

**ROLE OF ORAL LANGUAGE IN PHONEMIC AND PHONOLOGICAL
DEVELOPMENT OF HARD OF HEARING PUPILS IN SELECTED PRIMARY
SCHOOLS IN LUSAKA, ZAMBIA.**

BY

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the Award of Degree of Doctor of Philosophy in Special Education**

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CERTIFICATE OF APPROVAL

The Thesis by Rose Chikopela is approved as a fulfilment of the requirements for the award of the Degree of Doctor of Philosophy in Special Education of the University of Zambia.

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DECLARATION

I, ROSE CHIKOPELA do solemnly declare that, this thesis represents my own work and that it has not previously been submitted for a degree at the University of Zambia or any other University, and that it does not incorporate any published work or material from another University.

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DEDICATION

I dedicate this work to God almighty for granting me good health, knowledge and wisdom throughout my studies. This work is also dedicated to my late mother Ms. Anna Bwalya Nakazwe who passed on at the time I was admitted for my PhD studies. Mum, I miss you very much! I wish you were here to see how much your beloved last born daughter has achieved following your words of encouragement few weeks just before you passed on. I also dedicate this work to my father, Maj. Alphonsus George Chikopela and my uncle Mr. Emmanuel Chikopela for the motivation throughout my studies. This work is also dedicated to my husband Mr. Aubrey Matekenya Katongo for his continued support, encouragement and understanding during the course of my study. Lastly, special dedication goes to my lovely children, Lubuto Katongo, Mapalo Katongo and Chipso Katongo, and my sister Thresa Chikopela for their endless love and understanding during the time of my study.

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ABSTRACT

Oral language is essential for phonemic and phonological development and critical for pupils' academic success in initial literacy learning. Recent studies have validated the assertion that hard of hearing pupils benefit developmentally, educationally and socially from modern oralist teaching methodologies like the Auditory-Oral method. There is also evidence of poor phonemic and phonological skills in hard of hearing pupils. It is not known why the hard of hearing pupils perform poorly on phonemic and phonological skills in Zambia. This study therefore sought to establish the predictive role of oral language in phonemic and phonological development in pupils with hard of hearing impairment in grades one and two in Lusaka Zambia.

Specifically, the study sought to investigate the extent to which pupils with hard of hearing impairment in grades one and two know about sounds of letters. In addition, the study assessed how much pupils with hard of hearing impairment in grades one and two are able to combine letter sounds into meaningful words. The study further established types of teaching materials that help pupils with hard of hearing impairment to combine letter sounds into meaningful words.

The study utilised ex post facto research design as all pupils in their respective grades were assessed. Five schools from Lusaka district took part in the study. The sample comprised 60 pupils of which 31 were girls and 29 were boys, and 40 teachers giving a total of 100. Pupils were tested individually at the start of grades two and three to tap the skills they had acquired having completed grades one and two. The tests were administered in Nyanja (the language of instruction from first grade to fourth grade) in Lusaka. Interviews were used to obtain information from teachers.

To assess letter sound knowledge and sound blending skills, the Basic Skills Assessment Tool (BASAT) was used. BASAT includes tests to assess basic skills like letter knowledge, phonemic awareness and short-term memory. Familiarity with language was tested by the Peabody Picture Vocabulary Test to measure receptive vocabulary and One Word Picture Vocabulary Test to measure expressive language. Teachers were interviewed using interview guides. A variety of methods were used to analyse the data including, correlations, *t*-test, one way ANOVA, multiple regression and thematic approach.

Results revealed that hard of hearing impairment pupils displayed insufficient knowledge in letter sound knowledge and sound blending tasks. It was established that both expressive and receptive vocabularies did not predict sound awareness in hard of hearing impairment pupils due to lack of instruction in this area. The correlation analysis revealed that expressive and receptive language proficiency, letter knowledge, letter sound knowledge and sound blending were all weakly to moderately related with one another. The results further revealed that grades one and two were not statistically significantly different in terms of performance on letter sound knowledge and blending tasks.

The study also found that visual charts, flash cards and pictures were mostly suited to stimulating awareness of sounds in pupils with hard of hearing impairment. In addition, teachers mentioned that they used more of sign language than oral language when delivering lessons to the pupils. This could have been the reason pupils did not perform well in phonemic and phonological tasks.

The study recommends that Ministry of General Education (MoGE) provides appropriate adequate teaching aids in schools in order to help teachers deliver lessons effectively to the hard of hearing pupils. The study also recommends that teachers of the hard of hearing pupils should utilize oral language when teaching phonemic and phonological skills to hard of hearing pupils. In addition, training institutions should train teachers of the hard of hearing in sound awareness to ensure quality delivery of lessons in this area.

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ACRONMYS

AAE	African American English
ASL	American Sign Language
ANOVA	Analysis Of Variance
BASAT	Basic Skills Assessment Tool
CI	Cochlear Implant
CLA	Comprehensive Language Approach
DHH	Deaf Hard of Hearing
ICLI	International Communication Learning Institute
MoGE	Ministry of General Education
NH	Normal Hearing
NLS	National Literacy Strategy
NWR	Non-word Repetition
OPVT	One-Word Picture Vocabulary Test
PA	Phonological Awareness
PPVT	Peabody Picture Vocabulary Test
PSA	Phonological Sensitivity Approach
SEE	Signing Exact English

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents background to the study on role of oral language in phonemic and phonological development. The chapter also presents the statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, theoretical framework and definitions of terms.

1.1 Background to the study

Developing phonemic and phonological awareness skills with pupils who are hard of hearing is a possibility. Unequivocally recognized as a critical dimension for phonological success with hearing pupils, phonological awareness skills are now receiving more attention for pupils who are hard of hearing (Rachel & Friedman 2006). Oral language development is considered one of the indicators of phonemic and phonological development in hard of hearing pupils. Oral language is verbal communication through spoken symbols; sounds, words, sentences and discourse that represent objects, actions and ideas. It is essential for phonological learning, and successful use of oral language is critical for pupils' literacy development. Almost all classroom-based learning relies on oral language thereby making it also the foundation for hard of hearing pupils' learning. The role of oral language in phonological development on pupils with hard of hearing is not clear but it is known that oral language plays a role in phonological development in hearing children. It is known that the ability to communicate is essential to learning, working, social interaction, achieve and maintain independence. When communication is impaired, it affects every aspect of a person's life, including family and work interactions. The communicative competence of pupils with hard of hearing is directly associated with their acquisition of language. Young

learner's proficiency in their language is critical for facilitating communication and academic success (Daniels, 1994). Teachers of hard of hearing pupils in Zambia however, ignore use of oral language when teaching the hard of hearing pupils (Kuo & Anderson, 2006) creating knowledge gap on how oral language contribute to phonemic awareness and phonological development.

The development of oral language for most children is a natural process, heavily influenced by home literacy and preschool experiences. Thus, most children are able to learn the rules of their language over time with little or no formal instruction. Humans have a natural ability to learn the rules of their language used within their environment because most humans are born with the ability to speak and hear (Nyman, 2009). Children acquire their native language and its verbal channel, speech, through their hearing ability starting from birth. Neuroscientific research demonstrates that the brain has the capacity to acquire both a visual and spoken language without detriment to the development of either language through either modality (Nussbaum et al 2011).

Children start using language for communication in an efficient and fluent manner in a short span of time, i.e. three to four years. Many children who are deaf or hard of hearing (DHH) use both sign language and spoken language. The core principles and practices for facilitating auditory, speech, and spoken language for this population of children and adolescents are in any ways similar to those used for children who use spoken language only (Nussbaum et al, 2011). Children with hard of hearing acquire as their first language whichever language is used around them, whether oral or sign language. Deaf children and the hard of hearing will do the same with sign language, if one is used around them; oral language must be consciously taught to them, in the same way as written language must be taught to hearing children (Aaron, & Joshi, 2006). Both oral and sign languages are composed of words. In oral

languages, words are made up from a limited set of vowels and consonants, and often tone (phonology); in sign languages, words are made up from a limited set of shapes, orientations, locations, and movements of the hands, and often facial expressions; in both cases, these building blocks are called phonemes.

Phonological awareness develops over childhood and hard of hearing children gradually become aware of words, syllables, syllable fragments, and phonemes, in that order. Phoneme development is a long and slow process for children with hard of hearing. Awareness of phonemes is present at birth and phoneme analysis becomes operational by about 6 months of age, when infants begin to extract words from the speech stream (spoken phrases) and build a receptive vocabulary. At the babbling stage, hard of hearing infants learn how spoken language is produced mechanically, and check on how they are doing through auditory feedback (Vihman, 1993). Children are aware of individual sounds, this is evident from the fact that they begin to self-correct mispronounced phonemes in their speech before they become 3 years old (Chaney 1992). Chaney (1992) conducted research on phonological development and found that 93% of 3 year olds (average age 44 months) could listen to a sequence of isolated phonemes, blend them into a word, and select this word from a set of pictures with accuracy well above chance, scoring 88 percent correct. Chaney also found that the easiest task was saying a “word” when asked, showing that young children are well aware of what a “word” is. Explicit awareness of phonemes emerge around 6 or 7 years (Lieberman et al. 1974; Adams 1990).

Phonological awareness is an auditory skill that is developed through a variety of activities that expose pupils with hard of hearing and hearing pupils to the sound structure of the language and teach them to recognize, identify and manipulate it. Phonological awareness skill is a strong predictor of reading ability in young hearing children (Adams, 1990; Wagner

& Torgesen, 1987). Phonological awareness can be defined in broad terms as the ability to understand and engage in skills such as rhyming, alliteration, and syllabication. It includes specific phonemic awareness skills such as sound identification, sound blending, segmenting, and sound manipulation. Rhyming ability, in particular, is an often used technique to determine an individual's sensitivity to the phonological (or sound based) properties of English. Several researchers have used a variety of rhyming tasks to investigate this sensitivity on pupils with hard of hearing (Marschark et al, 2004; Miller et al, 2013; LaSasso et al., 2003; Sterne & Goswami, 2000) and have correlated phonological awareness with reading ability in Deaf Hard of Hearing (DHH) children (Colin, Magnan, Ecalle, & Leybaert, 2007; Dyer et al., 2003; Dillon, et al 2012; Kyle & Harris, 2010).

Oral language and listening skills are an important foundation for the development of phonemic and phonological awareness and they generally develop first. Hearing carries an important role in the acquisition of speaking skills (Rabin et al., 1999). However, hearing loss present before birth or during the first year of life, severely interferes with acquisition of the mother tongue and speech (Edwards, 2004). When this happens, the chance to acquire the culture of his/her society is reduced for the child with hearing impairment and an interruption in their intellectual development is likely to occur (Munro, et al, 2008). Such problems lead to defects in communication process (Vernon-Feagans, 2001) of children with hearing impairment. Pupils with a good understanding of phonemic and phonological awareness have the underlying framework in place for reading (decoding) and writing (encoding) when letter-sound correspondences (phonics) are learned (Adams, Foorman, Lundberg & Beeler 1998).

Because of the predictive power of oral language in determining phonemic and phonological development and literacy in hearing students, the role of oral language in phonemes and phonology development in pupils with hard of hearing vis-à-vis reading has been a subject of great interest in this study. Historically, the definition of phonemes has often been characterized as sound-based units, in part because much of the literature on phonology has focused on spoken languages (e.g., Wagner & Torgeson, 1987). In reality, phonemes are abstract cognitive units whose physical (or phonetic) forms are typically manifested via speech or cued gestures (Scarborough & Brady, 2002; Trezek, & Malmgren, 2005). Studies investigating phonemic and phonological development have focused largely on its role in reading acquisition and its function in the recognition or generation of rhymes (as rhyming is seen as an indicator of Phonological Awareness) ignoring the role of oral language in phonemic and phonological development. For example, in a UK-based study of orally raised deaf students, Conrad (1979) found better readers recalled fewer items from rhyming lists of printed letters than from corresponding non rhyming lists, suggesting that the more proficient deaf readers had access to phonetic coding that interfered with their recall. Campbell and Wright (1988) in a British study of orally raised deaf adolescents and hearing controls found that deaf children performed poorly on a rhyme judgment task as a consequence of being susceptible to orthographic similarity. Moreover, in an effort to match the two groups on reading age (using the Neale reading test), the investigators found that the average chronological age of deaf subjects was almost twice that of their hearing counterparts (14.6 and 7.6, respectively).

Investigations into the relation between early oral language proficiency and later reading outcome have repeatedly shown that comprehension of oral language is a strong predictor of phonological development and later reading ability (Catts et al., 2003; Bishop & Adams,

1990; Scarborough, 1989). In contrast, congenitally deaf children generally do not have sufficient auditory access to spoken languages and for them learning phonology and read is an entirely different endeavor. Many studies have consistently shown that profoundly and prelingually deaf individuals lag significantly behind their hearing peers in standardized measures of phonological and reading achievement (Karchmer, Milone, & Wolk, 1979; Conrad, 1979; Karchmer & Mitchell, 2003; Traxler, 2000). Their reading abilities vary widely, but national surveys (USA) indicated an average of third- or fourth-grade reading level (Furth, 1966; Trybus & Karchmer, 1977; Traxler, 2000). One explanation for this performance deficit is that deafness prevents access to spoken phonology (Shankweiler, Liberman, Mark, Fowler, & Fischer, 1979; Perfetti & Sandak, 2000) and, by extension, the use of phonetic coding in working memory, phonological awareness, and phonetic recoding in lexical access, which are considered to be interdependent hallmarks of successful reading development in pupils with hard of hearing (Wagner & Torgeson, 1987). This claim, however, is not without dispute as certain pupils with hard of hearing demonstrate evidence of phonological coding (Hanson, 1989; Hanson & Lichtenstein, 1990; Hanson & Fowler, 1987; Leybaert, 1993; Conrad, 1979; LaSasso, Crain, & Leybaert, 2003). Still, others have argued that the reason for limited reading achievement among many pupils with hard of hearing is the lack of higher order language skills, not phonological decoding, (Chamberlain & Mayberry, 2000), and that levels of comprehension required at the higher grade levels presents an obstacle to reading development.

In addition, recent studies in Zambia on oral language and reading have shown that oral language is closely related to phonological and reading skills and that children who are not familiar with the language of instruction might have problems in reading skills (Matafwali, 2010; Konza, 2011; Mwanza-Kabaghe, 2015).

Malicky and Norman (1999) have suggested that, rather than phonemic awareness per se, what seems to be essential to learning to read is that children develop an understanding of the connections between oral and written language. At the macro level this involves an understanding that written words represent words in oral language. At the micro level it involves understanding that letters, or groups of letters, in written words stand for individual sounds in spoken words. To complicate matters further, there is considerable variability in the use of communication systems among pupils with hard of hearing and their use is usually determined by whether they are born into families of deaf or hearing parents. Unfortunately, many early studies on phonology and reading outcomes have not taken into consideration the role of the various communication systems available to the deaf population, each of which may independently influence the degree to which pupils with hard of hearing access written English.

Written English language is a phonetic code. Each phoneme in a spoken word is represented by a grapheme in a written word. Although numerous studies have shown that early phonological skills training has beneficial effects on reading development (e.g. Cunningham, 1990; Duncan and Johnston, 1999), other training studies have shown that phonological awareness on its own, although necessary, is not sufficient. Phonological skills training and phoneme-grapheme correspondence instruction are both necessary components for maximum benefit (Berninger, Abbott, Jones, Wolf, Gould, Anderson-Youngstrom, 2006a; Bus and Van Ijzendoorn, 1999). In Zambia, teachers ignore use of oral language in phonemic and phonological training in hard of hearing pupils thereby exacerbating their ability to acquire literacy skills. This study therefore seeks to investigate the role of oral language in phonemic and phonological development and establish types of learning materials that can be used to teach these skills.

The majority of hard of hearing pupils come to school with neither the skill to hear the individual sounds in words nor the knowledge that written words represent spoken words and even more rarely with the knowledge that the letters in the written word represent the sounds in the spoken word. It could be that this awareness of the flexible nature of language is dependent on time and exposure to language and on their attentional control (Akhtar, Jipson & Callanan, 2001; Behrend, Scofield & Kleinknecht, 2001; Biemiller & Boote, 2006). Those who do not receive explicit instruction in the link between spoken and written language can begin to make false assumptions about written language. Many pupils believe that they must remember the whole word, rather than decode the word one sound at a time. They do not understand the fundamental intention of written English language. Once pupils begin to memorise whole words as a primary reading strategy, they have developed a bad habit which will make learning to combine letters to form words to read and spell correctly more difficult.

Since 1998, the National Literacy Strategy (NLS) Framework has required schools and teachers to incorporate phonological skills training and phoneme-grapheme correspondence into the early reading curriculum. The phonic work in the NLS Framework is built around the idea that spoken English language is encoded in approximately 44 phonemes and represented by 26 letters in about 140 graphemes in written English language. Hard of hearing pupils are required to learn to identify the phonemes in their spoken language and learn how these phonemes are commonly spelt, how they can be blended, segmented and manipulated.

They need to understand that: some phonemes are represented by graphemes consisting of one letter, others have more than one letter; many phonemes can be represented by more than one grapheme, whilst some graphemes can represent more than one phoneme. Thus hard of hearing pupils need to develop four basic skills to promote and develop independent writing and fluent reading. They must develop the ability to: Identify sounds in spoken words

(phonological awareness); Recognise the common spellings for each phoneme (phoneme-grapheme correspondence); Blend phonemes into words for reading; and Segment words into phonemes for spelling. In addition, hard of hearing pupils will need to develop a fifth skill, which will allow them to manipulate the phonemes in different parts of words for reading by analogy, a skill that will allow them to decode new words unaided. However, intervention studies teaching phonological awareness skills and measuring the impact on reading with this population are limited in the research literature (Trezek & Wang, 2006; Trezek et al., 2007). In addition to basic phonological awareness skills, specific and focused instruction in phonics also yields positive effects on reading ability in hearing children (National Reading Panel, 2000). Not surprisingly there is also a significant lack of this kind of research investigating role of oral language in phonemic and phonological development and interventions with hard of hearing pupils. (Schirmer & Schaffer, 2012; Trezek et al. (2007) have published three studies that expressly examine phonics instruction with hard of hearing pupils (Trezek & Malmgren, 2005; Trezek & Wang, 2006; Trezek et al., 2007). Those studies provide strong correlations between the phonics instructional programs they used and reading skills with hard of hearing pupils.

There is a small but growing research base per-taining to phonological awareness and phonics instruction with hard of hearing pupils, along with an extensive body of research that has demonstrated the critical importance of phonological awareness and phonics in learning to read any alphabetical script (such as English). In consideration of this research, several significant questions confront the field: how can hard of hearing pupils acquire the phonemic aspects of spoken language if access to hearing is limited; should these skills be taught to hard of hearing pupils for the purposes of impacting phonology and consequently reading achievement; and if so, how can we provide accurate and complete representations of the

phonemic aspects of spoken language, regardless of hearing acuity or communication method, so that hard of hearing pupils can access and process that information? Visual phonics represents one promising approach.

Visual Phonics also known as “See the Sound” was developed in 1982 by the International Communication Learning Institute (ICLI). Use of this system requires training provided by specialists certified by the ICLI. This programme uses a multisensory approach incorporating tactile, kinesthetic, visual, and auditory feedback to develop speech skills, phonological awareness, improve reading and writing in pupils with hard of hearing who do not learn readily from traditional reading approaches. Visual Phonics can be used to improve reading through the development of phonemic and phonological awareness skills, writing through the development of spelling skills, and speech through the development of articulation/mouth movements. Visual phonics was designed to visually represent phonemes in spoken language. Originally conceived by a parent of a deaf child to aid in reading acquisition, it is a system of 45 hand and symbol cues that provides visual and kinesthetic information associated with the way a sound is produced verbally. For example, the /p/ sound is represented with a hand cue that simulates the “plosiveness” of /p/—the air being released from the lips. There are unique symbol cues that correspond with each hand cue to provide students with a written correlate for a phoneme. Visual phonics is not a communication system, rather it is a tool for conveying the phonemic information contained within isolated words (International Communication Learning Institute, 1996).

In developed countries for example USA, Teachers learn visual phonics from trainers who are licensed by the parent organization, International Communication Learning Institute (ICLI). Training typically consists of 10–14 hours of group instruction during which time the hand cues and symbols are learned and participants are provided with ideas and strategies for

incorporating visual phonics into their reading instruction. Visual phonics is reportedly used by teachers, speech-language pathologists, paraprofessionals, and parents of a wide variety of hearing pupils. Although visual phonics has been used in classrooms of hard of hearing pupils for over 20 years, and was a component of several recent studies (Trezek & Malmgren, 2005; Trezek & Wang, 2006; Trezek et al., 2007), there is little research evidence to demonstrate its efficacy or describe its use in the role of oral language in phoneme development.

Several scholars have found vocabulary to be predictive of success in phonological training in preschool years (Kuo & Anderson, 2006; Lonigan, 2007). Furthermore, both phonological awareness and phonemic awareness has been shown to be precursors to successful reading acquisition (Phillips & Torgesen, 2006) as a result, many programs and studies are now suggesting that teachers begin explicitly teaching phonemic and phonological awareness early because the task can be trained beginning in early childhood education environments and because many hearing and hard of hearing pupils are already developing these skills during the preschool and early primary school years (Burgess, Hecht, & Lonigan, 2002; Jordan, Snow, & Porche, 2000; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Lonigan et al., 2003; Lonigan & Whitehurst, 1998; Whitehurst et al., 1999).

This view has been setting many academic research agendas around phonological awareness; and its ultimate level, phonemic awareness, has made its way into many classrooms and homes with varying degrees of success. Isolating the phonological awareness as the quickest route to reading acquisition has generated a somewhat linear take on reading acquisition. Additionally, this environment has invited a deficit model approach intended to close the achievement gap through phonological training via high quality preschool programs and

family literacy interventions. However, opening the research lens in this study to view a wider role of oral language in phonemic and phonological development in hard of hearing pupils might create a different definition for phonemic and phonological and reading acquisition and decoding altogether.

1.3 STATEMENT OF THE PROBLEM

The role of oral language in phonemic and phonological development in pupils with hearing has long been identified. Due to oral language, pupils with hearing impairment have been identified to be able to identify and produce letter sounds (Nussbaum et al. 2011) and combine the letter sounds into meaningful words (Nyman, 2009). However, the role of oral language in phoneme and phonological development in pupils with hard of hearing is not known in Lusaka, Zambia. As a result, teachers have ignored use of oral language in the delivery of lessons to pupils with hard of hearing impairment (Chikopela, 2013).

1.4 PURPOSE OF THE STUDY

The purpose of the study was to investigate how much pupils with hard of hearing in grade one and two know about sounds of letters and using the known letter sounds, how much are they able to combine the letter sounds into meaningful words.

1.5 STUDY OBJECTIVES

This study was guided by the following objectives:

1. To investigate the extent to which pupils with hard of hearing in grade one and two know about sounds of letters.
2. To assess how much pupils with hard of hearing in grade one and two are able to combine letter sounds into meaningful words.

3. Establish type of teaching materials that help pupils with hard of hearing to combine letter sounds into meaningful words.

1.6 RESEARCH QUESTIONS

The following study questions were used in this study:

1. To what extent do pupils with hard of hearing in grade one and two know about sounds of letters?
2. How much are pupils with hard of hearing in grade one and two are able to combine letter sound into meaningful words?
3. What type of teaching materials help pupils with hard of hearing to combine letter sounds into meaningful words?

1.7 SIGNIFICANCE OF THE STUDY

At a time when the role of oral language in phonemic and phonological development in hard of hearing pupils is not known, a study of this nature is significant.

It is hoped that this study may help in establishing the role of oral language on phonemic and phonological development in hard of hearing pupils in grade one and two.

The school administrators may benefit from the study by seeing the need to screen for the degree of hearing loss among pupils with hearing impairment at entry into grade one so that identified pupils are taught phonemic and phonological awareness orally.

The findings of the study may enable teachers to make use of appropriate teaching materials when delivering lessons on phonology and also to make use of oral language when teaching pupils with hard of hearing.

In addition, pupils with hard of hearing may benefit from lessons on phonology presented by teachers using oral language with appropriate teaching materials which would eventually enable them to acquire literacy skills.

The findings of this study may also stimulate interest for further research on the topic.

1.8 THEORETICAL FRAMEWORK

To understand how oral language contributes to phonemic and phonological development in hard of hearing pupils, the current study applied two theories or approaches namely, Phonological Sensitivity Approach (PSA) and Comprehensive Language Approach (CLA) proposed by Dickinson et al.(2003).

The phonological sensitivity approach posits that vocabulary provides the basis for phonological sensitivity, which then is the key language ability supporting reading.

Proponents of this model reveal that oral language is directly related to phonemic awareness and it is this phonemic awareness that enhance development of phonological skills and consequently reading (Poe, Burchinal, & Roberts, 2004). This approach envisages that vocabulary and discourse skills are key in the emergence of phonological sensitivity (i.e., ability to detect and manipulate the sound structure of oral language), phonological memory (i.e., short term memory for sound based information, and phonological naming (i.e. retrieval of phonological information from long-term memory), and it is these skills that uniquely predict reading skills once children enter school (Matafwali, 2010).

Evidence also shows that comprehensive language proficiency directly influence word reading skills and that, abilities such as receptive vocabulary, the ability to formally define words, and narrative skill would become more critical in middle elementary school (Snow &

Dickinson, 1991). Comprehensive Language Approach (CLA) posits that varied language skills interact with literacy knowledge and continue to play a vital role in subsequent reading achievement. In addition, non phonological language skills such as semantics and syntax are assumed to be closely related to phonological skills, alphabetic knowledge and beginning reading skill. The CLA model assumes that oral language is directly related to higher-level reading skills and indirectly related to lower-reading skills through phonological awareness.

Based on the PSA and CLA models, the current study anticipated that both the PSA and CLA models would predict phonemic and phonological skills in hard of hearing impairment pupils in grades one and two and that the CLA would uniquely predict reading in grade two.

1.9 LIMITATIONS OF THE STUDY

The schools that were included in the study were in Lusaka urban district. The researcher did not control for the age at which the pupils acquired hearing loss and the language the child gets exposed to in the home environment that could contribute to them being unable to acquire phonemes and phonology at an appropriate age at school. Thus there would be need to undertake a longitudinal approach for all hard of hearing pupils and include the age at which hearing loss was acquired and the mode of communication at home. It must be mentioned therefore that these limitations may narrow the scope of the present study and limit the generalization of the findings.

1.10 Operational definitions of key terms used in the study

Alphabetic knowledge: ability to name the letters of the alphabet.

Auditory discrimination: Making perceptual distinctions between any kind of sounds, including tones, music, and environmental noises.

Phonics: The connection between graphemes (letter symbols) and sounds.

Phonemes: Smallest units into which speech can be divided.

Phonemic awareness: Identifying phonemes in words, for example /p/o/t/ are the phonemes of the word 'pot'.

Phonological awareness: Often used to indicate that sounds of words are distinct from words' meaning. This may include sensitivity to syllables and morphemes (Wong, 1998).

Phonological knowledge: To be aware of the relationships of sounds within or between languages.

Phonological memory: Temporary storage of information in terms of phonological representation.

Deaf: lacking or deficient in the sense of hearing.

Hard of hearing: Defective but functional sense of hearing.

Sign language: is a language which chiefly uses manual communication to convey meaning.

Total communication (TC): An approach to deaf education that aims to make use of a number of modes of communication such as signed, oral, auditory, written and visual aids, depending on the particular needs and abilities of the child.

American Sign Language (ASL): is a complete, complex language that employs signs made by moving the hands combined with facial expressions and postures of the body.

Phonographic: The practice of transcribing speech by means of symbols representing elements of sound; phonetic transcription.

Visual phonics: A system of 46 unique hand cues and symbols that represent the sounds of English without the ambiguity of English orthography.

Pre-lingual deaf: Born with a hearing loss, or whose hearing loss occurred before they began to speak.

1.11 Summary

The goal of this chapter has been to provide an introduction to how oral language has been seen as a significant predictor of phonemic and phonological development in hard of hearing pupils in different countries of the world. All the studies cited have revealed that oral language has a positive effect in phonemic and phonological development in children and that these skills influence the ability to read. Studies have shown that hard of hearing pupils lag behind their hearing peers on sound awareness tasks despite having residual hearing and being exposed to the same curriculum. What seems to be lacking however, are studies on role of oral language in phonemic and phonological development in pupils with hard of hearing impairment. An inquiry into this matter is worth pursuing. In the next chapter, an effort is, thus made to review related literature on the role of oral language in phonemic and phonological development in hard of hearing pupils.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter is a review of literature on topic, role of oral language in phonemic and phonological development in hard of hearing impairment pupils. It begins with a history of deaf education. It proceeds with a review of studies on oral language development in hard of hearing pupils with a specific focus on its role in phonemic and phonological development. Furthermore, the review shows the importance of phonemic and phonological development in reading acquisition. It must be stated from onset that while there is considerable attention on the issue of phonological development in relation to reading, there is dearth of research that closely consider the role of oral language in phonemic and phonological development and methods as well as materials that are used to teach hard of hearing pupils these skills.

2.1 History of Deaf Education

The education of the deaf has not been viewed as successful (Marchark, et al, 2002; Annalene & Natale, 2010). The oral approach, which prohibited the use of signing, was the traditional method for teaching language and other academic subjects to the deaf. The first school for the deaf in the United States was founded by Thomas Hopkins Gallaudet in 1817. (Heward, & Orlansky, 1988). At the time of its inception, two distinct educational camps had formed. The oral (spoken language) camp was led by the inventor of the telephone, Alexander Graham Bell, who believed that almost all people process language through hearing. Proponents of the oral philosophy felt that deaf people must be trained to live and learn as much like hearing people as possible. However, the manual (sign language) camp, led by Edward Miner Gallaudet, was based on the belief that many deaf children could not learn to speak or

speech-read well enough to use it as their primary means of communication (Winefield, 1987).

At the International Congress on Deafness, held in Milan, Italy, in 1880, hearing educators of the deaf, in spite of opposition from deaf educators, decided that manual communication restricted or prevented growth of speech and language skills in deaf children. Since that time, and up until the 1970s, teaching using oral language (oralism) persisted as the overwhelmingly predominant method of education in America (Barnum, 1984). During the 1970s, oralism gave way to the Total Communication approach (combination of sign and oral language) (Barnum, 1984). This method utilized a simultaneous manual (sign language) and oral component. During the 1970s, pupils with hard of hearing began to attend programmes located in regular educational settings instead of the residential schools which had been common practice prior to that time (Ramsey, 1993). During the past twenty years, the residential schooling trend had shifted and most deaf children currently attended programs in regular public elementary schools whose Total Communication policies called for instruction through spoken English accompanied by some manual component (Ramsey, 1993). For the most part; however, the instructional emphasis has been on the use of Signing Exact English (SEE). Educators believed that the communication barrier that hard of hearing pupils suffer from could be broken simply by teaching the hard of hearing pupil to read English. This belief led to the development of manual codes for English. Signing Exact English (SEE) is reportedly the most commonly used within deaf education (Ramsey, 1993). However, linguists do not consider the various forms of manually coded English as natural languages for the deaf, but rather artificial codes meant to be accompanied by speech. The use of Signing Exact English is a similar situation in Zambia in terms of delivery of lessons to hard of hearing pupils.

In Zambia, history of deaf education is associated with the Dutch Missionaries from South Africa who founded the Magwero School for the Deaf in 1955 outside Chipata (Kalabula, 2007). Missionaries played a major role in teaching the deaf pupils. The Reformed Church in Zambia (formerly named the Dutch Reformed Church) in Northern Rhodesia colonial government supersede the Zambian Government in running the affairs of the school (Kelly, 1991). Charity organizations and international aid donors also helped. Miss Ella S. Botes, was instrumental in opening the school for the deaf. Initially, the school opened with only 5 male deaf pupils, 3 Zambian and 2 Malawian. Thus, the Magwero School for the Deaf enjoyed the status of being an international school for the Deaf until 1971 when Malawi set up their own school for the Deaf. Malawian children at the Magwero were gradually phased out.

Basic education that was formerly reserved for hearing and able-bodied children was now extended to Deaf children. However, the medium of instruction was oralism, where audiology and speech classes took precedence over all academic class work. There was no progression through standards or grades for these pupils, as is normally facilitated by official government promotion examinations (Marchark, et al, 2004). In addition, special education teacher training was not available in the country. The first teachers of the deaf in Zambia had to be trained at Morgester in Zimbabwe and Kutilwanong in South Africa (Baynton, 1996). These teachers were taught American Sign Language and it is the language they were using to deliver lessons to deaf pupils and currently it is being used in the schools today. Despite the inclusion of sign and oral language in the education of hard of hearing, their acquisition of phonemic and phonological skills is largely considered a failure.

