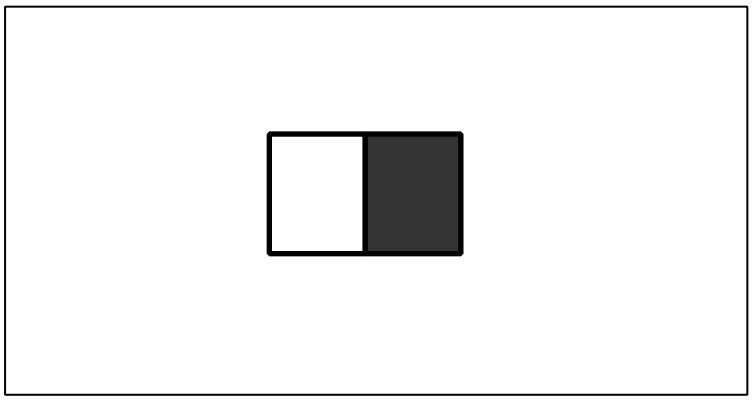


#3

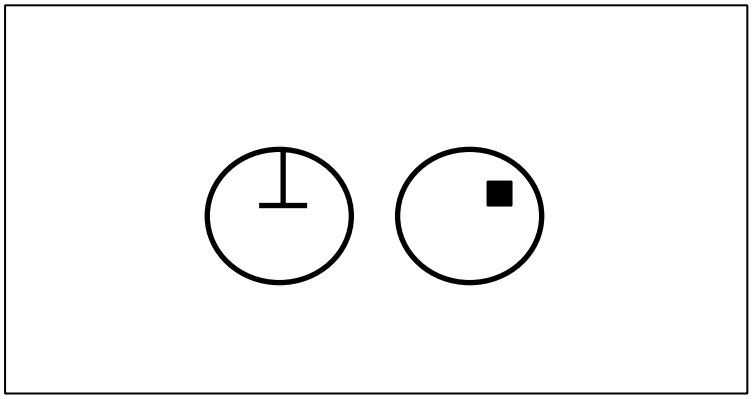


Blank Cards

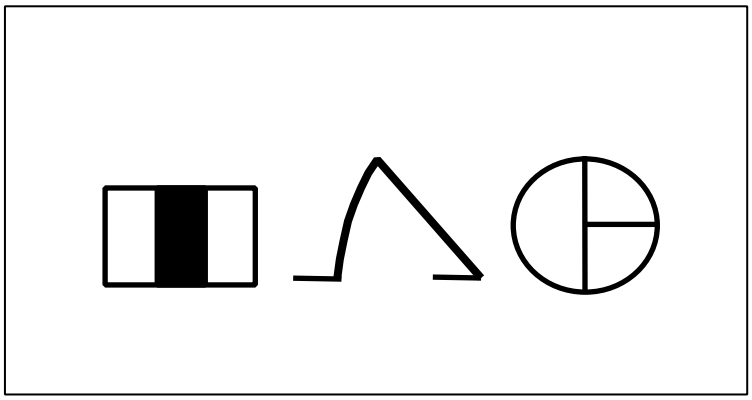
#1



#2



#3



Total wrong:_____

15. Have the student read the following words out loud. Mark any mistakes:

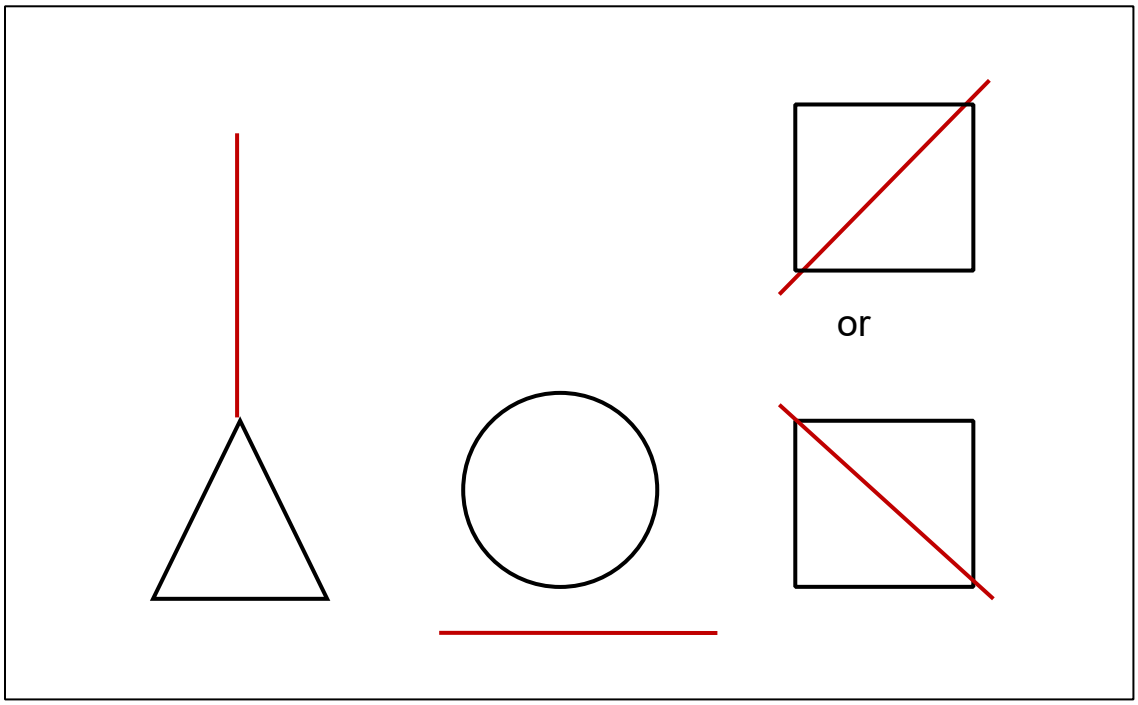
dad bad bib did bid dip bed

dab dob dib bop pod dap pad

Total wrong:_____

16. Have the student:

Draw a vertical or up and down line on top of the triangle.
Draw a horizontal or sideways line under the circle.
Draw a diagonal or slanted line through the square.



Total wrong:_____

17. Say each group of words out loud and have the student repeat them back to you in the exact same order: (Say the words slowly and clearly.)

1. dog - snake- moon
2. please- simple- bringing- supple
3. design – frighten- glistening- production –desperate

Total wrong:_____

18. Read the following sound segments out loud. Have the student repeat them to you. Mark those sounds the student misses.

og	in	eep	one	ib	ort
fuh		yuh	unk	ab	esk
esp					
ert	wuh	ane	oon	ut	osk

Total wrong:_____

19. Have the student repeat these words exactly back to you. Mark yes or no.

vacationing in Venice _____

curiously courteous _____

animals in aluminum _____

suspicious suddenly _____

arguable announcing _____

conscientious candidate _____

Total wrong:_____

Dyslexia Screening Test Results

1. Total up how many the student has missed:

Use the following guidelines to determine if your child has symptoms of dyslexia. Keep in mind that these are guidelines for a dyslexia screening, not a firm diagnosis.

Kindergarten to 1st grade:	10 mistakes
Grades 2 - 4	7 mistakes
Grades 5 - 8	5 mistakes
Grades 9 - higher	3 mistakes

©2014 by Lisa Harp, certified teacher. Any dyslexia screening test that resembles this one has been pirated and is illegal to use.