American Sign Language (ASL), the sign system used by the deaf in the United States and Canada, has been recognized as a bona fide language and is also used in teaching hard of hearing pupils (Heward & Orlansky, 1988). While ASL and English share the same

lexicography, the syntactical structure of ASL differs considerably from that of Standard English and includes non-manual behaviours such as eye, head, face, and body movements. Neither the oral method nor the Total Communication approach has proven completely successful in deaf education. The academic achievement of deaf children still lags significantly behind that of their hearing peers. And in spite of its recognition by linguists as a language, ASL remains excluded from the deaf education process, while English continues to be the focal point of instruction (Hayes & Dilka & Olson, 1991). Despite the inclusion of oral and manual systems (sign language) in hard of hearing instruction, the education of hard of hearing is a challenge in terms of speech acquisition, phonological and reading skills (Cicourel & Boese, 1972). One explanation postulated for this challenge is that since the hard of hearing have difficulties in hearing oral language and therefore cannot monitor speech output accurately they seldom are capable of becoming fluent native speakers of an oral language.

2.2 Predictive role of oral language in phonemic and phonological development

There is unequivocal evidence that oral-language abilities are closely related to the emergence of phonemic and phonological development in early school years. Several studies have examined the long-term impact of a variety of oral-language abilities on subsequent reading achievement and found evidence of substantial impact of many different abilities. Such predictive abilities include phonological awareness, (Mwanza-Kbaghe, 2015; Chikopela, 2013; Matafwali, 2010; Dickinson et al, 2003) vocabulary, (Anderson & Freebody, 1981; Bishop & Adams, 1990; Hart & Risley, 1995; Pikulski & Tobin, 1989; Scarborough, 1989; Share, Jorm, Mac-lean, & Matthews, 1984; Stahl & Fairbanks, 1986; Walker, Greenwood, Hart, & Carta, 1994; see Whitehurst & Lonigan, 2001, for review), syntax (for review, see Dickinson, 1987, and Scarborough, 2001; see also Scarborough, 1990,

1991a, 1991b), and discourse (Beals, 2001; Bishop & Edmundson, 1987; Fazio, Naremore, & Connell, 1996; Feagans & Applebaum, 1986; Menyuket al., 1991; see Vernon-Feagans, Hammer, Miccio, & Manlove, 2001, for review). Oral language abilities are highly influential in the development of phonemic and phonological development in hard of hearing pupils in the lower grades.

The terms phonemic awareness and phonics are often used interchangeably with phonological awareness. However, these terms have different meanings. Phonemic awareness is a subset of phonological awareness that focuses specifically on recognizing and manipulating phonemes, the smallest units of sound. Phonological awareness at the phoneme level, often called “phoneme awareness” or “phonemic awareness”, is knowledge that words can be decomposed into discrete phonemes. Phonemic awareness has been measured with a wide variety of procedures, including phoneme isolation tasks in which participants are asked to say a word but pause between each phoneme, phoneme blending tasks in which participants are asked to combine a sequence of individual sounds into a word (or nonword), and phoneme reversal tasks in which participants are asked to metathesize two phonemes in a word (Gillon, 2004). Phonics requires students to know and match letters or letter patterns with sounds, learn the rules of spelling, and use this information to decode (read) and encode (write) words. Phonemic awareness relates only to speech sounds, not to alphabet letters or sound-spellings, so it is not necessary for students to have alphabet knowledge in order to develop a basic phonemic awareness of language (Gillon, 2004). However, phoneme awareness is necessary for hard of hearing pupils to use the sound knowledge to acquire letter sound knowledge through listening skills which enables them to distinguish environmental and speech sounds from one another. Oral language abilities play a significant role in the phoneme awareness.

In line with phoneme and phonological development, oral language plays two significant roles. Firstly, children may reach that watershed moment when their linguistic and metalinguistic skills allow for phoneme and phonological awareness to develop at different times within the early childhood period. Secondly, oral language may play a more significant role in decoding words that children hear. Metalinguistic awareness is the ability to attend to and monitor the use of various linguistic components (phonemes, morphemes, syntax, semantics) in addition to considering the meaning of the particular communicative act (Chaney, 1994; Roth, Speece, Cooper, & De La Paz, 1996). It would seem that a more varied use of language structures, vocabulary and semantics would benefit a child in all forms of communication by offering a flexible use of language receptively and expressively. It could also be that this awareness of the flexible nature of language is dependent on time and exposure to language and on their attentional control (Akhtar, Jipson, & Callanan, 2001; Behrend, Scofield, & Kleinknecht, 2001; Biemiller, 2006). Therefore, it would follow that the development of metalinguistic skills is initially based on exposure to language and cognitive control of attention and at some point the relationship between oral language and metalinguistic awareness becomes reciprocal in hard of hearing pupils. The study below confirms the important role of oral language in syntax competence.

Crosson, Geers & Hear (2001) instituted an investigation on narrative abilities in children with cochlear implants. The purposes of this study were to: 1) develop a scoring system to assess narrative ability in children; 2) evaluate the impact of auditory speech perception with a cochlear implant on narrative ability; and 3) evaluate the importance of narrative ability to reading comprehension in deaf children. Narrative productions prompted from an eight-picture sequence story were elicited from 8 and 9 yr olds; 87 who had at least 4 yr of cochlear implant experience and 28 who had normal hearing. The stories were transcribed and a

scoring system for narrative ability was developed based on the use of complete narrative structure, conjunctions linking semantic relations, and referents that served to identify and distinguish characters in the narrative. Narrative ability scores of cochlear implant users were examined in relation to their age, IQ, speech perception, language, and reading test scores. In addition, narrative ability scores for children with normal hearing were compared with two groups of cochlear implant users, those with above average speech perception scores and those with below average speech perception scores. Within the sample of hearing-impaired children, narrative ability scores correlated significantly with speech perception, language syntax, and reading test scores. A multiple regression analysis was conducted to predict reading comprehension scores from four predictor variables (age, IQ, language syntax, and narrative ability).

Results reflected the independent contribution of discourse-level language skills, as measured by the narrative ability score, as well as sentence-level language skills in predicting reading test scores. Analysis of stories obtained from 8- and 9-yr-old children with normal hearing revealed the classic pattern that included a high point, a resolution, and one or more evaluative statements. Their stories achieved cohesion from correct use of both conjunctions and referents. Deaf children who received above-average speech perception scores with a cochlear implant (i.e., scored above 48% on the Word Intelligibility by Picture Identification speech perception test) told narratives that were similar in structure and use of referents to those of age mates with normal hearing.

Although their use of subordinate conjunctions was not as well developed as normal-hearing children, it was significantly above that of deaf children who received less speech perception benefit after a similar period of implant use. These below-average speech perceivers exhibited significantly poorer use of narrative structure and cohesive devices than either

normal-hearing age mates or children who achieved above average speech perception with a cochlear implant. The results have indicated that narrative ability (oral language) is an important predictor of reading comprehension ability in deaf children above and beyond IQ and syntactic competence. Deaf children who receive a cochlear implant under 5 yr of age and obtain above average speech perception benefit from the device construct narratives that are similar in structure and cohesion to those of their hearing age mates by age 8 to 9.

Some research studies and reviews have suggested that the multifaceted and developmental nature metalinguistic awareness involves both expressive and receptive oral language and cognitive complexities (Chaney, 1994; Roth, Speece, Cooper, & De La Paz, 1996) and that this is also true for phonological awareness in particular (Anthony et al., 2002). In the past years, debate was questioning the nature of rhyme and syllable awareness as compared to phoneme awareness. Earlier studies grappled with the thought that phonemic awareness and rhyming abilities developed in separate domains, and that phonemic awareness should be in training programs during emergent literacy experiences at school and at home (Phillips & Torgesen, 2006). Recent studies have angled toward the idea that phonological awareness is a single construct with varying levels of linguistic and cognitive complexity, much the same way all other metalinguistic abilities may develop. More specifically, the simple to complex aspects of phonological awareness involve a spiralling progression of sensitivity to words, syllables, rhyme, and phonemes. Furthermore, the timing of this progression could also depend on cognitive growth (Anthony & Lonigan, 2004; Anthony et al., 2002; Lonigan, 2006, , 2007) and therefore should be treated as a developmental skill. Finally, Lonigan (2007) also determined that general language abilities and vocabulary, rather than receptive and expressive vocabulary alone, have a causal relationship with the development of phonological awareness. In this study, the researcher focused on examining how much oral

language abilities influence phonological development and consequently its impact on reading acquisition in hard of hearing impairment pupils.

Geers, Nicholas & Sedey (2003) investigated factors contributing to the comprehension and production of English language by children with prelingual deafness after 4 to 7 yr of multichannel cochlear implant use. The analysis controlled for the effects of child and family characteristics so that educational factors most conducive to maximum implant benefit could be identified. A battery of language tests were administered to 181 8- and 9 yr-old children from across the United States and Canada who received a cochlear implant by age 5. Tests of comprehension, verbal reasoning, narrative ability and spontaneous language production were administered either in speech and sign or in the child's preferred communication mode. These constituted the Total Language measures. Spoken Language measures were derived from a speech-only language sample. Type and amount of educational intervention since implantation constituted the independent variables. Characteristics of the child and the family were considered intervening variables. A series of multiple regression analyses determined the amount of variance in Total Language and Spoken Language ability accounted for by the intervening variables and the amount of additional variance attributable to the independent variables.

More than half of the children (with performance intelligence quotients in the average range) exhibited language skills that were similar to those of hearing 8 to 9 yr olds on measures of verbal reasoning, narrative ability, utterance length, and lexical diversity. Significant predictors of language ability were similar for Total and for Spoken Language outcomes and included greater nonverbal intelligence, smaller family size, higher socio-economic status and female gender. Age at receiving an implant did not affect language outcome. After the variance due to these variables was controlled, the primary rehabilitative factors associated

with linguistic outcome were amount of mainstream class placement and an educational emphasis on speech and auditory skills. In their conclusion, use of a cochlear implant had a dramatic impact on the linguistic competence of profoundly hearing-impaired children. More than half of the children in this sample with average learning ability produced and understood English language at a level comparable with that of their hearing age mates. Such mature language outcomes were not typical of children with profound hearing loss who used hearing aids. Use of a visual (i.e., sign) language system did not provide the linguistic advantage that had been anticipated. Children educated without use of sign exhibited a significant advantage in their use of narratives, the breadth of their vocabulary, in their use of bound morphemes, in the length of their utterances and in the complexity of the syntax used in their spontaneous language. Taken together, these results indicated that focus on oral educational training provided a significant advantage for both spoken and total language skills in hard of hearing children of which, if it was a similar case for Zambia, hard of hearing pupils would as well benefit and be able to develop phonemic and phonological skills.

Lonigan (2007) has considered a line of thought that recognizes that children with highly developed levels of phonemic awareness have reached this height, not so much do to drilling, but more due to oral language and attentional control. In fact, Lonigan (2007) demonstrated through reanalysis of previous data that effective vocabulary impacted phonological awareness, rather than the other way around. Another step in the direction of unpacking role of language and metalinguistics has shown that syntax and semantics create the context for vocabulary growth in children (Behrend, Scofield, & Kleinknecht, 2001; Biemiller, 2006).

Metalinguistic skills are related to both phonological acquisition and reading development (Chaney, 1994; Kuo & Anderson, 2006; Roth, Speece, Cooper, & De La Paz, 1996); however, the “unpacking” of this relationship was seen to be problematic in their research

(Kuo & Anderson, 2006). The relationship between metalinguistics and reading seemed relatively linear. For example, in order for children to understand the purpose of a letter and a letter sound, they must have the ability to control two concepts. First, oral language consists of words which are made up of sounds (phonological awareness). Second, the words and phrases we use orally can be represented in print (print awareness). It is understandable why research focused a great deal on these two principles (Anthony & Lonigan, 2004; Burgess, 2006; Lonigan, 2006; Phillips & Torgesen, 2006; Speece, Ritchey, Cooper, Roth, & Schatschneider, 2004).

One study that did use a variety of oral-language measures consistently during the initial reading period found that the relationship between oral-language and literacy skills may change over time. De Jong and van der Leij (1999) conducted a longitudinal study of Dutch children by using a variety of measures of phonological awareness, working memory, nonverbal intelligence, and receptive and productive vocabulary. They found that there was a significant correlation between a factor composed of the two vocabulary measures and measures of reading, but in regression analyses this factor was no longer significant once the measures of letter knowledge and nonverbal intelligence were entered. However, phonological awareness accounted for variation only during the first year of instruction, not in Grade 2. It may be important to note that compared with English, spoken Dutch maps well onto print, thereby making the use of decoding strategies especially effective for the group of children in the study.

Researchers working from a speech and language perspective have accumulated mounting evidence of the key role of oral language in supporting reading, even during the early years.

Additional evidence of facilitative relationships between language and reading over the years when children begin learning to read comes from Mason, Stewart, Peterman, and Dunning (1992), who administered a set of tasks that assessed a range of children's oral-language and early print skills at the beginning of kindergarten. Assessments of these children through the third grade revealed that children's early oral-language skills showed increasing power over time in predicting their reading comprehension skill.

A longitudinal study by Torgesen, Wagner, Rashotte, Burgess, and Hecht (1997) provides an example of how the contribution of language abilities other than phonemic awareness has been overlooked in longitudinal studies of more advanced readers. These researchers conducted analyses of factors that predicted the reading growth of children between third through fifth grades, with the goal of determining the relative contribution of phonemic awareness as opposed to rapid automatic naming speed. Included among the measures used was the vocabulary subtest of the Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986). In regression analyses conducted with the full sample of fourth graders, the vocabulary measure was found to account for nearly as much variance in reading comprehension as measures of phonological awareness. Among fifth graders, it accounted for 10% of the variance in contrast to the 2% of variance accounted for by phonological awareness measures. The vocabulary findings were not discussed, doubtless because the vocabulary measure was viewed simply as a control for general intelligence.

Using a different methodological approach, Speece et al. (1999) examined phonological awareness along with a number of other measures of oral-language skill in kindergarten and first-grade children. They created four profiles of children's performances across their battery of language tasks and correlated scores of children in different clusters with reading and

writing measures. Although they found some evidence that children in the high language profile perform better on reading measures, the frequency of superior performances was limited, leading them to conclude that phonological awareness may be of primary importance. However, they performed no separate analyses examining the impact of varied language measures on reading and writing of all the children in the four groups.

There is some evidence that oral-language abilities are closely related to the emergence of print knowledge and phonological ability in kindergarten and lower grades (Bowey & Patel, 1988). To further confirm the role of oral language in phonological development and consequently reading, a longitudinal study was conducted by Dickinson and Tabors (2001).

Dickinson & Tabors, 2001) conducted an 11-year longitudinal study of 74 Head Start children beginning when they were 3 years old. They examined a broad range of oral-language and literacy abilities with the working assumption that phonological abilities and print knowledge would be most important to children at the outset of literacy acquisition but that ability such as receptive vocabulary, the ability to formally define words, and narrative skill would become more critical in middle elementary school years (Snow & Dickinson, 1991). Consistent with findings of (Biemiller, 1999; Cunningham & Stanovich 1997), they found substantial long-term correlations of oral language with 4th- and 7th-grade decoding and reading comprehension. In addition, consistent with results reviewed by Scarborough (2001), children's narrative production, receptive vocabulary, and emergent literacy skills were significantly intercorrelated in kindergarten (Tabors, Roach, & Snow, 2001).

Earlier studies revealed the causal relationship between phonological awareness and reading acquisition, and more specifically, decoding (Phillips & Torgesen, 2006; Roth, Speece, Cooper, & De La Paz, 1996; Speece, Ritchey, Cooper, Roth & Schatschneider, 2004; Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998).

The move to study younger children has shown that the relationship between phonological awareness and reading is not as bidirectional as once thought; but, rather, there is a foundational tie between oral vocabulary and phonological awareness (Burgess, 2006) which begins to come together during the toddler years. Lonigan (2006) revisited the inside out outside in construct given the new understandings related to phonological awareness and language. He considered the idea that the two domains are not necessarily independent of common experiences, as once thought. They may be tied together through listening comprehension, understanding syntax, and definitional vocabulary.

Although there is ample evidence in support of the view that oral language skills make important contributions to phonological development, it is not clear how oral language skills contributes to phonemic awareness and consequently phonological development in hard of hearing pupils. An understanding of this fundamental issue will help clarify the importance of oral language in phonemic and phonological development and how lack of proficiency in oral language instruction would contribute to phonemic and phonological development failure in hard of hearing pupils in grades one and two.

Dickenson (2006) captures a great deal of the findings related to metalinguistic awareness and reading acquisition and development discussed to this point through a window metaphor. His focus was specifically directed toward vocabulary development and its relationship with the phonological aspects of metalinguistics. He conceptualized that a window is open for this learning from preschool through fourth grade. During this time a child's environment is critical in that it helps form the brain functions that allow for attentional control and higher cognitive functioning. Language is a key factor in this environment because it allows for the continuous development in attention and cognitive functioning, which together eventually

define that watershed moment when metalinguistic awareness begins to form. Finally, it is this awareness that creates the connections between print and language.

To prove the aspects of vocabulary development, phonological awareness and reading, Matafwali (2010) examined the role of oral language in the acquisition of oral literacy skills in a cross sectional and longitudinal study of 557 pupils in grade one and two from different provinces of Zambia. The study aimed at establishing the importance of language to literacy development in order to examine how lack of proficiency in the language of instruction can help explain reading difficulties observed in the majority of school going children in Zambia. The findings revealed that both language and alphabetic skills are independent predictors of reading, although alphabetic knowledge was a strong predictor in the early stage. In addition, longitudinal effects of oral language were found even when cognitive and background factors were taken into account. The study has clearly shown the impact of oral language on alphabetic knowledge, however, it is not known whether this could be a similar impact on hard of hearing pupils in grade one and two in Zambia hence the need for the current study to fill up this knowledge gap.

Prior to the above study, Mwanza-Kabaghe (2015) investigated preschool, executive functions and oral language as predictors of literacy and numeracy skills in first grade in Zambia. The findings revealed that oral language is important for performance in literacy skills and that linguistic diversity may explain delays of phonological and reading development of children who attend preschool in the first grade.

It is important to note that the relationship between phonological awareness and reading actually begins before formal literacy instruction (the explicit teaching of letters, sounds, and sight words). Moreover, a unique contributor to the timing of the onset of metalinguistic awareness has been found to be oral vocabulary development rather than the explicit drilling

of the various levels of phonological awareness and letter sounds. The research in the fields of metalinguistic awareness, cognition, literacy, and language have all contributed to a clearer understanding of the processes involved in becoming literate. Clearer understandings of how literacy develops is beginning to move us away from the linear conception of literacy and language is somewhat contextualized by the earlier conceptual models of reading acquisition and research projects. More recent studies and more sophisticated statistical modelling are leading some to a more systems view of phonological acquisition and reading development (Dickinson, McCabe, & Essex, 2006).

A study by Krystal & Melanie (2014) shows the efficacy of Phonemic Awareness Training in Children with Hearing Loss. The purpose of their single subject study was to evaluate whether initial sound segmentation training increased initial sound segmentation ability in preschool children with hearing loss. Two preschool children with hearing loss participated in this multiple probe design single subject study. The children participated in individual intervention that taught initial sound segmentation (37-39 half-hour sessions). Assessment of children's initial sound segmentation skill occurred at the beginning of each session. Results indicated that initial sound segmentation training increased children's performance on the initial sound segmentation assessment measures in the children with hearing loss.

The children exhibited some maintenance of skill when training ceased, but maintenance was not complete. Generalization to sounds not taught was generally not observed. Error analysis gave insight to children's skill. Phonological awareness training was associated with an increase in phonological awareness skill for these two children with hearing loss. This study suggested that future research should explore the effectiveness of phonological awareness training for all children with hearing loss. In addition, future research should explore the

effects of phonological awareness training on literacy outcomes for children with hearing loss.

Another study by Sue (2000) has proved that phonics intervention in hard of hearing pupils help to improve word reading. The study sought to investigate the efficacy of phonics intervention for hearing impaired children. Two children with hearing impairment were pre-tested on measures of spoken and written language, phonological abilities and alphabet knowledge prior to a 12 week intervention using a Phonographix teaching programme. Two children, child A (female) aged 8 years 10 months and child B (male) 9 years 0 months were in the study. Both children were pre-lingually deaf with profound bilateral sensori-neural hearing loss. Child A had unaided thresholds of 80dB at 250Hz down to 120dB at 4000Hz. Her aided thresholds were 30dB at 500 Hz down to 60dB at 4000 Hz. Child B had unaided thresholds of 85dB in the right ear and 100dB in the left ear at 250 Hz down to 120dB in both ears at 4000 Hz. His aided thresholds were 35dB at 500 Hz down to 60dB at 2000 Hz with no response at 4000 Hz.

The intervention period was 12 weeks. The researcher spent one hour twice a week with the children in addition to the time they spent with the teacher of the deaf during the daily literacy hour. During this hour, the researcher gave individual attention to the children. Specific sounds were concentrated on during the sessions. For each group of sounds exercises were carried out involving segmenting, blending and phoneme manipulation using real words, non-words and simple books. Prior to intervention the children were pre-tested on eight experimental measures of working memory encoding (Palmer, 2000), segmenting, blending, phoneme manipulation, letter-sound knowledge, Wide Range Achievement Test (WRAT) (reading and spelling) (Jastack and Wilkinson, 1984) and nonword reading. In addition five control measures were taken working memory span (auditory and visual), letter-

name knowledge, Wide Range Achievement Test (WRAT) (maths) (Jastack and Wilkinson, 1984), British Picture Vocabulary Scales (BPVS), (Dunn, Dunn, Whetton and Burley, 1997), Raven's Coloured Progressive Matrices (Raven, 1996).

Their results showed strong, positive effects of the Phonographix intervention on the development of grapheme-phoneme correspondence knowledge, and the acquisition of blending, segmenting and phoneme manipulation skills all of which lead to the development of word decoding and spelling skills. This study provides support for the view that structured and focused teaching of phoneme segmenting, blending and manipulation skills and of grapheme-phoneme correspondence does accelerate development of these skills and acquisition of this knowledge in hearing impaired children. This accelerated development does lead to improved word decoding and spelling skills despite poor receptive vocabulary scores and indeed can be used to help develop vocabulary.

Research has indeed shown that the most prominent subdomain of language development related to phonological development is the phonemic awareness (Vellutino et al. 2004). The early predictive signs based on speech processing and differentiating grade one and two pupils with hard of hearing with and without familial risk for phonological development difficulties reveal a typicality that compromises phonemic accuracy and negatively affects language development in general (Guttorm, et al. 2005). Perceptual problems may delay the acquisition of explicit phonemic awareness required for phonology and reading (Goswami & Bryant, 1990). Some children with hearing loss have great difficulty in acquiring early language and phonemic skills. Despite technological advances in amplification such as cochlear implants for some pupils with hard of hearings, the average phonemic, phonology and consequently reading level for this population has not increased in the past several decades.

2.3 Cochlear implant use in oral language training and phonological development

The distinct oral-language abilities are not necessarily developmentally independent. For example, evidence is beginning to indicate that the size of a child's vocabulary may play a role in bolstering the emergence of phonological awareness (Goswami, 2001; Metsala, 1999). The use of cochlear implants by deaf pupils has enabled them to have access to oral language and attach meaning to it. Phonological awareness refers to an individual's awareness of the phonological structure, or sound structure, of words (Gillon, 2004; Rvachew, Ohberg, Grawberg & Heyding, 2003; Stahl & Murray, 1994). Phonological awareness is an important and reliable predictor of later reading ability and has, therefore, been the focus of much research (Ehri et al., 2001; National Institute of Child Health and Human Development 2000a; National Institute of Child Health and Human Development 2000b).

Phonological awareness involves the detection and manipulation of sounds at three levels of sound structure namely syllables, onsets and rimes, and phonemes. Awareness of these sounds is demonstrated through a variety of tasks such as identifying, comparing, separating, combining and generating. Although the tasks vary, they share the basic requirement that some operation (e.g., identifying, comparing, separating, combining, generating) be performed on the sounds. It is assumed that the individual performing these tasks must have awareness of the units of sound in order to perform the operation.

The following studies show the extent to which cochlear implants stimulate development of oral language and consequently phonological skills in deaf/hard of hearing pupils prior to speech training. Further the studies reveal how oral language influences phonological and reading development in both hearing and hard of hearing pupils.

A study by Dillon, de Jong & Pisoni (2011) on phonological awareness, reading skills, and vocabulary knowledge in children who use cochlear implants assumed that in hearing children, reading skills have been found to be closely related to phonological awareness. They used several standardized tests to investigate the reading and phonological awareness skills of 27 deaf school-age children who were experienced cochlear implant users. Approximately two-thirds of the children performed at or above the level of their hearing peers on the phonological awareness and reading tasks. Reading scores were found to be strongly correlated with measures of phonological awareness. These correlations remained the same when they statistically controlled for potentially confounding demographic variables such as age at testing and speech perception skills. However, these correlations decreased even after they statistically controlled for vocabulary size. This finding suggests that lexicon size is a mediating factor in the relationship between the children's phonological awareness and reading skills, a finding that has also been reported for typically developing hearing children.

Similar to the above study, Bowey (1994) examined kindergarten-aged hearing children and found evidence of the interrelationships among phonological awareness, letter knowledge, word identification, and several measures of oral language (e.g., receptive vocabulary, sentence imitation). All the measures of oral language and literacy were significantly intercorrelated. When Bowey divided the children into novice readers and three groups of non-readers who varied in letter knowledge, she found that novice readers scored higher than all groups of nonreaders on phonological sensitivity and vocabulary knowledge. However, when she controlled for differences in vocabulary knowledge, sentence imitation, and digit span effects, none of the differences in phonological sensitivity remained significant. These

findings lend support to the point of view that, at least in kindergarten, this set of abilities is interrelated in important ways.

In addition, Catts et al. (1999) conducted a large-scale study of hearing children followed from kindergarten through second grade and found that over 70% of poor readers had a history of language deficits in kindergarten and, further, that most of these had problems in both phonological processing and oral language. Although both phonological processing and oral language (a composite of oral vocabulary, grammatical completion, sentence imitation, and narrative recall) accounted for unique and significant variance in second-grade reading achievement, the contribution of oral-language abilities to reading achievement was as great as or greater than that observed for phonological processing.

Phonemic processing deficits in pupils with hard of hearing may contribute to poor phonological and subsequently reading outcomes. At the same time, insensitivity reflected in speech processing may also affect language development in a more general way. For instance, it was established that optimal vocabulary growth is facilitated by the combination of a rich linguistic environment (diversity of input) and intact abilities for continuous phonological restructuring of the representations forming one's vocabulary (Fowler, 1991; Metsälä & Walley, 1998; Hoff & Naigles, 2002). Hard of hearing pupils are likely to have some access to sounds in spoken language through use of their residual hearing. Consequently, they may be able to hear and understand speech sounds. This auditory accessibility allows more immediate internalization of the phonological properties of words. Because many pupils who are hard of hearing also use spoken language to communicate, the way they are coding and storing the information matches their internal lexicons. It must be emphasized, however, that not all pupils with hard of hearing have complete access to the sounds in spoken language through audition alone. The researcher believes that oral language

has automatically promoted phonemic development in hearing children but it is not known if it has similar results in pupils with hard of hearing.

Fagan et al., (2004) illustrated the use of cochlear implants in facilitating sound awareness in deaf pupils. They investigated neuropsychological correlates of vocabulary, reading, and working memory in deaf children with cochlear implant. The performance of deaf children with cochlear implants was assessed using measures standardized on hearing children. To investigate nonverbal cognitive and sensorimotor processes associated with post-implant variability, five selected sensorimotor and visuospatial subtests from A Developmental Neuropsychological Assessment (NEPSY) were compared with standardized vocabulary, reading, and digit span measures. Participants were 26 deaf children, ages 6-14 years, who received a cochlear implant between ages 1 and 6 years; duration of implant use ranged from 3 to 11 years. Their investigation revealed significant correlations between standard scores on the Design Copying subtest of the NEPSY and standard scores on vocabulary comprehension, reading, and digit span measures. The results contribute to the researcher's understanding of the benefits of cochlear implantation and cognitive processes that may support post-implant language, phonological development and academic functioning at large.

Pupils with hard of hearing who have difficulties in phoneme awareness have also been found to have perceptual problems. According to Snowling (1990), development difficulties with speech perception could interfere with phonological processing. Auditory perception which is the ability to recognise or interpret what is heard provides an important pathway for phonological development. Many studies have shown that pupils with hard of hearing who have difficulties in phoneme awareness also have auditory perception problem (Stackhouse, 2000). These pupils may confuse words and phrases that sound alike. For instance, 'blue' with 'blow' or 'ball' with 'bell'. Snowling (1990) confirmed that poor performance in

auditory discrimination in five years has been found to correlate with subsequent failure in reading, delays in the acquisition of speech as a consequence of poor auditory perception which affects reading discrimination as the ability to recognise the difference between phoneme sound and to identify words that are the same and different.

Dillon et al., (2004) carried out a research on nonword repetition by children with cochlear implants: accuracy ratings from normal hearing listeners. Seventy-six children with cochlear implants completed a nonword repetition task. The children were presented with 20 nonword auditory patterns over a loud-speaker and were asked to repeat them aloud to the experimenter. The children's responses were recorded on digital audiotape and then played back to normal-hearing adult listeners to obtain accuracy ratings on a 7-point scale. The children's nonword repetition performance, as measured by these perceptual accuracy ratings, could be predicted in large part by their performance on independently collected measures of speech perception, verbal rehearsal speed, and speech production. The strongest contributing variable was speaking rate, which is widely argued to reflect verbal rehearsal speed in phonological working memory. Children who had become deaf at older ages received higher perceptual ratings. Children whose early linguistic experience and educational environments emphasized oral communication methods received higher perceptual ratings than children enrolled in total communication programs. The present findings suggest that individual differences in performance on nonword repetition are strongly related to variability observed in the component processes involved in language imitation tasks, including measures of speech perception, speech production, and especially verbal rehearsal speed in phonological working memory. In addition, onset of deafness at a later age and an educational environment emphasizing oral communication may be beneficial to the children's ability to develop the

robust phonological processing skills necessary to accurately repeat novel, nonword sound patterns.

A similar study was conducted by Kohler, Bahr, Silliman, Bryant, Apel and Wilkinson (2007) on African American English dialect and performance on nonword spelling and phonemic awareness tasks. The purpose of the study was to evaluate the role of dialect on phonemic awareness and nonword spelling tasks. These tasks were selected for their reliance on phonological and orthographic processing, which may be influenced by dialect use. Eighty typically developing African American children in Grades 1 and 3 were first screened for dialect use and then completed a standardized test of phonological processing and a nonword spelling measure. The influence of dialect was analyzed in both experimental tasks, followed by a qualitative analysis of dialect use in nonword spellings. Dialect density measures based solely on the use of African American English (AAE) phonological features explained few differences in phonological processing scores. In contrast, correlations indicated that children with higher dialect densities produced more nonword spelling errors influenced by AAE, an effect most evident in Grade 3. Qualitative analyses revealed AAE phonological features occurring in many of the misspelled nonwords. After Grade 2, nonword spelling may be more sensitive to the effects of dialect variation than are phonemic awareness tasks. It is suggested that spelling may be a more sensitive clinical indicator of difficulties in integrating the phonological and orthographic information needed for fluent decoding skill.

In addition to linking orthography and language abilities, Wu, Ko, Chen, Tsou and Chao (2011) conducted a study on written language ability in Mandarin speaking children with cochlear implants. The study aimed at examining narrative writing in cochlear implant (CI) children and understanding the factors associated with unfavorable outcomes. Forty-five CI children in grades 2-6 participated in this study. They received CIs at 4.1 ± 2.1 years of age

and had used them for 6.5 ± 2.7 years. A story-writing test was conducted and scored on 4 subscales: Total Number of Words, Words per Sentence, Morphosyntax, and Semantics. Scores more than 1.5 SD lower than the mean of the normal-hearing normative sample were considered problematic. Language and speech skills were examined. Their findings showed that significantly more implanted students were problematic on "Total Number of Words" ($p < 0.001$), "Words per Sentence" ($p = 0.049$), and "Semantics" ($p < 0.001$). Poorer receptive language and auditory performance were independently associated with problematic "Total Number of Words" ($R(2) = 0.489$) and "Semantics" ($R(2) = 0.213$), respectively. "Semantics" problem was more common in lower graders (grades 2-4) than in higher graders (grades 5-6; $p = 0.016$). In their conclusion, implanted children tend to write stories that are shorter, worse-organized, and without a plot, while formulating morphosyntactically correct sentences. Special attention is required on their auditory and language performances, which could lead to written language problems.

Tse, So and Hear's (2001) study investigated the phonological awareness abilities of Cantonese-speaking pre-schoolers with cochlear implants. Participants were 15 Cantonese-speaking children with cochlear implants (CIs) aged 3.08-6.10, chronological-age-matched with 15 children with normal hearing. Each participant performed 10 tasks evaluating different levels of phonological awareness abilities and phonological knowledge. The results showed that pre-schoolers with cochlear implants and their normal hearing peers had similar levels of syllable awareness, phoneme awareness and rhyme awareness. However, cochlear implant users showed significantly poorer performance on tone awareness and phonological knowledge tasks than their normal hearing peers. Cantonese-speaking pre-schoolers with cochlear implants were able to develop phonological awareness. However, the cochlear implants might not provide enough tonal information for children with hearing impairment

for tonal lexical comprehension. This study shows that incomplete speech and language stimulation may affect phonological knowledge development in Cantonese-speaking pre-schoolers with cochlear implants and other hard of hearing pupils in other countries.

The relative difficulty of phonological awareness tasks has been investigated by several researchers. Schatschneider, Francis, Foorman, Fletcher, & Mehta (1999) found that a group of kindergarten to second-grade children performed better on onset-rime blending, phoneme matching and phoneme categorization tasks than they did on phoneme segmentation, phoneme blending (of nonwords), and phoneme deletion tasks. In addition, Stahl and Murray (1994) found that a group of 5- to 7-year-old children obtained higher scores on a phoneme isolation task than on phoneme blending and phoneme deletion tasks, while performing most poorly on a phoneme segmentation task. Overall, results regarding the relations between the levels of phonological awareness have not yielded consistent, definitive results across studies to date. In general, however, tasks that involve explicit manipulation of phonological units seem to be more difficult for children to carry out than tasks that involve isolating or classifying (matching) units.

Similarly, findings regarding phonological awareness at the onset-rime level have been debated in the literature (Morais, 1991; Read, 1991). For example, Yopp (1988) found that onset-rime level awareness was not correlated with phoneme-level awareness. However, in a series of studies in which stimuli were carefully controlled for several characteristics including onset-rime versus phonemic level contrasts, Treiman and colleagues (see Treiman & Zukowski, 1991) obtained more robust results. They found that young children who are not yet capable of demonstrating phonemic awareness were nevertheless able to display onset-rime level awareness. Furthermore, they found that syllable level awareness seems to precede onset-rime level awareness. An in-depth investigation into whether the stimuli and tasks

intended to assess onset-rime level awareness rather than awareness at another phonological level (or some other auditory processing or cognitive skills) should provide new insights into this debate (see Morais, 1991).

One consistent finding that has been reported in the literature is that children tend to demonstrate phonological awareness at the syllable level earlier than they show phonological awareness at the phoneme level (see Gillon, 2004; Liberman et al., 1974; Lonigan, Burgess, Anthony, & Barker, 1998). More importantly, phonological awareness at both of these levels has been shown to predict reading ability later in the child's development, but correlations between phonemic awareness and reading skills tend to be stronger and more consistent than correlations between syllable-level phonological awareness and reading skills (Gillon, 2004). This general finding is not surprising given that the representation of spoken language with an alphabet hinges critically on the graphic representation of phonemes, not syllables. Liberman and her colleagues hypothesized that phonemic awareness is strongly related to reading ability (e.g., Liberman et al., 1974; Liberman, Shankweiler, & Liberman, 1989). Research findings over the past 50 years have repeatedly confirmed this original hypothesis, consistently finding high levels of phonemic awareness to be a strong concurrent and future predictor of reading skills in the hearing population (see the National Institute of Child Health and Human Development, 2000; Shankweiler, 1991).

Phonological sensitivity is an important causal variable in reading acquisition; however, there is controversy concerning its nature. One view holds that sensitivity to various linguistic units reflects independent abilities, whereas, another holds sensitivity to these units reflects one ability. Various studies in earlier discussions have shown evidence that phonological sensitivity, other language skills, and print knowledge are interrelated in the years before children begin receiving reading instruction, and there is evidence that these relationships

persist as children begin learning to read. However, there is far from general agreement about the nature of the relationships among language skills (e.g., vocabulary, syntax, and phonological processing and awareness) and between early and later literacy. The researcher now turns to a point of view that accords primary importance to phonemic awareness.

Given the established importance of phonological sensitivity, a number of researchers have explored the early origins of its development. Shankweiler et al. (1999) focused on phonological processing and argued that “deficient skill in mapping between the alphabetic representations of words and their spoken counterparts is the chief barrier to comprehension of text, at least in learners who are still at relatively early stages of reading” (p. 70). This perspective has been widely influential and has shaped research methodology and analytic approaches in ways that have limited attention paid to the independent contributions of oral language during the early phase of reading development.

The Whitehurst and Lonigan (1998, 2001) model drew on data from several studies, including that of Lonigan, Burgess, and Anthony (2000). Drawing on two samples of preschool children, Lonigan et al. (2000) developed models of the interrelationships among measures of phonological sensitivity, oral language, and nonverbal intelligence. Oral language in this project included receptive and expressive vocabulary, sentence production, and grammar for younger children (mean age _ 41 months) and grammatical production only for older children (mean age _ 60months). Their younger sample, the one most relevant to this article, was assessed at two points in time, but the oral-language measures were not administered the second time. For this group, three factors accounted for children’s test performance at Time 1: phonological sensitivity, oral language, and nonverbal IQ, with evidence of significant overlap between oral-language and phonological sensitivity factors.

Time 1 oral language and phonological sensitivity related to children's phonological awareness and literacy skills 18 months later. The preschool measures of phonological sensitivity and letter knowledge significantly predicted decoding at age 6 after controlling for grammatical sensitivity, the only oral language measure shared across both samples. Note that although this result demonstrates the importance of phonological awareness, by testing oral language only at one point in time and by using a restricted range of measures of oral language, the research method limited the possibility of finding contributions of oral language. Further, the analytic approach simply controlled for language, thereby eliminating examination of its independent contribution.

Anthony et al., (2002) carried the investigation on structure of preschool phonological sensitivity: overlapping sensitivity to rhyme, words, syllables, and phonemes. They examined relations among sensitivity to words, syllables, rhymes, and phonemes in 149 older preschool children (4- and 5-year-olds) and 109 younger preschool children (2- and 3-year-olds) who completed eight measures of phonological sensitivity and measures of print knowledge. Confirmatory factor analyses of all combinations of word, syllable, rhyme, and phoneme factors found that a one-factor model best explained the data from both groups of children (CFIs >.98). Only variance common to all phonological sensitivity skills was related to print knowledge and rudimentary decoding. Findings support a developmental conceptualization of phonological sensitivity.

Other studies also have found that oral language is related to phonological sensitivity in the years prior to direct reading instruction and that language, especially vocabulary, plays an important role in supporting reading during the initial stage when decoding is the primary challenge facing children. In a preschool sample, Dickinson and Snow (1987) found interrelationships among measures of print knowledge, phonological sensitivity, and oral

language. In a longitudinal study, Chaney (1992, 1994, 1998) followed 41 children from age 3 years through age 7. She gave children assessments of language comprehension, verbal ability, articulation, discrimination, word knowledge, sentence structure, five tasks testing phonological awareness, five for word awareness, two for structural awareness, and two of emergent literacy.

Thus, studies of the emergence of phonological awareness during the preschool years and early reading period have consistently found that phonological awareness plays an important role in predicting early decoding, but because of choices of research measures and analytic methods, they have not fully explored the potential enduring contributions of oral language to early decoding.

When the children were at the end of first grade, she gave them tests of phonological segmentation, phoneme deletion, sound-symbol knowledge, word identification, and comprehension. At age 3, the assessments of metalinguistic awareness (phonological, word, and structural) were intercorrelated and were also correlated with overall linguistic skill (excepting articulation and/or discrimination). Metalinguistic skill, especially phonological awareness, correlated with literacy knowledge, but oral-language skills such as receptive vocabulary were also strongly correlated with literacy at age 3. Evidence of long-term contributions of language to early reading came from Chaney's (1998) follow-up study, which found that overall language development at age 3 was as strongly correlated with reading scores at age 7 as it had been with metalinguistic and print knowledge scores at age 3. In addition, metalinguistic skills and print knowledge at age 3 made significant contributions to reading achievement above and beyond that provided by language development.

In another study, Scarborough (2001) conducted a meta-analysis of findings from 61 kindergarten research samples examining the impact of many aspects of oral language on subsequent reading abilities. She drew a number of conclusions, including that (a) during preschool, most verbal skills are well-correlated with each other, both concurrently and predictively, and (b) successful predictors of future reading abilities usually have not been confined to a single linguistic domain. She articulates the consequences of the controversy about whether oral-language skills other than phonological sensitivity are important only insofar as they enable children to develop phonological processing or whether these other skills continue to play an important role in children's reading achievement. Most important, she argues that targeted interventions with an inaccurate model of the relationship between oral language and literacy have not and will not be successful and recommends that researchers stop thinking about causality of reading only in terms of a linear chain of abilities.

In a longitudinal project, Lonigan, Burgess, Anthony, and Barker (1998) studied low- and middle-income 2- to 5-year-old children's phonological sensitivity in relationship to early reading. They administered a battery of measures of phonological sensitivity and oral-language measures of vocabulary and grammatical knowledge. Among the older children, who showed stable patterns of assessment, they found significant correlations between oral language and phonological sensitivity measures. In a related study, Burgess and Lonigan (1998) analyzed data from 4- and 5-year-old middle-class Caucasian children that were collected at two points in time. At Time 1 they included tests of grammatical understanding and expression, four measures of phonological sensitivity, and two measures of letter knowledge. At Time 2, the grammatical oral-language assessments were dropped. Once again, phonological awareness predicted early reading after controlling for language, but the independent contribution of language from Time 1 was not examined. Similarly, in a study

that followed children from kindergarten through fourth grade, Wagner et al. (1997) found increasingly strong correlations between measures of decoding and a vocabulary assessment, but in their regression analyses they simply used vocabulary as a control measure.

Similar to the longitudinal study, correlational studies that have examined children during the emergent reading period have found interrelationships between a variety of oral-language measures, measures of phonological sensitivity, and letter knowledge, but they gave only limited attention to the role of oral language. Although studies during the early reading period have found evidence highlighting the role of phonological sensitivity, especially among poor readers, Catts et al. (1999) argued that many results are largely an artifact of systematically excluding children with below-average IQs from investigations of good and poor readers because most IQ tests tap verbal abilities. Thus, it may be the case that researchers using the PSA do not find a broader range of oral-language abilities to be important because they do not look for them in a concerted way.

In addition, Berninger, Abbott, Thomson, and Raskind, (2001) studied language, reading, and writing in somewhat older children (Grades 1–6) with documented reading and/or writing problems. They found many complex and significant interrelationships among these variables, which led them to conclude that functional reading and writing systems are separate but highly interdependent and draw on common, as well as unique, component language processes. They introduce the term *flexible orchestration*: “the different ways those common language processes may be orchestrated, depending on which functional system is activated” (Berninger et al., 2001, p. 64). Also, Storch and Whitehurst (2002) published analyses of a longitudinal study that followed a group of children from Head Start through the fourth grade. These analyses drew on a large sample that made possible the testing of

alternative models of the relationship between early and later sets of skills. Using structural analysis, the authors concluded that reading development is best conceived of as the result of two distinct interacting factors, oral-language skills and code-related skills. The impact of oral-language skills was most apparent in the preschool years and again in third and fourth grades, but indirect effects were noted in first and second grades.

Phonological awareness is one component of a larger phonological processing system used for speaking and listening (Catts & Kamhi, 2005; Wagner & Torgesen 1987; Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993). Phonological awareness is different from other phonological abilities in that it is a metalinguistic skill, requiring conscious awareness and reflection on the structure of language (Gillon, 2004; Mattingly, 1972). Other phonological abilities: such as attending to speech, discriminating between sounds, holding sounds in memory: can be performed without conscious reflection. However, these other phonological abilities are prerequisite to the development of phonological awareness. Therefore, general listening skills are often among those included in phonological awareness instruction.

Pisoni and Clin (2015) reviewed information processing skill of deaf children with cochlear implants: some new process measures of performance. Recent findings on learning, memory and cognitive processes in deaf children following cochlear implantation were reviewed. The contribution of demographic factors was discussed and the results of several studies using "process" measures of performance were presented.

In the first study, results from an investigation of the "Stars" showed that the exceptionally good implant users differed from the low performers in several important ways reflecting their ability to rapidly encode sound patterns into phonological representations. In the second

set of studies, several new measures of information-processing performance were reported. Speaking rate, a measure shown in other populations to correlate well with an individual's verbal rehearsal speed for items in immediate memory was found to be strongly correlated with measures of a child's immediate memory capacity as well as open-set spoken word recognition scores. Additional evidence revealed atypical reproductive memory spans for auditory as well as visual sequences. Deaf children with cochlear implants also showed less benefit from simple repetition of a familiar sequence than age-matched normal-hearing children. Variation in children's success with cochlear implants reflects differences in the operation of elementary information-processing skills used in a wide range of language-processing tasks that draw on phonological coding and verbal rehearsal processes.

Phonological awareness skills are a subset of phonological processing skills, which also include phonological working memory skills and lexical retrieval (see Brady, 1991). Several recent studies of hearing children have found that phonological processing skills are related to vocabulary size (e.g., Edwards, Beckman, & Munson, 2004; Munson, Edwards, & Beckman, 2005). Other researchers (e.g., Elbro, Borstron, & Petersen, 1998; Fowler, 1991; Studdert-Kennedy, 2002) have proposed that the relationship between vocabulary knowledge and phonological processing skills arises because children's phonological representations become more robust as they are able to make more generalizations about the phonological structure of language due to the increases in their lexicon size that accompany increased exposure to spoken language. Thus, it is important to take vocabulary knowledge into consideration when investigating the relationship between phonological skills and reading in hard of hearing pupils.

Although some two-year-old hearing children demonstrate phonological awareness, for most hard of hearing children, phonological awareness appears in the third year, with accelerating

growth through the fourth and fifth years depending on training in this area (Gillon, 2004; Lonigan, Burgess, Anthony & Barker 1998). Phonological awareness skills develop in a predictable pattern similar across languages progressing from larger to smaller units of sound (that is, from words to syllables to onsets and syllable rimes to phonemes) (Lonigan, Burgess, Anthony & Barker 1998; Chaney, 1992; Stanovich, Cunningham & Crammer, 1984; Treiman & Zukowsky, 1991). Tasks used to demonstrate awareness of these sounds have their own developmental sequence. For example, tasks involving the detection of similar or dissimilar sounds (e.g., oddity tasks) are mastered before tasks requiring the manipulation of sounds (e.g., deletion tasks), and blending tasks are mastered before segmenting tasks (Anthony, Lonigan, Driscoll, Phillips & Burgess, 2003). It should be noted that the acquisition of phonological awareness skills does not progress in a linear sequence; rather, children continue to refine skills they have acquired while they learn new skills (Anthony, Lonigan, Driscoll, Phillips & Burgess, 2003).

Miller, Lederberg, and Easterbrooks (2013) explored the development of spoken phonological awareness for deaf and hard-of-hearing children (DHH) with functional hearing (i.e., the ability to access spoken language through hearing). Teachers explicitly taught five preschoolers the phonological awareness skills of syllable segmentation, initial phoneme isolation, and rhyme discrimination in the context of a multifaceted emergent literacy intervention. Instruction occurred in settings where teachers used simultaneous communication or spoken language only. A multiple-baseline across skills design documented a functional relation between instruction and skill acquisition for those children who did not have the skills at baseline with one exception; one child did not meet criteria for syllable segmentation. These results were confirmed by changes on phonological awareness tests that were administered at the beginning and end of the school year. They found that

DHH children who varied in primary communication mode, chronological age, and language ability all benefited from explicit instruction in phonological awareness.

The development of phonological awareness is closely tied to overall language and speech development. Vocabulary sizes as well as other measures of receptive and expressive semantics, syntax, and morphology are consistent concurrent and longitudinal predictors of phonological awareness (Lonigan, Burgess, Anthony & Barker 1998; Chaney, 1992; Cooper, Roth, Speece & Schatschneider, 2003; Dickinson, McCabe, Anastosopolous, Peisner-Feinberg, & Poe, 2003; Rvachew, 2006; Rvachew & Grawburg, 2006; Smith, Tager & Flusberg 1982; Walley, Metsala & Garlock, 2003). Consistent with this finding, children with communication disorders often have poor phonological awareness (Kamhi & Catts, H.W. (1991).

Law and So (2006) in their study examined the phonological skills of 2 groups of Cantonese-speaking children with prelingual, profound bilateral hearing loss. The phonological abilities of 7 children fitted with hearing aids were compared with the abilities of 7 children who wore cochlear implants. Participants in each group ranged in age from 5;1 to 6;4 years. The participants were asked to name 57 pictures and retell 2 stories. Phonological abilities were described in terms of the participants' phonological units and the phonological processes used. The participants' perception of single words was assessed using a Cantonese phonology test that includes tonal, segmental, and semantic distracters. All except 1 participant had incomplete phonetic repertoires. All participants showed complete vowel and tone inventories. The study group used both developmental rules and non developmental phonological rules. For perception of single words, participants chose the target word most often. The cochlear implant users had a significantly higher percentage correct score for consonant production than hearing aid users. The study concluded that the prediction that

Cantonese children wearing cochlear implants would have better phonological skills than children having hearing aids with a similar degree of hearing loss was confirmed. Cochlear implant usage appeared to promote consonant feature production development to a greater degree than did the use of a hearing aid.

Phonological development and articulatory accuracy is often correlated to phonological awareness skills, both for children with typical speech (Carroll, Snowling, Hulme & Stevenson, 2003) and those with disordered speech (Rvachew, Ohberg, Grawberg & Heyding, 2003; Larrivee & Catts, 1999; Webster & Plante, 1992). In addition to milestones of speech and language development, speech and language processing abilities are also related to phonological awareness: both speech perception (McBride-Chang, 1995; Nittrouer & Burton, 2005) and verbal short-term memory (McBride-Chang, 1995) have been concurrently and predicatively correlated with phonological awareness abilities.

Phonological awareness is the overarching term for skills such as rhyming, alliteration, onset and rime, and syllabication. Phonological awareness at the onset-rime level is knowledge that words consist of collated onsets and rimes. An onset is all of the phonemes that precede the vowel in a syllable, and a rime is the vowel and all of the phonemes that follow the vowel in a syllable. Tasks intended to measure onset-rime level awareness include rhyme recognition, rhyme oddity (detection of one word that does not rhyme with two or more other words), spoken rhyme generation, and onset-rime blending. Most hard of hearing pupils who can hear have a sensitivity to speech sounds that is acquired either naturally or through speech training in early years of life. Phonological awareness encompasses specific phonemic awareness skills such as sound identification, sound blending, segmenting, and sound manipulation. Skills and activities within these domains have been described and illustrated in other publications (see Gerber & Klein, 2004; Smith, 1998).

As hearing children develop phonological awareness, they are able to internalize the sound-based properties of words that allow sound-letter associations to be made. They are building internal phonological representations by realizing that sounds in words can be manipulated to create new words; they internalize rules and patterns associated with these sound-based properties, and subsequently can effectively decode novel words. Hard of hearing pupils also have the ability to associate the words they are decoding with words stored in their already expansive word banks. They can do this because the language they are using to communicate is the same language they are reading. Comprehension and true reading occurs when pupils easily decode words and apply word meanings to the context of what they are reading. Internal representations of phonemes are mental images of the sounds within words that hearing as well as hard of hearing pupils can develop.

When pupils who are hard of hearing develop phonological awareness skills, they are presumed to process, store, and later recall sound based information using a mental image, or an internal representation (Leybaert & Alegria, 2003). The internal representations do not need to be externalized for them to be meaningful (Hanson, 1989). In other words, it seems that pupils who are deaf do not need to use spoken language to understand and use phonological awareness. The process of building internal phonological representations may be more “transparent” for pupils who are hard of hearing than for pupils who are deaf. The use of visual phonics helps in phonological development in hard of hearing pupils.

Koo, Crain, LaSasso, Eden & Ann (2008) conducted a study on phonological awareness and short-term memory in hearing and deaf individuals of different communication backgrounds. In their study, they examined the effect of sensory experience, early language experience, and communication mode on the phonological awareness skills and serial recall of linguistic

items in deaf and hearing individuals of different communicative and linguistic backgrounds: hearing non signing controls, hearing users of ASL, deaf users of ASL, deaf oral users of English, and deaf users of cued speech. Since many current measures of phonological awareness skills are inappropriate for deaf populations on account of the verbal demands in the stimuli or response, they devised a nonverbal phonological measure that addressed this limitation. The Phoneme Detection Test revealed that deaf cuers and oral users, but not deaf signers, performed as well as their hearing peers when detecting phonemes not transparent in the orthography. The second focus of the study examined short-term memory skills and found that in response to the traditional digit span as well as an experimental visual version, digit-span performance was similar across the three deaf groups, yet deaf subjects' retrieval was lower than that of hearing subjects. Their results supported the claim (Bavelier et al., 2006) that lexical items processed in the visual-spatial modality are not as well retained as information processed in the auditory channel. Together these findings show that the relationship between working memory, phonological coding, and reading may not be as tightly interwoven in deaf students as would have been predicted from work conducted in hearing students.

Phonological awareness is important for reading development in hearing children, in whom it develops at the three consecutive levels of the syllable, rhyme, and phoneme. Deaf children typically have literacy difficulties, and previous research has been equivocal about whether deaf children can develop phonological awareness.

Sterne and Goswami's (2000) three experiments were presented that investigated the phonological skills of deaf children (mean age 11 years) at the three linguistic levels of syllable, rhyme, and phoneme. The first experiment showed that deaf children's syllable awareness can be equivalent to that of chronological age-matched hearing controls. In the

second experiment, deaf children's ability to make rhyme judgements was above chance, but poorer than that of younger reading-matched hearing controls. The third experiment showed that deaf children could phonologically recode nonsense words at a level above chance, suggesting that they could draw on phonemic skills in certain conditions. In their conclusion, they mentioned that deaf children can develop phonological awareness, but that their phonological skills lag those of hearing children and may develop in different ways. Differences between their tasks and those used in other studies are discussed in similar studies that have trained phonological awareness through use of visual phonics.

Visual Phonics also known as “See the Sound” was developed in 1982 by the International Communication Learning Institute (ICLI). Use of this system requires training provided by specialists certified by the ICLI. This programme uses a multisensory approach incorporating tactile, kinesthetic, visual, and auditory feedback to develop speech skills, phonological awareness, improve reading and writing in pupils with hard of hearing who do not learn readily from traditional reading approaches. Visual Phonics can be used to improve reading through the development of phonological awareness skills, writing through the development of spelling skills, and speech through the development of articulation/mouth movements.

Visual Phonics is a system of 45 hand cues that represent the 45 sounds in spoken English and written symbols that help pupils make the connection between written and spoken language. Each hand cue is suggestive of how a sound is made. Each sound has a written symbol and each written symbol is a visual representation of the hand shape and represents the same sound regardless of the spelling. The hand shapes and symbols help pupils make sense of the various spellings and reinforce the sound–symbol connection. Some Visual Phonics activities to incorporate into traditional phonologic awareness activities are Rhyming words and homophones. Rhyming words or homophones are presented with the words using

Visual Phonics hand cues and the written Visual Phonic symbols. With the hand cues and written symbols, hard of hearing pupils can see the similarity in how the words look in the same way that hearing pupils hear the similarity in the words. In addition to this is phoneme counting, where pupils are asked to count phonemes by using the Visual Phonics hand cues and written symbols to allow them to see how many phonemes are in a given word; the number of sounds may differ from the number of letters (i.e., coat has three sounds but four letters). Also, pupils are taught oddity task. This task is used when discriminating the beginning, ending, and medial sounds in words. Visual Phonics hand cues and written symbols are used to permit hard of hearing pupils to see which words begin or end with the same or different sounds and to identify the specific sounds. Finally, sequencing and segmenting sounds are taught by presenting sounds in words via Visual Phonics hand cues or written symbols to provide visual feedback and enhance the pupil's ability to sequence/segment the sounds in words.

Rachel's (2008) study examined the relationship between performance on a phonological awareness task, performance on a decoding task, reading ability, and length of time in literacy instruction with visual phonics for 10 DHH kindergartens through Grade 3 students receiving academic instruction with sign supported English and American Sign Language. Findings indicated that these students were able to use phonological information to make rhyme judgments and to decode; however, no relationship between performance on reading ability and length of time in literacy instruction with visual phonics was found.

Webb & Lederberg (2014) evaluated psychometric properties of two phonological awareness (PA) tests normed for hearing children when used with deaf and hard-of-hearing (DHH) children with functional hearing. The purpose of the study was to Measure phonological awareness in deaf and hard-of-hearing children. One hundred and eight DHH children (mean

age = 63.3 months) with cochlear implants or hearing aids were assessed in the fall and spring of the school year. Sixty-three percent communicated only with spoken language; 37% communicated with both sign and speech. Examiners administered PA subtests from the Phonological Awareness Test-2 and the Test of Preschool Early Literacy, along with assessments of speech perception and early literacy. Results on item analyses indicated that both tests showed good psychometric properties (e.g., high item discriminations and internal consistencies). DHH children scored higher on subtests and items that measured words, rhymes, and syllables than those that assessed phonemes. Although subtest difficulty influenced the factor structure in the fall, spring PA was best characterized as a single factor. PA correlated concurrently and predictively with early literacy.

In a large study of the contribution of abilities to early reading, Vellutino et al. (1996) studied over 1,000 kindergarten children, among whom 15% were identified as poor readers. Children were assessed on phoneme segmentation, rapid naming, rapid articulation, syntactic processing, receptive vocabulary, memory, general intellectual functioning, attention, precursor and rudimentary reading skills, and math abilities. Poor readers were given daily tutoring, and most were found to be within or above the average range after one semester of remediation. Children who were difficult to remediate performed below easily remediated and non remediated peers on kindergarten and first-grade tests evaluating phonological skills but not on tests evaluating visual, semantic, and syntactic skills. Note that this difficult-to-remediate group amounted to less than 2% of the original sample, and so might well be a distinct population. In separate analyses of the same data set, Scanlon and Vellutino (1997) compared 150 children rated as poor, average, and good readers and found stronger performance among good readers on assessments of sentence and word memory and semantic

skills. They interpreted their results as indicative of a problem with verbal memory among low readers.

2.4. Development of Phonological Awareness and Phonological Representations

The development of phonological awareness is predicated upon the opportunity and ability to explicitly access the phonological structure of spoken language and construct phonological representations in the mental lexicon. Deaf children who receive little or no benefit from sensory aids have been shown to develop phonological knowledge, which may be due to their development of phonological representations based on articulatory information obtained from their lip reading and speaking experiences (Hanson, 1991). Their knowledge of phonological units is knowledge related to articulatory gestures used in speech production, rather than knowledge based on perceptual units parsed from an acoustic stream (Hanson, 1991). Indeed, in a pioneering monograph on deaf school children, Conrad (1979) found that within the deaf population, good lip readers perform much better than poor lip readers on tasks that require phonological coding. Thus, even children with little or no hearing can benefit from their (articulatory) knowledge of the phonological units of their language when reading (see also Musselman, 2000; Perfetti & Sandak 2000).

Colins et al., (2004) conducted a study on the relation between deaf children's phonological skills in kindergarten and word recognition performance in first grade. The aim of the study was twofold: 1) to determine whether phonological skills measured in deaf pre readers predict their later phonological and reading skills after one year of reading instruction as is the case for hearing children; 2) to examine whether the age of exposure to a fully specified phonological input such as Cued Speech may explain the inter-individual differences observed in deaf children's phonological and word recognition levels. Twenty-one 6-year-old deaf pre readers and 21 hearing children of the same chronological age performed two

phonological tasks (rhyme decision and generation tasks); they were re-assessed 12 months later and presented with other phonological tasks (rhyme decision and common unit identification tasks) and a written word choice test. In their results, Phonological skills measured before learning to read predicted the written word recognition score the following year, both for hearing and for deaf participants. Age of onset of exposure to Cued Speech was also a strong predictor of phonological and written word recognition scores in beginning deaf readers. The study concluded that, the evidence broadly supports the idea of a capacity for acquiring phonological skills in deaf children. Deaf children who are able to develop an implicitly structured phonological knowledge before learning to read will be better readers when this knowledge becomes explicit under the pressure of reading instruction.

Horn, Fagan, Dillon, Pisoni & Miyamoto (2004) in their study first, investigated visual-motor integration (VI) skills of prelingually deaf (PLD) children before and after cochlear implantation (CI) and secondly, investigated correlations with spoken-language and related processing measures. Study 1 was a longitudinal study in which VI was tested pre implant. Study 2 was a cross sectional study of school-age children who used a CI for >2 years. In study 1, a standardized design-copying task was administered pre implant, and spoken-language data were obtained at intervals up to 4 years post implantation. Analyses were conducted to determine if pre implant VI scores were predictive of various spoken-language measures. In study 2, standardized design copying and speeded maze tracing tasks were administered along with speech perception, vocabulary, and related processing measures. They found that, pre implant VI scores for children in study 1 fell within the typical range based on age-equivalent norms, post implant VI standard scores in study 2 were low compared to the normative sample. Post implant VI scores were inversely related to age at implantation. Pre implant VI scores were robustly predictive of most, but not all, spoken-

language outcome scores. Post implant design copying scores were also correlated with spoken-language and related processing measures whereas maze-tracing scores were less robustly related to these measures. Their study concluded that, early auditory and linguistic experience may impact the development of VI skills. VI is a pre implant predictor of later spoken language outcomes. Design copying and speeded maze tracing tasks appear to tap different sets of cognitive resources in PLD children with CIs.

The auditory signal provided by cochlear implants to children who are deaf allows some cochlear implant users to perceive speech. The speech perception skills that cochlear implant users develop to varying extents through speech and language therapy, provides a mechanism by which they can develop phonological representations. These phonological representations could theoretically provide a basis for cochlear implant users to develop phonological awareness to a greater extent than was previously possible for children who are deaf. James et al., (2005) explored the developmental sequence of phonological awareness skills in a group of deaf children who use cochlear implants and in a group of severely deaf and profoundly deaf children who do not use cochlear implants. James and colleagues found that the children with cochlear implants and the profoundly deaf children without cochlear implants achieved phonological awareness scores that were highest at the syllable level, then at the rhyme (onset/rime) level, and poorest at the phoneme level. The severely deaf children differed from the other groups in that they had higher rhyme awareness scores than syllable awareness scores, but like the other groups they also performed most poorly on the phoneme awareness measure.

Results reported by Carter, Dillon, and Pisoni (2002) on deaf children with cochlear implants are also consistent with these findings. A group of children who were experienced cochlear implant users completed a nonword repetition task. Analyses of their nonword repetition

responses showed that they produced the correct suprasegmental features (number of syllables and stress placement) more often than the correct segmental features (consonant place, manner, and voicing; vowel height and backness). Additional findings are described in Cleary, Dillon, and Pisoni, (2002), Dillon, Burkholder, Cleary, and Pisoni (2004), Dillon, Cleary, Pisoni, and Carter (2004), Dillon and Pisoni (2006), and Dillon, Pisoni, Cleary, and Carter (2004). These results are consistent with the hypothesis that phonological awareness develops at levels of larger phonological units (syllable, onset-rime) prior to awareness at the phoneme level in deaf children, as has also been found in hearing children. Although the precise relationship between nonword repetition skills and phonological awareness is not yet understood, perhaps the children's ability to accurately reproduce the syllable structure of the target nonwords even when they did not accurately reproduce the phonemic content of the target nonwords was a reflection of the earlier development of phonological awareness at the syllable level relative to phonological awareness at the phonemic level.

In another study, Dillon, Cleary, Pisoni & Carter (2007) carried out an investigation on imitation of nonwords by hearing impaired children with cochlear implants: segmental analyses. The phonological processing skills of 24 pre-lingually deaf 8- and 9-year-old experienced cochlear implant users were measured using a nonword repetition task. The children heard recordings of 20 nonwords and were asked to repeat each pattern as accurately as possible. Detailed segmental analyses of the consonants in the children's imitation responses were carried out. Overall, 39% of the consonants were imitated correctly. Coronals were produced correctly more often than labials or dorsals. There was no difference in the proportion of correctly reproduced stops, fricatives, nasals, and liquids, or voiced and voiceless consonants. Although nonword repetition performance was not correlated with the children's demographic characteristics, the nonword repetition scores were strongly

correlated with other measures of the component processes required for the immediate reproduction of a novel sound pattern: spoken word recognition, language comprehension, working memory, and speech production.

In a similar study, Carter, Dillon & Pisoni (2002) carried out an investigation on imitation of nonwords by hearing impaired children with cochlear implants: suprasegmental analyses. In their study, they examined two prosodic characteristics of speech production in 8-10-year-old experienced cochlear implant (CI) users who completed a nonword repetition task. They looked at how often they correctly reproduced syllable number and primary stress location in their responses. Although only 5% of all nonword imitations were produced correctly without errors, 64% of the imitations contained the correct syllable number and 61% had the correct placement of primary stress. Moreover, these target prosodic properties were correctly preserved significantly more often for targets with fewer syllables and targets with primary stress on the initial syllable. Syllable and stress scores were significantly correlated with measures of speech perception, intelligibility, perceived accuracy, and working memory. These findings suggest that paediatric CI users encode the overall prosodic envelope of nonword patterns, despite the loss of more detailed segmental properties. This phonological knowledge is also reflected in other language and memory skills.

Another similar study by Burkholder-Juhász, Levi, Dillon & Pisoni (2007) was done on nonword repetition with spectrally reduced speech: some developmental and clinical findings from paediatric cochlear implantation. Nonword repetition skills were examined in 24 paediatric cochlear implant (CI) users and 18 normal-hearing (NH) adult listeners listening through a CI simulator. Two separate groups of NH adult listeners assigned accuracy ratings to the nonword responses of the paediatric CI users and the NH adult speakers. Overall, the nonword repetitions of children using CIs were rated as more accurate than the nonword

repetitions of the adults. The nonword repetition accuracy ratings from both groups of subjects were correlated with open- and closed-set word recognition scores and forward digit spans. Only the perceptual accuracy scores from pediatric CI users were correlated with measures of speech production accuracy. These results suggest that although the pediatric CI users had more experience and success in perceiving speech under degraded auditory conditions, developmental differences in their memory skills prevent them from performing as well on working memory tasks as mature listeners.