APPENDIX VII: READING APPENDIX TEST (PRE-TEST)
Student Number:

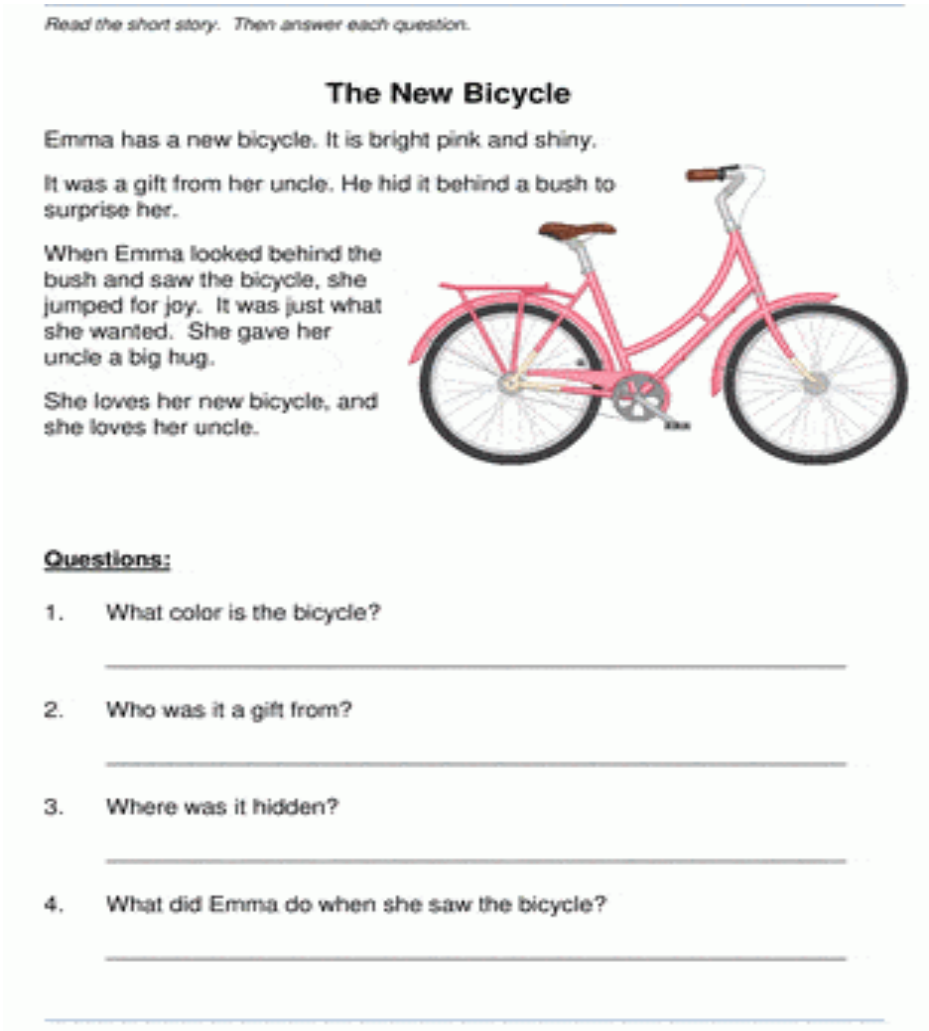
Gender:

Age:

rm	ock	at	is
red	art	oon	ame
ile	me	uch	alk
one	een	ss	th
chool	arners	acher	incipal
anning	eading	urriculum	oliday
allenge	rategy	omprehension	ocabulary
aragraph	ssessment	ognitive	xonomy
nowledge	fficult	oring	egaphone
khaustion	rminology	onsciousness	oss
ouble	nceremonious	verachievement	apacitate
ouse	oarrow	orse	olygon
ntelope	quid	acket	osolute
onstitution	uspicious	etective	ust
bling	nnoyed	rious	orks
gument	lationship	etermined	mbarrassed
Whistle	neaked	aster	uppet
reeze	aundry	ase	nockdown
errible	rotect	unctuation	ivate
omputer	kamine	ve up	obbled

Total number of words: 80-To be read in one minute.

Reading Comprehension



Read the short story. Then answer each question.

The New Bicycle

Emma has a new bicycle. It is bright pink and shiny.

It was a gift from her uncle. He hid it behind a bush to surprise her.

When Emma looked behind the bush and saw the bicycle, she jumped for joy. It was just what she wanted. She gave her uncle a big hug.

She loves her new bicycle, and she loves her uncle.