Reading skills in hard of hearing children are closely related to their phonological processing skills, often measured using a nonword repetition task in which a child relies on abstract phonological representations in order to decompose, encode, rehearse in working memory and reproduce novel phonological patterns.

Evidence is also shown in Dillon and Pisoni's (2006) study on nonword repetition and reading skills in children who are deaf and have cochlear implants. They found that nonword repetition performance was significantly related to nonword reading, single word reading and sentence comprehension. Communication mode and nonverbal IQ were also found to be correlated with nonword repetition and reading skills. A measure of the children's lexical diversity, derived from an oral language sample, was found to be a mediating factor in the relationship between nonword repetition and reading skills. Taken together, their findings suggest that the construction of robust phonological representations and phonological processing skills may be important contributors to the development of reading in children who are deaf and use cochlear implants. This study confirms their findings (Dillon & Pisoni, 2001) where they reported analyses of nonword repetition responses from 76 experienced pediatric cochlear implants users. Nonword repetition performance reflects the participants' reliance on their phonological system, which has been found to be related to phonological

awareness skills and reading in normal-hearing children. They found that nonword repetition performance was strongly correlated with several measures of reading readiness and reading in deaf children with cochlear implants. Correlations between nonword repetition performance and reading indicate that the children relied on their knowledge of phonology to complete the reading tasks.

Bouton, Bertoncini, Serniclaes & Colé (2011) assessed the reading and reading-related skills (phonemic awareness and phonological short-term memory) of deaf children fitted with cochlear implants (CI), either exposed to cued speech early (before 2 years old) (CS+) or never (CS-). Their performance was compared to that of 2 hearing control groups, 1 matched for reading level (RL), and 1 matched for chronological age (CA). Phonemic awareness and phonological short-term memory were assessed respectively through a phonemic similarity judgment task and through a word span task measuring phonological similarity effects. To assess the use of sublexical and lexical reading procedures, children read pseudo words and irregular words aloud. Results showed that cued speech improved performance on both the phonemic awareness and the reading tasks but not on the phonological short-term memory task. In phonemic awareness and reading, CS+ children obtained accuracy and rapidity scores similar to CA controls, whereas CS- children obtained lower scores than hearing controls. Nevertheless, in phonological short-term memory task, the phonological similarity effect of both CI groups was similar. Overall, these results support the use of cued speech to improve phonemic awareness and reading skills in CI children.

Dillon, Pisoni, Cleary & Carter (2004) did a study on nonword imitation by children with cochlear implants: consonant analyses. The objectives of the study were to complete detailed linguistic analyses of archived recordings of pediatric cochlear implant users' imitations of nonwords; to gain insight into the children's developing phonological systems and the wide

range of variability in nonword responses. Eighty-eight 8- to 10-year-old experienced pediatric cochlear implant users were assessed on Nonword repetition in repetition of 20 auditory-only English-sounding nonwords. Several different consonant accuracy scores based on the linguistic structure (voicing, place, and manner of articulation) of the consonants being imitated and analysis of the errors produced for all consonants imitated incorrectly were recorded. In their results, Seventy-six children provided a response to at least 75% of the nonword stimuli. In these children's responses, 33% of the target consonants were imitated correctly, 25% of the target consonants were deleted, and substitutions were provided for 42% of the target consonants. The children tended to correctly reproduce target consonants with coronal place (which involve a mid-vocal tract constriction) more often than other consonants. Poorer performers tended to produce more deletions than the better performers, but their production errors tended to follow the same patterns as the better performers. They concluded that poorer performance on labial consonants suggests that scores were affected by the lack of visual cues such as lip closure. Oral communication users tended to perform better than total communication users, indicating that oral communication methods are beneficial to the development of pediatric cochlear implant users' phonological processing skills.

Nakeva et al., (2011) also explored on segmental and suprasegmental properties in nonword repetition, an explorative study of the associations with nonword decoding in children with normal hearing and children with bilateral cochlear implants. This study explored nonword repetition (NWR) and nonword decoding in normal-hearing (NH) children and in children with bilateral cochlear implants (CI). Participants were 11 children, with CI, 5:0-7:11 years ($M = 6.5$ years), and 11 NH children, individually age-matched to the children with CI. All children were assessed after having practiced with a computer-assisted reading intervention with a phonics approach during four weeks. Results showed that NH children outperformed

children with CI on the majority of aspects of NWR. The analysis of syllable number in NWR revealed that children with CI made more syllable omissions than did the NH children, and predominantly in prestressed positions. In addition, the consonant cluster analysis in NWR showed significantly more consonant omissions and substitutions in children with CI suggesting that reaching fine-grained levels of phonological processing was particularly difficult for these children. No significant difference was found for nonword-decoding accuracy between the groups, as measured by whole words correct and phonemes correct, but differences were observed regarding error patterns. In children with CI phoneme, deletions occurred significantly more often than in children with NH. The correlation analysis revealed that the ability to repeat consonant clusters in NWR had the strongest associations to nonword decoding in both groups. The absence of as frequent significant associations between NWR and nonword decoding in children with CI compared to children with NH suggest that these children partly use other decoding strategies to compensate for less precise phonological knowledge, for example, lexicalizations in nonword decoding, specifically, making a real word of a nonword.

Individual differences in nonword repetition are associated with language and literacy development, but few studies have considered the extent to which learning to read influences phonological skills as indexed by nonword repetition performance. This statement was explored by Nation & Hulme (2010) using a latent variable longitudinal design. Reading, oral language and nonword repetition were assessed in 215 children at age 6 years and one year later at age 7. Reading at 6 years predicted growth in nonword repetition between 6 and 7 years, independent of the effects of oral language skills and the autoregressive effect of nonword repetition at 6 years, but nonword repetition was not a longitudinal predictor of the growth of reading. These findings demonstrate that learning to read has a powerful effect on

children's language processing systems. They considered how learning to read might influence speech processing, and discuss the implications of other researcher's findings for theoretical accounts of reading disorder.

Gathercole (1995) conducted a study entitled; Is nonword repetition a test of phonological memory or long-term knowledge? It all depends on the nonwords. The extent to which children's performance on tests of nonword repetition is constrained by phonological working memory and long-term lexical knowledge was investigated in a longitudinal study of 70 children tested at 4 and 5 years of age. At each time of testing, measures of nonword repetition, memory span, and vocabulary knowledge were obtained. Reading ability was also assessed at 5 years. At both ages, repetition accuracy was greater for nonwords of high- rather than low-rated word likeness, and memory-span measures were more closely related to repetition accuracy for the low-word like than for the high-word like stimuli. It is argued that these findings indicate that nonword repetition for unword like stimuli is largely dependent on phonological memory, whereas repetition for word like items is also mediated by long-term lexical knowledge and is therefore less sensitive to phonological memory constraints. Reading achievement was selectively linked with earlier repetition scores for low-word like nonwords, suggesting a phonological memory contribution in the early stages of reading development. Vocabulary knowledge was associated with repetition accuracy for both low- and high-word like nonwords, consistent with the notion that lexical knowledge and nonword repetition share a reciprocal developmental relationship.

Vermeulen, van Bon, Schreuder, Knoors & Snik's (1995) study investigated on Reading comprehension of deaf children with cochlear implants. The reading comprehension and visual word recognition in 50 deaf children and adolescents with at least 3 years of cochlear implant (CI) use were evaluated. Their skills were contrasted with reference data of 500 deaf

children without CIs. The reading comprehension level in children with CIs was expected to surpass that in deaf children without implants, partly via improved visual word recognition. Reading comprehension scores of children with implants were significantly better than those of deaf children without implants, although the performance in implant users was substantially lagging behind that in hearing children. Visual word recognition was better in children with CIs than in children without implants, in secondary education only. No difference in visual word recognition was found between the children with CIs and the hearing children, whereas the deaf children without implants showed a slightly poorer performance. The difference in reading comprehension performance of the deaf children with and without CIs remained present when visual word recognition was controlled for. This indicates that other reading-related skills were also contributing to the improved reading comprehension skills of deaf children with CIs.

Burkholder, Pisoni & Svirsky (2007) examined the effects of perceptual learning on nonword repetition performance of normal-hearing listeners who were exposed to severely degraded auditory conditions that were designed to simulate the auditory input of a cochlear implant. Twenty normal-hearing adult listeners completed a nonword repetition task using an eight-band, frequency-shifted cochlear implant simulation strategy both before and after training on open- and closed-set word recognition tasks. Feedback was provided during training. The nonword responses obtained from each participant were digitally recorded and played back to normal-hearing listeners. These listeners rated the nonword repetition accuracy in comparison to the original unprocessed target stimuli using a seven-point scale. The mean nonword accuracy ratings were significantly higher for the non words repeated after training than for non words repeated prior to training. These results suggest that the word recognition training tasks encouraged auditory perceptual learning that generalized to

novel, nonword auditory stimuli. These findings also suggest that adaptation and learning from the degraded auditory stimuli produced by a cochlear implant simulation can be achieved even in a difficult perceptual-motor task such as nonword repetition which involves both speech perception and production of an auditory stimulus that lacks any lexical or semantic representation.

Harris & Moreno (2004) carried an investigation on Deaf children's use of phonological coding: evidence from reading, spelling, and working memory. Two groups of deaf children, aged 8 and 14 years, were presented with a number of tasks designed to assess their reliance on phonological coding. Their performance was compared with that of hearing children of the same chronological age (CA) and reading age (RA). Performance on the first task, short-term recall of pictures, showed that the deaf children's spans were comparable to those of RA controls but lower than CA controls. For the older deaf children, short-term memory span predicted reading ability. There was no clear evidence that the deaf children were using phonological coding in short-term memory when recall of dissimilar items was compared with recall of items with similarly sounding names. In the second task, which assessed orthographic awareness, performance of the deaf children was similar to that of RA controls although scores predicted reading level for the deaf children but not the hearing. The final task was a picture spelling test in which there were marked differences between the deaf and hearing children, most notably in the number of spelling refusals (which was higher for the deaf children in the older group than their RA controls) and the percentage of phonetic errors (which was considerably lower for both groups of deaf children than for any of the hearing controls). Overall these results provide support for the view that deaf children place little reliance on phonological coding.

Wu, Chen, Chan, Lee, Hsu, Lin & Liu (2011) documented receptive and expressive language levels and reading skills achieved by Mandarin-speaking children who had received cochlear implants (CIs) and used them for 4.75-7.42 years. The effects of possible associated factors were also analyzed. Standardized Mandarin language and reading tests were administered to 39 prelingually deaf children with Nucleus 24 devices. The Mandarin Chinese version of the Peabody Picture Vocabulary Test was used to assess their receptive vocabulary knowledge and the Revised Primary School Language Assessment Test for their receptive and expressive language skills. The Graded Chinese Character Recognition Test was used to test their written word recognition ability and the Reading Comprehension Test for their reading comprehension ability. Raw scores from both language and reading measurements were compared to normative data of normal hearing children to obtain standard scores. The results showed that the mean standard score for receptive vocabulary measurement and the mean T scores for the receptive language, expressive language and total language measurement were all in the low-average range in comparison to the normative sample. In contrast, the mean T scores for word and text reading comprehension were almost the same as for their age-matched hearing counterparts. Among all children with CIs, 75.7% scored within or above the normal range of their age-matched hearing peers on receptive vocabulary measurement. For total language, Chinese word recognition and reading scores, 71.8, 77 and 82% of children with CIs were age appropriate, respectively. A strong correlation was found between language and reading skills. Age at implantation and sentence perception scores account for 37% of variance for total language outcome. Sentence perception scores and pre implantation residual hearing were revealed to be associated with the outcome of reading comprehension. They concluded that by using standard tests, the language development and reading skill of Mandarin-speaking children who use CIs from a young age appear to fall within the normal range of their hearing age mates, at least after 4.8-7.4 years of experience. However, to fully

evaluate the fine linguistic skills of these subjects, a more detailed study and longer follow-up period are needed.

Similarly, Geers (2004) examined whether age at cochlear implantation or duration of implant use is associated with speech, language, and reading skills exhibited at age 8 to 9 years in children who underwent implantation by age 5 years. Performance outcomes in speech perception, speech production, language, and reading were examined in terms of the age at which children first received a cochlear implant (2, 3, or 4 years), the age they received an updated (Spectra) processor, and the duration of use of an implant and an updated processor. Data collection was conducted at summer research camps held over 4 consecutive years to maximize the number of children available at a specific age (8-9 years). Children were tested individually by experienced examiners, and their parents and therapists provided background and educational history information. A total of 181 children from 33 different states and 5 Canadian provinces who received a cochlear implant by age 5 years were tested. A subsample of 133 children with performance IQ scores of 80 or greater and onset of deafness at birth were selected for the age-at-implantation analysis. Another subsample of 39 children with deafness acquired by age 3 years was also examined. A battery of tests of speech perception, speech production, language, and reading was administered to each child and reduced to a single factor score for each skill.

Correlation coefficients between age at implantation and duration of use did not reach significance for any of the outcome skills measured. Age at which the updated speech processor (Spectra) was fitted was significantly related to speech production outcome (earlier use of an updated processor was associated with greater speech intelligibility) but not to any other skill area. However, more of the children who underwent implantation at age 2 years (43%) achieved combined speech and language skills commensurate with their age-matched

peers with normal hearing than did children who underwent implantation at age 4 years (16%). Furthermore, normal speech and language skills were documented in 80% of children who lost hearing after birth and who underwent implantation within a year of onset of deafness. They concluded that, for children who received a cochlear implant between the ages of 2 and 4 years, early cochlear implantation does not ensure better speech perception, speech production, language, or reading skills. However, greater speech and language proficiency may be expected from children who exhibit normal hearing for even a brief period after birth and receive a cochlear implant shortly after losing their hearing. Further research examining the benefits of cochlear implantation before age 2 years would help families and clinicians better understand the time-sensitive nature of the decision to conduct cochlear implant surgery.

Ormel, Hermans, Knoors, Hendriks & Verhoeven (2010) Studied phonological activation during visual word recognition in deaf and hearing children under two circumstances: (a) when the use of phonology was not required for task performance and might even hinder it and (b) when the use of phonology was critical for task performance. Deaf children mastering written Dutch and Sign Language of the Netherlands were compared with hearing children. Two word-picture verification experiments were conducted, both of which included pseudo homophones. In Experiment 1, the task was to indicate whether the word was spelled correctly and whether it corresponded to the picture. The presence of pseudo homophones was expected to hinder performance only when phonological recoding occurred. In Experiment 2, the task was to indicate whether the word sounded like the picture, which now made phonological recoding essential in order to enable the acceptance of pseudo homophones. The hearing children showed automatic activation of phonology during visual word recognition, regardless of whether they were instructed to focus on orthographic

information (Experiment 1) or phonological information (Experiment 2). The deaf children showed little automatic phonological activation in either experiment. Deaf children do not use phonological information during word reading.

In another study, Colin, Magnan, Ecalle & Leybaert (2007) Sought to (1) determine whether phonological skills measured in deaf pre readers predict their later phonological and reading skills after one year of reading instruction as is the case for hearing children; 2) to examine whether the age of exposure to a fully specified phonological input such as Cued Speech may explain the inter-individual differences observed in deaf children's phonological and word recognition levels. Twenty-one 6-year-old deaf pre readers and 21 hearing children of the same chronological age performed two phonological tasks (rhyme decision and generation tasks); they were re-assessed 12 months later and presented with other phonological tasks (rhyme decision and common unit identification tasks) and a written word choice test. Phonological skills measured before learning to read predicted the written word recognition score the following year, both for hearing and for deaf participants. Age of onset of exposure to Cued Speech was also a strong predictor of phonological and written word recognition scores in beginning deaf readers. The evidence broadly supports the idea of a capacity for acquiring phonological skills in deaf children. Deaf children who are able to develop an implicitly structured phonological knowledge before learning to read will be better readers when this knowledge becomes explicit under the pressure of reading instruction.

In addition, Muter, Hulme, Snowling & Stevenson (2004) conducted a 2-year longitudinal study of 90 British children beginning at school entry when they were 4 years 9 months old (range = 4 years 2 months to 5 years 2 months). The relationships among early phonological skills, letter knowledge, grammatical skills, and vocabulary knowledge were investigated as predictors of word recognition and reading comprehension. Word recognition skills were

consistently predicted by earlier measures of letter knowledge and phoneme sensitivity (but not by vocabulary knowledge, rhyme skills, or grammatical skills). In contrast, reading comprehension was predicted by prior word recognition skills, vocabulary knowledge, and grammatical skills. The results are related to current theories about the role of phonological, grammatical, and vocabulary skills in the development of early reading skills.

To sum, Bowyer-Crane, Snowling, Duff, Fieldsend, Carroll, Miles, Götz & Hulme's (2008) study compared the efficacy of two school-based intervention programmes (Phonology with Reading (P + R) and Oral Language (OL) for children with poor oral language at school entry. Following screening of 960 children, 152 children (mean age 4;09) were selected from 19 schools on the basis of poor vocabulary and verbal reasoning skills and randomly allocated to either the P + R programme or the OL programme. Both groups of children received 20 weeks of daily intervention alternating between small group and individual sessions, delivered by trained teaching assistants. Children in the P + R group received training in letter-sound knowledge, phonological awareness and book level reading skills. Children in the OL group received instruction in vocabulary, comprehension, inference generation and narrative skills. The children's progress was monitored at four time points: pre-, mid- and post-intervention, and after a 5-month delay, using measures of literacy, language and phonological awareness. Their data was clustered (children within schools) and robust confidence intervals were reported. At the end of the 20-week intervention programme, children in the P + R group showed an advantage over the OL group on literacy and phonological measures, while children in the OL group showed an advantage over the P + R group on measures of vocabulary and grammatical skills. These gains were maintained over a 5-month period. Intervention programmes designed to develop oral language skills can be delivered successfully by trained teaching assistants to children at school entry. Training

using P + R fostered decoding ability whereas the OL programme improved vocabulary and grammatical skills that are foundations for reading comprehension. However, at the end of the intervention, more than 50% of at-risk children remain in need of literacy support.

2.5 Teaching strategies and teaching materials that help hard of hearing pupils combine letter sounds into meaningful words (phonology)

From broader literature on the education of the Deaf, it appears that the field of Deaf Education suffers from a shortage of evidence-based teaching materials and practices implemented to enhance deaf pupil's literacy skills (Luckner and Handley 2008). At international level, studies by Storbeck (2005) and Annalene et al, (2010) indicates that teachers in South African schools for the Deaf and hard of hearing were not required to have formal training and/or qualifications in Deaf Education. As a result, most hearing teachers at these schools had little or no knowledge of the pedagogical implications of teaching literacy to pupils who were deaf and hard of hearing, whether by means of oral or sign language instruction.

Historically, the education of the deaf has not been viewed as successful. The oral approach, which prohibited the use of signing, was the traditional method for teaching language and other academic subjects to the deaf. During the 1970s, oralism gave way to the Total Communication approach (Barnum, 1984). This method utilized a simultaneous manual (sign language) and oral component. Educators believed that the communication barrier that deaf pupils suffered from could be broken simply by teaching the deaf pupil to read English. This belief led to the development of manual codes for English. Signing Exact English (SEE) is reportedly the most commonly used within deaf education (Ramsey, 1993). However, linguists do not consider the various forms of manually coded English as natural languages for the deaf, but rather artificial codes meant to be accompanied by speech. (American Sign

Language Bilingual Research Journal, 1994). The sign system used by the deaf in the United States and Canada has been recognized as a bonafide language. While American Sign Language (ASL) and English share the same lexicography, the syntactical structure of ASL differs considerably from that of Standard English and includes non-manual behaviors such as eye, head, face, and body movements. Neither the oral method nor the Total Communication approach has proven completely successful in teaching reading skills to the pupils with hearing impairment. The academic achievement of deaf pupils still lags significantly behind that of their hearing peers even after exposure to the New Breakthrough to Literacy (NBTL) programme in Zambia in the recent years (Chikopela, 2013). In spite of its recognition by linguists as a language, ASL remains excluded from the deaf and hard of hearing education process, while English continues to be the focal point of instruction (Hayes & Dilka & Olson, 1991).

The communicative competence of pupils with hearing impairment is directly associated with their acquisition of language. Young learner's proficiency in their language is critical for facilitating communication and academic success (Daniels, 1994). Despite the inclusion of oral and manual systems in hard of hearing instruction, the education of these pupils is largely considered a failure in terms of speech acquisition and phonological skills. One explanation postulated for this failure is that since the deaf would not hear and understand all words in oral language and therefore would not monitor speech output, they seldom are capable of becoming native speakers of an oral language (Cicourel & Boese, 1972). The various manual forms of English are not considered natural languages for the hard of hearing, but rather artificial codes meant to be accompanied by speech. The crucial flaw in hard of hearing education has been the language of instruction (i.e. coded English) since it is not a

natural language that hard of hearing pupils are capable of acquiring without intensive intervention (Drasgow, 1993).

A psycholinguistic perspective views language acquisition as a learning process; that is, learning how to process certain kinds of information efficiently (Drasgow, 1993). If hard of hearing pupils cannot fully comprehend the linguistic information received in English, they will not be competent in reading. Researchers like Barnum (1984) indicated that the best avenue for hard of hearing pupils to learn English is through the acquisition of a natural sign language, which for the deaf meant American Sign Language and oral language. Minority languages, for the most part, have had only a marginal place in the educational system in spite of the fact that a child's first language is normally the best instrument for learning. Minority language teaching also promotes a positive self-image in the child (Appel & Muysken, 1987). So many hard of hearing pupils are illiterate in English because the systematic denial of their primary oral and sign language shuts out the most effective means for teaching them a second language (Lane, 1992). When existing teaching method like the sign language alone is not producing acceptable results in literacy and other academic areas, then it is time to consider another approach i.e oral language. Hard of hearing pupils still lag behind their hearing peers much to the same extent that they did 80 years ago (Strong & Prinz, 2000). Recently, some deaf researchers have advocated a bilingual/bicultural approach to the education of the deaf and hard of hearing, in which ASL would be considered the first or native language and English would be considered the second language (Barnum, 1984). The purpose of a bilingual/bicultural approach to deaf/hard of hearing education is to provide deaf/hard of hearing pupils access to a natural and oral language which can then become the language of instruction for teaching phonology and later English (Drasgow, 1993).

Pupils who rely upon sign-based communication, either through simultaneous communication or ASL, frequently have limited or no auditory access to sounds in spoken language. Similar to some of their peers who are hard of hearing, they will need to establish the development of their phonological representations through visual, tactile, and kinesthetic cues. Information about the phonological (sound-based) properties of words must be complete for accurate internal representations to be formed. Researchers have discussed the perils of inadequately developed internal representations that result in the weak development of phonological awareness skills (Leybaert & Alegria, 2003). Therefore, strategies that provide complete information about phonological aspects of spoken language seem to be advisable in instruction. Similar to instruction with hearing students who require skill development in phonological awareness (NRP, 2000), deaf pupils should be taught using explicit, systematic, and meaningful instruction. One of the challenges for pupils who are hard of hearing is the connection between the internal phonological representations that create words and meaning. For pupils who use sign-based systems for communication, the ability to decode words and connect those words to their internal lexicons could be problematic. There may not be an immediate connection between the blended sounds, /k/ /a/ /t/, and the small furry house pet. The link between the phonological information contained within the word and the meaning must be explicit during instruction. The semantic and phonological analysis of vocabulary must occur simultaneously (Stanovich, 1994). The studies have not clearly mentioned the teaching methodology and the types of learning materials that stimulate phonological development in pupils with hard of hearing. The researcher therefore also seeks to fill up this knowledge gap.

Several scholars have found vocabulary to be predictive of success in phonological training in preschool years (Kuo & Anderson, 2006; Lonigan, 2007). Furthermore, both phonological

awareness and phonemic awareness has been shown to be precursors to successful reading acquisition (Phillips & Torgesen, 2006). A great many programmes and studies are now suggesting that teachers begin explicitly teaching phonological awareness early because the task can be trained beginning in early childhood education environments and because many children are already developing these skills during the preschool years (Burgess, Hecht, & Lonigan, 2002; Jordan, Snow, & Porche, 2000; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Lonigan et al., 2003; Lonigan & Whitehurst, 1998; Whitehurst et al., 1999).

This view has been setting many academic research agendas around phonological awareness; and its ultimate level, phonemic awareness, has made its way into many classrooms and homes with varying degrees of success (Lonigan et al., 2003). Isolating the phonological awareness as the quickest route to reading acquisition has generated a somewhat linear take on reading acquisition.

Phonological awareness is an auditory skill that is developed through a variety of activities that expose pupils to the sound structure of the language and teach them to recognize, identify and manipulate it. Listening skills are an important foundation for the development of phonological awareness and they generally develop first (Gillon, 2004). Therefore, the scope and sequence of instruction in early childhood literacy curriculum typically begins with a focus on listening, as teachers instruct children to attend to and distinguish sounds, including environmental sounds and the sounds of speech. Early phonological awareness instruction also involves the use of songs, nursery rhymes and games to help pupils to become alert to speech sounds and rhythms, rather than meanings, including rhyme, alliteration, onomatopoeia, and prosody.

While exposure to different sound patterns in songs and rhymes is a start towards developing phonological awareness, exposure in itself is not enough, because the traditional actions that go along with songs and nursery rhymes typically focus on helping pupils to understand the meanings of words, not attend to the sounds. Therefore, different strategies must be implemented to aid pupils in becoming alert to sounds instead. Specific activities that involve pupils in attending to and demonstrating recognition of the sounds of language include waving hands when rhymes are heard, stomping feet along with alliterations, clapping the syllables in names, and slowly stretching out arms when segmenting words. Phonological awareness is technically only about sounds and students do not need to know the letters of the alphabet to be able to develop phonological awareness.

Foy & Mann, (2001) posits that pupils in primary education sometimes learn phonological awareness in the context of literacy activities, particularly phonemic awareness. Some research demonstrates that, at least for older children, there may be utility to extending the development of phonological awareness skills in the context of activities that involve letters and spelling. A number of scholars have been working on this approach (Carroll, Snowling, Hulme & Stevenson, 2003)

The National Reading Panel (2000) in their Washington D. C. report indicated that the National Literacy Strategy (NLS) framework was intended for use by all teachers with all children in the delivery of the curriculum, regardless of their sensory status. Children with hearing impairments are at an immediate disadvantage when learning to read on two main counts. Hearing children usually enter school with a broad knowledge of words and their meanings. We cannot make such assumptions for hearing impaired children. Reading is dependent upon, and reflects children's linguistic, cognitive and experiential development. (American Speech-Language-Hearing Association, 2004). Even where the hearing impaired child

has been in a pre-school environment where books have been in abundance and whose cognitive development is on a par with his or her hearing peers, the overarching problem for hearing impaired children learning to read is one of language. In addition, even when they have had access to appropriate, early and consistent amplification, they may not have easy access to all the sounds within words and hence may develop inaccurate phonological representations, if indeed they develop them at all (Caitlin, et al. 2000). Children educated in an entirely signing environment might develop the connection between 'spoken' and written words at a macro level, but often not at a micro level apart from finger spelling. While children educated within auditory/oral environments can achieve micro level correspondence through amplified residual hearing, confusions may still arise when sounds are outside the child's hearing range, or are confusable in lip shape. Despite recent advances in amplification technology and subsequent improvements in speech perception outcomes, children with hearing loss continue to have impaired phonemic awareness and subsequent literacy skills. Teacher content knowledge predicts student outcomes in other academic areas but has not been evaluated specifically for deaf educators' phonemic awareness skills. In this regard,

Krystal & Melanie's (2014) study hypothesized that improving teachers' phonemic awareness skills may cause student literacy outcomes to improve. Their study was a preliminary investigation of deaf educators' phonemic awareness skills as a first step toward pursuing this line of inquiry. Eighty deaf educators completed an online assessment of their skills on basic phonemic awareness tasks: (a) phoneme matching, (b) phoneme segmentation, and (c) phoneme isolation. Deaf educators did not score at ceiling. They scored highest on phoneme matching, lowest on phoneme isolation, and better on easy-to-segment words than hard-to-segment words. Performance of deaf educators was not predicted by communication mode, phonetics coursework, or education level. Deaf educators scored higher than other educators

but lower than speech-language pathologists. Concerns were raised in this study regarding deaf educators' ability to teach children to analyze sounds in words when their own phonemic awareness skills are limited.

In another study, Sue (2010) assessed the benefits of phonics intervention on hearing impaired children's word reading. The study sought to investigate the claim that phoneme awareness training, particularly when combined with grapheme-phoneme correspondence (letter to sound matching) teaching, results in improved reading and spelling development for normally hearing children. Two hearing impaired children were pre-tested on measures of spoken and written language, phonological abilities and alphabet knowledge prior to a 12 week intervention using a phonographix teaching programme. The children were again tested on all measures immediately after intervention. The intervention programme accelerated the children's acquisition of phoneme awareness and of phoneme-grapheme correspondence knowledge, and their ability to apply these in reading and spelling. Concentration on teaching phoneme awareness and phonics radically improve reading and spelling standards of hearing impaired children despite a poor standard of receptive language.

A study by Nakeva, Lyxell, Sahlén, Dahlström, Lindgren, Ors, Kallioinen & Uhlén (2014) examined computer-assisted reading intervention with a phonics approach for deaf and hard of hearing (DHH) children in Sweden using cochlear implants or hearing aids, or a combination of both. The study included 48 children, 5, 6 and 7 years of age. Sixteen children with normal hearing (NH) served as a reference group. The first purpose of the study was to compare NH and DHH children's reading ability at pre and post-intervention. The second purpose was to investigate effects of the intervention. Cognitive and demographic factors were analyzed in relation to reading improvement. Results showed no statistically significant difference for reading ability at the group level, although NH children showed overall higher

reading scores at both test points. Age comparisons revealed a statistically significant higher reading ability in the NH 7-year-olds compared to the DHH 7-year-olds. The intervention proved successful for word decoding accuracy, passage comprehension and as a reduction of nonword decoding errors in both NH and DHH children. Reading improvement was associated with complex working memory and phonological processing skills in NH children. Correspondent associations were observed with visual working memory and letter knowledge in the DHH children. Age was the only demographic factor that was significantly correlated with reading improvement. The results suggest that DHH children's beginning reading may be influenced by visual strategies that might explain the reading delay in the older children.

Leybaert (1998) has argued that the development of phonological representations in deaf children does not necessarily depend on auditory experience, neither at the perception nor at the production level. Instead, this development depends upon early experience of an input in which all phonological contrasts are well specified, independent of input modality. Leybaert and Alegria (1995) found that in spelling, as well as reading, hearing impaired children relied on inaccurate speech representations derived mainly from lip-reading and hence showed more errors of confusion consistent with lip-readability than hearing children. Preschool and early school-aged children with specific language impairment not only have spoken language difficulties, but also are at risk of future literacy problems. Effective interventions targeting both spoken language and emergent literacy skills for this population are needed.

Munro, Lee & Baker (2008) reported a feasibility study of a hybrid language intervention approach in Australia that targeted vocabulary knowledge and phonological awareness skills within the context of oral narrative, storybook reading, and drill-based games. Their study also reported on two novel, experimental assessments that were developed to expand options for measuring changes in lexical skills in children. Seventeen children with specific language

impairment participated in a pilot within-group evaluation of a hybrid intervention programme. The children's performance at pre- and post-intervention was compared on a range of clinical and experimental assessment measures targeting both spoken language and phonological awareness skills. Each child received intervention for six one-hour sessions scheduled on a weekly basis. Intervention sessions focused on training phonological awareness skills as well as lexical-semantic features of words within the context of oral and storybook narrative and drill-based games. The children significantly improved on clinical measures of phonological awareness, spoken vocabulary and oral narrative. Lexical-semantic and sublexical vocabulary knowledge also significantly improved on the experimental measures used in the study. The results of their feasibility study suggested that a larger scale experimental trial of an integrated spoken language and emergent literacy intervention approach for preschool and early school-aged children with specific language impairment is warranted.

Phonological and working memory skills have been shown to be important for the development of spoken language. Children who use a cochlear implant (CI) showed performance deficits relative to normal hearing (NH) children on all constructs: phonological skills, working memory, and spoken language. Given that phonological skills and working memory have been shown to be important for spoken language development in NH children, Ingvalson, Young & Wong's (2014) study hypothesized that training these foundational skills would result in improved spoken language performance in CI-using children. Nineteen prelingually deafened CI-using children aged 4- to 7-years-old participated. All children had been using their implants for at least one year and were matched on pre-implant hearing thresholds, hearing thresholds at study enrollment, and non-verbal IQ. Children were assessed on expressive vocabulary, listening language, spoken language, and composite language. Ten

children received four weeks of training on phonological skills including rhyme, sound blending, and sound discrimination and auditory working memory. The remaining nine children continued with their normal classroom activities for four weeks. Language assessments were repeated following the training/control period. Children who received combined phonological-working memory training showed significant gains on expressive and composite language scores. Children who did not receive training showed no significant improvements at post-test. On average, trained children had gain scores of 6.35 points on expressive language and gain scores of 6.15 points whereas the untrained children had test-retest gain scores of 2.89 points for expressive language and 2.56 for composite language. Their results suggested that training to improve the phonological and working memory skills in CI-using children may lead to improved language performance.

In another study, Ormel, Hermans, Knoors, Hendriks & Verhoeven (2010) focused on phonological activation during visual word recognition in deaf and hearing children under two circumstances: (a) when the use of phonology was not required for task performance and might even hinder it and (b) when the use of phonology was critical for task performance. Deaf children mastering written Dutch and Sign Language of the Netherlands were compared with hearing children. Two word-picture verification experiments were conducted, both of which included pseudo homophones. In Experiment 1, the task was to indicate whether the word was spelled correctly and whether it corresponded to the picture. The presence of pseudo homophones was expected to hinder performance only when phonological recoding occurred. In Experiment 2, the task was to indicate whether the word sounded like the picture, which now made phonological recoding essential in order to enable the acceptance of pseudo homophones. The hearing children showed automatic activation of phonology during visual word recognition, regardless of whether they were instructed to focus on orthographic

information (Experiment 1) or phonological information (Experiment 2). The deaf children showed little automatic phonological activation in either experiment. They concluded that, deaf children do not use phonological information during word reading.

In Russia, Shafiro & Kharkhurin (2009) explored the role of native-language phonology in the auditory word identification and visual word recognition of Russian-English bilinguals. Their research question was, can native language phonology influence visual word processing in a second language? This question was investigated in two experiments with two groups of Russian-English bilinguals, differing in their English experience, and a monolingual English control group. Experiment 1 tested visual word recognition following semantic categorization of words containing four phonological vowel contrasts (/i/-/u/, /I/-/A/, /i/-/I/, /epsilon/-/ae/). Experiment 2 assessed auditory identification accuracy of words containing these four contrasts. Both bilingual groups demonstrated reduced accuracy in auditory identification of two English vowel contrasts absent in their native phonology (/i/-/I/, /epsilon/-/ae/). For late-bilinguals, auditory identification difficulty was accompanied by poor visual word recognition for one difficult contrast (/i/-/I/). Bilinguals' visual word recognition moderately correlated with their auditory identification of difficult contrasts. These results indicate that native language phonology can play a role in visual processing of second language words. However, this effect may be considerably constrained by orthographic systems of specific languages.

In New York, Charlier & Leybaert (2000) reported on their two experiments which investigated whether profoundly deaf children's rhyming ability was determined by the linguistic input that they were exposed to in their early childhood. Children educated with Cued Speech (CS) were compared to other deaf children, educated orally or with sign language. In CS, speech reading is combined with manual cues that disambiguate it. The

central hypothesis is that CS allows deaf children to develop accurate phonological representations, which, in turn, assist in the emergence of accurate rhyming abilities. Experiment 1 showed that the deaf children educated early with CS performed better at rhyme judgement than did other deaf children. The performance of early CS-users was not influenced by word spelling. Experiment 2 confirmed this result in a rhyme generation task. Taken together, results support the hypothesis that rhyming ability depends on early exposure to a linguistic input specifying all phonological contrasts, independently of the modality (visual or auditory) in which this input is perceived.

Much of the aforementioned research has started to tie phonological awareness to vocabulary (Anthony & Lonigan, 2004; Biemiller, 2006; Bracken, 2005; Burgess & Lonigan, 1998; Dickinson, McCabe, & Essex, 2006) and definitional vocabulary (Lonigan, 2007). Scholars in the field of literacy studied ways that syntax and semantics helped vocabulary and more in depth concept development in children; and more specifically, they studied how story book reading lends itself to this development (Pan, Rowe, Singer, & Snow, 2005; , "Pathways to Reading: The Role of Oral Language in the Transition to Reading", 2005; Storch & Whitehurst, 2001), and how a child internalized a word or fact about the world.

Most of these studies and interventions involved the traditional use of storybooks, which did provide substantial linguistic and social contexts within which to learn language. However, reading stories in and of itself is not enough to enhance language learning. Attention and varied purposes and words play a role as well (Pan, Rowe, Singer, & Snow, 2005). Storybook reading helps to create this linguistic and social context in some cultures, but it is important to note that oral language is primarily developed through purposeful and varied use of words and grammatical structures to learn about the world.

Anthony & Lonigan (2004) found that vocabulary has been causally related to phonological awareness. Additionally, a more recent construct of phonological awareness acknowledges that its development is dependent on various cognitive abilities that are dependent on language and these come together at different times for different children. Therefore, it also could be that the perceived stable nature of phonological awareness is more due to the teaching practices than it is to the theory of metalinguistics itself.

Scholars identified what was required in pupils in order for them to be trained in phonological awareness and examples of how to teach these skills and what is contained in them. Listening skills was one of the requirements. It is the ability to attend to and distinguish environmental and speech sounds from one another (Virginia Department of Education, 1998). Hard of hearing pupils must poses the following in order to learn phonological awareness;

- Alertness: Awareness and localization of sounds
- Discrimination: Recognize same/different sounds
- Memory: Recollection of sounds and sound patterns
- Sequencing: Identify order of what was heard
- Figure-ground: Isolate one sound from background of other sounds
- Perception: Comprehension of sounds heard
- Syllable-structure awareness tasks

Phonological awareness at the syllable level is knowledge that a word can be decomposed into syllables, can be assessed with a variety of behavioural tasks that require the participant to count the number of syllables in a word, clap their hands for each syllable, place objects on a table to represent the number of syllables in a word, delete a syllable from a spoken word,

and so on. The following are examples of how teachers ought to teach phonological awareness to hard of hearing pupils;

- Syllable segmentation: e.g., "How many syllables (or parts) are in the word *coffee*?" (Dodd, Holm, Oerlemans & McCormick, 1996)
- Syllable completion: e.g., "Here is a picture of a rabbit. I'll say the first part of the word. Can you finish the word *ra*_____?" (Muter, Hulme, Snowling & Stevenson, 2004)
- Syllable identity: e.g., "Which part of *complete* and *compare* sound the same?" (Dodd, Holm, Oerlemans & McCormick, 1996)
- Syllable deletion: e.g., "Say *finish*. Now say it again without the *fin*" (Rosner, 1999)

Examples of onset-rime awareness tasks

- Spoken word recognition: e.g., "Do these words rhyme: *shell bell*?" (Dodd, Holm, Oerlemans & McCormick, 1996)"
- Spoken rhyme detection or rhyme oddity task: e.g., "Which word does not rhyme: *fish, dish, hook*?" (Bradley & Bryant, 1983)
- Spoken rhyme generation: e.g., "Tell me words that rhyme with *bell*?" (Muter, Hulme & Snowling, 1997)
- Onset-rime blending. (Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993)

Examples of phonemic awareness tasks

- Alliteration awareness (aka phoneme detection and sound or phoneme categorization): e.g., "Which word has a different first sound: *bed, bus, chair, ball*?" (Torgesen & Bryant, 1994)

- Phoneme matching: e.g., "Which word begins with the same sound as *bat*: *horn*, *bed*, *cup*?" (Torgesen & Bryant, 1994)
- Phoneme isolation: e.g., "Tell me the sound you hear at the beginning of the word *food*" (Stahl & Murray, 1994)
- Phoneme completion: e.g., "Here is a picture of a watch. Finish the word for me: *wa*_____" (Muter, Hulme & Snowling, 1997)
- Phoneme blending with words or non-words: e.g., "What word do these sounds make: *m...oo...n*?" (Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993)
- Phoneme deletion, also referred to as phoneme elision: e.g., "Say *coat*. Now say it again but don't say /k/" (Rosner, 1999)
- Phoneme segmentation with words or non-words: e.g., "How many sounds can you hear in the word *it*?" (Dodd, Holm, Oerlemans & McCormick, 1996)
- Phoneme reversal: e.g., "Say *na* (as in *nap*). Now say *na* backwards" (Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993)
- Phoneme manipulation: e.g., "Say *dash*. Now say it again, but instead of /æ/ say /I/" (Rosner, 1999)
- Spoonerism: e.g., *felt made* becomes *melt fade*. (Dodd, Holm, Oerlemans & McCormick, 1996)

To sum, various scholars have clearly shown how teachers can teach sound awareness tasks to hard of hearing pupils.

2.6 Knowledge gap for this study

In winding up this chapter, it is clear from reviewed literature that, oral language has a great influence in the development of phonemes and phonology in hearing pupils especially when

these skills develop in tandem when children begin schooling. In addition, oral language skills, phonemic and phonological skills are central to early literacy and long term literacy success because oral language plays a significant role in organizing cognitive and other effective behavioral systems that support literacy related activities in hearing pupils (Dickinson, 2003). It is however not known whether or not oral language can stimulate phonemic and phonological development in hard of hearing children in the same way it does in hearing pupils. There is also evidence showing that visual phonic intervention has helped hard of hearing pupils in some countries to develop phonological skills and consequently reading. However, not much has been revealed on teaching materials used to teach sound awareness to the pupils, a gap that the present study fills. The subsequent chapter presents the methodological approach utilized in the present study.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter outlines the research methodology that was used to explore the role of oral language in phonological development of hard of hearing pupils. It begins with a description on the paradigm that was used and design. The target population, sample, sampling procedures, research instruments and how they were administered as well as data analysis process are discussed. Furthermore the chapter presents reliability and validity, ethical considerations and ends with a summary.

3.1 Paradigm

In research a methodology is a model to conduct research within the context of a particular paradigm. It comprises underlying sets of beliefs found in the underlying paradigm. A paradigm is a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline (Guba, 2000). A paradigm is a fundamental image of the subject matter within a science. It serves to define what should be studied, what questions should be asked, and what rules should be followed in interpreting the answers obtained (Barker, 1992). A paradigm therefore, is a broadest unit of consensus within a science and serves to differentiate one scientific community (or sub-community) from another. It subsumes, defines and interrelates the exemplars, theories, and methods and tools that exist within it. There are mainly two paradigms namely; postpositivism (positivist) and interpretivism (constructivist) (Mackenzie & Knipe, 2006). Postpositivism in social research believes that a researcher perceives that the existence of reality is external and independent of social actors and their interpretation of it,

usually referred to as objectivist or realistic. This is a quantitative approach to research. While interpretivism which is referred to as subjectivist or nominalist theory believes that reality is dependent on social actors and assumes that individuals contribute to social phenomena (Wahyuni, 2012). The interpretivism paradigm is a qualitative approach to research.

In this study, the researcher drew liberally from both quantitative and qualitative assumptions when engaging in research. By using both methods the researcher, used both quantitative and qualitative data to provide the best understanding of a research problem (Tashakkori & Teddlie, 1998). Recognising that all methods have limitations, the researcher felt that biases inherent in quantitative method such as bias during study design could neutralize or cancel the biases of qualitative methods i.e. interviewer bias (Creswell, 1994). However, the study relied heavily on the positivist paradigm which is quantitative in nature. By this paradigm, the belief of the researcher was that existence of reality (role of oral language on phonemic and phonological development) is external and dependent of social actors (pupils with hard of hearing and their teachers) and their interpretation of it. The positivist philosophy was applied to understand the phenomena that oral language contributes to phonological development in hard of hearing pupils.

While methodology refers to a domain or map, where as methods are a set of steps to travel in between the two places on the map (Creswell, 1994). A research method comprises specific procedure, tools and techniques to gather and analyse data. The foregoing sections present the methods used in this study.

3.2 Research design

According to Muzumara (1998), a research design is “the organisation, plan, or procedure by which an investigator intends to answer research questions. The design is also intended to control errors of procedures and interpretation: the structure of the design specifically delimits the kind of observations which can be made, the persons from whom data can be collected, and the kind of analysis it is possible to make within the framework and the form of the data.” A research design involves selecting an overall approach to investigate a particular problem of interest and in doing so, an appropriate method of data collection should be applied and its related specific strategies. This study used ex post facto research design to investigate cause-and-effect relationships between independent (oral language) and dependent (hard of hearing pupils) variables. This design is used in situations that do not permit the randomization and manipulation of variables characteristic of experimental research (Ary et al., 2010). Additionally, a concurrent nested approach was applied because quantitative method was given priority in the study in order to quantify generalizable variables and measure factors of amount, intensity or frequency with the view of describing and making inferences from obtained results (Guba & Lincoln, 2005; Mwanza-Kabaghe, 2015) as well as predicting variables and establishing relationships between social facts (White, 2005). Qualitative method was nested upon to give in-depth understanding of the generated data from teacher interviews. As posited by Mandyata, (2015) a combination of qualitative and quantitative techniques provided the researcher with opportunity for normative theorization on the research problem based on the findings.

Grade one and two hard of hearing pupils from five (5) schools in Lusaka district were assessed at the beginning of grade two and three in January, 2016. The focus was on establishing their experience on what they had acquired in phonemic and phonological skills

after completing grade one and two. A total number of 60 hard of hearing pupils (31 females and 29 males) participated in the study. The reason for choosing Lusaka as a site for the study was that most schools for the hard of hearing pupils were found in Lusaka (MOGE, 2014).

At the beginning of grade two and three, hard of hearing pupils were assessed using the BASAT to tap the phonemic and phonological skills. Peabody picture vocabulary test and the One Word Picture Vocabulary test were used to tap receptive and expressive language skills. Receptive and expressive language abilities are predictors of phonological skills (Mwanza-Kabaghe, 2015; Matafwali & Bus 2013). Included in the study were 40 teachers of grade one and two pupils and were interviewed to obtain information on their understanding of role of oral language on phonemic and phonological development as well as establishing types of teaching materials they use to enhance these skills.

3.3 Population

A population is the theoretically specified aggregation of study elements which may include individuals, organisations, events or artefacts. A study population has the total number of units from which data can potentially be collected (Babbie and Mouton, 2004).

The target population of this study comprised all hard of hearing pupils who had completed grades 1 and 2 and were in Grades 2 and 3 in term one in the selected schools. The focus was their experience in phonemes and phonology in Grades one (1) and two (2) in selected schools in Lusaka urban district of Zambia namely; Bauleni special school, University Teaching Hospital (UTH) special school, Desai deaf school, Deaf Baptist School and St Lawrence School. Teachers of these pupils were also part of the population.

3.4 Sample

A sample is a carefully selected subset of the accessible population that has characteristics of the larger population. Kasonde-Ng'andu (2013) describes a sample as a subset of the population taken to be representative of the whole study population. The sample for this study consisted of one hundred (100) respondents. This comprised sixty (60) hard of hearing pupils and forty (40) teachers for the hard of hearing pupils. Hard of hearing pupils had been chosen because they had the characteristics of the target group. Teachers had been chosen because they also had characteristics that were representative of the target group.

3.5 Sampling technique

Schools that were part of this study were selected using simple random sampling. The names of the schools were put in a bowl and randomly picked 5. This was done by writing the names on a piece of paper that was later folded and put in a bowl and thereafter conducted a raffle draw. All the pupils in grade two and three in the first week of term one January, 2016 made the sample in the selected schools. Purposive sampling and snowball was employed to select the teachers, in that, teachers that were teaching grade one and two were very few hence they helped the researcher in identifying other teachers who had taught grade one and two before in the same school.

The sample was chosen because it had special characteristics (pupils with hearing impairment and their teachers) of the respondents that, according to the researcher, fit a specific purpose. Leedy and Ormrod (2005) argue that purposive sampling technique ensures that participants with needed information about the topic are selected. The individuals that were likely to yield the most needed information about the topic under investigation, in this case the teachers who had been teaching the hard of hearing pupils were chosen. The researcher also noted that in

purposive sampling, rich information rather than the number of participants was important (Simuchimba & Luangala, 2007).

3.6 Research instruments

The Basic Skills Assessment Tool (BASAT) was used to assess pupil's phonological and reading skills. Subtests from the screening instrument (BASAT) were administered to pupils with hard of hearing. BASAT is an individual Assessment tool developed by the Ministry of Education in Zambia, primarily to assess the basic reading of pupils. The instrument was validated in 2003 and it has since been translated into the seven Zambian local languages. It comprises sub test which assesses prerequisites and correlates of the beginning of reading of pupils of children based on findings. The following are the subtests measured by the BASAT; letter knowledge, letter sound knowledge, phonological tasks, syllable segmentation, initial and ending sound identification, sound blending, reading and digit span which measures the pupil's retention of information in the working memory. Previously, researchers have used BASAT and shown that scores in their studies were low (Matafwali, 2010; Chikopela, 2013; Mwanza-Kabaghe, 2015). The reading comprehension test was modified in such a way that hard of hearing pupils were made to describe what was happening in the picture shown by the researcher.

3.7 Measurements, reliability scales and validity of quantitative instruments

In quantitative research, reliability and validity of the instrument are very important for minimizing errors that might arise from measurement procedures. Reliability refers to the accuracy and precision of a measurement procedure (Thorndike, 1997). Reliability of the quantitative instruments (BASAT, Peabody and One-word assessment tools) were determined by computing Cronbach's alpha (α) values. The Chronbach's alpha (α) values for the instruments are acceptable when the measure of reliability is more than .70 thresh hold.

However, alpha is highly dependant on the number of items in a proposed summated scale so .69 is acceptable for a four item scale (Thorndike, 1997). The Chronbach's alpha (α) values for the instruments are shown on each item were tests where conducted on in this section. The first item were tests were conducted is alphabetic knowledge in BASAT. Below are details of the tests on alphabetic knowledge.

Alphabetic knowledge

This comprised three tasks that assessed knowledge of the alphabet namely; letter name knowledge, letter identification knowledge, letter sound knowledge and sound letter knowledge. On alphabet letter name knowledge, 26 letters of the alphabet were randomly printed on a card and a pupil was asked to name the letters in the order that they appeared on the card.

Letter identification: The random letters of the alphabet on the card were presented to the pupil and was required to point at the letter that represented the sound produced by the examiner.

Letter sound knowledge: On this task, pupils were told to name the sound of each letter on the letter card that was presented in random order.

Sound letter knowledge: This task required pupils to identify the corresponding sound of the letter. The examiner produced the individual letter of the alphabet and pupils were asked to identify the corresponding letters.

The maximum score on alphabetic knowledge was 76, and the Cronbach's alpha was .72 on a sample (n) of 60 pupils i.e. (n = 60). This implies that that the test was reliable for this sample.

Phonological tasks were one of the subtests in BASAT.

There were four tasks that were used to assess pupils' phonemic and phonological awareness skills. These were syllable segmentation, discrimination of initial sound in a word, discrimination of ending sound in a word and sound blending.

Syllable segmentation: This task consisted of four words that comprised two syllable and three syllable words. The examiner produced each word and the pupil was asked to say the number of syllables in that word.

Discrimination of initial and ending sound: There were 20 compound words on this task and pupils were asked to identify the initial sounds in the first 10 words as well as identify the ending sounds in the other 10 given words.

Sound blending task: On this task, pupils were required to combine sound elements to form a word. Sounds were printed on a card to reduce memory demands and the examiner produced the sound of the letter upon showing the letter card to the pupil. As each sound on a card was produced, the letters were placed in front of the pupil and the pupil was asked to combine the sounds to make a word.

The maximum score on phonological tasks was 29, and the Cronbach's alpha was .91 (n=60).

Memory for digits: Ministry of Education (2003) used the forward digit span as a measure of phonological memory. The test begins with the items containing two digits. The number of digits increased from two digits for the first items to seven digits on the last items. The test required the pupil to repeat back series of digits that are spoken by the examiner. The examiner then recorded the number of items that the child could recall on a single trial. The maximum score was 14, and the Cronbach's alpha was .69 (n=60).

Reading tasks was among the subtests that were conducted.

The pupils were asked to read a series of words from two syllable words to three syllable words and sentences. The scores were coded on a two point scale: 0 = complete fail and 1 = able to read accurately. The Cronbach's alpha was .70 (n=60).

Validity of quantitative instruments used

Validity refers to the degree to which a study accurately reflects or assesses the specific concept or construct that the researcher is attempting to measure (Thorndike, 1997). Content validity of the quantitative instruments was checked for the extent to which the items in the instruments and the scores from the items were representative of all possible questions on language, sound knowledge and sound blending in grade one and two curriculum.

Oral language tests

The tests were conducted on both receptive and expressive language.

Fink et al, (2012) described receptive language skills as an individual's ability to understand spoken words and expressive language as an individual's ability to produce words and express his or her thoughts. Two tests were used to tap expressive and receptive language in pupils with hard of hearing. The assessment tools were standardized and were Zambian oriented tools.

The Peabody Picture Vocabulary Test (PPVT)

This test was used to assess receptive vocabulary and the Fink, et al (2012) version was used because it was adapted to the Zambian context. Peabody is a non-verbal language assessment instrument and was used to measure the knowledge of a child in common items found in the environment. Peabody Picture Vocabulary test consists 30 items. These items were translated into Nyanja in order to adapt to the Zambian education context. An individual child was shown groups of four pictures and was asked by the examiner to point at the corresponding picture and responses were marked as correct or incorrect. Researchers like Matafwali (2010)

and Mwanza-Kabaghe (2015) used PPVT and found oral language abilities to be a significant predictor of phonological awareness and later reading. Cronbach's alpha was .74 (n = 60).

One-Word Picture Vocabulary Test (OPVT)

This test was used to assess expressive vocabulary. The assessment tool was developed by the researcher to test receptive language of pupils in common items found in the environment. The tests were administered in Nyanja. The examiner showed items to an individual child and ask him/her to say the word of the item shown. The responses were marked as correct and incorrect. Cronbach's alpha was .71 (n = 60)

Semi-structured interview guide

Interviews on teachers were used to collect information on their knowledge of the role of oral language in phonemic and phonological development and how they can help hard of hearing pupils develop phonemes and phonology. Semi-structured interviews are primarily used in explanatory research to understand the relationships between variables, perhaps as have been revealed by some prior descriptive research. Additionally, semi-structured interviews are used in exploratory studies to provide further information about the research area Chiyongo (2010). A few guiding interview questions were prepared for the teachers. The guiding questions made it possible for the researcher to obtain the data required to meet the specific objectives of the study. White (2005) states that an interview instrument "provides access to what is inside a person's head, makes it possible to measure what a person knows (knowledge or information), what a person likes or dislikes (values and preferences) and what a person thinks (attitudes and beliefs)". In this study therefore, the researcher and participants can be considered to be key instruments in data collection.

3.8 Reliability and validity of qualitative instruments

Qualitative researchers are more concerned with validity than reliability (Merriam, 1998).

Instead, they seek believability, based on coherence, insight, and instrumental utility (Eisner,

1991) and trustworthiness (Lincoln & Guba, 1985) through a process of verification rather than through traditional reliability computations. This process is termed as credibility establishment.

In this study, credibility was established by way of evidence based on referential or interpretive adequacy (Ary, Jacobs, & Sorensen, 2010). Referential or interpretive adequacy was established by using 40 evidence descriptors which in this study were direct quotations from the participants in the responses.

3.9 Data collection procedure

Permission was obtained from the school manager to conduct research in the school. The school manager then introduced the researcher to teachers of grades 2 and 3 pupils. The pupils were recruited at the start of grade two and three with the help of their teachers as they had knowledge on the level of hearing impairment the pupils had. The researcher then explained the purpose of the research to teachers and pupils in grades 2 and 3.

The data collection involved gathering both numeric information through assessment instruments as well as text information on interviews so that the final database represented both quantitative and qualitative information. Data was collected by means of assessments on pupils and semi-structured interviews on teachers. Testing of the pupils was done in the school hall and only pupils who were being tested were present so as to avoid pupils being distracted by external stimuli from pupils who were not part of the study. The testing took about 60 minutes per child. The first test was the Basis Skills Assessment (BASAT), it was administered in 40 minutes followed by Peabody picture vocabulary test which was administered in 20 minutes and finally one word picture vocabulary test which was also administered in 20 minutes. The tests were administered by the researcher with the help of

two trained research assistants who were speakers of Nyanja, the language that was used in the study. One of the research assistants was a degree student at the University of Zambia and another, a teacher with a diploma certificate. The assistant researchers were trained for two days by the principal researcher before commencement of assessments.

The researcher then interviewed teachers using semi-structured interviews. The interview guide was generated to construct information on their understanding of the role oral language plays in phonemic and phonological development and how they teach these skills to hard of hearing pupils.

3.10 Data analysis

Data was analyzed qualitatively using themes and quantitatively using SPSS version 21. Information obtained from the BASAT, Peabody and One-word picture vocabulary test was analysed quantitatively using descriptive analysis to describe distribution of scores on each of the tests for each grade and to determine which variables on the assessment tools respondents differed significantly. Independent samples t-test was used to check whether there was a significant difference in performance between grades on the tasks and one way ANOVA was run to check for differences in terms of performance among schools on the variables under investigation. In addition, correlations were computed to investigate if there was any association between oral language and sound awareness tasks on the scores obtained. Data derived from the interview with teachers was analysed qualitatively using content analysis in the thematic approach. The responses from the assessments and interviews were then used to determine the role of oral language in phonemic and phonological development among learners with hearing impairment.

3.11 Ethical consideration

Ethical clearance was obtained from the University of Zambia ethics committee.

Confidentiality was observed and maintained by not requesting for identities of respondents.

In addition, information provided had no connection with the BASAT, Peabody and one-word picture tool numbers. This was done to ensure that the assessments conducted were neither interfered with nor contested by the researcher. Permission was obtained from the head teachers before administration of assessment tests and interviews and the right of respondents were observed by telling them the actual purpose of the study and permission was obtained from the headmasters before administration of questionnaires and interviews.

3.12 Summary

This study used ex post facto design. The researcher opted to use this design in order to examine whether oral language stimulates phonemic and phonological development in hard of hearing grade one and two pupils. The study sample included pupils in grade one and two. All the pupils in grade one and two in selected schools participated in the study. Purposive and snowball sampling was applied to select teachers. A wide range of standardised measures were used to assess oral language abilities, basic literacy skills, executive functions, numeracy, and background factors. These measures have extensively been utilised in early literacy studies both in national and international studies (Mwanza-Kbaghe, 2015; Tambulukani & Bus, 2012; Matafwali, 2005; Davidse, 2014; Dickinson *et al.*, 2003; Dunn & Dunn, 1997). A strength in the methodology of the present study is that the researcher applied bivariate and multiple regression to explore the relation between independent and dependent measures. The next chapter presents the findings of the study.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.0 Overview

This chapter presents the findings of the study on the role of oral language on phonemic and phonological development. These findings are presented according to study questions. The first question was, to what extent do pupils with hard of hearing in grade one and two know about sounds of letters? Second question was, how much are pupils with hard of hearing in grade one and two able to combine letter sound into meaningful words? And thirdly, what type of teaching materials help pupils with hard of hearing to combine letter sounds into meaningful words?

4.1 Pupils knowledge about sounds of letters

In order to answer question one, descriptive statistics were run to check the overall performance on letter knowledge, letter sound knowledge, syllable segmentation, initial sound discrimination and ending sound discrimination. In addition, t-test was run to check whether there was significant difference between grades on the tasks and one way ANOVA was run to check for differences in terms of performance among schools. In addition, correlations were computed to investigate if there was any association between oral language and letter sound knowledge.

Concerning whether pupils had knowledge about letters, it was found that 11 (18.3%) of the 60 pupils knew the letters in the alphabet. Table 1 shows details on this.

Table 1: Pupils' Performance on Letter Knowledge (n = 60)

Marks obtained	4.00	6.00	7.00	8.00	13.00	14.00	15.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	Total
Pupils	1	1	2	2	2	2	3	2	4	4	5	5	5	4	3	4	11	60
Percent of pupils	1.7	1.7	3.3	3.3	3.3	3.3	5.0	3.3	6.7	6.7	8.3	8.3	8.3	6.7	5.0	6.7	18.3	100.0

Majority of the pupils scored between 15 and 25 of which the expected maximum average score was 26. As shown in the table, only one pupil had the lowest score four. This shows that most pupils in the study were able to write, name and identify the letters of the alphabet.

Concerning performance on sounds of letters in the alphabet, it was found to be low as the highest score was 8 out of 26. Table two provides detailed information.

Table 2: Pupils' Performance on Letter Sound Knowledge (n=60)

Marks obtained	.00	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	8.00	Total
Number of Pupils	32	4	4	6	1	4	1	1	3	2	1	1	60
Percentage of pupils	53.3	6.7	6.7	10.0	1.7	6.7	1.7	1.7	5.0	3.3	1.7	1.7	100.0

Table 2 shows that 32 (53.3%) of the 60 pupils had no score at all. In addition, 6 (10%) scored 1.5 out of 26. Most pupils had very low scores. This implies that the performance on letter sound knowledge task was generally low.

As regards to performance on initial sound discrimination, 24 (40%) of the 60 pupils that participated in the study did not identify initial sounds in words. The details on this task are in table 3.

Table 3: Pupils' Performance on Initial Sound Discrimination (n=60)

Marks obtained	.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	Total
Pupils	24	6	3	4	3	5	6	4	3	2	60
Percent of pupils	40.0	10.0	5.0	6.7	5.0	8.3	10.0	6.7	5.0	3.3	100.0

The table indicates that only 2 (3.3%) of the 60 pupils were able to identify nine out of a maximum of ten initial sound in words with a majority of pupils scoring between one and eight. This means that performance on this task was equally low.

Concerning whether pupils had knowledge about discriminating ending sounds in words, it was found that only one pupil managed to score ten out of a maximum of ten ending sounds. Details are in table 4 below.

Table 4: Pupils' Performance on Discriminating Ending Sounds (n=60)

Marks obtained	.00	1.00	2.00	3.00	4.00	5.00	8.00	10.00	Total
Pupils	30	6	8	7	3	2	3	1	60
Percent of pupils	50.0	10.0	13.3	11.7	5.0	3.3	5.0	1.7	100.0

The results in table 4 reveals that 30 (50%) of the pupils did not discriminate ending sounds in words. In addition, the majority of the pupils scored between one and three. This indicates that pupils' performance on this task was quite low.

Further tests were conducted on sound knowledge. As regards to performance on syllable segmentation, all the pupils did not segment words into syllables. Details on this are provided in table 5.

Table 5: Pupils' Performance on Syllable Segmentation (n=60)

Marks obtained	.00
Pupils	60
Percent of pupils	100

Findings indicate that all the 60 pupils that participated in the study were not able to segment words into syllables. The expected maximum score on this task was 4. Performance on this task was very poor as pupils did not attempt to answer anything at all, they said they did not know how to segment the words that were said to them into syllables and that they had not learnt anything on syllable segmentation. This implies that pupils had no idea what syllable segmentation means.

To further understand how the variables in the study are associated and if oral language has an influence on this performance, bivariate correlation was computed on all variables in the analyses. The variables were weakly to moderately associated with one another as illustrated in table 6 below.

Table 6: Bivariate Correlations (n=60)

	Letters	Sounds	Initial	Ending	Blending	Memory	Receptive	Expressive	Age	Gender
Letters	--									
Letter Sounds	.292*	--								
Initial sound	-.031	.089	--							
Ending sound	-.086	.111	.737**	--						
Blending	.029	-.024	.223	.275*	--					
Memory	.526**	.488**	.074	.144	.068	--				
Receptive language	.358**	.092	.126	.149	.094	.282*	--			
Expressive Language	.255*	.138	-.027	.150	-.092	.204	.341**	--		
Age	.111	-.058	-.077	-.078	-.055	-.160	.137	.228	--	
Gender	-.063	-.087	-.206	-.102	-.146	-.138	.160	.093	.145	--
Grade	.012	.104	.197	.235	.127	.077	.132	.118	.081	-.033

Expressive and receptive language proficiency, letter knowledge, letter sound knowledge and blending were all weakly to moderately correlated with one another. The correlation between expressive language and letter knowledge was moderate ($r = .25^*$). Between letter knowledge and letter sounds the correlation was ($r = .29^*$), whereas letter sound and sound blending it was rather low ($r = .029$). Age, gender and grade also had weak correlations with letter sound knowledge and expressive language. This is due to the fact that hard of hearing pupils are not

taught sound awareness as well as sound blending skills because these tasks demand the use of oral language hence teachers rely more on sign language. In addition, there was a high correlation between working memory and letter knowledge ($r = .52^{**}$) implying that pupils have mastered the letters of the alphabet because the task does not demand use of oral language.

4.1.1 Differences in performance in sounds of letters

To determine whether there were differences in performance between grade one and two, independent samples t-tests were conducted to compare pupils' scores on letter sound knowledge, initial sound discrimination and ending sound discrimination between grade one and two. Results revealed that there were no differences in performance between the grades on all tasks. The table 7 below shows details on this.

Table 7: Differences in Pupils' Performance in Sounds of Letters

Variable	N	M	SD	t	df	p
Letter sound knowledge						
Grade 1	30	0.95	1.53	-.795	58	.430
Grade 2	30	1.30	1.90			
Initial sound discrimination						
Grade 1	30	2.20	2.92	-1.52	58	.132
Grade 2	30	3.40	2.10			
Ending Sound discrimination						
Grade 1	30	1.10	1.91	-1.84	58	.070
Grade 2	30	2.20	2.20			

As shown in table 7, pupils in grade one and two were not significantly different on letter sound knowledge, ($p=.430$). Inspection of the two group means indicates that the average letter sound score for grade one ($M=0.95$) is significantly lower than the score ($M=1.30$) for grade 2. The difference between the means is 0.34. The table further shows that performance on initial sound discrimination was not significant, ($p=.132$). The two group means indicates the average initial sound discrimination score for grade one (2.20) significantly lower than the score (3.40) for grade two. The difference between the means is 5.6. In addition, there was no significant difference on discriminating ending sounds, ($p=.070$). Inspection of the two group means indicates that the average ending sound discrimination score for grade one (1.10) is significantly lower than the score (2.20) for grade two. The difference between the means is 1.1. The results imply that both grades are at the same level in terms of performance on letter sound knowledge tasks.