Questions:

1. What color is the bicycle?

2. Who was it a gift from?

3. Where was it hidden?

4. What did Emma do when she saw the bicycle?

Assessment Tools to Measure Reading Ability

1. To track progress and tailor teaching strategies to meet each student's individual needs, the present study will use two reading methods, Structural Analytical Synthesis (SAS) and the Gasuka reading method of pictures and syllables, to assess reading abilities among dyslexic grade three learners.
2. **Assessment tool 1: Structural Analytical Synthesis (SAS)**
3. The SAS method emphasises that humans see things as a whole with curiosity accompanied by high curiosity (Solchan, et al., 2010). Rasmitadila, Rachmadtullah, Samsudin, Aliyyah, Humaira and Syaodih, (2020) highlight that the SAS method is the method used to help students read and write the beginning for elementary school students, which focuses on several steps that consist of 1) structural, to show the whole; 2) analytical, decomposition process; 3) analytic re-incorporation into structural. The emphasis of the SAS method is on the learning experiences, curiosity development, and enhanced sense of memory (Sochan et al., 2010), making it suit the mnemonic instruction.

Here is an example of using the SAS method in English and XiTsonga (the local language in Bohlabela District).
First steps (structure): Students pay attention to simple pictures and sentences provided by the teacher. Next, the students read a simple text by removing the image.

Second steps: analysis of sentence structure (In XiTsonga)
Example: Tumelo u hlaya buku (Tumelo is reading a book)
Third steps: combining complete sentence structure (In XiTsonga)
Another example using the SAS method in English is explained below.
First steps: students read the reading card by mentioning the image and the initial syllable of the picture (in Indonesian)

Second steps: reading syllables without pictures into words and sentences

itu majalah ayah
i-tu ma-ja-lah a-yah
i-t-u-m-a-j-a-l-a-h a-y-a-h
Third steps: combining complete sentence structure (in Indonesian)

i-t-u-m-a-j-a-l-a-h- a-y-a-h

i-tu ma-ja-lah a-yah
itu majalah ayah
Therefore, in English,
Step 1: The teacher shows children a picture and the initial syllable of the image. For an example a picture of a boy holding a ball and the syllable “b-”
Step 2: Reading syllables without pictures into words and sentences
b-o-y, b-a-l-l Sentence: Boy and ball. The –boy- has –a- ball.
Step 3: combining complete sentence structure
The boy is playing with a ball.

Assessment tool 2 (Picture and syllable method/ Gasuka method)

Another method that can improve students' reading ability is the picture and syllable method/ Gasuka method which uses a reading card media that is adapted to the initial syllable with objects that have similarities with syllables and pronunciation sounds, Rasmitadilla, (2020). This reading card is beneficial for students to analyze syllabic sounds into objects found by the students everyday. The Gasuka method, according to Rasmtadilla, (2020) can increase the memory and ease of students in reading and helps students in improving the psychomotor, language, communication, and social development.

Examples of rhymes on Syllables

Syllables
Syllables are parts of words
Parts of words, parts of words
Syllables are parts of words,
Clap them out with me!

Fly has just one syllable,
Syllables, syllables.
Fly has just one syllable,
Clap it out with me!

Butter has two syllables
Syllables, syllables
Butter has two syllables,
Count them out with me!

Butterfly has three syllables,
Syllables, syllables
Count them with me!

There are many other examples that teachers can get from Pintrest.com.cdn.ampproject.org and other sources on the internet in teaching reading using the SAS and the Gasuka methods in a bid to enhance reading abilities among dyslexic grade three learners.

Reading Comprehension Passage

Sam and Jill go to school by bus. The bus is red. They take their bags on the bus. The bus stops. What now? Sam looks at Jill. The bus stops for the old man and his dog. The man and his dog get on the bus. They also want to go to school.

Total number of words: 54

Comprehension: Tick correct or incorrect

1. Who goes to school?
2. What color is the bus?
3. What do they take with them?
4. Who got on the bus?
5. Where do they want to go?