Further analysis was conducted on receptive language. Results revealed that 15 (25%) out of the 60 pupils that participated in the study were able to score 28 out of 30 with the majority scoring between 23 and 26. Details on this are in table 8.

Table 8: Pupils' Performance on Receptive Language (n=60)

Marks obtained	17.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	Total
Pupils	1	1	1	6	7	7	5	11	15	5	1	60
Percent of pupils	1.7	1.7	1.7	10.0	11.7	11.7	8.3	18.3	25.0	8.3	1.7	100.0

Performance on receptive language implies that hard of hearing pupils had knowledge of oral language despite performing quite low on sound awareness tasks.

Spearman rho correlation coefficient between letter sound knowledge and receptive language

To investigate if there was a statistically significant association between letter sound knowledge and receptive language, a correlation was computed. The Spearman rho statistic was calculated, $r_s(58) = .07$, $p = .624$. The correlation was positive though weak which means there was an association between receptive language and letter sound knowledge. Even though hard of hearing pupils had high scores on receptive language as shown in table 7, their performance on letter sound knowledge as indicated in table 2 was quite low. This means that letter sound knowledge cannot be predicted from receptive language in the hard of hearing pupils in the current study.

Figure 1.

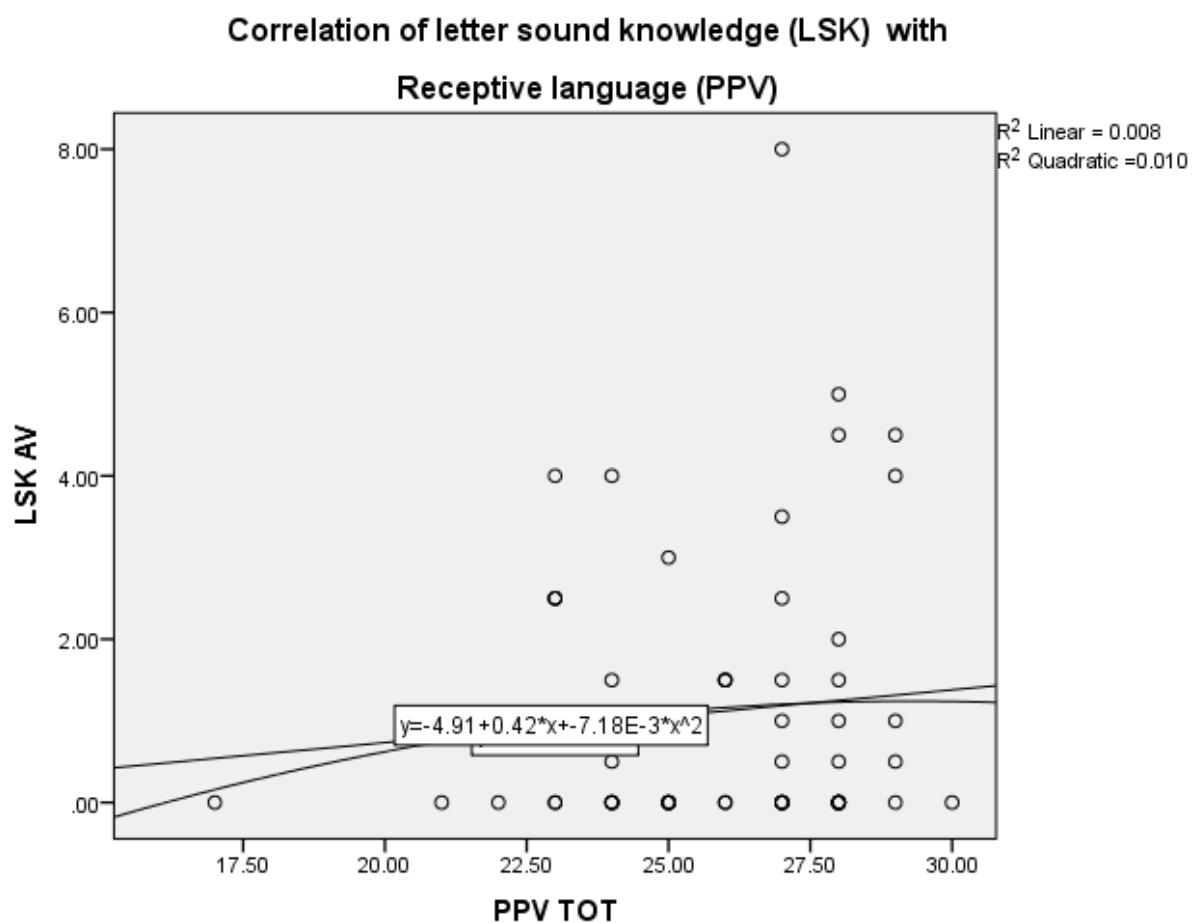


Figure 1 shows that there was a weak correlation between letter sound knowledge and receptive language.

Concerning pupils' performance on expressive language, it was found that 14 (23.3%) out of 60 pupils scored 18 out of a maximum of 25 words as shown in table 9.

Table 9: Pupils' Performance on Expressive Language (n=60)

Marks obtained	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	Total
Pupils	1	1	4	2	14	5	8	8	13	2	2	60
Percent of pupils	1.7	1.7	6.7	3.3	23.3	8.3	13.3	13.3	21.7	3.3	3.3	100.0

13 (21.7%) pupils scored 22 out of 25 respectively and only 1 (1.7) scored the lowest although above average. This implies that pupils' performance on this task was generally good despite performing poorly on sound knowledge tasks.

Spearman rho correlation coefficient between letter sound knowledge and expressive language

Another correlation was run to investigate if there was a statistically significant association between letter sound knowledge and expressive language. The Spearman rho statistic was, $r_s(58) = .093$, $p = .482$. There was a positive though weak correlation which means that there was a weak association between expressive language and letter sound knowledge. This shows that hard of hearing pupils who had higher scores on expressive language test surprisingly had low scores on letter sound knowledge. This indicates that letter sound knowledge cannot be predicted from expressive language.

The figure below shows a weak though positive correlation between letter sound knowledge and expressive language

Figure 2.

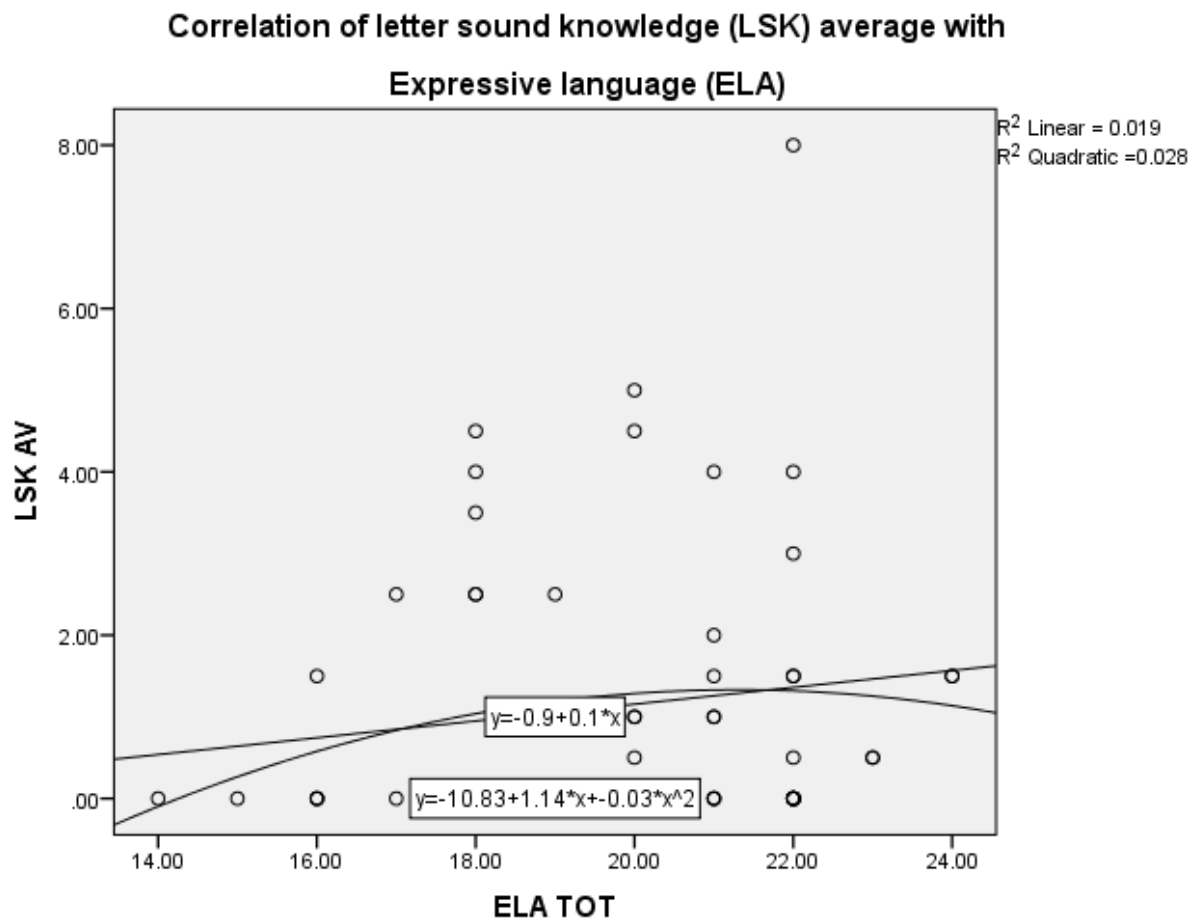


Figure 2 indicates that there was a weak correlation between letter sound knowledge and expressive language.

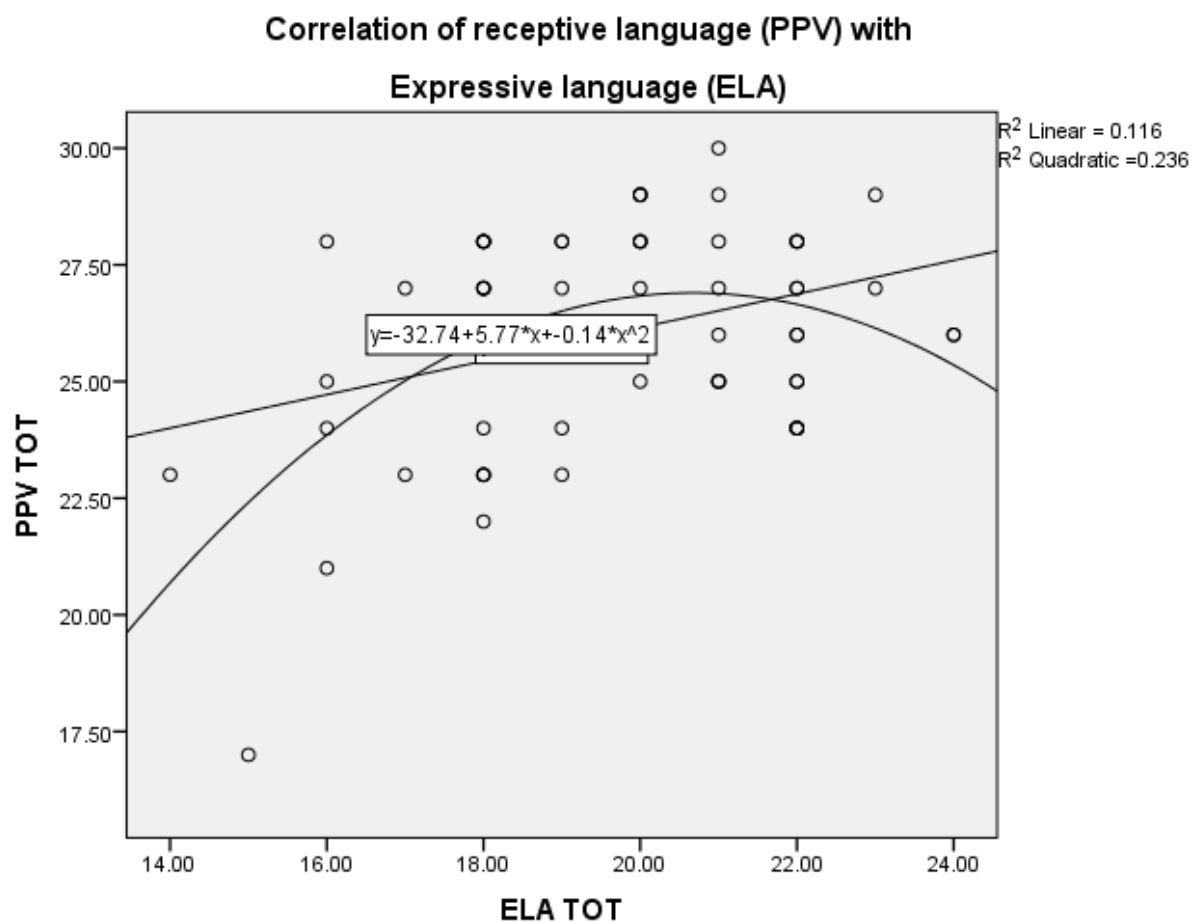
Spearman rho correlation coefficient between receptive and expressive language

In addition, an investigation was carried out to establish the association between expressive and receptive language. The results of the Spearman rho statistic was, $r_s(58) = .204$, $p = .117$,

a medium effect size according to Cohen (1988), for hard of hearing pupils in grade one and two in the study. The direction of the correlation was positive which means there was an association between receptive and expressive language. The R squared indicates that approximately 40% of the variance in receptive language can be predicted from expressive language.

Findings show that there was a strong correlation between receptive language and expressive language. This implies that hard of hearing pupils understand oral language and are also able to express themselves orally despite having low scores on sound related tests. Lastly, refer to figure 3 for details.

Figure 3.



In conclusion, the tests run on knowledge of letter sounds shows that pupils have challenges with sound awareness tasks even though they have shown to have well developed oral language. Further, it has been revealed that grade two did not outperform grade one on sound language tests. The pupils were on the same level of performance despite one grade being higher than the other.

4.2 Combining sounds into meaningful words

In order to address the second question, how much pupils with hard of hearing in grade one and two are able to combine letter sounds into meaningful words, descriptive statistics, t-tests, ANOVA, correlations and multiple regression were computed.

Pertaining to performance on sound blending, it was found that 44 (73.3%) out of the 60 pupils that participated in the study were unable to blend sounds into words. Refer to table 10 for details.

Table 10: Pupils' Performance on Sound Blending (n=60)

Marks obtained	.00	1.00	2.00	Total
Pupils	44	14	2	60
Percent of pupils	73.3	23.3	3.3	100.0

A majority, 14 (23.3%) of the pupils only managed to score one out of the maximum of five marks. In addition, 2 (3.3%) pupils obtained two scores on the task. This implies that hard of hearing pupils did not perform well on the sound blending task. They generally exhibited difficulties on this test. In addition, tests were run on reading to check how much pupils are able to read already combined letter sounds as shown in table 11 below.

Results indicate that only one pupil was able to score seven out of a maximum of 38 words with a majority scoring between one and two.

Table 11: Pupils' Performance on Reading (n=60)

Marks obtained	.00	1.00	2.00	3.00	4.00	7.00	Total
Pupils	3	26	21	8	1	1	60
Percent of pupils	5.0	43.3	35.3	13.3	1.7	1.7	100.0

This shows that pupils expressed insufficient knowledge on reading two letter words, three syllable words, four syllable words and sentences. This performance could be due to the fact that pupils had exhibited challenges in sound blending task hence could not also read already blended sounds. Oral language abilities are essential for successful performance of sound blending as well as reading tasks unfortunately, investigation on correlating language and blending tasks showed a very weak relationship between the two variables ($r = -.092$).

As regards to performance on reading comprehension, results revealed that most pupils, 50 (83.3%) scored four out of a maximum of four words. The details on this are in table 12.

Table 12: Pupils' Performance on Reading Comprehension

Marks obtained	1.00	2.00	3.00	4.00	Total
Pupils	2	1	7	50	60
Percent of pupils	3.3	1.7	11.7	83.3	100.0

The table further shows that 7 (11.7%) pupils had two scores, 1 (1.7%) had one score and 2 (3.3%) had two scores respectively. In this task, pupils were shown pictures and the assessor read the response and asked pupils to say the number that corresponded to what was shown in

the picture. The results show that there was good performance on this task implying that hard of hearing pupils understand activities presented in picture form.

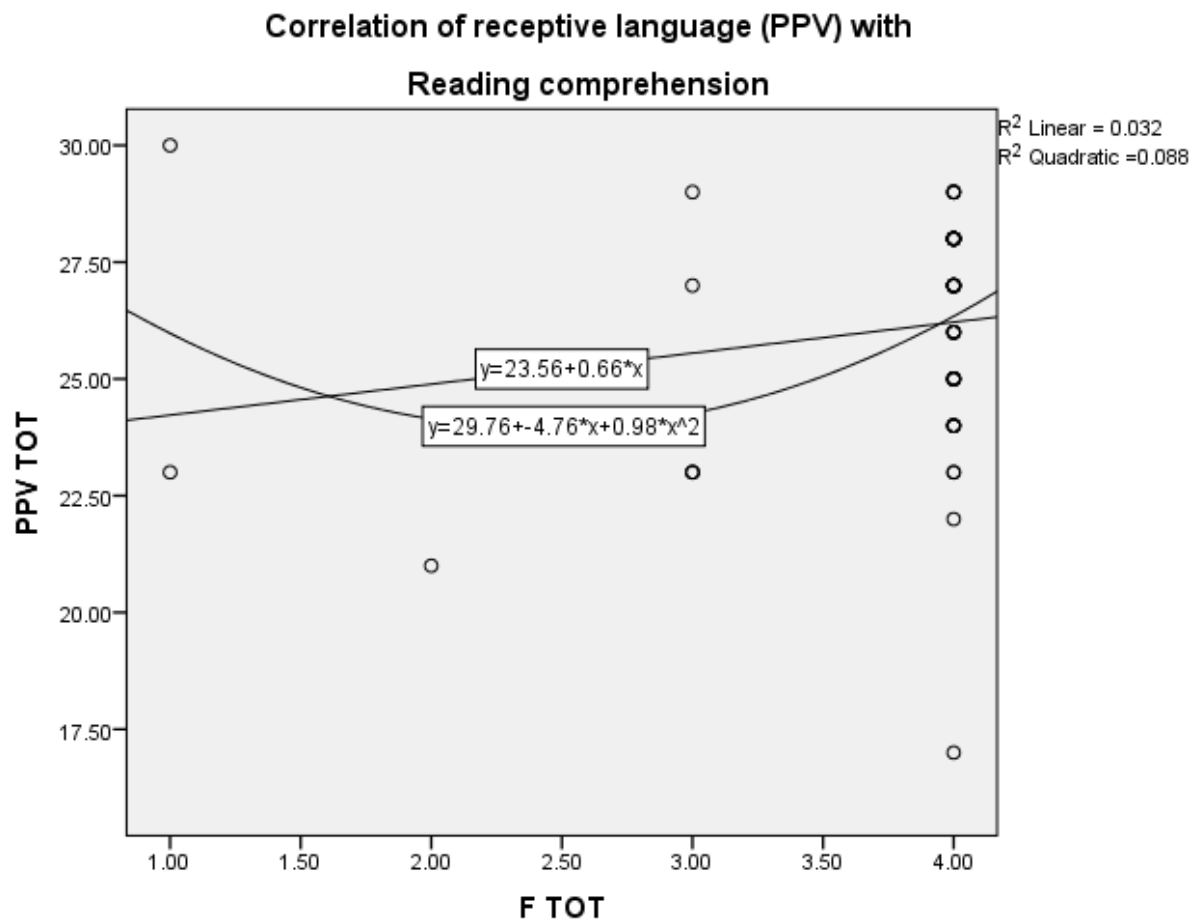
In addition, a correlation was computed to investigate if there was a statistically significant association between receptive language and reading comprehension.

Correlation between receptive language and reading comprehension

The Spearman rho statistic was calculated, $r_s(58) = .255^* p = .05$. The direction of the correlation was positive and strong. The performance on receptive language skills as well as reading comprehension was good. This means that hard of hearing pupils found it easy to learn through pictures. Using Cohen's (1988) guidelines, the effect size is medium for studies in this area. The R squared indicates that approximately 50% of the variance in reading comprehension can be predicted from receptive language.

The figure 4 shows a positive correlation between receptive language and reading comprehension.

Figure 4.



4.2.1 Differences in Performance on Sound Blending and Reading Between Grades

Independent samples t-tests were run to compare pupils' scores on letter sound knowledge, initial sound discrimination and ending sound discrimination between grade one and two. Results reveal that there was no difference in performance between the grades. Details on this are in table 13.

Table 13: Differences in Performance on Sound Blending and Reading Between Grades (n=60)

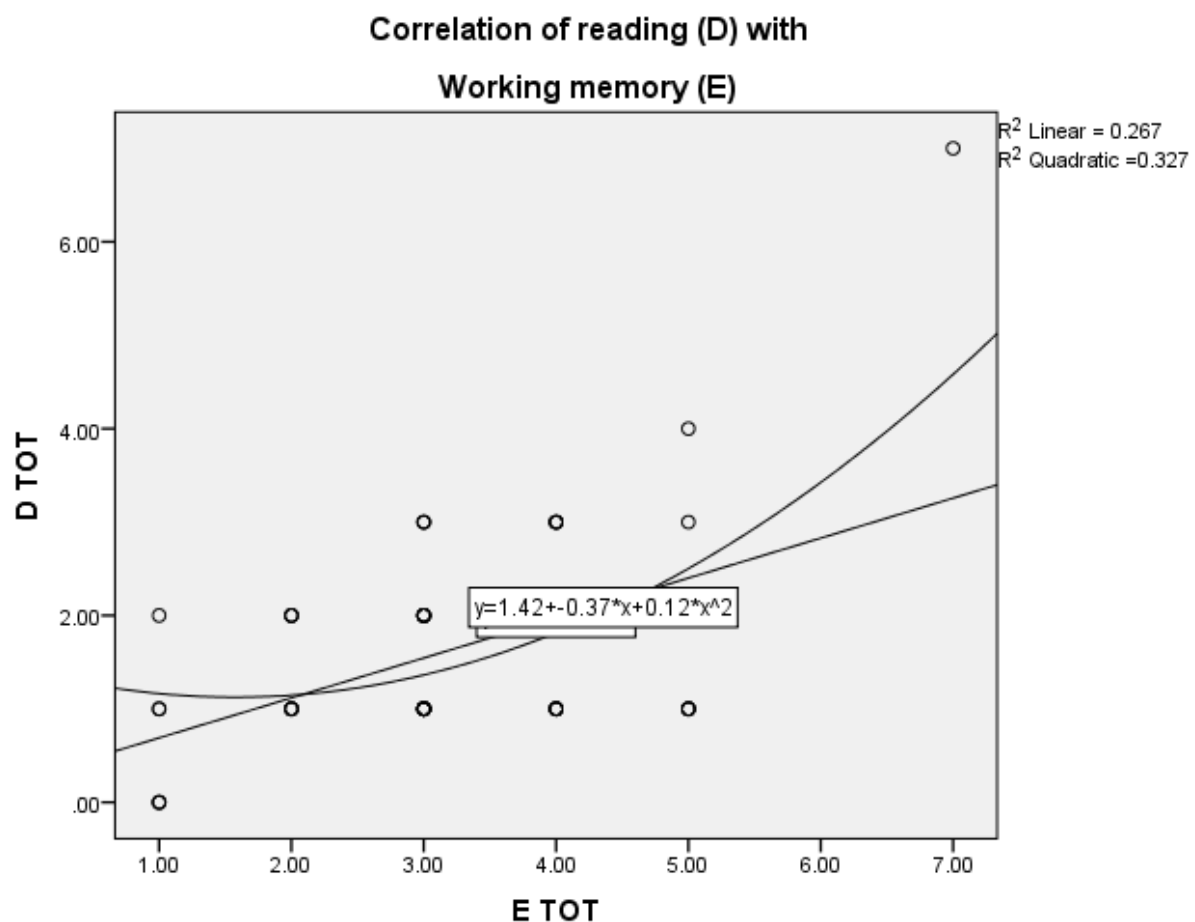
Variable	M	SD	t	df	p
Sound blending					
Grade one	.23	.50	-.973	58	.36
Grade two	.37	.56			
Reading					
Grade one	1.73	1.31	.12	58	.91
Grade two	1.70	.84			
Reading comprehension					
Grade one	3.8	.504	.196	58	.85
Grade two	3.73	.784			

Grade one and two were not significantly different on sound blending, ($p=.36$). Inspection of the two group means indicates that the average sound blending score for grade one ($M=.23$) is significantly lower than the score ($M=.37$) for grade 2. The difference between the means is .14. The table further shows that performance on reading was also not significant, ($p=.91$). The two group means indicates the average reading score for grade one (1.73) significantly higher than the score (1.70) for grade two. The difference between the means is 0.03. In addition, there was no significant difference on reading comprehension, ($p=.85$). Inspection of the two group means indicates that the average reading comprehension score for grade one (3.8) is significantly higher than the score (3.73) for grade two. The difference between the means is 0.07.

To investigate if there was a statistically significant association between reading and digit span (working memory), a correlation was computed. The Spearman rho statistic was

calculated, $r_s(58) = .395^{**}$ $p = .002$. Figure 5 shows that direction of the correlation was positive which means hard of hearing pupils who have low scores on digit span also tend to have low scores on reading tasks and vice-versa. Using Cohen's (1988) guidelines, the effect size is much larger for studies in this area. The R squared indicates that approximately 33% of the variance in reading can be predicted from working memory.

Figure 5.



In addition, another correlation was computed to investigate if there was a statistically significant association between letter sound knowledge and working memory. The Spearman rho statistic was calculated, $r_s(58) = .610^{**}$ $p = .000$. It was also a positive correlation implying that hard of hearing pupils who have low scores on working memory also tend to

have low scores on letter sound knowledge and vice-versa. Using Cohen's (1988) guidelines, the effect size is much larger for studies in this area. The R squared indicates that approximately 24% of the variance in letter sound knowledge can be predicted from working memory.

A summary of correlations computed reveal a moderate correlation between sound blending and reading (.267*) as shown in the table below.

Table 14: Summary Table on Correlations Between Variables on Letter Sound Combination Tasks (n=60)

	Blending	Reading	Memory	Reading comp
Sound blending	--			
Reading	.267*	--		
Working Memory	.068	.517**	--	
Reading comprehension	.122	.113	.236	--
Expressive language	-.092	.027	.204	.164

The level of correlation between sound blending and reading is as a result of pupils' poor performance on both tests. In addition, reading highly correlated with working memory ($r = .517^{**}$) meaning that pupils had difficulties in remembering three numbers in sequence and beyond in the same way they had difficulties remembering more than three syllable words.

4.2.2 Difference in Performance Among Schools on Letter Sound Knowledge, Sound Blending and Reading

One way ANOVA tests were conducted to compare school's performance in letter sound knowledge, sound blending and reading. Results indicate that there was no difference in performance on the variables under investigation. Tables 15 and 16 have details on this. Table 15 shows the means and standard deviations of the 5 schools on letter sound knowledge, sound blending and reading.

Table 15: Means and Standard Deviations Comparing 5 School's Performance Groups

Schools	<u>Letter sound knowledge</u>			<u>Sound blending</u>		<u>Reading</u>	
	n	M	SD	M	SD	M	SD
School 01	27	.796	1.81	.444	.640	1.66	1.33
School 02	13	.730	1.05	.153	.375	1.46	.877
School 03	6	2.08	2.13	.000	.000	1.66	.816
School 04	9	2.00	1.58	.333	.500	1.77	.666
School 05	5	1.20	1.68	.200	.447	2.60	.894
Total	60	1.13	1.69	.300	.530	1.71	1.09

The mean in letter sound knowledge for school 01 is highest .796, school 02 is .730, school 03 is 2.1, school 04 2.00 and school 05 is lowest at 1.20. The mean for sound blending is .444 for school 01, .153 for school 02, .000 for school 03, .333 for school 04 and .200. The mean for reading is 1.7 for school 01, 1.5 for school 02, 1.7 for school 03, 1.8 for school 05 and 2.6 for school 05.

Table 16 below further shows if there was any significant difference prior to having different means.

Table 16: Differences in Performance Among Schools Between Groups and Within Groups in Letter Sound Knowledge, Sound Blending and Beading

Table 16. Source	df	SS	MS	F	P
Letter sound knowledge					
Between groups	4	17.367	4.34	1.56	1.98
Within groups	55	152.946	2.78		
Total	59	170.313			
Sound Blending					
Between groups	4	1.441	.360	1.31	.279
Within groups	55	15.159	.276		
Total	59	16.600			
Reading					
Between groups	4	4.864	1.22	1.02	.403
Within groups	55	65.320	1.18		
Total	59	70.183			

Table 16 shows that a statistically significant difference was not found among the schools on letter sound knowledge, $F(4, 55) = 1.56$ $p = 1.98$, sound blending, $F(4, 55) = 1.31$ $p = .279$, and reading, $F(4, 55) = 1.02$ $p = .403$. This implies that the pupils' performance on the tasks remained the same regardless of the school they were learning from.

4.2.3 Differences in Performance on Letter Sound Knowledge, Sound Blending and Reading Between Genders

Concerning whether there was a difference between gender on performance, results revealed that there was no difference on all tasks. Details are in table 17 below.

Table 17: Pupils' Performance Between Genders

Variable	M	SD	t	df	P
Letter sound knowledge					
Males	1.28	1.98	.662	58	.511
Females	.984	1.41			
Sound blending					
Males	.379	.561	1.12	58	2.66
Females	.226	.226			
Reading					
Males	1.83	1.17	.759	58	.451
Females	1.61	1.02			

Males were not significantly different from females on letter sound knowledge, ($p=.511$). Inspection of the two group means indicates that the average letter sound score for males ($M=1.28$) is significantly higher than the score ($M=.984$) for females. The difference between the means is 0.78. The table further shows that performance on sound blending was as well not significant, ($p= 2.66$). The two group means indicates the average sound blending score for males (.379) significantly higher than the score (.226) females. The difference between the means is 0.15. In addition, there was no significant difference on reading, ($p=.451$). Inspection of the two group means indicates that the average reading score for males (1.83) is significantly higher than the score (1.61) for females. The difference between the means is 0.22. These results have shown evidence that males and females are at the same level in terms of letter sound knowledge, blending and reading regardless of the school they were attending lessons from. In addition, investigations on differences between age revealed that older pupils did not outperform younger pupils.

4.2.4 Multiple Regression

Simultaneous multiple regression was conducted to investigate the best predictors of letter sound knowledge test scores. The means, standard deviations, and intercorrelations are shown in table 18. The combination of variables to predict letter sound knowledge from pupils grade, gender and school was not statistically significant, $F(3, 56) = 1.58, p > .21$. The beta coefficients are presented in table 19. School significantly predict letter sound knowledge when all the three variables are included. The adjusted R squared value was .028. This indicates that .03% of the variance in letter sound knowledge was predicted from the school attended by the pupils. As suggested by Cohen (1988), this is a smaller effect.

Correlation and regression

Table 18: Means, Standard Deviations, and Intercorrelations for Letter Sound Knowledge and Predictor Variables 9 (n = 60)

Variable	M	SD	Pupils grade	Gender	School
Letter sound Knowledge	1.13	1.70	.104	-.09	-.23*
Predictor variables					
1.Pupils grade	1.50	.504	--	-.033	-.024
2.Pupils gender	1.52	.504		--	.142
3.School	2.20	1.38	--		

* $P < .05$; ** $P < .01$.

This table shows that the means on pupils' grade, gender and school were quite low. The mean on school was significantly higher implying that when all the variables were included in the analyses school predicted letter sound knowledge development.

Table 19: Simultaneous Multiple Regression Analysis Summary for Pupils Grade, Gender and School Predicting Letter Sound Knowledge

Variable	<i>B</i>	<i>SEB</i>	β
Pupil's grade	.36	.43	.11
Pupil's gender	-.399	.44	-.12
School	.31	.16	.25*
Constant	.52	1.00	
Note. R squared = .078; F (3, 56) = 1.58, p < .21.			
* p < .05; ** p < .01			

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 19 shows that the school that hard of hearing pupils attended had an impact on their ability to learn sounds of letters.

Another simultaneous multiple regression was conducted to investigate the best predictors of reading test scores as shown in tables 20 and 21. The combination of variables to predict reading achievement from letter knowledge, letter sound knowledge, oral language and memory was statistically significant, $F(4, 55) = 5.68$, $p = .001$. When all the four variables are included, working memory significantly predict reading skills. The results also indicated that 26% of the variance in reading skills was explained by the model. According to Cohen (1988), this is a medium effect.