Letter Sounding

B	n	L	v	o	S	h	j	g	D
e	T	K	y	I	c	r	w	o	F
v	q	U	p	a	m	z	G	y	A
x	r	T	f	W	n	d	v	m	Z
A	p	G	E	h	j	b	e	J	R

f	o	W	r	C	i	y	u	t	E
h	K	T	i	p	n	c	l	A	S
d	f	M	k	o	v	D	t	u	C
g	k	B	s	a	L	e	n	H	P
j	t	U	v	x	Y	i	q	m	L

Reading Words

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Sibling	Anger	Pedal	Whistle	Carring	Annoyed	Ashamed	Mutter	Print	Dairy
Brother	Argue	Balance	Shout	Toast	Distract	Pickon	Awful	Cursive	Privat
Sister	Argument	Determin	Stomp	Toast	Distract	Bull	Tear	Punctu	Top

s	S	e	B	e	e	l	T	a	i
t	h	d	e	r	d	y	e	ti	c
e	o	G	g	T	F	T	r	o	C
r	ut	iv	T	u	o	e	r	n	l
T	O	e	a	r	c	a	i	S	e
y	ft	u	u	n	u	s	b	e	a
p	e	p	g	O	s	e	l	n	r
e	n	P	h	f	e	G	e	t	E
O	J	ra	t	f	d	r	W	e	x
l	e	ct	P	e	F	o	a	n	a
d	al	is	at	r	u	u	t	c	m
e	o	e	ie	S	r	p	c	e	i
r	u	C	n	u	i	S	h	T	n
Y	s	o	t	p	o	i	S	y	e
o	A	nf	C	p	u	n	p	p	C
u	tt	id	h	o	s	g	e	e	l
n	e	e	al	s	F	l	c	M	u
g	nt	nt	le	e	r	e	t	e	e
e	io	S	n	d	e	A	a	s	D
s	n	u	g	t	e	l	t	s	e
t	C	c	i	o	z	o	o	a	t
Y	o	c	n	O	e	n	r	g	e
o	n	e	g	f	F	e	G	e	c
u	f	e	S	t	r	S	o	C	t
n	u	d	i	e	o	p	a	o	i
g	s	F	m	n	z	e	l	m	v
e	e	ai	p	L	e	n	S	p	e
r	d	l	le	o	R	d	c	u	S
O	R	T	H	o	e	t	o	t	u
l	el	ip	o	k	a	i	r	e	s
d	at	p	o	A	l	m	e	r	p
e	io	e	te	f	i	e	T	p	i
	n	d	r	t			e	h	c

stMiddleOnlyTroubleRuinAnnoyedFur	shipAlikeDifferentSimilarbehave	overEmbarrassedWobbledshook	SneakedHoldscream	erPuppetPuppetsshowServePerform	zeKitchenExpectedDisheshLaundryhel	WithContinueCruelKnockdowntalent	llProtectTrustCrowd	oneParagraghletterCardCompletе	iousPencilPenMarkerCrayon

ious					pful	ed			
House Goes Works Where Two	Each Week Nice Sister home	Tried Wanted Felt Asked please	Helped Friend Could dn't Fellag ain	Sick Mother Made Laugh Better	Felt Broth her Wants Eat for got	Idea Socc er Boots Score Goal	Why Proud Nasty Upset move	Calm Read The re Dirty sec rets	Hair Quest ion Writte Hidde who

APPENDIX VIII: INTERVIEW GUIDE FOR PARENTS

1. Tell me a little about your child. Is the child male or female?
2. What is the age of your child?
3. How do you rate your child on reading?
4. To what extent does your daughter or son prefers to memorize vocabulary definitions using mnemonics after the intervention?
5. What are the benefits of phonemic strategy in enhancing reading among dyslexic learners after the intervention?
6. What are the benefits of mnemonics in enhancing reading among dyslexic learners after the intervention?
7. How fluent is your daughter or son in reading after the interventions?
8. How good is your daughter/ son in terms of spelling-sound relationships before and after intervention?
9. 9. To what extent is your daughter or son able to memorize new information using mnemonics after intervention?
10. To what extent does your child enjoy using the memorization strategy after intervention?

APPENDIX IX: INTERVIEW GUIDE FOR TEACHERS

During the interview, English will be used as a medium, but the interviewer can code –

switch to the local language, XiTsonga, for all respondents to understand.

1. How do you view the reading abilities of learners with dyslexia who participated in the intervention?
2. To what extent does memory strategies help students in reading? Give reasons for your answer.
3. What are the benefits of memory strategies help students in reading among dyslexia learners after intervention?
4. To what extent does phonemic strategies help students in reading? Give reasons for your answer.
5. What are the benefits of phonemic strategies help students in reading among dyslexia learners after intervention?
6. Which gender performs better in reading at grade three level, boys or girls?
7. What ages do learners find memory strategies and sounds helpful?

APPENDIX X: INTERVIEW GUIDE FOR DEPUTY PRINCIPALS

During the interview, English will be used as a medium, but the interviewer can code – switch to the local language, XiTsonga, for all respondents to understand.

1. How do you view the reading abilities of dyslexic learners who participated in the intervention?
2. To what extent does memory strategies help students in reading? Give reasons for your answer.
3. What are the benefits of memory strategies help students in reading among dyslexia learners after intervention?
4. To what extent does phonemic strategies help students in reading? Give reasons for your answer.
5. What are the benefits of phonemic strategies help students in reading among dyslexia learners after intervention?
6. Which gender performs better in reading at grade three level, boys, or girls?
7. What ages do learners find memory strategies and sounds helpful?

APPENDIX XII: MNEMONIC & SUB LEXICAL REINFORCEMENT INTERVENTIONS

To enhance grade three learners' memory and learning requirements, the mnemonic strategy will be used while sub lexical reinforcement technique will enhance word-level reading and spelling skills (Wright, Colon, Wright & Dyck, 2016). In the present research study, the researcher will use the mnemonic and the sub-lexic reinforcement techniques to enhance reading abilities among grade three learners in one of the two public schools, specifically the experimental school. The mnemonic intervention will be presented during the first term of the year while the sublexic technique will be presented in the second term. Each intervention will take three months and the researcher will teach for one hour, 5 days a week, for three months.

PART I: Mnemonic Reinforcement Intervention

Mnemonics are memory devices that help learners recall larger pieces of information, especially in the form of lists like characteristics, steps, stages, parts, phases and so on. (Congos, 2011). Many types of mnemonics exist but the 9 basic types of mnemonics that are going to be used in this research during data collection are: music mnemonics, name mnemonics, expression or word mnemonic, model mnemonics, ode, or rhyme mnemonics, note organization mnemonics, image mnemonics, connection mnemonics and spelling mnemonics. The researcher will present the mnemonic interventions one at a time. All the nine types will be used, say at least one per week. The following 9 types of mnemonics have been extracted from Congos, 2011.

1. Music mnemonics. Music is a powerful memory technique, and it can work very well in school. Many learners have made songs out of information when a list of items must be learned. Music mnemonics work best with long lists, (Congos, 2011). Congos, 2011 reiterates that some children learn the ABC's by singing the "ABC" song. When a grade three learner would like to memorize when to use "have" or "has", he or she may compose a song as follows:

A. It has……..

He has ……

She has …….,

while

B. They have ……

You and John……have…

Peter and Memory have….

Theme 1: Week 1 About our holiday See attached lesson plan

2. In a Name Mnemonic, the first letter of each word in a list of items is used to make a name of a person or thing. An example is:
3. ROY G. BIV= colors of the spectrum (Red, Orange, Yellow, Green, Blue Indigo Violet. Name of Expression mnemonic (Hereema, 2020 and others call it Letter/ Word or Keyword mnemonic)

This is by far the most popularly used mnemonic. To make an expression or word mnemonic, the first letter of each item in a list is arranged to form a phrase or word. Examples include:

a. In English, the 7 coordinating conjunctions are For, And, Nor, But, Or, Yet, So, = **FANBOYS**
b. The order of operations for math is Parentheses, Exponents, Multiply, Divide, Add and Subtract= **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally
c. For those who have to remember the order of colour coding on electronic resistors: Black, Blue, Red, Orange, Yellow, Green, Brown, Violet, Gray, White, Silver, Gold.

Bad **B**oys **R**ile **O**ur **Y**oung **G**irls, **B**ut **V**iolet **G**ives **W**elts (to) Silly **G**uys. Grade 3 learners may sing the rainbow song: "Red and yellow, pink and green, purple and orange and blue", you can sing a rainbow, sing a rainbow, sing a rainbow tune! If they have forgotten the colors, they simply sing and thereby remember!

There are several other examples which are not going to be stated for now.

4. Model Mnemonics

In a **Model Mnemonic**, some type of representation is constructed to help with understanding and recalling important information.

a. Examples include a circular sequence model, a pyramid model of stages, a pie chart, and a 5-box sequence. Models should be used in addition to words and lists because they make recall a test time easier

5. Ode or Rhyme Mnemonics

An Ode or Rhyme Mnemonic puts information to be recalled in the form of a poem. Examples include:

a. A commonly used rhyme Mnemonic for the number of days in each month is:

i. 30 days has September, April, June, and November. All the rest have 31, Fine! February 28 except when 29.

b. In 1492, Columbus sailed the ocean blue.

c. I before e except after c

or when sounding like a in neighbor and weigh

6.Note Organization Mnemonics

The way textbook and lecture notes are organized can inhibit learning and recall or promote it. In the sense that the organization of notes can promote recall, it is a memory device.

a. Notecards

Notecards are an easy way to organize main ideas and relevant details to be recalled. If main ideas are formatted into possible test questions, notecards can give learners practice in seeing questions and recalling answers as they must do on exams.

b. Outlines clearly separate main ideas from details. This helps organize the information in the mind making it easier to remember.

7.Image Mnemonics

The information in an image mnemonic is constructed in the form of a picture that promotes recall of information when you need it. The sillier the image mnemonic is, the easier it is to recall the related information. These images may be mental or sketched into text and lecture notes.

8.Connection Mnemonics

In this type of mnemonic, the information to be remembered is connected to something already known.

Examples include :

a. Remembering the direction of longitude and latitude is easier to do when you realize that lines on a globe that run North and South are long and that coincides with LONGitude. Another Connection Mnemonic points out that there is an **N** in LONGitude and N in North. Latitude lines must run east to West, then, there is no N in latitude.

b. Another Connection Mnemonic is related to sound. The first part of the word latitude sounds like flat and flat runs horizontal or East and West.

9.SpellingMnemoa. Here is an example of a spelling mnemonic. A princi**pal** at a school is your **pal**, and a principle you believe, or follow is a ru**le**.

b. Another commonly used Spelling Mnemonic is combined with an Ode/ Rhyme Mnemonic

I before e except after c

Or when sounding like a

In neighbor and weigh

c. A third example deals with the problems some learners have remembering that there is an "a" in the middle separate using an exaggerated "a".

d. To spell Mississippi, many learners combine a Rhythm Mnemonic with a Spelling mnemonic: M-iss-iss-ipp-i

e. Some more examples of spelling mnemonics

Geography: George **E**dwards **O**ld **G**randma **R**ode A **P**ig **H**ome **Y**esterday

Diverse examples of mnemonic devices will be used in each lesson, in order to enhance reading abilities of the selected sample of dyslexic grade three learners. For dyslexic grade three learners to decode and learn new words, they need to be taught words in terms of their constituent parts. The present research will use phonics to help learners to be able to read. A Digital HomeApp, Letterland which is a phonics-based approach to teaching reading, writing and spelling for 3- to- 10- year- olds, will be used in the study.

Letterland Classroom Solutions: Letterland was created to teach phonics using a story-based approach. The story logic engages learners leading to long-term retention of concepts. Letterland is multi-sensory, and it activates every learning channel through music, actions, alliteration, movement, song, art, games and role-play.

PART II: Sub lexical Intervention

Intervention on sub-lexical reinforcement techniques will be developed on WIAT-II Word identification, WIAT -II Pseudo decoding, Castles & Coltheart word lists, Curriculum-based non-word reading, Reading Comprehension and Text reading accuracy. These interventions will be used on learners from the experimental school while traditional methods will be used on the control group.

Colon, Wright, Colon & Dyck, (2011) used the WIAT-II or Word Identification, WIAT-II Pseudo decoding, Castles & Coltheart wordlists, Curriculum-based non-word reading, Reading Comprehension and Text reading accuracy sub-tests on a child with dyslexia and Asperger's Disorder. In the current study, the measures will be used on dyslexic grade three learners, and this will be done in the second term of the year. The WIAT-II Word

identification assesses single word recognition skill while the WIAT-II Pseudo decoding sub-test assesses the ability to use phonological information to decode words. On the other hand, Castles and Coltheart word lists assesses word level reading skills. Curriculum-based non-word reading tests are administered in which non-words constructed from each of the GPCs will be selected because they match the curriculum content of items presented in the same order. The Reading comprehension or the Neale Analysis of Reading Ability is administered as a measure of reading comprehension and with the Text reading accuracy, the Neale Analysis of Reading Ability will be used to assess text reading accuracy where the participants will read a series of up to graded passages.

WIAT -II (Word identification) The Word- Reading sub-test from the WIAT-II (Wechsler, 2001) will be used to assess single -word recognition skill. The task will require the 30 selected dyslexic grade 3 students from the intervention school to pronounce single letters and single words. Letter sounds will be administered and are attached on the appendices section. In the current study, the dyslexic learners will do several reading tests.

WIAT -II (Pseudoword decoding). The ability to use phonological information to decode words will be assessed with Pseudoword Decoding sub-test from the WIAT-II (Wechsler, 2001). Pseudowords or 'non-words' will be used to determine how well the individual can decode and pronounce words they have not seen before (Muter, 2006). Non -words are letter strings that resemble English words and conform to the spelling and sound structure of English but do not make sense (e.g., leb, ruckid, and unfrodding).

Castles & Coltheart word lists. The revised version of the Castles and Coltheart word lists (CC2, Castles, Coltheart, Larsen, Jones, Saunders, & McArthur, 2009) will be used to assess word -level reading skills. The CC2 includes three -word lists each of 40 words: irregular-, regular-and-non-words. The test is available in two formats: a web-based version and a pencil-and-paper PDF version (see http://www.motif.org.au). The pencil and paper version will be used in the current study. The children will be presented with items for reading aloud, one at a time, until they make five consecutive errors or any single item type. At that point, presentation of that type of word list ceases. Testing proceeds until the child makes 5 consecutive errors on the final item type. A total raw

score /40 is obtained and can be converted to z-scores and percentiles within age-bands of 5-6 months.

Curriculum-based non-word reading. A curriculum-based non-wording test (hereafter CBM Non-words) will be administered. The GPCs will be selected because they match the curriculum content of the intervention program (Understanding words, Wright,2005) that will be used with the dyslexic learners. The items will be presented in the same order each time the learners are tested. The items will be printed on individual cards printed on big font.

Reading Comprehension: The Neale Analysis of Reading Ability (3rd Edition, NARA-III; Neale, 1999) will be administered as a measure of reading comprehension. The NARA -III includes two parallel forms with standardized norms. This test will require the participants to read a series of up to six graded passages. Word-reading errors are subtracted from a total possible passage score of 16 (e.g if 4 errors are made, the participant receives a passage score of twelve.). The stopping rule applies when the participant makes 12 or more errors in a single passage. When <12 errors are made on a passage, questions about the text are presented orally immediately on completion of each passage.

Text reading accuracy: The Neale Analysis of Reading Ability (3rd Edition, Neale, 1999) will be used to assess text reading accuracy. The participants will read a series of up to six graded passages. Word reading errors will be subtracted from a total possible passage score of 16. The stopping rule applies when the participant makes 12 or more errors in a single passage. In the current study, the LWD will be constantly tested for reading accuracy.