Table 20: Means, Standard Deviations, and Intercorrelations for Reading and Predictor Variables 9 (N = 60)

Variable	M	SD	Letter Know.	Letter sound.	Lang.	Memory
Reading	1.72	1.09	.25**	.13*	.03**	.56
Predictor variables						
1. Letter knowledge	19.77	5.77	--	.29*	.26*	.53**
2. Letter sound knowledge	1.13	1.69	--	--	.14	.49**
3. Language	19.70	2.29	--	--	--	.20*
4. Working memory	3.40	1.32	--	--	--	--
* $p < .05$; ** $p < .01$.						

Table 20 indicates the means and standard deviations and intercorrelations for independent variable (reading) and the dependent variables (letter knowledge, letter sound knowledge, language and working memory). Table 21 below shows the variables that predicted reading.

Table 21: Simultaneous Multiple Regression Analysis Summary for Pupils Grade, Gender and School Predicting Reading

Variable	<i>B</i>	<i>SEB</i>	β
Predictor variables			
1. Letter knowledge	-.001	.03	-.006
2. Letter sound knowledge	-.101	.08	-.16
3. Language	-.04	.06	-.06
4. Working memory	.51	.12	.61**
R squared = .29; F (4, 55) = 5.68, p .001.			
* p < .05; ** p < .01			

As mentioned earlier, when all the four variables are included, working memory significantly predict reading skills.

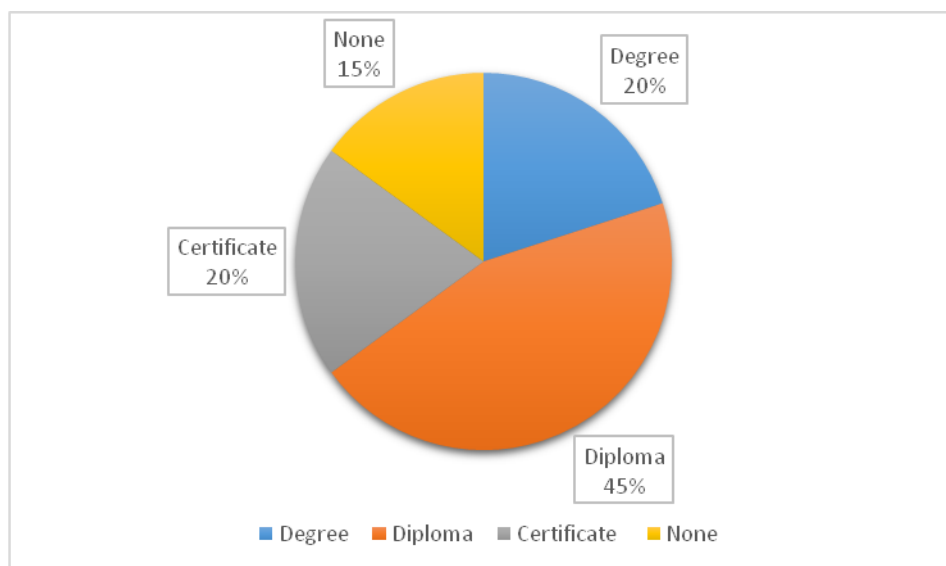
Summary

The findings have revealed that hard of hearing grade one and two pupils' performance in sound blending and readings task is not significantly different. This implies that both grades were at the same level in terms of performance on the analyses.

This section presents findings on research question 3 on types of teaching materials that help pupils with hard of hearing combine letter sounds into meaningful words. This will begin by revealing the types of qualifications the teachers have in special education and how long they have been teaching and then the materials that they use when teaching sound awareness.

There were 40 teachers in the study, details on their qualifications are in the figure below.

Figure 6: Qualification of Teachers in Special Education



Results revealed that 15% teachers had no qualifications in special education, 20% had Certificates in special education, 45% had Diplomas in special education and 20% had Degrees in special education. One of the teachers without qualifications in special education said:

I have no qualification in special education, I am just helping to teach grade one and two hard of hearing impaired pupils with the little knowledge I have in sign language because there are very few teachers trained in special education who teach the hard of hearing pupils at this school.

The results have shown that not all teachers who teach hard of hearing pupils have the qualifications required to teach.

Results further indicates that teachers who had no qualifications in special education had taught from three years to 10 years. Among these, two teachers had taught for 3 years, four taught for 4 years and ten taught for 2 years.

Teachers with certificates had taught from 4 years to 6 years. 4 teachers had taught for 5 years and 6 teachers had taught only 1 year.

Diploma holders taught from less than a year to 3 years. Among them, 1 taught one month, 4 taught 3 years and the other 4 taught only 1 year each.

Twelve teachers with degrees who participated in the study had taught from three months to 5 years as follows; four taught 3 months, another four taught 4 years and finally the other four had taught for five years.

The results have revealed that teachers who had no qualifications in special education had taught more years than those that had qualifications in special education.

4.3 Type of materials used in teaching sound awareness

The study found that visual charts, flash cards and pictures were mostly suited to stimulating awareness of sound in pupils with hard of hearing impairment. Table 21 provides details about how teachers ranked the teaching/learning materials concerning their suitability in helping pupils with hard of hearing impairment develop awareness of sounds.

Table 22: Teaching Materials Used in Teaching Sound Awareness

Teaching material	Frequency
Visual aids/ charts	17
Literacy games	1
Television and video tapes	1
Pictures	6
Computer assisted software	1
Concrete objects	4
Sign language literacy books	1
Flash cards	7
Story books	2
Total	40

Out of the 40 teachers that participated in the study, 17 (42.5%) said they use visual aids/charts to teach sound awareness skills to hard of hearing pupils in grade one and two.

In explaining how teaching was done, one of the teachers with a diploma said:

Letters of the alphabet are put on a chart and taught to the pupils. Thereafter, sounds of the letters on the same chart are taught and pupils are asked to produce their sounds. For teachers of pupils in grade one, teaching letters of the alphabet and phonics is an everyday activity done as an introduction to every lesson. This is done to ensure that pupils are reminded of the letters and their sounds. When they name the letters, I also ask them to produce their sounds. I have come to believe that what they see on the chart helps them to remember their respective sounds.

Another teacher without qualification in special education said:

I make my pupils name the letters of the alphabet every day before I begin a new lesson. When they name the letters, I also ask them to produce their sounds. In addition, I have two other charts where one has vowels and the other has consonants and I ask them to sound the letters on each chart. The charts are very good teaching/learning materials for me and the pupils.

Another teacher with a degree said:

I make letters on a chart and ask pupils to sound them and then blend them. When a correct word is formed, I ask them to name the initial and the ending sound in the word.

Another teacher said:

I make letters on a chart and ask pupils to sound them and then blend them. When a correct word is formed, I ask them to name the initial and the ending sound in the word.

This study has also shown that literacy games are used to teach sound awareness to hard of hearing pupils. Out of the 40 teachers that participated in the study, one teacher mentioned that he has a literacy game that he uses as a demonstration phoneme frame to teach basic phonic spellings. When using this tool, the pupil is asked to click on the sound buttons and is

able to hear each phoneme. Upon hearing the phoneme, the teacher asks the pupil to imitate the sound and also to relate it to the letter of the alphabet that it represents. In addition, the teacher said:

The school has no games of this nature as a result, I use my personal game to teach phonics to hard of hearing pupils.

Watching video tapes was found to be one of the materials that can be used to develop sound awareness in hard of hearing pupils. Out of the 40 teachers that participated in the study, only one mentioned using video tape to teach sound awareness skills to hard of hearing pupils. The teacher said that:

I use a video tape to teach letter sound knowledge and blending skills to the hard of hearing impairment grade two pupils.

The teacher explained that once a week she makes grade one pupils watch a video tape of peers signing and making sounds of letters and blending them to form words. After watching the video, she asks each pupil to sign, produce some sounds he/she has heard and thereafter make a word. The teacher however mentioned that the video tape she uses is from Canada hence the accent on the pronunciation of the letters and words is slightly different from the Zambian language. In some case pupils were even getting confused and in the end learnt very little or nothing at all from the video.

The findings also revealed that teachers use pictures to teach sound awareness skills to hard of hearing pupils. 6 out of the 40 teacher that participated in the study confirmed pictures being useful in teaching sound awareness skills to the hard of hearing pupils. One teacher with a degree in special education said:

I use pictures of letters of the alphabet and show pupils. I teach them what they are and ask them to repeat after me. Thereafter, I teach them the sounds they represent.

The results have shown that use of pictures has proven to be one of the most effective ways of teaching sound awareness to hard of hearing pupils. Majority of the teachers mentioned that they use pictures that have letters of the alphabet alongside a word and animal, fruit or food that begins with the initial sound of the letter presented. For example a teacher without qualifications in special education said:

I make use of pictures when teaching initial sound awareness skills. I have pictures of fruits that I use when teaching. For example picture of banana has initial sound 'b', and mango the initial sound is 'm'. When teaching, I first show the pupils the fruits, followed by the word of the fruit e.g. banana then I ask them to sound the initial sound in the word.

Another teacher with a diploma said:

I find it easy to deliver lessons on sound blending, initial and ending sound awareness, using pictures of animals. For example a picture of a cat is shown, followed by the word cat. I then ask the pupils to give the sounds of c/a/t. Thereafter, pupils are asked to give the initial and ending sound in the word cat.

Computers were also found to be used in teaching sound awareness and reading to pupils with hard of hearing impairment in grades one and two. Only one teacher with a degree in the study mentioned using a computer. She said:

I use a computer to teach letters of the alphabet, sounds, sound blending and spelling. Pupils find it interesting to type letters and forming words using a computer.

In addition, the teacher mentioned that the school only has two computers hence it is difficult to teach all the pupils in class at once but instead, puts them in pairs and makes them take turns when practicing.

Use of concrete objects was also found to be one of the materials used to teach sound awareness to hard of hearing pupils. Out of the 40 teachers that participated in the study, 4 mentioned that they use concrete objects to teach sound awareness skills to hard of hearing

pupils. The teachers explained that they use real objects when teaching sound awareness to hard of hearing pupils. For example one teacher with a diploma said:

I use real fruits and food when teaching initial sounds. For instance, “a” apple, “b” banana, “c” cucumber, “e” egg “n” nshima.

The teacher explained that it is not easy to teach sound awareness skills to hard of hearing pupils hence he has to use real objects to make the lesson interesting so that when pupils come across that particular type of food, they are able to remember what was taught in class. In addition, pupils can also relate the letter sounds they learnt on particular names of food to other type of food they would come across.

A sign language literacy book was one of the materials used to teach sound awareness. The studies revealed that only one teacher in the study use a sign language reading book to teach sound awareness. He mentioned that he has a book that has words and sign language in it that he uses to teach letters, letter sounds and words. He also explained that he uses it to teach syllables and rhymes. He said:

I use oral language and sign language to teach syllables and rhymes using a sign language literacy book.

He explained that using both oral and sign language helps him to communicate and deliver lessons effectively to the hard of hearing pupils who depend on both oral and sign languages to learn because they are able to relate the signs to the spoken words and consequently are able to relate both oral and sign language to syllables and rhymes taught.

The findings have also provided evidence that using story books is an interesting activity in teaching sound awareness to hard of hearing pupils. Out of the 40 teachers that participated in the study, 4 said they use story books to teach sound awareness skills. They mentioned that

story books were used in teaching spoken rhyme detection or rhyme oddity tasks. For example one of the teachers with a certificate said:

I get a particular sentence in the story that has rhyming and non-rhyming words for example “fish, dish, hook” and ask the pupils to mention the word that does not rhyme, in this case “hook”.

The study revealed that use of flash cards is one of the materials used in teaching hard of hearing pupils sound awareness skills. 7 out of the 40 teachers in the study used flash cards when teaching hard of hearing impaired pupils. They said that letters of the alphabet are put on cards and are shown to the pupils in order for them to make sounds and also combine the letter sounds on the cards to form words. A teacher with a diploma said:

I have made cards where I have put the letters of the alphabet that I show to pupils when teaching. I show the letters to the pupils and ask them to make the sounds. Thereafter, I ask each pupil to get some cards, make a word and read it out to the fellow pupils in class.

Another teacher without qualifications in special education said:

I use letter cards to teach letter sounds, two syllable words, three syllable and four syllable words to the hard of hearing pupils.

4.4 New knowledge contributed

The study revealed findings that might provide new insights into the persistent failure in phonemic and phonological tasks observed among Zambian hard of hearing pupils. It is clear from the findings that oral language has a very low prediction in phonemic and phonological development in hard of hearing pupils. It has been clearly revealed that most teachers in Zambian schools that have enrolled hard of hearing pupils do not make use of oral language when teaching pupils. In addition, most of these teachers skip activities that involves sounds

thereby exacerbating hard of hearing pupils' knowledge in the tasks. A detailed discussion of these important findings is presented in the subsequent chapter.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Overview

This chapter discusses the research findings of the study whose major aim was to explore the role of oral language in phonemic and phonological development in grades one and two pupils with hard of hearing impairment. The following study objectives guided the discussion; (1) to investigate the extent to which pupils with hard of hearing in grade one and two knew about sounds of letters, (2) to assess how much pupils with hard of hearing in grade one and two were able to combine letter sounds into meaningful words and (3) to establish type of teaching materials that helped pupils with hard of hearing to combine letter sounds into meaningful words. Three questions were formulated. The first question was, how much do pupils with hard with hard of hearing in grade one and two knew about sounds of letters? Secondly, how much were pupils with hard of hearing in grade one and two able to combine letter sound into meaningful words? and thirdly, what type of teaching materials helped pupils with hard of hearing to combine letter sounds into meaningful words?

Thus, the chapter is organised in four sections. Section one gives the general overview on the relationship between oral language skills to the development of letter sounds and sound blending. Section two discusses the pupils' letter sound knowledge and their ability to combine letter sounds into meaningful words with special emphasis on oral language in relation to working memory. Section three discusses the influence of letter sound knowledge and sound blending on reading. Section four discusses the type of teaching materials that helped pupils with hard of hearing to combine letter sounds into meaningful words.

5.1 Oral language as a predictor of letter sound knowledge and sound blending

The relationship between oral language and letter sound knowledge was examined by testing letter naming and letter sound knowledge and correlating it with receptive and expressive language. It was anticipated that alphabetic skills and language skills would be relatively closely related to each other and that sound blending skills would be related to both. Such a pattern of results would be taken as support for the Phonological Sensitivity Approach (PSA), which suggests that general oral-language abilities, especially vocabulary, provide the critical basis for the emergence of phonological sensitivity, which thereafter is the key language skill. This supports the view by Lonigan (2007) and Dickenson (2006) who indicate that general language abilities and vocabulary, rather than receptive and expressive vocabulary alone have a causal relationship with the development of phonological awareness in pupils.

Bivariate correlation was used to investigate whether there was a relationship between oral language abilities and sound awareness tasks. The correlation analysis revealed that expressive and receptive language proficiency, letter knowledge, letter sound knowledge and blending were all weakly to moderately related with one another. Although the correlations were not high, there was evidence showing existence of this pattern of correlation in hard of hearing pupils thus supporting the Phonological Sensitivity Approach (Dickinson et al., 2003) that emphasised the importance of oral language in acquisition of these skills.

Results revealed a moderate correlation between expressive language and letter knowledge and between letter knowledge and letter sounds. These correlations were in line with previous work that suggested that oral language abilities stimulate phonological skills and act as subsequent contributors to literacy development (Matafwali, 2010; Chikopela, 2013; and Mwanza-Kabaghe, 2015). The findings on letter knowledge support earlier findings by

Matafwali, (2010) that proficiency in oral language has a longitudinal effect on letter knowledge and phonological awareness. One possible explanation for this type of performance on letter knowledge could probably be due to intensive practice in grade one through to grade two regardless of the language used by teachers to deliver lessons in this area. Conversely, the weak relationship between oral language and sound awareness tasks portray lack of instruction in this area. Most teachers seem not to know that pupils with hard of hearing equally can learn sounds just like hearing pupils in that, they also have functional hearing and that it is these sounds that would enable them learn to read.

The results on research done by Burgess & Lonigan (1998) and Wagner (1994) on letter knowledge were in congruent with this study and other studies of young children (Gillon, 2004; Rvachew, Ohberg, Grawberg & Heyding, 2003; Stahl & Murray, 1994) that have found a predictive relation between phonological sensitivity and later letter knowledge and between letter knowledge and both current and subsequent phonological sensitivity.

The findings of this study revealed a high correlation between working memory and letter knowledge implying that pupils had mastered the letters of the alphabet. This could be because the task of mastering letters does not demand use of oral language. This could also mean that even when pupils are taught using sign language, oral language has no bearing on performance on this task. As a result both grades one and two pupils with hard of hearing continued to express this knowledge and had no challenges in this area. In contrast, Chikopela (2013) found that it was much easier for deaf and hard of hearing pupils to name the letters shown to them than reciting the letters from memory.

It is noteworthy that a good performance was portrayed on letter naming task. This could be due to the fact that these pupils learn through picture and word association hence easy to remember the letters shown to them. This finding is similar to that of Annalene and Natale (2010) who suggest that well-developed sign language skills and visual coding strategies that are based on sign language may offer deaf pupils phonological or orthographic link, thus enhancing their written English skills which further help them with their reading skills at school.

The findings could also imply that the first instruction in reading in grade one requires pupils to know all the 26 letters of the alphabet, a trend which also continues in grade two. In this regard, most hard of hearing pupils seem to be doing fine in this area regardless of instruction in oral language because it is easy for teachers to demonstrate the letter symbols to the pupils using sign language and make them sign repeatedly until this skill is learnt. In addition pupils are shown the letters as part of the demonstration. Similarly, Haptonstall-Nyakaza and Schick (2007) in their study show that deaf pupils acquire finger spelled words as lexical items without formal instruction very early in life thus find it easy for them to learn letters in grade one. Corollary, Chikopela (2013) revealed that it was also easy for most pupils with hard of hearing impairment to recite and name the letters of the alphabet. This clearly shows that at grade one level the first instruction given to pupils in reading is that of knowing the letters of the alphabet hence it is much easier to remember and that at this level they have also not learnt a lot of things that they are required to remember. Both grades one and two hard of hearing pupils were able to name the letters that were shown using both oral and sign language.

It was rather strange that there was a very low correlation between letter sound knowledge and sound blending. A plausible explanation to this type of performance could be that hard of hearing pupils were not taught using oral language and that, this could have been even hard for teachers to introduce sound awareness tasks prior to alphabetic lessons that are taught using sign language. The teachers in the study also confirmed that they mostly made use of sign language when delivering literacy lessons to these pupils. These findings therefore seem to suggest that when hard of hearing pupils lack proficiency in oral language instruction, they may experience significant difficulties developing sound awareness as well as sound blending skills which will eventually have a negative impact on their ability to acquire reading skills which are essential in academic advancement.

These findings are inconsistent with Krystal & Melanie (2014) who provides evidence that initial sound segmentation training increased children's performance on the initial sound segmentation assessment measures in the children with hearing loss. In their study, phonological awareness training was associated with an increase in phonological awareness skills for the children with hearing loss. In contrast to the present study, there is no evidence of phonological awareness training in hard of hearing pupils in most schools. These outcomes confirm the hypothesis of Dickinson et al., (2003) that a deficit in oral language might alter the pattern of association between language and alphabetic knowledge and between these skills and phonological skills.

Another finding in contrast with this study is Sue's (2000) that proved beyond reasonable doubt that phonics intervention in hard of hearing pupils help to improve phoneme manipulation, letter-sound knowledge, segmenting, blending, reading and spelling. The results further showed strong, positive effects of the phonographix intervention on the

development of grapheme-phoneme correspondence knowledge, and the acquisition of blending, segmenting and phoneme manipulation skills all of which lead to the development of word decoding and spelling skills. These results provides support for the view that structured and focused teaching of phoneme segmenting, blending and manipulation skills and of grapheme-phoneme correspondence does accelerate development of these skills and acquisition of this knowledge in hearing impaired children which is not the case in this study, even when pupils have functional hearing.

Research on effective teaching strategies for deaf and hard of hearing pupils is even more limited within the Zambian context than internationally. Some teachers who teach pupils with hearing impairment in Zambia are not trained in special education and do not make use of oral language when teaching making it difficult for pupils to understand the lesson (Chikopela, 2013).

5.2 Pupils' knowledge about letter sounds and sound blending

The previous analyses have demonstrated that oral language skills make an important contribution to the development of letter sound knowledge and sound blending. Thus, a corollary of this is that hard of hearing pupils with limited oral language abilities should have more difficulty in letter sound development and sound blending than those with adequate oral language abilities that were given training in this area. This subsection begins by presenting the general levels in letter sound and sound blending as this would provide an insight regarding the overall situation in letter sound knowledge and sound blending in grades one and two.

It was sad to note that pupils with hard of hearing displayed insufficient knowledge in sound awareness tasks as 53.3% of the pupils were not able to identify letter sounds and vice-versa.

In addition 40% of the pupils were not able to identify initial sounds in words and 50% of the pupils did not discriminate ending sounds in words. These results could be interpreted to imply that hard of hearing pupils had limited skills in oral language which acts as a benchmark to acquisition of sound awareness skills. In addition, all pupils with hard of hearing that participated in the study were not able to segment words into syllables and 73.3% of them were unable to blend sounds into words. Similarly, the relative difficulty of phonological awareness tasks has been revealed by several researchers. Schatschneider, Francis, Foorman, Fletcher, & Mehta (1999) found that a group of kindergarten to second-grade children performed better on onset-rhyme blending, phoneme matching and phoneme categorization tasks than they did on phoneme segmentation, phoneme blending (of nonwords), and phoneme deletion tasks. In addition, Stahl and Murray (1994) found that a group of 5 to 7 year-old children obtained higher scores on a phoneme isolation task than on phoneme blending and phoneme deletion tasks, while performing most poorly on a phoneme segmentation task. Overall, results regarding the relations between the levels of phonological awareness have not yielded consistent, definitive results across studies to date. In general, however, tasks that involve explicit manipulation of phonological units seem to be more difficult for hard of hearing pupils in grade one and two to carry out than tasks that involve isolating or classifying (matching) units.

These results could be interpreted to imply that pupils have weak oral language hence are unable to learn sounds when some teachers in the study try to teach them. These findings are also consistent with Chikopela (2013) who found that 100% deaf/hard of hearing pupils in the study were unable to segment, discriminate initial and ending sounds in words and blend sounds into words. It is noteworthy that both expressive and receptive vocabularies did not predict sound awareness in hard of hearing pupils. This pattern of performance among the

hard of hearing pupils in grades one and two clearly shows that there is negligent on the part of the teachers to utilise oral language to spearhead development of sound blending in hard of hearing pupils.

In contrast, Geers, Nicholas & Sedey (2003) found that, use of a cochlear implant had a dramatic impact on the linguistic competence of profoundly hearing-impaired children. More than half of the children in their sample with average learning ability produced and understood English language at a level comparable with that of their hearing age mates. Such mature language outcomes were not typical of children with profound hearing loss who used hearing aids. Use of a visual (i.e., sign) language system did not provide the linguistic advantage that had been anticipated in their study. The outcomes of Geers, Nicholas & Sedey's (2003) study challenges the constant use of sign language, ignoring the use of oral language in lesson delivery to hard of hearing pupils.

The current study has provided important evidence on the consequences of not using both oral and sign language when teaching pupils with hard of hearing impairment. In the study, few pupils that were educated with use of oral and sign language exhibited a significant advantage in their use of narratives, the breadth of their vocabulary, in their use of bound morphemes, in the length of their utterances and in the complexity of the syntax used in their spontaneous language. Taken together, these results indicated that focus on both oral and sign language educational training provided a significant advantage for both spoken and total language skills in hard of hearing children of which, if it was a similar case for all hard of hearing pupils in Zambian schools, all pupils would benefit and be able to develop phonemic and phonological skills.

Conversely, Bowey's (1994) findings revealed evidence of the interrelationships between phonological awareness, letter knowledge, word identification, and several measures of oral language (e.g., receptive vocabulary, sentence imitation). All the measures of oral language and literacy were significantly intercorrelated. When Bowey divided the children into novice readers and three groups of nonreaders who varied in letter knowledge, she found that novice readers scored higher than all groups of nonreaders on phonological sensitivity and vocabulary knowledge. However, when she controlled for differences in vocabulary knowledge, sentence imitation, and digit span effects, none of the differences in phonological sensitivity remained significant. These findings lend support to the point of view that, at least in kindergarten, this set of abilities is interrelated in important ways.

The current research has demonstrated that phonemic processing deficits in pupils with hard of hearing may contribute to poor performance in phonological tasks. At the same time, insensitivity reflected in speech processing may also affect language development in a more general way. For instance, it was established that optimal vocabulary growth is facilitated by the combination of a rich linguistic environment (diversity of input) and intact abilities for continuous phonological restructuring of the representations forming one's vocabulary (Fowler, 1991; Metsälä & Walley, 1998; Hoff & Naigles, 2002). It was also established that hard of hearing pupils in grades one and two have access to sounds in spoken language through use of their residual hearing and are able to hear and understand speech sounds. This auditory accessibility would allow more immediate internalization of the phonological properties of words during training in this area. Because many pupils who are hard of hearing also use spoken language to communicate, the way they are coding and storing the information matches their internal lexicons. In the current study, these abilities have not been promoted because oral language training is not there hence the poor performance in language

related tasks. Similar studies grappled with the thought that phonemic awareness and rhyming abilities developed in separate domains, and that phonemic awareness should be in training programs during emergent literacy experiences at school and at home (Phillips & Torgesen, 2006). In congruent, studies have angled toward the idea that phonological awareness is a single construct with varying levels of linguistic and cognitive complexity, much the same way all other metalinguistic abilities may develop. More specifically, the simple to complex aspects of phonological awareness involve a spiraling progression of sensitivity to words, syllables, rhyme, and phonemes. Furthermore, the timing of this progression could also depend on cognitive growth (Anthony & Lonigan, 2004; Anthony et al., 2002; Lonigan, 2006, , 2007) and therefore should be treated as a developmental skill. For example, Lonigan (2007) has considered a line of thought that recognizes that children with highly developed levels of phonemic awareness have reached this height, not so much do to drilling, but more due to oral language and attentional control. In fact, Lonigan (2007) demonstrated through reanalysis of previous data that effective vocabulary impacted phonological awareness, rather than the other way around. Lonigan (2006) revisited the inside out outside in construct given the new understandings related to phonological awareness and language. He considered the idea that the two domains are not necessarily independent of common experiences, as once thought. They may be tied together through listening comprehension, understanding syntax, and definitional vocabulary. Given the established importance of phonological sensitivity, a number of researchers have explored the early origins of its development. Shankweiler et al. (1999) focused on phonological processing and argued that “deficient skill in mapping between the alphabetic representations of words and their spoken counterparts is the chief barrier to comprehension of text, at least in learners who are still at relatively early stages of reading” (p. 70). This perspective has been widely influential and has shaped research methodology and analytic approaches in

ways that have limited attention paid to the independent contributions of oral language during the early phase of reading development. Given this wealth of research on the importance of oral language on sound awareness, this study suggests that lack of training in this area highly contributed to poor performance of pupils in the study.

5.3 Letter sound knowledge and sound blending skills predicting reading

The Comprehensive Language Approach was employed to investigate the interrelationships among oral language, phonological awareness and reading. It was anticipated that a deficit in oral language might alter the pattern of association between language and alphabetic knowledge and between these skills and reading (Dickinson et al., 2003). Studies have supported a strong relationship between oral language, phonology and development of reading skills in pupils with hard of hearing (Bouton, Bertoncini, Serniclaes & Colé, 2011; Webb & Lederberg, 2014). If a pupil has trouble understanding spoken language, it is highly unlikely that he/she will comprehend written language. Moreover, one of the consistent findings in literature is that oral language abilities in early childhood predict beginning literacy skills such as letter knowledge, name writing and phonological awareness as well as later reading achievement (Bishop & Adams, 1990; Chaney, 1992; Scarborough, 1990). Furthermore, the Comprehensive Language Approach (CLA) contends that although oral language is important for the acquisition of phonemic awareness in grade one, it is even more critical to reading words from grade one onwards. Simply put, the CLA assumes that oral language has a direct impact on learning to read among pupils.

Given the importance of oral language abilities in the prediction of phonological awareness and reading, this study therefore provides an empirically powerful examination of the role of oral language in predicting the development of phonological awareness and reading in

the first grade and how the acquired skills in the first grade determine reading performance in the second grade.

A simultaneous multiple regression, was conducted to investigate the best predictors of reading scores. It was revealed that a combination of variables to predict reading achievement from letter knowledge, letter sound knowledge, oral language and memory was statistically significant. The results also indicated that 26% of the variance in reading skills was explained by the model. In line with previous research, Matafwali, (2010) revealed that oral language skills accounted for variability (25%) in reading outcomes independent of that accounted for by alphabetic knowledge. In congruent, Lonigan et al., (2000), full model revealed a positive significant relationship between oral language and alphabetic knowledge, implying that the effect of alphabetic skills in relation to reading is stronger among those hard of hearing pupils with higher oral language skills. This is also in line with the theoretical position that posits that oral language and alphabetic knowledge both bear a causal relationship to reading achievement (Dickinson et al., 2003; Bishop and Adams, 1990; Wagner, Torgesen & Rashotte, 1994). It is clear from this study therefore that hard of hearing pupils with low oral language skills have difficulties attaining reading skills than those with adequate oral language facility. This also implies that hard of hearing pupils who are familiar with oral language instruction make more progress in reading words even though alphabetic skills enable pupils to decode.

Further multiple regression investigations revealed that the school that the pupils attended predicted their letter sound knowledge when combined with the pupils' grade, gender and age. This implies that some teachers that were interviewed in the study who confirmed use of oral language in lesson delivery belonged to the few schools that had a positive effect on

letter sound development in hard of hearing pupils that eventually enabled them to acquire some skills in reading.

It is important to note that the relationship between phonological awareness and reading actually begins before formal literacy instruction (the explicit teaching of letters, sounds, and sight words). Moreover, a unique contributor to the timing of the onset of metalinguistic awareness has been found to be oral vocabulary development rather than the explicit drilling of the various levels of phonological awareness and letter sounds.

It was established in the analysis that working memory significantly predict reading skills when combined with letter knowledge, letter sound knowledge and oral language. This means that hard of hearing pupils who exhibit poor processing short term memory skills are at potential risk of developing reading difficulties. Similarly, Matafwali (2010) revealed that it is specific intelligence and not general intelligence that consistently predicted reading in the longitudinal study. This supported her assumption that the relationship between cognitive abilities and reading outcomes reflects essential but distinct cognitive demands of reading and digit span (working memory). Corollary, Dickenson (2006) found that language from the environment is a key factor in the development of attention and cognitive functioning and it is this awareness that creates the connection between print and language when children are learning to reading. In line with the findings, results of Koo, Crain, LaSasso, Eden & Ann (2008) supported the claim of (Bavelier et al., 2006) that lexical items processed in the visual-spatial modality are not as well retained as information processed in the auditory channel. Together these findings show that the relationship between working memory, phonological coding, and reading may not be as tightly interwoven in hard of hearing pupils as would have been predicted from work conducted in hearing pupils. In addition, the

findings confirms Dillon et al., (2004) report that children whose early linguistic experience and educational environments emphasized oral communication methods received higher perceptual ratings than children enrolled in total communication programs. Their findings suggest that individual differences in performance on nonword repetition are strongly related to variability observed in the component processes involved in language imitation tasks, including measures of speech perception, speech production, and especially verbal rehearsal speed in phonological working memory. In addition, onset of deafness at a later age and an educational environment emphasizing oral communication may be beneficial to the children's ability to develop the robust phonological processing skills necessary to accurately repeat novel, nonword sound patterns.

5.4 Group differences between groups on letter sound knowledge, blending and reading

It was anticipated in this study that grade two pupils would outperform grade one in all the tasks reason being that they are a year ahead in terms of learning and that they have had more exposure to oral language instruction unlike grade ones. Surprisingly, results revealed that grade one and two were not significantly different on letter sound knowledge, blending and reading tasks. Similar studies have shown that phonological processing skills are related to vocabulary size (Edwards, Beckman, & Munson, 2004; Munson, Edwards, & Beckman, 2005). Other researchers (e.g., Elbro, Borstron, & Petersen, 1998; Fowler, 1991; Studdert-Kennedy, 2002) have proposed that the relationship between vocabulary knowledge and phonological processing skills arises because children's phonological representations become more robust as they are able to make more generalizations about the phonological structure of language due to the increases in their lexicon size that accompany increased exposure to spoken language. The same level of performance by grades one and two could be interpreted to imply that both groups are at the same level in terms of vocabulary knowledge. Majority of

these pupils were experiencing difficulties developing grade level phonemic and phonological skills as a result of weak oral language abilities hence the similar pattern of performance on phonological as well as reading tasks.

Inspection of the two group means indicated that the average letter sound knowledge, sound blending and reading score for grade one and two was low. This finding clearly shows that hard of hearing pupils hardly make progress in this area from grade one to two. This finding is consistent with the CLA which posits that if a child has a serious deficiency in oral language abilities, this deficiency might limit the extent to which oral language support early literacy (Dickinson et al., 2003). This finding is also in support of the assertion that the size of a child's vocabulary may play a role in bolstering the emergence of phonological awareness (Goswami, 2001; Metsala, 1999). The findings of the current study also conforms with Mwanza-Kabaghe (2015) who revealed that oral language was important for performance in literacy skills and that linguistic diversity may explain delays of phonological and reading development of children who attend preschool in the first grade in Lusaka, Zambia. In addition, Catts et al. (1999) found that over 70% of poor readers had a history of language deficits in kindergarten and, further, that most of these had problems in both phonological processing and oral language. Although both phonological processing and oral language (a composite of oral vocabulary, grammatical completion, sentence imitation, and narrative recall) accounted for unique and significant variance in second-grade reading achievement, the contribution of oral-language abilities to reading achievement was as great as or greater than that observed for phonological processing in their study. The findings of this study therefore proves that there is so much reliance on sign language as a language of instruction other than oral language thereby limiting the pupils' performance in tasks that demand use of oral language. In addition, the relative difficulty of phonological awareness

tasks has been investigated by several researchers. Schatschneider, Francis, Foorman, Fletcher, & Mehta (1999) found that a group of kindergarten to second-grade children performed better on onset-rime blending, phoneme matching and phoneme categorization tasks than they did on phoneme segmentation, phoneme blending (of nonwords), and phoneme deletion tasks.

The results also revealed that there was no difference in performance between boys and girls. This means that performance in sound awareness as well as reading tasks was generally very low to the extent that the two groups could not be distinguished in their achievement. Conversely, Elley (1994) found that girls scored significantly higher than boys in reading. The results are however in line with Matafwali (2010) who revealed that there was no significant difference between boys and girls in reading.

5.5 Teaching materials and qualifications of teachers

These results revealed that more teachers with qualifications were teaching pupils with hard of hearing in the study. It was however noted that a few unqualified teachers had taught more years than the qualified teachers. This led the researcher to establish the type of materials used by all teachers in order to teach phonemic and phonological skills to the hard of hearing pupils in grades one and two. The investigation into this matter was instituted in order to establish whether the qualified or unqualified teachers were using the appropriate materials with an appropriate method and also to establish whether the type of qualification had an impact on the type of materials used.

It was imperative to know the reason why teachers without qualification in special education were teaching pupils with hard of hearing. Among the teachers without qualifications that were interviewed, one of them said:

I have no qualification in special education, I am just helping to teach grade one and two hard of hearing impaired pupils with the little knowledge I have in sign language because there are very few teachers trained in special education who are able to use sign language to teach the hard of hearing impaired pupils at this school.

This finding clearly indicates that most schools in the study believed that the most appropriate means of communication when teaching hard of hearing is through sign language. This has led the schools to employ people with sign language knowledge to teach hard of hearing pupils. The results in the present study support the findings by Van Staden et al. (2009) in their South African study where they reported that, teachers at South African schools for the Deaf are not required to have formal training and/or qualifications in Deaf Education. As a result, most hearing teachers at these schools have little or no knowledge of the pedagogical implications of teaching literacy to children who are deaf, whether by means of oral or sign language instructions. This also implies that the use of unqualified teachers in the study could have contributed to the low performance in phonemic and phonological tasks by hard of hearing pupils. Similarly, a survey by DeafSA (2006) highlighted that only 14% of teachers in schools for Deaf learners can sign proficiently. The teachers who are not proficient in South African Sign Language (SASL) consequently use manually coded spoken language or Total Communication as the language of instruction. Corollary, Reagan (2001) revealed that the use of manually coded spoken language or Total Communication is problematic since these modalities of language are not natural languages and are confusing for Deaf learners. This situation therefore calls for teachers to be trained in special education, with specific emphasis on the use of oral language in order to acquire the necessary skills needed to teach phonemic and phonological skills to the hard of hearing pupils in grades one and two, bearing in mind that the early school years experience lay a foundation on literacy outcomes in the following years.

The findings from the current study revealed that teachers use charts when teaching phonemic and phonological tasks. For example a teacher with a certificate in Special Education said:

I make letters on a chart and ask pupils to sound them and then blend them. When a correct word is formed, I ask them to name the initial and the ending sound in the word.

Similar findings were reported by Krystal & Melanie (2014) who indicated that initial sound segmentation training increased children's performance on the initial sound segmentation assessment measurement in children with hearing loss. Results of this study have shown that use of charts, helps to teach phonemic and phonological skills through oral language.

This study has also shown that literacy games were used to teach sound awareness to hard of hearing pupils. One teacher with a diploma mentioned that he has a literacy game that he uses as a demonstration phoneme frame to teach basic phonic spellings. When using this tool, the pupil is asked to click on the sound buttons and is able to hear each phoneme. Upon hearing the phoneme, the teacher asks the pupil to imitate the sound and also to relate it to the letter of the alphabet that it represents. Interestingly, this finding provides evidence that literacy games are teaching and learning tools that can help develop phoneme awareness in pupils with hard of hearing impairment. It is however worth mentioning that these games are not stocked in the Zambian government schools and that the only teacher who mentioned the use of this game uses his personal game to help speed up development of phoneme awareness in pupils in his class. These findings are similar to that by Dillon et al., (2007) who found that non-word repetition scores were strongly correlated with other measures of the component processes required for the immediate reproduction of a novel sound pattern: spoken word recognition, language comprehension, working memory, and speech production.

Watching video tapes was found to be one of the materials that can be used to develop sound awareness in hard of hearing pupils. One teacher with a certificate mentioned that once a week she makes grade one pupils watch a video tape of peers signing and making sounds of letters and blending them to form words. After watching the video, she asks each pupil to sign, produce some sounds he/she has heard and thereafter make a word. The teacher however mentioned that the video tape she uses is from Canada hence the accent on the pronunciation of the letters and words is slightly different from the Zambian language. For this reason, pupils' pace of sound development was slowed down. Videos proved disadvantageous to pupils' progress. In some case pupils were even getting confused and in the end learnt very little or nothing at all from the video. This was attributed to the fact that pupils find it easy and interesting to learn from the language and accent they hear on a daily basis than from a foreign accent.

The findings also revealed that teachers use pictures to teach sound awareness skills to hard of hearing pupils. One teacher without qualification said:

I use pictures of letters of the alphabet and show pupils. I teach them what they are and ask them to repeat after me. Thereafter, I teach them the sounds they represent.

Use of pictures has proven to be one of the most effective ways of teaching sound awareness to hard of hearing pupils. Majority of the teachers mentioned that they use pictures that have letters of the alphabet alongside a word and animal, fruit or food that begins with the initial sound of the letter presented. This means that, use of pictures when teaching sound awareness helps pupils to associate the initial letter of the word that the animal on the picture presents and the sound it represents. It is however worth mentioning that, most of these teachers used more of sign language than oral language when teaching. It is for this reason that pupils had

high scores on reading comprehension that required them to point at the picture that corresponded to what the assessor said. In addition, teachers taught syllable segmentation using the actual word on the picture. Similarly, Annalene (2009) in her study found that deaf children who mostly make use of visual-spatial abilities benefited from visual imagery training techniques. Encoding concrete words, both as images (pictures) and written labels (via fingerspell coding), facilitated retrieval because twice-coded items/words provide more potential retrieval cues than words that exist only in verbal form. This finding also implies that regardless of the qualification most teachers preferred to use sign language in an attempt to teach phonological skills, thereby ignoring the use of oral language in sound development.

Computers were also found to be used in teaching sound awareness and reading to pupils with hard of hearing impairment in grades one and two. One of the teachers said that she uses a computer to teach letters sounds, sound blending and spelling. Similarly, Reitsma's (2009) study reported that finger spelling provided deaf pupils a phonological link to the print that they encounter on a daily basis. In practice, this implies that exposing deaf children to opportunities for fingerspell coding for example by means of computer-based exercises and sequencing worksheets can enable them to analyze finger spelt English words in the same way that hearing pupils apply their knowledge of letter-sound correspondences to decode words in their spoken vocabularies. In Congruent, a recent finding by Nakeva, Lyxell, Sahlén, Dahlström, Lindgren, Ors, Kallioinen & Uhlén (2014) on computer-assisted reading intervention with a phonics approach for deaf and hard of hearing (DHH) children in Sweden using cochlear implants or hearing aids, or a combination of both revealed higher reading scores in the test. This led them to suggest that DHH children's beginning reading may be influenced by visual strategies that might explain the reading delay in the older children.

Use of concrete objects was also found to be one of the materials used to teach sound awareness to hard of hearing pupils. Teachers in the study explained that they use real objects when teaching sound awareness to hard of hearing pupils. For example one teacher with a degree said:

I use real fruits and food when teaching initial sounds. For instance, “a” apple, “b” banana, “c” cucumber, “e” egg “n” nshima.

Use of concrete objects when teaching helps hard of hearing pupils store mental images of objects being studied. Due to this factor, pupils would associate the letters they see to the sound they represent and the food associated to them. This would make them remember the sounds as well as the words. This might in turn speed up the learning process in most hard of hearing pupils in the lower grades. Similarly, Whitehurst & Lonigan, (1998) in their study reveals that the use of haptic exploration improved letter knowledge and because of this, phonemic awareness was easily acquired in young pupils. Words are easily learnt when one is aware of phonemes in those particular letters or words and it all begins by being able to learn letter sounds and associating them to words.

A sign language literacy book was one of the materials used to teach sound awareness. The studies revealed that only one teacher in the study use a sign language reading book to teach sound awareness. He mentioned that he has a book that has words and sign language in it that he uses to teach letters, letter sounds and words. He also explained that he uses it to teach syllables and rhymes. This means that use of total communication through literacy books can help develop sound awareness skills in hard of hearing pupils that can eventually make them efficient readers in the lower grades and these skills can be used as they progress to upper grades. A similar study done by Wagner (1997) shows that pupils in the lower grades who are

better at detecting and manipulating syllables, rhymes, or phonemes are quicker to learn to read than those who are not, and this relation is present even after variability in reading skill owing to factors such as IQ, receptive vocabulary and memory skills. In addition, studies done by Burgess & Lonigan (1998) and Johnston, Anderson & Holligan (1996) reported that children who knew no letters never succeeded in phoneme segmentation or deletion tasks because letter knowledge leads to the acquisition of letter sounds. Hard of hearing pupils might have problems in phonological processing and any language related abilities if teachers do not orient them early in pre school years. This problem might manifest itself in the pupils' inability to form words and consequently read. Combining oral and sign language in the delivery of lessons helps hard of hearing pupils to understand.

The findings have also provided evidence that using story books is an interesting activity in teaching sound awareness to hard of hearing pupils. In addition, story books were used in teaching rhyming skills. A similar study by Crossland (1990) also provided evidence that explicit awareness of a particular sound was gained only when there was connection with a particular letter of the alphabet. This means that once the pupils miss out on the first parts of the letter knowledge skills which require them to know letters and associate them with letter sounds, it makes them have difficulties in rhyming and reading activities.

5.6 Summary

In summary the study has addressed the objectives which were to: investigate the extent to which pupils with hard of hearing in grade one and two knew about sounds of letters, (2) to assess how much pupils with hard of hearing in grade one and two are able to combine letter sounds into meaningful words and (3) to establish type of teaching materials that helped pupils with hard of hearing to combine letter sounds into meaningful words.

As regards to objective one, pupils with hard of hearing in grade one and two had little knowledge about the sound of letters in the alphabet. Objective two sought to assess how much pupils with hard of hearing in grade one and two were able to combine letter sounds into meaningful words. Letter sound awareness tests were conducted using BASAT and the results were that majority of the pupils knew very little about blending sounds of letters.

As regards to objective three which sought to establish type of teaching materials that helped pupils with hard of hearing to combine letter sounds into meaningful words, the study has also shown that visual charts, flash cards and pictures were mostly suited to stimulating awareness of sounds in pupils with hard of hearing impairment though most of the lessons were presented in sign language.

Overall, the results suggest that pupils' oral language abilities were a prediction of their performance in phonemic and phonological tasks. Based on these findings, it is argued that lack of proficiency in oral language was the most causal factor in pupils with hard of hearing's poor performance in phonemic and phonological skills. This is in tandem with the Phonological Sensitivity Approach and Comprehensive Language theory by Dickinson et al., (2003). From this study, it has been established that teachers hardly made use of oral language there by worsening the hard of hearing pupils' ability to acquire phonemic and phonological skills in grades one and two.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6. Overview

This study was conducted in order to establish the role of oral language in phonemic and phonological development in hard of hearing pupils. Literature reviewed confirmed the crucial role oral language has on development of these skills and their influence in reading ability.

The purpose of this study was to investigate how much pupils with hard of hearing in grade one and two knew about sounds of letters and using the known letter sounds, how much they were able to combine the letter sounds into meaningful words. The study also sought to establish the type of teaching materials that helped pupils with hard of hearing to combine letter sounds into meaningful words. Studying the importance of oral language in phonemic and phonological development in hard of hearing impairment pupils is very important because it will improve insight into how teachers should utilize oral language when teaching phonemic and phonological skills to hard of hearing pupils. A summary of the most significant findings is presented below:

6.1 Summary

6.1. 1 Oral language as a predictor of letter sound knowledge and sound blending

This study established that hard of hearing pupils lacked proficiency in oral language instruction as a result were experiencing significant difficulties developing sound awareness and sound blending skills which eventually caused them not to acquire reading skills which are essential in academic advancement. The correlation analysis revealed that expressive and receptive language proficiency, letter knowledge, letter sound knowledge and blending were all weakly to moderately related with one another. It was established that the weak

relationship between oral language and sound awareness tasks was as a result of lack of instruction in this area. Most teachers seem not to know that hard of hearing pupils can equally learn sounds just like hearing pupils in that, they also have functional hearing and that it is these sounds that would enable them to learn to read.

The findings revealed a high correlation between working memory and letter knowledge implying that pupils have mastered the letters of the alphabet because the task does not demand use of oral language. It is clear from this study that even when pupils are taught using sign language, oral language has no bearing on performance on this task. As a result both grades one and two hard of hearing pupils continue to express this knowledge and have no challenges in this area. In addition, good performance was portrayed on letter naming task implying that these pupils learn through picture and word association hence easy to remember the letters shown to them.

6.1.2 General levels of letter sound knowledge and sound blending

It was revealed that hard of hearing pupils displayed insufficient knowledge in sound awareness tasks implying that they had limited skills in oral language which acts as a benchmark to acquisition of sound awareness skills. It was established that both expressive and receptive vocabularies did not predict sound awareness in hard of hearing pupils. This pattern of performance among the hard of hearing pupils in grades one and two clearly shows that there is negligent on the part of the teachers to utilise oral language to spearhead development of sound blending in hard of hearing pupils. The current research has demonstrated that phonemic processing deficits in pupils with hard of hearing contributed to poor performance in phonological tasks.

6.1.3 Letter sound knowledge and sound blending skills predicting reading

It was revealed that a combination of variables to predict reading achievement from letter knowledge, letter sound knowledge, oral language and memory was statistically significant. The results also indicated that 26% of the variance in reading skills was explained by the model. It is clear from this study therefore that hard of hearing pupils with low oral language skills have difficulties attaining reading skills than those with adequate oral language facility. This also implies that hard of hearing pupils who are familiar with oral language instruction make more progress in reading words even though alphabetic skills enable pupils to decode. Further investigations revealed that the school that the pupils attended predicted their letter sound knowledge when combined with the pupils' grade, gender and age. This implied that some teachers that were interviewed in the study who confirmed use of oral language in lesson delivery belonged to the few schools that had a positive effect on letter sound development in hard of hearing pupils that eventually enabled them to acquire some skills in reading.

6.1.4 Group differences between groups on letter sound knowledge, blending and reading

This study showed that grade one and two were not significantly different on letter sound knowledge, blending and reading tasks. The same level of performance in sound awareness tasks and reading implied that both groups were at the same level in terms of vocabulary knowledge. Majority of the pupils were experiencing difficulties developing grade level phonemic and phonological skills as a result of weak oral language abilities hence the similar pattern of performance on phonological as well as reading tasks. This finding clearly shows that hard of hearing pupils hardly make progress in this area from grade one to two. This study therefore proves that there is so much reliance on sign language as a language of

instruction other than oral language thereby limiting the pupils' performance in tasks that demand use of oral language.

6.1.5 Teaching materials and qualifications of teachers

These results revealed that teachers with qualifications and without qualification in special education were teaching hard of hearing pupils in the study. It was however noted that a few unqualified teachers had taught more years than the qualified teachers. The study found that visual charts, flash cards and pictures were mostly suited to stimulating awareness of sounds in pupils with hard of hearing impairment. Most of the teachers mentioned that they used mostly sign language when delivering lessons to the pupils. This could have been the reason pupils did not perform well in phonemic and phonological tasks.

6.2 Conclusion

Based on the findings of the study, it is concluded that oral language played a role in phonemic and phonological development on hard of hearing pupils. However, lack of proficiency in oral language was the most causal factor in pupils with hard of hearing's poor performance in phonemic and phonological skills. Teachers relied so much on sign language as a language of instruction other than oral language thereby limiting the pupils' performance in tasks that demanded use of oral language.

6.3 Recommendations:

In view of the study findings, the following recommendations are made:

1. A number of studies have shown the importance of oral language in phonological development. This study established that lack of proficiency in oral language caused hard of hearing pupils' poor performance in phonemic and phonological skills which are important in development of reading skills. A majority of the pupils did not know

letter sounds and were also unable to blend sounds into meaningful words. The researcher strongly recommends that teachers of the hard of hearing pupils should utilize oral language when teaching phonemic and phonological skills to hard of hearing pupils.

2. Use of cochlear implants and hearing aids in hard of hearing pupils have been found to be helpful in sound detection in deaf/hard of hearing pupils. Previous studies by Crosson, Geers & Hear (2001) suggest that Deaf children who receive a cochlear implant under 5 year of age and obtain above average speech perception benefit from the device construct narratives that are similar in structure and cohesion to those of their hearing age mates by age 8 to 9. This study therefore recommends that pupils with hard of hearing impairment are identified early by the teachers, possibly at entry into preschool or grade one so that they are provided with either device to help them speed up the acquisition of oral language skills.
3. Further, training institutions should train teachers for the hard of hearing in sound awareness to ensure quality delivery of lessons in this area. It was noticed in this study that most teachers for the hard of hearing were eluding teaching sound awareness tasks to hard of hearing pupils because they did not know how to deliver lessons in this area. A few teachers who were able to teach sound awareness tasks were also doing so with a combination of both oral and sign language but confirmed using more of sign language than oral language in lesson deliveries. Some research studies and reviews have suggested that the multifaceted and developmental nature metalinguistic awareness involves both expressive and receptive oral language and cognitive complexities (Chaney, 1994; Roth, Speece, Cooper, & De La Paz, 1996) and that this is also true for phonological awareness in particular (Anthony et al.,

2002). It is therefore important that teachers make more use of oral language when delivering lessons of this nature.

4. This study documented a number of teaching materials used by teachers. It was established that most schools do not have adequate teaching aids that suit hard of hearing pupils. For example teachers are supposed to use both oral and sign language when teaching hard of hearing pupils, meaning that even the materials they use should have both text and sign language. This was however not the case in this study. Majority of the teachers were using materials for the hearing pupils to deliver lessons to hard of hearing pupils. All the teachers that were using these materials confirmed having challenges in terms of lacking knowledge on what signs to attach on some words when teaching using both oral and sign language. The researcher strongly recommends that Ministry of General Education (MOGE) provides appropriate adequate teaching aids such as visual charts, flash cards and pictures in schools in order to help teachers deliver lessons effectively to the hard of hearing pupils.
5. A wealth of studies have shown that improving teachers' phonemic awareness skills may cause student literacy outcomes to improve. The performance of the pupils in phonemic and phonological tasks made the researcher to doubt if there was any research-based literacy intervention programme through Continuous Profession Development (CPD). The researcher therefore recommends that schools should conduct CPD programmes for teachers to learn how to teach phonemic and phonological skills to the hard of hearing pupils. Such a fora would also allow teachers to share experiences on the challenges if any, that are faced when teaching hard of hearing pupils using oral language and sign language.

6.4 Innovations of the study

- This is the first study in Zambia to investigate the role of oral language in phonemic and phonological development among hard of hearing pupils in grade one and two. The findings of the study have shown that teaching in oral language helps in the development of phonemic and phonological skills among grade one and two hard of hearing pupils.
- This study has added to literature on literacy development among hard of hearing pupils through the teaching materials and methods that have been identified.
- The study also makes visible the influence of oral language on phonemic development in hard of hearing pupils. Effects of phoneme awareness on phonology in hard of hearing pupils have also been seen. Phoneme awareness skills help pupils to develop phonological skills.
- The study has also shown that phonological skills are key to reading development among hard of hearing pupils.

6.5 Implications of the study to policy and practice

The Zambian government policy on education of the deaf is stated clearly through the 1996 policy document “Educating our Future” which upholds the principle that every individual has an equal right to education opportunity. This implies that every child regardless of disability has a right to access and participate in the education system at all levels of education with appropriate interventions applied. The poor performance in sound awareness tasks clearly shows that no proper interventions in line with phonological development are being used and followed to help hard of hearing pupils acquire reading skills at an early stage. In addition, policy makers have not evaluated the teaching materials and methods used when teaching hard of hearing pupils and the outcomes of using such materials and methods at grade one and two levels. The language policy in terms of lesson delivery to the hard of

hearing is also not clear as a result teachers have continued to cling to sign language when teaching letters and words to hard of hearing pupils thereby worsening their performance in phonological awareness. If no interventions are put in place, literacy levels will remain low and this would lead to high levels of dropouts at grade 7 level.

As regards to practice, teachers in the classroom use more of sign language than oral language when teaching phonological skills to the hard of hearing pupils. The teachers have also not been guided on what materials to use and how to use them when teaching phonemic and phonological skills to hard of hearing pupils making them abandon some lessons of this nature. In addition, there are inadequate teaching materials in the schools for teachers to use when teaching phonemic and phonological skills. To address this challenge, schools should stock teaching materials to use in phonemic and phonological lessons.

6.6 Implications for future research

Additional research is needed in several areas.

- Future research should explore the effectiveness of phonemic and phonological awareness training for all children with hearing loss.
- Further, research is also warranted to explore the effects of phonological awareness training on literacy outcomes for children with hearing loss.
- More studies focusing on early literacy skills in hard of hearing pupils are needed as early literacy abilities lay a foundation for success in academic field.

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APPENDICES

Appendix A:

SCORE SHEET FOR ONE WORD PICTURE VOCABULARY TEST

INSTRUCTIONS

Assessor:

Indicate **1** for the correct response and **0** for a wrong response in the score column in the table below.

If a child gives a wrong response write the word of the response in the response column in the table below.

Child:

I want you to look at the pictures I will show you.

Look carefully at the pictures on the paper.

When I point at the picture, I want you to sign the word of the picture.

Scoring sheet

ITEM	WORD	RESPONSE	SCORE
1	Plate		
2	Dog		
3	Cup		
4	Cow		
5	Goat		
6	Cat		
7	Road		
8	Path		
9	Tunnel		
10	Railway		
11	Greeting		

12	Picking/plucking		
13	Banana		
14	Car		
15	Soaks		
16	Skirt		
17	Bus		
18	Bicycle		
19	Shoes		
20	Train		
21	Fish		
22	Laughing/Happy		
23	Crawling		
24	Money/coins		
25	Running		
TOTAL			

Appendix B:

PEABODY PICTURE VOCABULARY TEST

Practice:

I want you to look at some pictures with me. [Turn to practice item A]

See all the pictures on this page? [Pointing to each of the four pictures]

I will say a word, then I want you to put your finger on the picture of the word I have said.

Let's try. Put your finger on _____.

If the subject is correct:

That's fine. [Turn to practice item B]

Now put your finger on _____.

If the subject again makes the correct response, turn to practice item C, saying:

Good! Show me _____.

If the subject chooses the wrong illustration at any point, before going on to the next item, point out the correct response while saying:

You made a good try, but this is the correct answer.

Test:

Fine. Now I am going to show you some other pictures. Each time I say a word, you find the best picture of. When we get further along, you may not be sure you know the meaning of the word, but I want you to look carefully at all pictures anyway, and choose the one you think is right. [begin test items below]

SET 1

ITEM	WORD	KEY	RESPONSE
PPV1	Broken/ Cophwanyika	2	
PPV2	Yawning/ Kuchitamwau	2	
PPV3	Tortoise/Fulu	1	
PPV4	Dressing/ Kubvala	1	
PPV5	Picking/ Kutenga	4	
PPV6	Pair/ Vibili	3	
PPV7	Pulling/ Kuguguza/Kudonsa	1	
PPV8	Pouring/ Kukhutula	4	
PPV9	Empty/ Mulibe	4	
PPV10	Liquid/ Zamadzi	4	
PPV11	Washing/ Kusamba	4	
PPV12	Terrified/ Kuopakwambiri	1	
PPV13	Sharing/ Kugawana	2	
PPV14	Bucket/ Mugomo	1	
PPV15	Tugging/ Kuguza	2	
TOTAL			

SET 2

ITEM	WORD	KEY	RESPONSE
PPV16	Full/ Kudzala	2	
PPV17	Caterpillar/ Matondo/cinkhuwala	3	
PPV18	Arguing/ Kutsutsana	1	
PPV19	Branch/ Nthambi	2	
PPV20	Chain/ Cheni	2	
PPV21	Goat/ Mbuzi	4	
PPV22	Fighting// Kumenyana	1	
PPV23	Root/Mizu	2	
PPV24	Coming/ Kubwera	3	
PPV25	Hoeing/ Kulima	2	
PPV26	Printing/ Kulembacimodzi-cimodzi	4	
PPV27	Time/ Nthawi	3	
PPV28	Reading/ Kuwelenga	4	
PPV29	Leaking/ Kukha	3	
PPV30	Injection/ Nsingano	4	
TOTAL			

Appendix C:

INTERVIEW GUIDE FOR TEACHERS

RESEARCH TOPIC; THE ROLE OF ORAL LANGUAGE IN PHONEMIC AND PHONOLOGICAL DEVELOPMENT OF HARD OF HEARING PUPILS IN SELECTED PRIMARY SCHOOLS IN ZAMBIA

1. What is your qualification in sign language?
.....
2. How long have you been teaching grade one and two hard of hearing pupils?
.....
3. How do you teach these pupils?
.....
4. Do you think oral language plays a role in phonemic and phonological development in hard of hearing pupils? Explain.
.....
5. Do you have learning materials that stimulates phonemes and phonology in hard of hearing pupils?
.....
6. What type of learning materials do you use in order to help stimulate phonemic and phonological development in hard of hearing pupils? Give examples.
7. Suggest other learning materials that can be used.....
8. How do you help hard of hearing pupils develop phonemic and phonological skills?
.....
9. What other teaching methods can be used to help hard of hearing pupils develop phonemic and phonological skills?
.....
10. What challenges do you face when teaching literacy to hard of hearing pupils?
.....

Thank you for participating in the study.

Appendix D:**BASIC SKILLS ASSESSMENT TOOL (BASAT)**

Reading and Writing Skills – Grades 1 and 2

Name: _____

School: _____

Grade: _____

Teacher: _____

Examiner: _____

	Year	Month	Day
Date			
Date of birth			
Age			

Province: _____ District: _____

Sex: ☐ Female☐ Male

Time begun _____ Time ended _____

3. Summary of the BASAT (Fill in this table after completing the assessment)

Area	Score and Skill Level
A. Letter knowledge	
B. Letter-sound knowledge	
C. Phonological tasks: 1. Syllable segmentation	
2. Initial Sound Identification	
3. End Sound Identification	
4. Sound blending	
D. Reading	
E. Writing	
F. Reading comprehension	
G. Digit Span	

A. Letter knowledge

Indicate and count the letters the child knows and estimate the average number of letters the child knows which means that the child can write, name and identify them.

Indicate the letters the child knows here

Average
Number of
Letters
Known

1. Writes letters.		<input type="text"/>
2. Names letters.		
3. Identifies letters.		

B. Letter-sound knowledge Indicate and count the letter-sound relations the child knows and estimate the average number of letter-sound relations the child knows which means that the child can relate the letters to the sound and the sound to the letter Indicate Letter-sound relations here		Average Number of Letter-Sound-Relations Known
1. Relates letters to letter sounds.		<input type="text"/>
2. Relates letter sounds to letters.		

C. Phonological tasks:

For each item in section C, mark "1" if the child answers the item correctly otherwise mark "0". Calculate the total score for each section!

C1. Segments words into syllables: (e.g. un-der, re-mem-ber):

Score

a. Teacher (teach-er)	c. September (sep-tem-ber)	
b. Answer (an-swer)	d. Everyone (eve-ry-one)	

TOTAL SCORE: SYLLABLE SEGMENTATION (max.4)

C2. Discriminates initial sounds in Words:

Score

a. a pple	
b. i mpala	
c. e ggs	
d. u se	
e. o range	
f. s un	
g. b ox	
h. m oney	
i. p ipe	
j. c at	
TOTAL SCORE: INITIAL SOUND DISCRIMINATION (max.10)	<input type="text"/>

C3. Discriminates ending sounds in words:

Score

a. dog	
b. pen	
c. tom	
d. hat	
e. cup	
f. bus	
g. work	
h. red	
i. much	
j. life	
TOTAL SCORE: END SOUND DISCRIMINATION (max.10)	<input type="text"/>

C4. Blends sounds into words:

Score

a. p /o/ t (pot)	d. s /i/ t (sit)	
b. d /i/ g (dig)	e. m /u/ d (mud)	
c. r /a/ t (rat)		

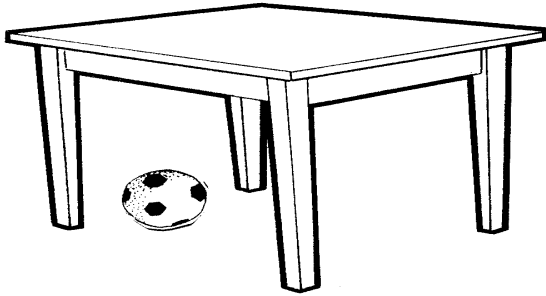
TOTAL SCORE: SOUND BLENDING (max.5)

D. Reading: For each item mark "2" if the child reads the item perfectly and "1" if the child commits only one minor error, otherwise mark "0". Calculate the total score for the whole reading section!			
	Score		Score
1. Recognises own name.			
2. Combines two letters/sounds/both into a syllable or word:		3. Reads 1-syllable words:	
a. an		a. sit	
b. so		b. run	
c. at		c. old	
d. be		d. spoon	
4. Reads 2-syllable words:		5. Reads 3-syllable words:	
a. water		a. elephant	
b. pencil		b. holiday	
c. yellow		c. happiness	
d. football		d. yesterday	
6. Reads sentences:			
a. Musa and Maria are going to school.			
b. Musa is wearing a blue shirt.			
TOTAL SCORE READING SECTION (max.38)			<input type="text"/>

E. Digit Span (Working memory): For each item (a and b) Mark "1" if the child remembers the digit sequence correctly otherwise mark "0". Calculate the total score !		Score
1. Remembers two numbers in sequence:	a. 4-3	
	b. 1-5	
1. Remembers three numbers in sequence:	a. 5-6-4	
:	b. 3-1-5	
3. Remembers four numbers in sequence:	a. 4-1-6-2	
	b. 3-6-5-1	
4. Remembers five numbers in sequence:	a. 5-6-3-1-4	
	b. 2-1-4-6-3	
5. Remembers six numbers in sequence:	a. 7-3-5-1-6-2	
	b. 1-5-2-7-4-3	
6. Remembers seven numbers in sequence:	a. 5-8-3-6-1-7-2	
	b. 3-5-2-8-7-1-6	
TOTAL SCORE DIGIT SPAN (max.12)		<input type="text"/>

F. Reading Comprehension:

Tick the child's response for each item and calculate the number of items correctly understood !



- a. The ball is on the table.
- b. The ball is under the table.
- c. The ball is under the car.



- a. He is standing.
- b. He is walking.
- c. He is sleeping.



- a. She is drawing a chair.
- b. She is drawing a bed.
- c. She is making a drum.



- a. The sun is not shining.
- b. The sun is shining.
- c. The moon is shining.

Number of Reading Comprehension items understood correctly (max.4)



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P O Box 32379
Lusaka, Zambia

19th April, 2016

Ms. Rose Chikopela
C/o The University of Zambia
Department of Educational Psychology,
Sociology and Special Education
P.O Box 32379
LUSAKA

Dear Ms. Chikopela,

RE: EXEMPTION FROM FULL ETHICAL CLEARANCE

With reference to your research proposal entitled: **"The role of oral language in phonological development on pupils with hearing impairment in selected primary schools in Zambia."**

As your research project does not contain any ethical concerns, you are hereby given an exemption from full clearance to proceed with your research.

ACTION:	APPROVED
DECISION:	19th April, 2016
EXPIRATION DATE:	18th April, 2017

However, it is recommended that all data to be collected should be kept confidential and that if there are plans for publication or dissemination of results, the names of the participants should not be linked with the research in order to ensure confidentiality.

Please note that you are expected to submit to the Secretariat a Progress Report and a copy of the full report on completion of the project.

Finally, and more importantly, take note that notwithstanding ethical clearance given by the HSSREC, you must also obtain authority from the Permanent Secretary of the appropriate Ministry before conducting your research.

Yours sincerely,

Prof. C. M. Namafe
ACTING CHAIRPERSON - HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies