IMPACTS OF PHONOLOGICAL DISORDERS ON ENGLISH LANGUAGE LEARNING OF LEARNERS WITH DOWN SYNDROME IN NYERI COUNTY, KENYA

BY

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DECLARATION

This thesis is my original work and has not been presented for any degree award in any other University.

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We confirm the work reported in this thesis was carried out by candidate under our supervision as the university supervisor.

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DEDICATION

To the Almighty God for the strength and capability in accomplishing this work.

To my husband, Ndegwa and children Wanjiru and Kinyua, for their unwavering support, patience and encouragement while I worked on this research.

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TABLE OF CONTENT

ABBREVIATIONS AND ACRONYMS

AAC	Augmentative and Alternative Communication devices
DS	Down Syndrome
DSSK	Down Syndrome Society of Kenya
EA	Error Analysis
ID	Intellectual Disabilities
IEP	Individualized Educational Program
IQ	Intelligent Quotient
PA	Phonological Awareness
SNE	Special Needs Education

ABSTRACT

The purpose of this study was to analyse the impacts of phonological disorders on English language learning of learners with DS. The main objectives of the study were: to identify the types of phonological disorders in language learning of learners with DS; to analyse the patterns of phonological errors made by learners with DS, to establish how the presence of phonological errors affect English language learning of learners with DS and; to establish possible ways of correcting phonological disorders in language learning of learners with DS. These objectives were achieved by observing, analyzing and interpreting the sounds and words children with DS produced. The study was prompted by the delays in speech and language development in learners with DS and therefore the need to study the nature of their language specifically phonological awareness, speech and the possible intervention techniques that can be used to address the situation. The study was based on the theory of Natural Phonology by David Stampe (1989). A descriptive case study was conducted on children with DS and their speech observed and recorded through participant observation. The teachers were also given questionnaires on their take and experience when teaching language to these learners. A qualitative research design was used to analyse the data. The school under study was Blessed Joseph Allamano Special School located in Tetu Sub-county, Nyeri County. The study targeted pupils with DS in the school. The participants were all the fifteen pupils and the two language teachers. The research instruments used were:-test tools, observation checklists, questionnaires and document analysis. The analysis was qualitative in nature where errors were identified, analysed and their impact on language learning established. Analysis was also done on the respondents' suggestions and opinions. Furthermore, document analysis was done to gain an insight on the background of the learners and records of their performance in language. Data collected was presented in form of simple descriptive statistics and tables, it was then analysed and discussed. The following findings emerged: the DS condition hinders phonological awareness leading to emergence of phonological errors. This in turn hinders language learning which can be improved through a variety of complementary intervention techniques to help correct the situation. Conclusion was drawn, guided by the findings, that learners with DS experience phonological challenges when learning language. They therefore need special attention in language learning to help them curb the challenges of phonological errors and increase their chances of language mastery. Consequently, the following major recommendations were made: teachers who teach English language to learners with DS should be well trained on the best way to teach them, early intervention should be done to train the learners at an early age, there is need for parental involvement and also the Ministry of Education should re-examine the 8.4.4 syllabus putting into consideration the needs of learners with DS.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background to the problem, statement of the problem, purpose of the study, specific objectives of the study, the research questions, the significance of the study, limitations and delimitations, assumptions, theoretical and conceptual frameworks, and definitions of key terms.

1.1 Background of the Study

Phonological disorder is often divided into three categories, based on the cause of the disorder (American Psychiatric Association; July, 2000). One cause is structural problems, or abnormalities in the areas necessary for speech sound production, such as the tongue or the roof of the mouth which make it difficult for children to produce certain sounds.

Normally, phonological errors, normally termed as 'phonological disorder' affect learner's ability to acquire easily understood language when they are about four years old. In some of them, phonological disorder affects the leaning ability of reading and spelling. This is usually the case if they are weak in speech intelligibility when they start learning

language about five or six years of age and while still having difficulties with semantics and syntax (Most and Guiberson, 2005). In essence, the child with a phonological disorder has a language difficulty affecting their ability to learn and organise their speech sounds into a system of 'sound patterns' or 'sound contrasts' (Buckley and Bird, 2001)

Language learning is a common problem in children with Down syndrome (DS). This is more so because their speech is limited and they tend to make certain phonological errors which then affect language learning. A variety of language difficulties are present among children with DS. Roberts, Prince and Malkin (2007) explain that several milestones of language development observed in children with DS start with observation of deficits in phonology. These deficits form a basis of other errors in other levels of language learning of these learners. Issues relating to speech and language development in children with DS have been studied in the developed countries and measures identified to assist DS children socialize and also achieve academically. This is shown in the work of Buckley and Bird (2001) who after realizing the language challenges of learners with DS came up with the principles of effective interventions which includes: targets for all the four components of speech and language skills (communication, vocabulary, grammar and speech), targets for comprehension and production, parental therapy among others.

About one in every 800 children in Kenya are born with DS. Hence, approximately, 40,000 Kenyans are living with this condition (Down Syndrome Society of Kenya, 2009). Unfortunately, many of these children are not taken to school because they are seen as not fitting in the school system especially with the speech and language problems.

They help the learners with DS to receive speech therapy, as well as physiotherapy early enough, which makes their capabilities develop faster and improving their quality of life. DSSK is also planning to set up the first school for children with DS, because most schools do not take care of their needs to enhance the children's prospects.

It is unfortunate that developing countries, which Kenya is part of, are still dealing with issues of typically developing children therefore ignoring special needs education (SNE), where DS is inclusive. There is little research from Africa addressing language issues of learners with DS. However, in South Africa research has been done on the performance of learners with DS. Gill (1998) outlines that language problems in learners with DS are due to difficulties in hearing, auditory discrimination and working memory. He recommends mainly the method of teaching reading to teach talking.

As a result of the many challenges facing children with DS, the focus of this study, Special Needs Education (SNE), a system for the delivery of services to children with different disabilities have been developed. The right to inclusive education and Education for All (EFA) was initially

stated in Salamanca Statement and Framework for Action (2000) in 1994. It stated that the schools need to change to adapt to the numerous needs of all learners with special needs. The UN Convention on the Rights of Persons with Disabilities (1994) established the inclusive education as a legal right (Ngigi and Macharia, 2006). This kind of education programme is customized to address each individual child's unique needs. Accommodations and modifications to the regular SNE programme includes changes in the regular curriculum, supplementary aides or equipment and the provision of specialized physical adaptations or changes that enable children to fully participate in the environment to the fullest possible (McBrayer& Lian, 2002).

In Kenya, a research by the Down Syndrome Society of Kenya (2010) indicates that learners with DS suffer from illiteracy, poor education system, lack of speech therapy programs and affordable and available specialists. According to Bricker and Schiefelbush (1984), children with special needs, for instance those with DS, require teachers who are sensitive and responsive to student-initiated communication(s) as they occur in daily interactions. Such spontaneous and natural interactions will affect the academic, social and communicative skills of the student and can easily be incorporated within an instructional framework.

This study sought to describe the impacts of phonological disorders on the English language learning of learners with DS with an aim of coming

up with possible ways of eradicating or minimizing the impacts hence improving language learning.

1.2 Statement of the Problem

The implementation of Free Primary Education (FPE) in Kenya led to an introduction of new categories of Special Needs Children which includes autistic children, those with DS, cerebral palsy, loco-motor impairment, maladjusted children, multiple handicapped children and gifted and talented learners in public schools. These increased demands from parents and teachers overstretched the ministry's resources lowering the quality of education. There is therefore need for various researchers on these categories, DS included to come up with better ways of improving their learning.

In Kenya, teachers dealing with learners with DS are not well trained on phonological disorders with some of them even not aware of their existence. This therefore calls for research on phonological disorders and intervention strategies for the learners with DS to help them learn language with minimal difficulties.

1.3 Purpose of the Study

The purpose of this study was to analyse the impacts of phonological disorders on English language learning of learners with DS.

1.4 Objectives of the Study

The study set out to achieve the following objectives;

1. To identify the types of phonological disorders in English language learning of learners with DS.
2. To analyse the patterns of phonological errors made by learners with DS.
3. To establish how the presence of phonological disorders affect English language learning in learners with DS
4. To establish possible ways of correcting phonological disorders in language learning of learners with DS.

1.5 Research Questions

The study attempted to answer the following research questions;

1. What phonological disorders do learners with DS exhibit when learning English language?
2. What are the patterns of phonological disorders made by learners with DS?
3. How does the presence of phonological disorders affect language learning of learners with DS?
4. What possible measures can be used to correct the phonological disorders in language learning of learners with DS?

1.6 Significance of the Study

Children with DS are expected to show cognitive delay, which may be in part the consequence of the language learning difficulties. Any serious language delay will inevitably result in increasing cognitive delay as language is such a powerful tool for gaining knowledge and for understanding, thinking, reasoning and remembering. Conversely, the more we can do to overcome the children's language learning and speech difficulties, then the better equipped they will be to learn and improve their cognitive abilities. It is the researcher's belief that if interventions based on our current knowledge were implemented throughout childhood many young people with DS would have much better speech, language and cognitive skills and consequently enjoy a much improved quality of life.

It is the researcher’s hope that the findings of this study will yield information for use by teachers in charge of children with DS, so that they too can learn language with ease. Linguists and speech therapists too may use the findings of this study to enhance the language development of these learners. Parents will also be able to intervene for their children by understanding their language problems and employing the proposed measures to enhance their children’s language.

The findings of this study should provide useful insight to policy makers, curriculum developers and educationists to develop appropriate policy, curriculum, and teacher training programmes and establish relevant learning facilities that will promote language development among children with DS in Kenya. It is also hoped that this study will serve as a basis for further research in this area, since there is a lot that needs to be done to improve language of learners with DS.

1.7 Assumptions of the Study

The study was based on the following assumptions;

1. The learners with DS in the area under study show certain phonological disorders in their language learning.
2. The phonological disorders shown by the learners with DS influence language learning.
3. The disorders can be minimized or corrected through certain measures.
4. The school administration, teachers and learners in the area of study will cooperate during the study.

1.8 Scope and Limitations of the Study

This study falls within the broad area of language development. Language has many variations and change may be phonological, morphological, syntactic, lexical, and semantic among others. Cheshire

(1991) notes that variation in a language is an extremely complex phenomenon and it would be quite unrealistic to attempt to analyse all its aspects. In this connection, the present study limits itself to analysis of phonological disorders.

The research was based on English language although the learners use other languages like Swahili and Kikuyu. However, this study limits itself to English language since it is the official language of instruction in the classroom. The rest were left out in order to narrow the scope.

This study dealt with phonological errors in English language learning of learners with DS. Although there are various categories of children with special needs in Kenya, the study limited itself to learners with DS. The group was preferred because as stated by Brown and colleagues (2003), the nature of their oral cavity may hinder phonological awareness. This and other reasons helped narrow the scope to learners with DS.

Although there are many schools in Kenya catering for children with DS, the study limited itself to Blessed Joseph Allamano Special School, purposively sampled due to the ample population of learners with DS. Besides, most of the children with DS in the school have mild to moderate conditions, a fact that makes them suitable for this study.

1.9 Theoretical and Conceptual Framework

1.9.1 Theoretical Framework

This study was based on the theory of Natural Phonology by David Stampe (1989) which suggests that as children desire to communicate, they tend to simplify what they want to say to make it possible and easy for them to articulate it. This theory assumes that young children's "underlying representations" are just like an adult's in that they gradually reduce the rate of simplification as their abilities improve,. Eventually their speech comes to sound like that of an adult. Simplifications here mean “natural processes” believed to be innate, universal, mental operations, sometimes just called phonological processes. The term phonological development is used when learners learn to suppress (stop using) the natural processes.

The theory of Natural Phonology also explains the presence of phonological disorders. This is the delay or inability to suppress the natural processes. The suppression is meant to occur naturally as the natural phonology is learnt. This means that if the suppression do not occur, then an intervention measure has to be put into place to help the child suppress it. This is the case of learners with DS because the suppression may not occur naturally and therefore require intervention measures to suppress it.

1.9.2 Conceptual Framework

The preceding discussion on theoretical framework guided the researcher to give different views on its application on phonological awareness and language learning of children with DS. Generally, these children develop a certain underlying representations of phonology. This is what is being referred to as natural phonology. However, children with DS encounter problems because the suppression of these simplifications may not occur naturally. This leads to emergence of phonological errors which then affect language learning. They require early and consistent intervention to minimize the errors, acquire phonological awareness and therefore promote language learning. The conceptual framework is represented in figure 1 below.

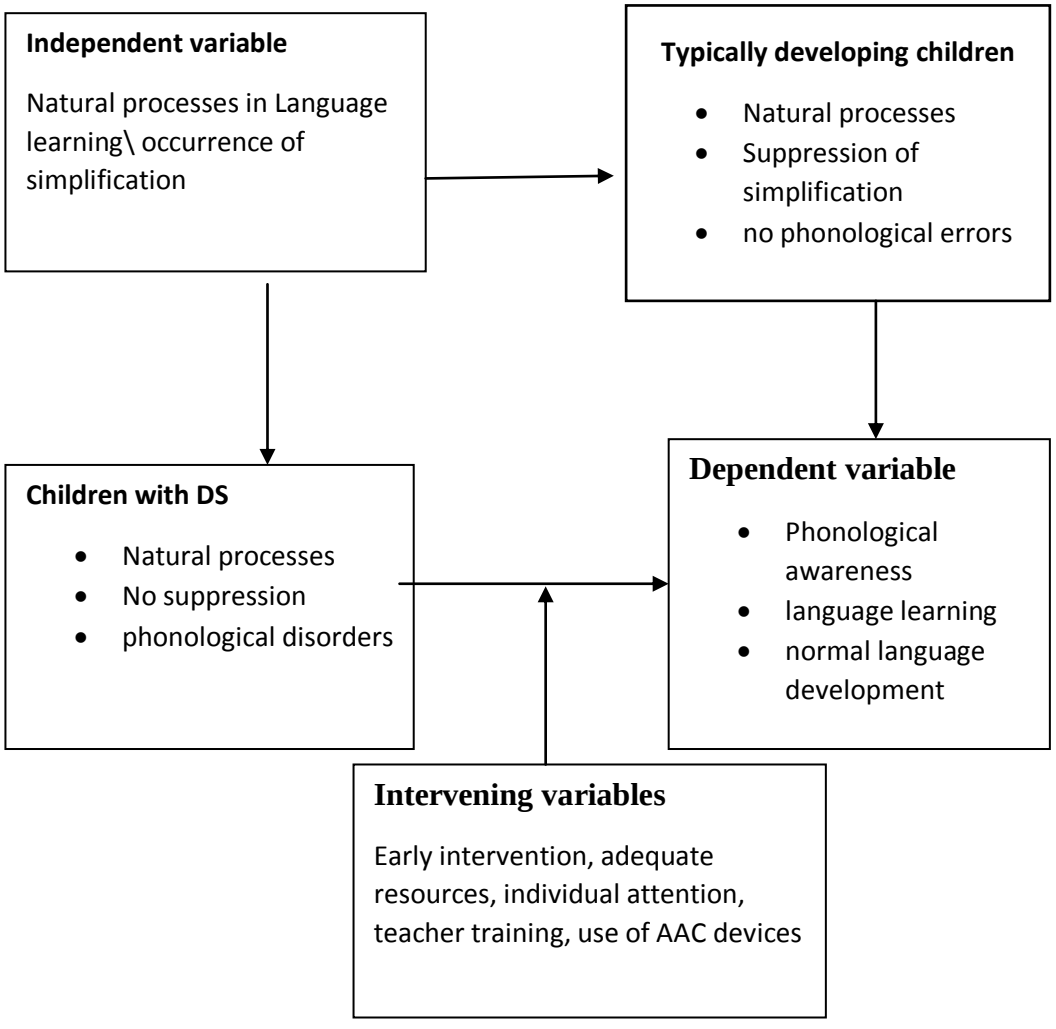


Figure 1: Conceptual Framework

The conceptual framework above elaborates how the variables of the study relate: the independent variable is phonological disorders which develop as a result of natural phonological processes in language learning such as simplification not being suppressed at the appropriate age. Failure to outgrow the natural processes in language learning will certainly have an effect on the dependent variable, normal language development (language learning). For language learning to occur therefore, the intervening variables come in to help minimize the impacts of

phonological disorders (independent variable) on language learning (dependent variable). The intervening variables include; the right intervention, adequate resources, adequate teacher training, use of AAC devices, individual attention and most importantly, early intervention.

1.10 Operational Definition of Key Terms

Down Syndrome: a congenital disorder arising from a chromosome defect involving chromosome 21, usually an extra copy (trisomy-21), causing intellectual impairment and physical abnormalities. It is a life-long condition that causes delays in learning and development (Chapman, Hesketh and Kistler, 2002)

Language Learning: is the process by which the language capability develops in a human especially the ability to communicate.

Individualized Educational Program: An Individualized Education Program (IEP) is a written document of the educational program aimed at meeting a child's individual needs which forms the cornerstone of a quality education for each child with a special need (DSSK, 2009).

AAC Devices: Augmentative and Alternative Communication (AAC) is the term used to explain different forms of communication that are used to add on speech and are used to ease problems with ordinary speech.

Early Intervention: a system of services provided at an early stage of learning or as soon as a potential problem is identified to help children with developmental delays or disabilities overcome their challenges.

Phonology: It is a branch of linguistics that deals with the systematic organization of sounds in language.

Phonetics: a branch of linguistic concerned with the physical production, acoustic transmission and perception of the sounds of speech.

Typical Sound Changes: Typical sound changes is inclusive of substitutions, additions, or omission that affect a cluster of sounds or a sound sequence or order.

Atypical Sound Changes: These are some phonological errors present in children with DS that involve sound changes that are not commonly found in typical phonological development.

Phonological Errors: patterns of sound deviations from the norm that typically developing children use to simplify speech as they are learning to talk because they don't have the ability to coordinate the lips, tongue, teeth, palate and jaw for clear speech. These errors also called phonological processes or phonological deviations, should fade away as soon as language learning occurs (Nadel, 1999). When this pholological deviations or errors do not fade away, they become **phonological disorders.** This is a speech sound disorder that occurs when phonological processes persist beyond the age when most typically developing children have stopped using them or when the processes used are much different than what would be expected (Mishra, 2006). Therefore, a phonological disorder is a persistent form of a phonological error. For this current study, the two terms were used almost interchangeably.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of literature related to the study topic and it will be organized in the following sections; general characteristics of learners with DS, DS in Kenya, types and patterns of phonological disorders in learners with DS, their impacts on language learning of these learners, methodologies and Strategies in language learning of learners with DS and the interventions that can help minimize phonological disorders in learners with DS.

2.1 Characteristics of Children with Down Syndrome

Common characteristics of individuals with DS include characteristically similar facial features, broad hands, low muscle tone and delayed growth. Cognitive deficits are also typically present, they display varying degrees of cognitive abilities (Robert, Prince and Malkin, 2007). The degree of cognitive ability ranges from near normal intelligence to severe intellectual disabilities (ID), with 80% of the DS population having moderate ID (Roberts et al., 2007). Individuals with moderate ID have an intelligence quotient (IQ) between 36 and 51 and demonstrate deficits with cognition, receptive and expressive language skills (Owens, 2010).

According to Randolph and Burack (2000), attention may be another area of concern as infants with DS demonstrated challenges when focusing on the relevant characteristics of new toys presented to them. Brown, Szapocznik, Spokane, Fals, Gambirazio, Zarate and Mason (2003) support findings by Randolph and Burack (2000), reporting that individuals with DS demonstrate challenges with attention, specifically sustained attention which negatively affect a child with DS ability to develop language.

Another characteristic that may prove troubling for speech and language development in children with DS is their oral structure. According to Brown and colleagues (2003), there are a variety of differences observed in the oral cavity of children with DS. Among these structural variations, a small oral cavity, a narrow high arched palate, an irregular dentition and an enlarged protruding tongue can be examined. Along with internal structural differences, children with Down syndrome also display muscle abnormalities of the face, both of which are possible contributing factors to a decrease in speech intelligibility.

2.2 Language Development in Children with Down Syndrome

This study found it necessary to briefly look at literature on language development in children with DS and the challenges faced as this gave insightful understanding during data collection and analysis. Descriptive accounts of the development of children with Down syndrome almost

always draw attention to the delays to be expected in their speech and language development. Despite a wide range of individual differences, most children are late in saying their first words, their vocabulary grows more slowly than in ordinary children and although they use the same range of two- word phrases as all children, they have difficulty in mastering the many rules for talking in grammatically correct sentences (Rondal 1988, Miller 1988).

Individuals with DS achieve a limited Mean Length of Utterance (MLU), perform poorly on tasks on comprehension and elicitation of grammatical morphemes and more complex syntactic structures (Rondal & Complain, 1996). Furthermore, in the expressive domain, deletion of unstressed syllables, errors in syllable final sounds, reduction of consonant clusters, substitutions, omissions and additions of particular sounds are present in childhood and often persist in adulthood (Dodd & Thompson, 2001). Chapman and others (1998) found a more inconsistent use of both bound morphemes (plural –s, possessive –s, third person singular, contractible auxiliaries and present progressive –ing, regular past tense –ed) and free function words (auxiliaries, modal auxiliaries, articles, prepositions, pronouns, adverbial adjuncts, conjunctions and infinitive 'to') in children with DS than in those with typical intelligence. Research in the morphosyntactic abilities of children with DS in the second language is very poor due to the fact that they have difficulties in their first language and this is worse for the second one.

Children with DS have been found to be good “visual” readers, finding it relatively easy to establish sight vocabulary and grammatical knowledge (Most & Guiberson, 2005). Reading or efficient word recognition generally takes place through visual, phonological and contextual input. Phonological awareness or PA has been the single most important framework of literacy research for several decades, most particularly in the acquisition of alphabetic orthographies like English (Brynt & Goswami, 1987). It has been consistently argued that awareness in phonology makes a distinctive contribution to reading by helping children master the grapheme-to-phoneme conversion rules quite early in life. Moreover, different studies on phonological awareness in several local languages using different populations have revealed that if early intervention is not done during the early stages of language learning, phonological errors become more prominent and this in turn affects literacy and language learning. (Mishra, 2006)

It has been suggested that children with DS graduate from logographic stage (sight vocabulary) to the alphabetic stage (words sounded out) at a much slower rate compared to normal children (Buckley, Bird & Byrne, 1996). When their language and vocabulary increase as a result of age, they start identifying new words and eventually learn to read. It has also been suggested that such children with DS may lack some fundamental processes that underlies metalinguistic ability and as a result require an individualized and a suitable method of instruction. However there are

few empirical studies to demonstrate this unique mode of learning in children with DS. More research therefore need to be done in order to come up with suitable methods to teach language in these learners.

Reading difficulties among school-going children should be considered as a serious handicap in life in that children who do not learn to read may not succeed in life (Lerner, 2006). While various policy documents regret the high levels of school failure and wastage, measured in terms of school drop-out, repetition and absenteeism, one could argue that these phenomena are aggravated by the poor quality of learning, especially the weak foundations of language and the subsequent frustration produced by learners' inability to read to learn. Indeed, reading difficulties have been attributed to the overall phenomena of drop-out (Jimmerson, Egeland, Sroufe & Carlson, 2000), discipline problems and low self-esteem among learners (Wekesa, Poipoi, Wanyama & Begi, 2012). Secondly, inadequate language development and the weak foundations to reading have been linked to teacher quality (Quiroga & Gray 2002; Wekesa et al., 2012), teacher experience (Bashir 1994; Mugo, Mwoma & Limboro 2011) and the general classroom environment and practice. As Lerner (2006) argues, it is critical that teachers identify children with reading problems early and provide them with appropriate early interventions rather than practicing the policy of wait–and-fail method. These findings are very relevant to the learners with DS as they are likely to face the reading and

language development challenges which may cause social maladjustment and therefore the need for appropriate interventions.

Several studies have outlined the stages of language development with each stage being an important milestone. For instance Maneno and Runo (2007) state that at around 18 months of age, children experience a surge in vocabulary growth and rather than learning one new word a week, they learn several words and phrases in a day such as "book there", "big car", among others. The most intensive period of speech and language development is during the first five years of life, a period when the brain is developing and maturing. Gunning (1996), describes a stage known as confirmation of fluency which is mainly for learners aged 7 to 8 years. At this stage, the child recognizes patterns of words and reaches a level of automaticity in word recognition. The child acquires orthographic knowledge of words. This stage is of gaining control of reading. According to Gunning (1996), the next stage is called reading to learn where learners are expected to refine their reading skills and apply them to obtain information from various types of texts.

The researcher's opinion is that learners with DS may move through the stages of language development though at a delayed rate. For instance, they may not learn several words and phrases in a day at 18 months as typically developing children will do (Maneno & Runo, 2007) but will do it later in their stage of development. However, these children may still benefit in basic academic skills if given proper remediation and especially

if the teacher is aware of the basis of language learning and therefore focus on it.

Although some of the physical genetic limitations of children with DS cannot be overcome, education and proper care will improve the quality of life. Developing of speech and language abilities may take longer but finally these children do develop the communication skills they need. According to Shriver (2010), children with DS have a wide range of abilities and talents and each child develops at his or her own particular pace. They should be given the opportunity and encouragement to develop their talents and gifts. It may take them longer than other children to reach developed mental milestones, but many of these milestones will eventually be met.

2.3 Types of Phonological Disorders

Phonological disorders whether written or spoken can be categorized in various ways. In this study, the phonological disorders were mainly categorized according to typical and atypical sound changes, often referred to as phonological processes (Edwards, 1992). In this type of analysis, disorders can be characterized in terms of assimilation, as well as changes in place of articulation, manner of articulation, voicing, and syllable structure. In the study, each speech sound disorder was classified according to the types of individual (component) sound changes involved: distortions, typical sound changes, and atypical sound changes

Typical sound changes represent substitutions, additions, or deletions that affect a class of sounds or a sound sequence (Edwards, 1992). For example, children with typically developing speech, as well as children with DS, often produce stops in place of fricatives, as in 'tu' for *Sue* 'su'. Some errors involve more than one feature change at a time, as in 'du' for *Sue* 'su', which would be accounted for by a combination of stopping the fricative and adding voicing.

Atypical Sound Changes are some phonological errors exhibited by children with language problems (inclusive of those with DS). They reflect sound changes that are found rarely, if at all, in typical phonological development. For example, children with DS may delete the initial consonant in a word and realize *Sue* as [u] (Dodd & Iacano, 1989), or they may replace a sound produced in the front of the mouth with one produced further back in the mouth, as in [hu] or [gu] for *Sue*. Such errors have been characterized as unusual, deviant, atypical, non-developmental, or different from those exhibited by normally developing children (Dodd, 2005; Lowe, 1994). It is hypothesized that atypical disorders reflect relatively weaker phonological representations (Dodd 2005; Leitao & Fletcher, 2004) and thus will make a significant contribution to the variance in PA. Typical disorders are assumed to reflect less-impaired phonological representations than atypical ones, and therefore to have a weaker relationship with PA. Finally, disorders that represent minor deviations from a target (e.g., distortions) and that presumably reflect

more accurate phonological representations will not significantly contribute to the variance in PA.

2.4 Patterns of Phonological Disorders

According to American Speech-Language-Hearing Association (ASHA) (2016), the acquisition of speech sounds is a developmental process, and children often demonstrate "typical" errors and phonological patterns during this acquisition period. For example, it is considered typical and acceptable for younger children to replace later-acquired sounds, such as /s/, with earlier-acquired sounds, such as /t/, up until a certain age range. Developmentally appropriate errors and patterns are general in all children and fades away gradually at the stipulated time. However the errors and patterns in children with disabilities are likely to go beyond the expected age and in worse cases persist without fading. In this case, they now become phonological disorders (Nadel, 1999). ASHA 2016 considered the patterns of phonological disorders to be of 3 broad groups namely; assimilation, substitution and syllable structure. The table 2.1 below is a clear presentation of phonological patterns as outlined by ASHA 2016:

Assimilation (Consonant Harmony) **One sound becomes the same or similar to another sound in the word**		
Process	Description	Example
Velar Assimilation	non-velar sound changes to a velar sound due to the presence of a neighboring velar sound	*kack* for *tack*
Nasal Assimilation	non-nasal sound changes to a nasal sound due to the presence of a neighboring nasal sound	*money* for *funny*
Substitution **One sound is substituted for another sound in a systematic way**		
Process	Description	Example
Fronting	sound made in the back of the mouth (velar) is replaced with a sound made in the front of the mouth (e.g., alveolar)	*tar* for *car*; *date* for *gate*
Stopping	fricative and/or affricate is replaced with a stop sound	*tee* for *see*; *chop* for *shop*
Gliding	liquid (/r/, /l/) is replaced with a glide (/w/, /j/)	*wabbit* for *rabbit*
Deaffrication	affricate is replaced with a fricative	*shop* for *ch*op
Syllable Structure **Sound changes that affect the syllable structure of a word**		

Process	Description	Example
Cluster Reduction	consonant cluster is simplified into a single consonant	*top* for *stop*
Weak Syllable Deletion	unstressed or weak syllable in a word is deleted	*nana* for *banana*
Final Consonant Deletion	deletion of the final consonant of a word	*bu* for *bus*

Source: American Speech-Language-Hearing Association (ASHA) (2016)

Other studies have grouped the patterns slightly differently but they narrow to the same patterns. Kennedy and Flynn, 2003 states that there are four different patterns that can be made when producing speech sounds and these are Substitutions, Omissions, Distortions and Additions. Cupples and Iacon 2000 groups them into substitution, omission and additions.

2.5 Impacts of Phonological Disorders on Language Learning of Learners with Down Syndrome

Studies that have explored phonological awareness in English speaking children with Down's syndrome have noted that such children do perform poorly in language; but with some training, their scores improve, and this improvement is often considered to influence their performance in reading (Iacono & Cupples 2000). Different studies have found different levels of performance on phonological awareness tasks by children with DS. It is often alleged that children with DS perform low on commonly used PA tasks because those tasks put a lot of memory and cognitive demand on their systems and are not suitable for comparison with their counterparts without DS (Byrne, 1993). This therefore means that for children with DS to acquire PA, the memory and cognitive demand has to be reduced or broken down to more manageable tasks. This calls for research on appropriate techniques and interventions to help learners with DS acquire PA efficiently.

Converging evidence suggests that literacy abilities such as spelling, reading decoding, reading comprehension, and reading fluency are greatly affected by phonological disorders both concurrently and longitudinally (Snow, 1998). There is also evidence that children with phonological disorders are at risk for pre-literacy and literacy problems when they begin kindergarten (Nathan L, Stackhouse J, Goulandris N, Snowling M (2004).

There have been many studies exploring the casual connections between metaphonological awareness and development of reading abilities in children with DS. It has been observed that such children do benefit from reading with an explicit training in phonological awareness (Kennedy & Flynn, 2003; Cupples & Iacon 2000). On the other hand, it has also been reported that children with DS do acquire reading as they grow but their explicit knowledge of phonological skills if tested on tasks, remains low (Cassu, Rossini & Marshall, 1993). Few studies have shown dissociations in performance on some phonological skills compared to others.

Several tests has been used to determine the extent of phonological disorders by several researchers; McDowell, Lonigan and Goldstein (2007) used the Goldman-Fristoe Test of Articulation-2, GFTA-2 (Goldman & Fristoe, 2000) along with a measure of nonsense word repetition to estimate speech sound accuracy in 700 children with DS. They noted that phonological disorders are associated with lower receptive vocabularies and more atypical sound errors. For these children, salient features in speech sound production might also be poorly represented, resulting in unusual productions of words (e.g., deletions of initial singleton consonants or strong syllables). This poses as a challenge when learning language and this calls for proper intervention to correct the phonological errors to enhance acquisition of language skills.

Percent Consonants Correct (PCC) is a widely used measure for assessing severity of a speech sound disorder (Shriberg, Austin, Lewis, McSweeny

and Wilson 1997; Shriberg & Kwiatkowski, 1982). In this measure, however, all consonant errors are weighted equally. Although PCC has been found to relate to severity of speech production problems (Shriberg & Kwiatkowski, 1982), it may not be the best measure for evaluating the relationship between speech sound accuracy and phonological awareness (PA) because it does not distinguish between patterns of disorders.

2.6 Methodologies and Strategies in Language Learning of learners with DS

This study found it necessary to briefly review on the methodologies and strategies used in language learning of learners with DS to gain an insight on better methods and intervention strategies for these learners with DS.

Existing body of literature highlights a wide range of methods that are used to teach language (reading and speaking), among them the phonics method (Dubeck et al., 2012; Runo, 2009),alphabetic method (Heilman, Blair & Rupley, 1981; Maneno, 2008), and the whole-word or look-say method (Dubeck et al, 2012; Lerner 2000). Analysis by Waweru (2003) indicates that most teachers utilized either the phonic (31.9%) or the whole-word (31.9%) approaches. The alphabet method was utilized by only 5.6% of the teachers. A significant proportion of teachers (11.2%) did not seem aware of the main methods of teaching reading, and indicated flashcards, sound and modelling word as among the reading methods they utilized.

Beard (1987) justifies the effectiveness of the phonics method in teaching reading, arguing that the method has been in use since the middle of the 19th century. Phonics instruction is built upon teaching letter sound relationships. Learners are taught these techniques so that they are able to identify words that they do not recognize in print.

While the phonics method is increasingly becoming entrenched in reading instruction in Kenya, a study by Maneno (2008) on identification processes of articulation and phonemic disorders in children with communication disorders in Nairobi established that most teachers did not have phonological skills needed to effectively handle children with phonemic problems. The study also determined that children with learning disabilities who had phonological problems were labelled slow learners and could not get any assistance from their class teachers. This knowledge is very important to this study because the various intervention measures outlined by the study will help the teachers and educationists acquire phonological skills that will enhance language learning of these learners.

Arguably, the whole-word method (chanting, or look-say) is the most utilized method in teaching reading in Kenya (Dubeck et al. 2012). In this method, it is expected that learners will be able to identify words on sight without first having to go through conscious letter-by- letter analysis. The method is also referred to as “look and say” because learners are expected to say (identify) a word as soon as they look at it. As noted during this

study, this method was also used while teaching language to learners with DS and it proved to be effective because gradually the learners learnt the word through familiarization.

On the other hand, in the alphabet method the child learns to read by saying the names of the letters through which they learn to recognize and pronounce words (for example "em-ee-en). According to Beard (1987), the alphabet method overlaps with phonics in that the consonant letter names contain a phoneme with which they are commonly associated. While this method was used during this study it took longer for learners to master the letters than whole words. This can be explained by the fact that letters are more abstract compared to words which are more meaningful.

2.7 Possible Ways of Correcting Phonological Disorders in Learners with DS

In terms of intervention for single-word productions, most programs focus on increasing the phonetic repertoire and reducing the number of errors, using therapy techniques similar to those for children with phonological delay or disorder. Of particular interest is a study by Cholmain (1994) that described a therapy program for young children with DS (chronological age 4;1-5;6) whose speech is unintelligible. The program provided children with "simple uncluttered examples of the organisation of the sounds in the language in order to encourage them to

comprehend the phonological system." Based on the therapy principles advocated by Hodson and Paden (1983), key elements of the program included listening and production practice focused on particular phonemes and phonological processes, with therapy occurring in the clinic and at home. In spite of the low language mastery of the children involved in the study, results showed change in their phonological systems within the first two weeks of beginning therapy despite minimal change in the previous 3-12 months.

The following are brief descriptions of both general and specific treatments for children with phonological disorders. These approaches, listed alphabetically, can be utilized to treat speech sound problems in a variety of populations, including children with apraxia of speech, structurally based disorders, syndrome-based disorders, and hearing impairment. (Williams, McLeod, & McCauley, 2010).

Minimal Oppositions therapy also known as "minimal pairs" therapy, uses pairs of words that differ by only one phoneme or single feature signaling a change in meaning, in an effort to establish contrasts not present in the child's phonological system (door vs. sore, pot vs. spot, key vs. tea) (Baker, 2010). On the other hand, Maximal Oppositions therapy uses pairs of words in which one speech sound known and produced by the child is contrasted with a maximally opposing sound not known or produced by the child (manner of production and place of production, such as /m/ vs. /s/) (Gierut, 1992). These intervention techniques are not

commonly used with learners with DS as they tend to be more abstract and more demanding cognitive-wise. Furthermore, the manner of articulation is greatly affected by their oral structure.

A core vocabulary approach focuses on whole-word production and is used for children with inconsistent speech sound production. Words selected for practice are those that are used frequently in the child's functional communication. A list of frequently used words is developed (e.g., based on observation, parent report, and/or teacher report), and a number of words from this list are selected each week for treatment. The child is taught his "best" word production, and the words are practiced until consistently produced (Dodd, Holm, Crosbie, & McIntosh, 2006). This approach is suitable for learners with DS as they tend to learn better through familiarization and relation.

The cycles approach targets phonological pattern errors and is designed for highly unintelligible children who have extensive omissions, some substitutions, and a restricted use of consonants. The goal is to increase intelligibility within a short period of time, and treatment is scheduled in cycles ranging from 5 to 16 weeks. During each cycle, one or more phonological patterns are targeted. After each cycle has been completed, another cycle begins, targeting one or more different phonological patterns. Recycling of phonological patterns continues until the targeted patterns are present in the child's spontaneous speech (Hodson, 2010; Prezas & Hodson, 2010).

Metaphon therapy is designed to teach metaphonological awareness, the awareness of the phonological structure of language. This approach assumes that children with phonological disorders have failed to acquire the rules of the phonological system, and the focus is on the sound properties that need to be contrasted. For example, for problems with voicing, the concept of "noisy" (voiced) versus "quiet" (voiceless) are taught. Targets typically include processes that impact intelligibility, can be imitated, or are not seen in typically developing children of the same age (Howell & Dean, 1994).

Long term interventions are also necessary for children with persisting speech difficulties. They may continue to have problems with oral communication, literacy, and social aspects of life as they transit to post-secondary education and vocational settings. The potential impact of persisting speech difficulties highlights the need for continued support to facilitate a successful transition to young adulthood. These supports include; the development of a formal transition plan in middle or high school that includes discussion of the need for continued therapy, if appropriate, and supports that might be needed in postsecondary educational and/or vocational settings (IDEA, 2004). Disability Support Services that may include accommodations, such as extended time for tests, the use of assistive technology (e.g., to help with reading and writing tasks), accommodations for oral speaking assignments, and methods/devices to augment oral communication, if necessary.

2.8 Summary

It is often alleged that children with DS perform low on language learning tasks because they put a lot of memory and cognitive demand on their systems and are not suitable for comparison with their counterparts without DS (Byrne, 1993). This therefore means that for children with DS to acquire PA, the memory and cognitive demand has to be reduced or broken down to more manageable tasks. This calls for research on appropriate techniques and interventions to help learners with DS acquire PA efficiently.

Many existing studies have treated phonological disorders as one aspect and therefore the need to break it down to its components or patterns. For instance, although PCC has been found to relate to severity of speech production problems (Shriberg & Kwiatkowski, 1982), it does not distinguish between patterns of disorders.

It should be noted that it may be impossible to come up with a general profile for all children with DS. These children will differ in their areas of difficulties of language acquisition despite being in one group. This therefore calls for the need of diverse research in various areas to identify the specific phonological disorders in these learners and formulation of remediation to them.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter presents the research methodology that was used in this study. It consist of the following; research design, study locale, target population, sampling techniques and sample size, research instruments, pilot study, validity and reliability, data collection, data analysis procedures and the ethical and logical considerations.

3.1 Research Design

The study employed a case study design. The purpose of descriptive case study according to Orodho (2008) is to give an accurate account of a particular phenomenon, situation, community or person. He states that descriptive study designs are useful to descriptive studies so as to allow the researcher to gather information, summarize, present and interpret the data for the purpose of clarification.

This study gives an account of the phonological errors made by learners with DS while learning language at Blessed Joseph Allamano Special School, Nyeri County. The study mainly used qualitative approach. However, simple descriptive statistics was used in the analysis of the frequency of phonological errors.

3.1.1 Research Variables

The study comprised of the dependent, independent and also intervening variables. The dependent variable in the study was language learning while the independent variable was the phonological disorders. The intervening variables are adequate resources, early intervention, individual attention, teacher training and AAC devices used in language learning of learners with DS.

The variables are interrelated in that if the independent variable (phonological disorder) is present, it will hinder the occurrence of the dependent variable (language learning). However, with the intervening variables, language learning will occur as they will reduce the impact of the phonological disorders.

3.2 Study Locale

The location of the study was Blessed Joseph Allamano Special School in Nyeri County, Kenya. It is a public school managed by the Catholic Community. It is a mixed day and boarding school with pupils from almost all counties. It has a population of 113 pupils with intellectual disabilities though not all have DS. It has both academic and vocational centers. It is situated in a rural area of approximately 8 kilometres from Nyeri town.

This area was preferred by the researcher because the school is in the rural area. Bwana and Kyohere (2001) notes that learners with DS in the

rural areas are more likely to encounter language difficulties than those in urban areas. It was also easily accessible, the terrain of the area chosen was also friendly, furthermore, the researcher was familiar with the area and therefore it was possible to develop a rapport with the respondents who supplied the much needed information for the study. Singleton (1993) states that the recommended setting for a research should be easily accessible and should permit instant rapport with the respondents.

3.3 Target Population

Target population is a term used for the items or people targeted in any field of research to which the researcher wishes to generalize (Orodho, 2008). The targeted population included all the 113 learners in the school and the 12 teachers.

3.4 Sampling Procedure and Sample Size

Since this was a case study, purposive sampling was done where only the learners with DS and the language teachers participated. The sample therefore included all the fifteen learners with DS, two language teachers. This made a total of seven male informants, twelve female informants giving a total of nineteen informants. This is shown in Figure 3.0 below:

Number of Informants			
	Male	Female	Total
Learners	6	9	15
Lang. teachers	1	1	2

Fig. 3.0 Sample Population

3.5 Research Instruments

The researcher used three instruments, namely: Test of Phonology as the test tool for the learners, questionnaires for the teachers and observation schedule.

- **Test tool (Test of Phonology):** the test tool for the learners helped the researcher get first-hand information by collecting data on the phonological errors made.

  This test tool was developed by the researcher. It consisted of two parts; in part A, the learner was required to identify given words and read them aloud and where possible write them. Part B entailed picture reading where the learner was supposed to name the given picture and the name recorded as per their articulation (Ref: App 1; pg 101. It helped identify both mastered and non-mastered sounds and analyse their influence in word and sentence level. The test tool focused on a particular sound in each word but not limited to it so that any other sound change was recorded. The

researcher gave the test herself but in collaboration with the language teacher.

- **Questionnaire for the teachers:** The questionnaire for teachers helped in answering the research questions based on presence of phonological disorders, teacher's encounter with phonological disorders, problems and issues encountered while teaching language due to this disorders and intervention measures employed.
- **Observation schedule:** This instrument was used to investigate the patterns of phonological disorders, the frequency of their occurrence and how they influence language learning. It was also used to address research questions based on resources, teachers' training and learners' response. The information was recorded using an observation checklist (Ref: App II; p 103)

3.6 Piloting

Piloting was done to determine the validity and reliability of the instruments. It ensured clarity and suitability of the chosen research instruments and to detect the need for any adjustments in the instruments to be used. For instance, after piloting the researcher saw the need to modify the test tool where the complex tasks were made simpler to the level of the learners under study. Research instruments were pilot tested at Wandumbi Special School. It is a public school under the District Education Board and managed by a Board of Management. The school

was selected because it has similar conditions with the school of study. The respondents of the pilot study were five learners with DS and the language teacher.

3.6.1 Validity of the Research Instruments

According to Nachimas and Nachimas (1999), validity is concerned with the question, "Am I really measuring what I wanted to measure?" Mugenda and Mugenda, (2003) states that validity is the degree to which various measures of a concept accurately measures the concept. It is the degree to which results obtained from the data analyzed will actually represent the phenomena under study. Help was sought from the university supervisors and other professionals in validating the research instruments and where necessary, modifications were made, any relevant information was added and ambiguous items were corrected.

3.6.2 Reliability of the Research Instruments

A research instrument is reliable if it measures a variable correctly and consistently and give similar results under similar conditions over a given time notes Nachimas and Nachimas, (1999). Mugenda and Mugenda (1999) argues that reliability is a measure of the degree to which a research instrument yields same results after repeated trials. Piloting was a good way of determining reliability of the research instruments. Items that were left unanswered/ blank were a good indicator of the need to adjust the research instruments to avoid misinterpretation by the respondents. For instance, the question on 'Do you use AAC devices

while teaching language' was left unanswered and the teacher confirmed that he did not understand what that was and these prompted the researcher to briefly explain what those are. To assess reliability of the research instruments, test-retest method was used whereby the same questionnaires were administered at an interval of one week to the same group of respondents and thereafter the outcomes compared.

The data obtained on the first and the second tests were consistent as recommended by Orodho, 1998 that data from a test should give consistent results under the same condition over time. Therefore, the instrument was regarded to be reliable.

3.7 Data Collection Procedures

A preliminary visit was made to the schools to inform the principals of the intended research. On that day, appointments were booked with the target respondents to avoid an impromptu visit which would probably have inconvenienced the respondents. The researcher personally administered the research instruments directly to the respondents. The Test of Phonology was administered to the learners by the researcher at the beginning of the field work, it was then administered after two weeks and one month after. The data was analysed and results compared. The observation checklist was filled frequently to record any relevant information observed. All the data collected from the respondents was

treated as first-hand information. The test tools were administered by the researcher, the errors were recorded categorically.

3.8 Data Analysis and Presentation Techniques

Upon completion of data collection, data analysis was done by adopting the typical steps in any Error Analysis research as recommended by the linguist Corder (1993), the steps are as follows;

1. collecting samples of learner language
2. identifying the errors
3. categorizing the errors as per the types
4. describing the effects of the errors on language learning
5. evaluating/correcting the errors

Data from questionnaires and observation schedule was studied, explained and coded. The raw data was then condensed into meaningful groups and tables for further analysis through the computation of frequencies and percentages.

3.9 Logical and Ethical Considerations

The researcher obtained an introductory letter from Kenyatta University, Graduate School. Research Permit was then obtained from the National Commission for Science, Technology and Innovation (NACOSTI) Permission was also obtained from County Director of and the authority of the schools of the study.

No harm was subjected to the participants and their information was treated with confidentiality. The response of the participants was out of free will. Informed consent was obtained from the head teacher and teachers as the children are minors.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter contains the data presentation, analysis, interpretation and discussion of the study findings. The study employed the descriptive survey design and used questionnaires, test tool, observation checklists and document analysis. The analysis was qualitative in nature where disorders were identified, analysed and their impact on language learning established. Analysis was also done on the respondents' suggestions and opinions. Furthermore, document analysis was done to gain an insight on the patterns of phonological disorders. Data collected is presented in form of simple descriptive statistics, tables and charts. The discussion is in line with the objectives of the study which includes; identifying phonological disorders in language learning of learners with DS, analyzing the pattern of these disorders, establishing how they affect language learning and suggestions of how they can be corrected.

All the 15 learners with DS targeted as the respondents participated in the research. However, only 3 took the test as the rest could not read adequately. Also, one of the respondent had very minimal speech and could only utter very few and only familiar words. The test tool, Test of Phonology was developed by the researcher with guidelines from reviewed literature and with the set objectives in mind.

4.1 Types of Phonological Disorders in Learners with DS

4.1.1 Introduction

For this particular study, phonological disorders were classified as typical and atypical sound changes.

Typical sound changes represent sound changes for they represent sound patterns that can be explained systematically and phonetically for instance the processes of substitutions, additions, or deletions that affect a class of sounds or a sound sequence (Edwards, 1992). On the other hand, Atypical Sound Changes are phonological disorders that are unsystematic and therefore not explained phonetically. They are mostly exhibited by children with language problems (inclusive of those with DS) For example; children with DS may delete the initial consonant in a word and realize *Sue* as [u] (Dodd, 2005). Typical disorders are assumed to reflect less-impaired phonological representations than atypical ones, and therefore to have a weaker relationship with PA.

This study sought to examine the presence of both typical and atypical sound changes in the learners with DS. To achieve this, the study relied on observation of classroom and out-of-classroom interactions. The study recorded spontaneous responses by learners arising from spontaneous questions raised by teachers.

4.1.2 Atypical Sound Patterns

Atypical sound patterns were observed in some learners especially those with relatively low speech abilities

Below is an illustration of data collected representing the atypical sound disorders.

RESPONDENT	ACTUAL WORD	REALIZATION
R15/ R5	Zip	Ship
R12	Rabbit	Wabi
R8	Water	Loder
R14	Most	Mots
R4	No	Do
R10	Shoe	Gue
R15	Fan Van pan	Ban Ban Ban

Table 4.0 Presence of Atypical Phonological Disorders in Language of Learners with DS

Table 4.0 above is a sample of data collected during the study that shows presence of atypical phonological disorders. For instance, during the study, 2 respondents, R15 and R5 realized the word ‘zip’ as ‘ship’.

Predictably, the word ‘zip’ would undergo the phonological process of devoicing so that the word is realized as ‘sip’. However, the respondents replaced the voiced /z/ with a consonant digraph /ʃ /. R14 realised the word ‘most’ as ‘mots’ this shows the reversal of the position of two sounds or syllables, a condition known methathesis (Dodd, 2005). He states that this is the transposition of sounds or letters in a word which may or may not be adjacent to each other.

R4 articulated the word ‘no’ as ‘do’. This involved replacing nasal consonants with homorganic, non-nasal consonants. This may have occurred because of their closeness in terms of place of articulation (Edwards, 1992). For instance, R4 substituted the nasal sound /n/ with the closest non- nasal sounds /d/. R10 articulated the word ‘shoe’ as ‘do’. This involved the replacement of a sound produced in the front of the mouth /ʃ/ with one produced further back in the mouth, /g/. Likewise, R12 articulated the word ‘rabbit’ as ‘wabi’ while R8 articulated ‘water’ as ‘loder’. These show unsystematic phonological processes with exaggerated change in words. Interestingly, R15 realized the word ‘fan’, ‘van’ and ‘pan’ as ‘ban’. This shows overuse of one particular sound in place of many others. This happens when a child has mastered a particular sound and therefore portrays a strong sound preference (Dodd, 2005)

The atypical errors may be caused by the inaccessibility of motor programmes responsible for the production of certain sounds. Ladefoged

(1982) states that motor deficiencies of the tongue and other speech organs make it difficult for these children to produce speech. This is because all speech is the product of motor behaviour and muscular movement of the vocal organs. Learners with DS experience difficulties in production of sounds due to their biological structures of irregular dentation deformed tongue, and oral cavity.

4.1.3 Typical Sound Changes

These are phonological processes that are systematic and phonetically defined. They are said to portray less serious phonological representations than atypical changes and therefore said to portray a weaker connection with PA (Lowe, 1994). He states that these changes are expected at early stages of language development but should fade as the child grows. However, if they do not fade, they are termed as disorders. This is common in children with speech or muscular disabilities which children with DS is part of. (Gill, 1998)

Data collected during the research indicate that these phonological disorders are present in all respondents. Table 4.1 below is a sample of the checklist that was used to ascertain the presence of phonological disorders in the respondents.

Respondent	Tree	spoon	Tall	Book	Doll
R1	1	1	0	0	0
R2	1	0	0	0	1
R4	0	1	1	0	0
R6	1	1	0	0	0
R8	0	1	1	0	1
R10	1	0	0	0	0
R12	1	0	1	1	1
R14	1	1	0	0	0

Key: 0 mastered word, 1 non-mastered word

Table 4.1 Presence of Phonological Disorders in Language of Learners with DS

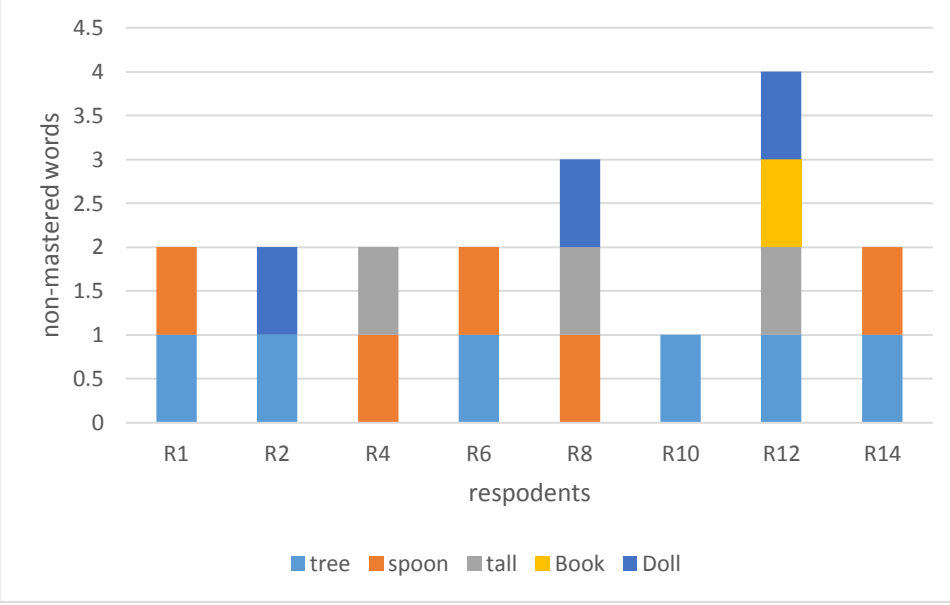
In the observation checklist above, five words were administered to the respondents. They were then marked as mastered or not mastered. From the sample above, only 2 realised the word ‘tree’ correctly. For the other 75%, it underwent cluster reduction to become ree /ri:/. The same happened to the word ‘spoon’ and only 38% were able to articulate the word. The word ‘tall’ was realized with omission of the final syllable to become [ta]. The word ‘doll’ was realized either with fronting to become toll [tal] or with omission to become [do]. However, 63% were able to realize it correctly.

Table 4.2 below shows the frequency of phonological errors in specific categories. There were 173 phonological errors. The errors were most frequent in omissions at 35.8% as shown.

CATEGORY	**FREQUENCY**	**PERCENTAGE**
Omission	60	35.8
Substitution	45	25.5
Cluster reduction	32	18.2
Devoicing	17	9.6
Fronting	12	6.8
Stopping	7	4.0
Total	173	100

Table 4.2: Frequency of Phonological Errors in Specific Patterns

Table 4.2 shows the frequency of occurrence of each phonological error in words. It shows how the 173 phonological errors are distributed in the phonological patterns.



Graph 4.0 Realization of Sample Words in Learners with DS

Graph 4.0 is a pictorial representation of the rate of mastery of sample words by 8 of the respondents. R10 had the highest word mastery with only 1 non-mastered word. 86% of the respondent realized the word 'book' correctly and only R12 realized it with an omission of /k/. This high level of mastery was associated with familiarity of the word. The occurrence of the phonological error was affected by whether the word is familiar to the respondents or not. New words posed more challenges to them compared to the familiar ones.

4.2 Patterns of Phonological Disorders in Language of Learners with DS

To get more insight on the patterns of disorders, the Test of Phonology was carried out. Guided by the literature review and the research objectives, the researcher came up with a short-word based test. It was short because learners with DS has low concentration spun and inadequate attention. (Burack, 2000) It was also word-based because learners with DS experience poor rate of phonological and language mastery due to their delayed cognitive ability (Lowe, 1994). Table 4.3 below is a sample of the Test of Phonology carried out by 3 respondents who were targeted because they could read and had better speech. For the sake of the discussions, they are coded as R1, R2 and R3.

Phoneme	**Target Word**	**Realization of the word**	**Type of Phonological Process**
R1			
g/n	green /gri:n/	*leen* /li:n/	Omission+substitution
b/d	bread /bred/	*pread* /pred/	Substitution
Z	zip /zip/	*Sip* /sip/	Devoicing
G	gas /gas/	*gas* /gas/	----------
Sp	spoon /spu:n/	*Poo*n /pu:n/	Cluster reduction
K	key /ki:/	*tey* /ti:/	Fronting
V	very /veri/	*bery* /beri/	Stopping
Dr	dress /dres/	*ress* /res/	Cluster reduction
R2			
g/n	green /gri:n/	*geen* /gi:n/	Omission+substitution
b/d	bread /bred/	*brea* /bre/	Omission
Z	zip /zip/	*zip* /zip/	----------

G	gas /gas/	*kas* /kas/	Fronting
Sp	spoon /spu:n/	*poo*n /pu:n/	Cluster reduction
K	key /ki:/	*tey* /ti:/	Fronting
V	very /veri/	*ber*y /beri/	Stopping
Dr	dress /dres/	*ress* /res/	Cluster reduction
R3			
g/n	green /gri:n/	*green* /gri:n/	----------
b/d	bread /bred/	*brea*d /bred/	----------
Z	zip /zip/	*zip* /zip/	----------
G	gas /gas/	*gas* /gas/	----------
Sp	spoon /spu:n/	*poo*n /pu:n/	Cluster reduction
K	key /ki:/	*key* /ki:/	----------
V	very /veri/	*very* /veri/	----------
Dr	dress /dres/	*ndres*s /ndres/	Distortion

Table 4.3 Occurrence of Phonological Disorders in Language of Learners with DS

Table 4.3 above tabulates respondents' phonological processes that occurred in their articulation. The data is drawn from the Test of Phonology (Appendix III). The data above indicates that phonological errors occurred in all the targeted respondents though at different levels. For instance, R3 was able to realize 75% of the words correctly while R1 only realized 12% correctly. It is also possible for two phonological errors to occur at the same time in a word, for example, R1 realised the word green /gri:n/ as /li:n/. This displays omission of /g/ and substitution of /r/ with /l/. Cluster reduction was the most common in all the respondents with 99% displaying it.

From the data above, it is evident that all the respondent displayed cases of phonological disorders. However, R3 had minimal phonological disorders and articulated most of the words correctly at 75%. This as indicated by the teacher respondents is partly because R3 has been in school for a longer period of time and therefore more exposed to language learning. She may also have a high IQ. As noted in the test and also during the observation schedule, the respondents seemed to avoid the more complex phonological processes like in the case of clusters. For example, 'dress' was realized as 'ress' and spoon /spu:n/ as /pu:n/ in cases of cluster reduction. This is so because as stated by Robert et al (2007), these individuals have biological defects that might disfavor language development in them. This includes; a deformed tongue,

delayed motor skills, low muscle tone and delayed growth. The cases of substitution and omission can be accounted by the manner and place of articulation of those sounds. For the sounds such as ‘sp’ and ‘dr’ to be produced, they require faster coordination of the tongue and the palate, the teeth or lips. The tongue tip therefore has to be adequately flexible to make the sounds. In the present study, the respondents’ tongue structure and low muscle tone seems to present a challenge in the articulation of these phonemes (Burack, 2000). The phonological processes are discussed below:

4.2.1 Omission/ deletion

By observing classroom proceedings, analyzing data from the test and referring to the performance records of the learner, the study recorded the data on phonological disorders. It was observed that children with DS in this study presented speech characterized by omission of sounds as illustrated below:

R1 pronounces the word 'green' as ‘glee’ while R2 realize it as 'geen' hence deletion of alveolar trill in word medial position. The trill is articulated with a complete closure and open approximation. The tip of the tongue touches the alveolar ridge completely and is trilled against it. The omission may be explained by the fact that in the word 'green', the

place and manner of articulation for the voiced velar stop, / g / and the trill are different and hence poor coordination of muscles.

In another case, R10, R14 realised the word ‘banana’ as ‘nana’. This is a case of weak syllable deletion where the unstressed word-initial syllables /ba/ is deleted. Deletion of initial syllable was also observed for instance, R1 articulated ‘green’ as ‘leen’. The omission could be explained that learners with DS tend to avoid more complex task and therefore the deletion of the syllable to make it easier to articulate.

The study noted that the highest number of omissions was in word initial and medial positions as opposed to word final position. This could imply that the initiating task in articulation is challenging. The affected children fail to gather enough air in the lungs to be able to pronounce whole words. The teachers pointed out that, children with DS have difficulties initiating speech and consequently, articulate final syllables only. The study therefore agrees with what Dockrell & Messer (1999) state that all speech sounds are made with some movement of air and that the aggressive pulmonic is by far the most commonly used. However, the child with mental handicap may be able to inhale deeply but unable to control exhalation which is the most needed for speech. It can thus be argued that children with DS are unable to carry out coordinative movements of articulatory muscles due to their structural limitation.

4.2.2 Cluster Reduction

This is the phonological disorder that involved sound blend where one or more consonants from a two or three consonant cluster is deleted (Hudson, 2004). In this case, sound blends are reduced to a single sound. For instance, during the study, the researcher focused on the word ‘spoon’ with keen interest on the consonant cluster /sp/ in the initial position of word. In the speech of 5 respondents the word was realized as poon /pu:n/. However, R12 realized the word as ‘poo’ /pu/. This shows two phonological processes in one word; cluster reduction of /sp/ to /p/ and deletion of the final nasal sound /n/ The word ‘stool’ /stu:l/ was also realized as ‘tool’ /tu:l/ therefore reducing the consonant cluster /st/ to /t/. During general observation R15 was captured realizing the word ‘clean’ as ‘keen’ hence reducing the consonant cluster /cl/ to a single consonant sound /k/.

Cumulatively, this study established that the cluster reduction occurred in 90% of the learners. This study observed that cluster reduction occurred mostly in initial word position. For example, during observation, respondent R3 simply uses the adjective 'smart' as ‘mart’ whose initial sound is omitted. The teacher respondents pointed out that children with DS, do blend sounds to simplify what they want to say. According to Bowen (1998), the consonant cluster demands for the manipulation of different articulating organs, something that is elusive to even normal

speakers. Therefore, the learners with DS will avoid clusters and substitute them with those sounds that are less involving.

4.2.3 Devoicing

The phonological disorder involved loss of voice when attempting to produce a voiced sound so that it becomes voiceless. For instance, the researcher focused on the word ‘gas’ with keen interest on the initial consonant of the word. R2 realized the word as /kas/ replacing the voiced velar sound /g/ with a voiceless velar sound /k/. Respondent R14 realized the word ‘pig’ as ‘pick’. This is a case of word final devoicing where the final consonant voiced sound /g/ is replaced with final consonant voiced sound /k/. According to Zattore and Gandour (2008), voicing requires the vibration of vocal cords, a more complex process. For learners with DS, important qualities in speech sound production are poorly represented, resulting in unusual productions of words (e.g., devoicing, deletions of initial singleton consonants or strong syllables). This poses as a challenge when learning language and this call for proper intervention to correct the phonological errors to enhance acquisition of language skills (Dubeck et al., 2014)

4.2.4 Fronting

The error pattern involved the replacement of a back sound with a front sound. For instance, in the word /key/ the word has a phonetic realization as [ki]. In this word the researcher targeted the phoneme /k/ in initial position. In the speech of the respondents R7 and R10, the word was realized as tey [ti]. An examination of the output representation of the word KEEP [ki:p] by respondent R12 and R1 also reflected this kind of impairment, the word was realized as teep [ti:p]. The cases presented shows velar fronting in the cases the velar plosive sound /k/ is replaced with an alveolar plosive /t/. During classroom observation, when an attempt was made, the teacher prompted the learners to say 'good'. It was noted that respondent R11 articulated the word as 'dood'. This is a case of fronting where the velar sound /g/ articulated at the back of the mouth is replaced with an alveolar sound /d/ produced in front of the mouth. These disorders in phonological processes can be explained by research findings by Abbeduto et al. (2007), who noted that phonological decoding is a deficiency caused by challenges with auditory memory, deformed facial features, low muscle tone and delayed growth. Their facial features which include irregular dentition and a 'heavy' tongue are possible explanation to the phonological fronting explained above.

4.2.5 Stopping

This is the substitution of a fricative or an affricate for a stop consonant. For instance, the word ‘full’; the researcher targeted the initial consonant /f/. In the speech of R5, R11 and R12, the word ‘full’ was realized as ‘bull’. In the word ‘very’, the target was on the initial consonant /v/. The output presentation of the word was bery [beri] instead of the phonetic realization [very]. The fricative /v/ is therefore replaced with a stop /b/. During classroom observation, when R2 wanted her ‘chair’ from a classmate, she said that she wanted her ‘tare’. In this case, the affricative sound /tʃ/ is replaced with the plosive voiceless /t/. During out-of-class observation R4 was noted realizing the word ‘shop’ as ‘dop’. Here, the /ʃ/ sound which is unvoiced fricative is replaced with a voiced plosive /d/ the process known as stopping. The above data can be attributed to the delay in cognitive abilities and their oral structure. According to Roberts et al. (2007), there are variations noted in the mouth cavity of learners with DS. These includes; a reduced oral cavity, a narrow curved palate, an irregular dental formulae and an enlarged tongue. Apart from internal structural differences, larners with DS also show muscle abnormalities of the facial features, both of which are possible contributing factors to a reduced speech intelligibility (Roberts et al., 2007).

4.2.6 Substitution

Ingram (1976) defines substitution as a case where a sound is replaced by another without reference to neighbouring sounds. This is the phonological disorder where one sound was replaced with another. For instance the researcher focused on the word ‘doll’; as indicated in table 4.1, R8 and R2 did not realize the word correctly but realized it as /toll/ therefore substituting the voiced alveolar sound /d/ with a voiceless alveolar sound /t/. Respondent R6 articulated the word ‘man’ as ‘mam’. This involves the substitution of final alveolar nasal sound /n/ with a bilabial nasal sound /m/. The substitutions may be caused by the inaccessibility of motor programmes responsible for the production of alveolar and palatal sounds. Ladefoged (1982) states that motor deficiencies of the tongue and other speech organs make it difficult for these children to produce speech. This is because all speech is the product of motor behaviour and muscular movement of the vocal organs. Zattore and Gandour (2008) state that for sounds to be articulated correctly, the lips, tongue, jaw, velum and larynx ought to move in the right way else the intended sounds become distorted. The teacher respondent pointed the learners with DS have delayed muscle movement and poor coordination, a possible explanation of substitution as a phonological processes. The substitution occurred in all word positions. However, it was observed that substitution in word initial position was more prevalent than medial and final.

Going by the study data presented on phonological disorders in learners with DS, it can be concluded that the various phonological disorders are present in learners with DS. This observation reinforces what Algozzine et al (2006) state that children with DS display delayed and defective speech, due to the condition involved. Such children struggle tremendously to complete a task that may otherwise be considered simple.

General hypotonicity influences lip and tongue movements concerned with various aspects of speech production.

4.3 Impacts of Phonological Disorders in Language Learning of Learners with DS

Various research notes that literacy abilities including spelling, reading decoding, reading comprehension, and reading fluency are greatly affected by phonological disorders concurrently and also longitudinally (Snow, 1998). There is also evidence that children with phonological disorders are at risk for pre-literacy and literacy problems when they begin kindergarten (Nathan et al, 2004).

Data collected from the observation schedule indicated that the respondents had difficulties in taking apart words into sounds, recognizing their identity, putting them together again and differentiating

those that are almost similar. For instance, when a respondent was taught letters of the alphabets and told that ‘k is for key’, he realized it as ‘k for tey’ showing fronting. The respondents had problems in identifying /k/ in the words ‘kite’ and ‘bake’. This finding is supported by Castles and Coltheart (2004). They state that syllable segmentation accounted for 9% of the variance of writing skills. This task requires participants to split words into syllables and be able to combine syllables into words.

Due to the phonological disorders, the respondents had difficulties relating spoken and written words. They failed most tests of pairing printed and spoken words and in most cases relied on familiarity rather than realization. For instance, when given various flashcards with words ‘gun’, ‘green’, ‘tooth’ and ‘dog’, it was easy for the respondents to identify ‘dog’ due to familiarity (as they would not say it correctly or read) but challenging to identify ‘gun’ as the word was relatively new to them. The challenge of relating spoken and written word is noted by Landgraf, R. Beyer, A. Pannekamp, G. Schaadt, D. Koch, M. Foth, E. 2011 who states that production of written words, that is transition of written language symbols into speech (reading), is based on phonological awareness, phonetic recoding in short-term memory and the subsequent initiation of motor programs (speech production).

The teacher respondents confirmed in their questionnaires that the long term effect of phonological disorders is significantly increased risk for reading disabilities characterized by spelling difficulties, speech disorders

and general poor performance in learning. This is likely to persist after age 10 if interventions do not occur. This finding is supported by Adamson, L. B., Bakeman, R., Deckner, D. F., & Romski, M. (2009). who states that children with developmental disorders, such as Down syndrome, who demonstrate deficits in phonological skills, also demonstrate difficulties with language development. Children who lag behind in developing PA skills are likely to be at-risk for reading difficulties (Torgesen, Wagner & Rashotte, 1997).

Studies on phonological awareness in English speaking learners with DS have observed that these learners perform poorly in language; but with intervention, their ability improve, and this in turn influence their performance in reading (Iacono & Cupples 2000). Various researches noted different levels of achievement on phonological awareness tasks by individuals with DS. It is often alleged that children with DS perform low on commonly used PA tasks because those tasks put a lot of memory and cognitive demand on their systems and are not suitable for comparison with their counterparts without DS (Byrne, 1993). This therefore means that for children with DS to acquire PA, the memory and cognitive demand has to be reduced or broken down to more manageable tasks. This calls for research on appropriate techniques and interventions to help learners with DS aquire PA efficiently.

Goldman and Fristoe, 2000 carried out a research with a measure of nonsense word repetition to estimate speech sound accuracy in 700

children with DS. They noted that phonological disorders are associated with lower receptive vocabularies and more atypical sound errors.

In summary phonological disorders affect the main domains in language development which includes; literacy abilities, word analysis, syllable recognition and the relationship between written and spoken language. These deficits can eventually lead to reading disabilities. This therefore call for appropriate intervention to reduce the impacts of phonological disorder in language learning. This is illustrated in the subtitle below.

4.4 Possible Ways of Correcting Phonological Disorder in Language of Learners with DS

One of the objectives of this study was to propose some corrective measures to minimize these phonological disorders in learners with DS. To establish ways of correcting phonological disorders in learners with DS, this study adopted two methods of collecting data. Participant observation was used in active class interactions while questionnaires were given to the language teachers. Using these techniques, the study established that the following methods are used by the teachers to enhance language learning of these learners with DS: They include early intervention, use of Core Vocabulary Therapy, Integral Stimulation, reducing the need to multitask, using AAC technique to supplement learning and teaching alphabet knowledge.

Early intervention is considered as the first major means of correcting phonological disorder. Data collected from the questionnaires indicate that the earlier the efforts in creating phonological awareness, the earlier the minimization of phonological disorders and this enhance language learning at an early level. For instance, R10 in table 4.1 had only 1 non-mastered word and this was partly attributed to the fact that she has been in school for long and therefore more exposed to language learning.

The teachers employed the specific word selection criteria, also known as the Core Vocabulary Therapy in creating phonological awareness. The procedure begins with the child and teacher selecting 10 target words that are functionally 'powerful' for the learner, and 'mean something' to him or her. This includes names of familiar objects that are frequently used (like spoon, book), family, friends. At the end of each week the learner produces 3-4words three times in a day. Words that have not been mastered remain on the list while still adding others. By the end of the first week, 20% of the respondent had fully achieved the target while 80% acquired at least 1word from the list.

The use of imitation or Integral Stimulation was also recommended by one of the teacher respondent. In this case, the teacher models an utterance and the child imitates it with the teacher ensuring that the child's attention is focused, as he or she listens to the auditory model

while looking at the teacher's face. Integral stimulation ensures that syllable, word and sentence stress are emphasised very early in the learning of language and also improves the learner's attention.

During the research it was noted that those strategies that reduce the need of the child to multitask improve phonological awareness. They have to concentrate hard and consciously deal with the task at hand. The level of mastery improved if the amount of spoken or written information to be processed was manageable and the complexity and level of abstraction of the task is regulated. For instance, it was easier for the respondents to learn the word 'door' than 'dull' because of its abstraction. Other helpful strategies included ensuring that the rate of presentation of the information to be processed is slow enough and modifying the sorrounding to eliminate unnecessary information including distractions.

During the research, it was noted that, the phonological problem of the respondents begin with difficulties in mastering alphabets and sounds. Therefore, teaching alphabet knowledge, including recognising and being able to say the letter names, proved fruitful. It was also observed that, the more the engaging and enjoyable the session was, the more the attention of the learner and hence the more the learning. For example, playing games with flashcards while matching letters with words increased the concentration from 15 minutes to 25 minutes and therefore more time for word mastery.

Data collected from the teacher respondents and through observation schedule indicate that the learners are easily confused if two phonological tasks are introduced concurrently. For example a respondent who had not been able to realize the word ‘very’ and realized it as ‘bery’. When asked to realize ‘very much’ the respondent articulated it as ‘bery buch’. This shows that a typical error can provoke an atypical error. To avoid these contagious errors, a specific target approach is used. Here, a certain goal is set with a specific objective. For example the phonological awareness improved when the respondents were presented with words targeting the same sounds like ‘dog, mud, door.’

The teacher respondent noted that in some cases, the learners with DS show minimal improvement in language learning, for instance, the case of R15 who had very minimal speech. In such cases there is need to supplement their language learning and therefore the use of AAC devices. The use of augmentative or alternative communication (AAC) as a tool of enriching language learning was also very effective. This included the use of symbols, aids, strategies, and techniques to enhance the communication process. For example, when R15 was asked to articulate the word ‘spoon’ he said it as ‘poo’. However, when an object (spoon) was integrated, he improved the articulation to ‘poon’ and after 6 times, he improved to ‘spoon’. The choices were represented by real items, pictures of items, and symbols for items (including print). The objective

was to make the child associate the tools with words. A sample of the pictures used in this method is attached in the Appendix III part B.

4.5 Summary of the Chapter

In the preceding sections of this chapter, this study has tackled the questions it sought to answer. The occurrence of phonological disorders in learners with DS have been presented and analysed. Data collected is in line with the Theory of Natural Phonology by David Stampe (1989) that all children have underlying simplification which occurs as 'phonological errors' which gradually fades either naturally or through intervention. In the case of this study, interventions have to be implemented for effective learning of language to occur. Some strategies which can help correct the phonological errors has also been highlighted.

The types of phonological disorders were classified as typical and atypical sound changes. Typical disorders being sound patterns that can be explained systematically and phonetically including the processes of substitutions, additions, or omissions. On the other hand Atypical Sound Changes are phonological disorders that are unsystematic and therefore not explained phonetically (Edwards, 1992).

From the data obtained from the study on phonological disorders in learners with DS, it can be concluded that the various phonological disorders are present in learners with DS and this includes omission, substitution, cluster reduction, stopping, devoicing and fronting. This

observation reinforces what Algozzine et al (2006) state that children with DS display delayed and defective speech, due to the condition involved.

The findings also states that phonological disorders affect the main domains in language development which includes; literacy abilities, word analysis, syllable recognition and the relationship between written and spoken language. These deficits can eventually lead to reading disabilities.

Researchers have it that the differences in structure and in tongue size of children with DS influence the production of lingual consonants (Miller & Leddy, 1998). Furthermore, weak facial muscles limit lip movement, thus affecting production of labial consonants and rounded vowels (Leddy, 1999). Because of these characteristics, there is need for adequate and appropriate intervention to enhance their language learning. This study came up with several ways in which the phonological errors can be corrected to improve language learning. This includes; early intervention, use of Core Vocabulary Therapy, Integral Stimulation, reducing the need to multitask, using AAC technique to supplement learning and teaching alphabet knowledge.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This Chapter contains the summary of the findings, conclusions and recommendations. It first provides a brief summary of the findings in relation to the research questions, research objectives and the methodology. Recommendations and suggestions for further research are then outlined.

5.2 Summary of Findings

The objectives of the study were to identify the types of phonological disorders in language learning of learners with DS; to analyse the patterns of phonological disorders made by learners with DS, to establish how the presence of phonological disorders affect language learning in learners with DS, and to establish possible ways of correcting phonological disorders in language learning of learners with DS.

The presence of phonological disorders are explained using the Natural Phonology by David Stampe (1989) which states that in their intention to communicate, children simplify what they intend to say to make it possible for them to produce it but slowly reduce the amount of simplification naturally. The theory also states that in rare cases, the suppression of simplification do not occur and this lead to emergence of

phonological disorders. For the learners under study, it was found out that this suppression did not occur and therefore required intervention measures to learn language.

Several findings emerged from the analysis of the data. From the first objective, the types of phonological disorders were basically two; atypical and typical disorders. Atypical disorders are mostly present in children with speech related disabilities while atypical errors are present in all learners. However if they persist beyond the expected age, they may pose as a disorder (Leitao & Fletcher, 2004). According to Roberts et al. (2007) speech intelligibility affected by these phonological disorders is a lifelong challenge for those with Down syndrome. The effects of these types of disorders may not be distinctive as they may have the same effects.

The second objective aimed at analyzing the patterns of phonological disorders in language learning of these learners with DS. The study results indicated that learners with DS display phonological errors which may also emerge as disorders. The phonological disorders identified included; omission, cluster reduction, devoicing, fronting, stopping and substitution. The results reveal that cluster reduction was the most common as it requires a high coordination of the tongue and other speech organs. They tend to avoid the complex phonological processes, partly due to the deformities around the oral cavity which includes a thick tongue and low muscle tone (Abbeduto, Warren, & Conners, 2007).

The third objective aimed at establishing how phonological disorders affect language learning in learners with DS. The study found out these disorders affect the main domains of language which include; spoken language, written language and reading abilities. Martin et al. (2009) support this as they report that language learning may be affected by phonological awareness, voice quality, apraxia of speech, and dysarthria. Decreased speech intelligibility creates communication barriers in individuals and also negatively affect the development of correct language skills.

The fourth objective set out to establish ways of correcting phonological disorders in learners with DS. Through the use of questionnaire and observation, the study found out that indeed language learning of learners with DS can be improved by employing certain strategies. This includes early intervention, use of Core Vocabulary Therapy, Integral Stimulation, reducing the need to multitask, using AAC technique to supplement learning and teaching alphabet knowledge. Kumin, 1998 agrees that treatment of speech and language in individuals with Down syndrome may be best if started early, but will be a continuous activity as it may be helpful throughout different points in life but only if the right intervention is put in place.

5.3 Conclusions

Learners with DS experience phonological disorders which greatly affect language learning. Basically, nearly all learners with DS experience the challenges with phonological processes. They also portray a similar pattern of phonological errors partly because of their common characteristics. The findings further show that with intervention, these disorders can be minimized.

The findings indicated that these learners experience challenges when learning language especially in the spoken language particularly articulation of words as shown in Table 4.2 in Chapter 4. These challenges are attributed to their generic characteristics which include; small oral cavity, a narrow high arched palate, an irregular dentition and an enlarged protruding tongue. They also display muscle abnormalities of the face and low intellectual abilities both of which are possible contributing factors to a decrease in speech intelligibility.

Learners with DS therefore need special attention in language learning to help them curb the challenges of phonological errors and increase their chances of language mastery. The special attention can be in form of intervention in early stage of life, strategies and appropriate policies. This is tackled by objective four where suggestions are made on possible ways of minimizing phonological disorders.

5.4 Recommendations

Based on the findings that emerged in this study, the following recommendations can be made:

Early intervention is considered as the starting point of minimizing phonological disorders. Therefore, exposure to language learning should be done as early as possible as soon as the child with DS acquires school-going age to increase their chances of language mastery. This is an important corrective measure and in line with the fourth objective on possible corrective measures to phonological errors.

As outlined by objective 1 and 3, learners with DS experience phonological disorders which affect language learning, therefore, teaching and learning strategies should be put in place to help the learners in language learning. This includes: the use of augmentative or alternative communication (AAC) as a tool of enriching language learning which entails the use of symbols, aids, strategies, and techniques to enhance the communication process. The use of Core Vocabulary Therapy which requires the teacher and the learner to select target words, learn them consistently and gradually removing the mastered ones. Employing Integral Stimulation where the teacher models an utterance and the child imitates it with the teacher ensuring that the child's attention is focused. Avoiding multitasking and using a specific target approach also proved fruitful in minimizing phonological errors.

In addition to the strategies, teachers who teach learners with DS should be well trained on the best way to teach them as they require specialized attention and approach in order to help them overcome the challenges posed by their generic characteristics while learning language. This study recommends that the language teachers of learners with DS should be given special training tailored towards assisting these learners achieve their full potential in language. Those who are still in practice should be given in-service training on the skills. This is in line with objective 4 because if the teachers are appropriately trained, they will be able to focus on the real phonological issues faced by the learners thereby improving their language learning.

For the interventions to be effective, there is need for parental involvement. There is need for the parents and the caregivers of learners with DS to be aware of social and academic implications of defective speech. Thus, they also need to be sensitized on the language challenges faced by their children and the benefits intervention. Parents and the caregivers should be willing and motivated to participate in language learning of their children. This can be achieved, for example, through regular parent-teacher meeting to discuss the learner's progress and the way forward and also through seminars to sensitize public on the same.

As revealed through objective 1 that indeed learners with DS experience phonological disorders which in turn affect language learning as stated in objective 3. The findings of this research may be useful to the curriculum

developers as they develop their education policies. Thus, the recommendation for the Ministry of Education is that it should re-examine the 8.4.4 syllabus where oral skills are tested in relation to learners with DS. The Ministry's policies should be developed in consideration to the needs of learners with DS in language learning as language forms the pillar to the general learning of other academics areas.

5.5 Suggestions for Further Research

The following has been suggested as possible areas for further research:

1. This study focused on the impacts of phonological disorders in learning language and mainly focused on English as the language. Further studies establishing whether the phonological disorders affect the learning of other languages like mother tongue need to be carried out.
2. This study was done in a school environment. However, putting in mind that language is a continuous process (not restricted to a school environment), a study can be done in a home or another social environment to determine the effects of phonological disorders in language of learners with DS in communication and general learning of language.
3. This study was done in Nyeri County, Kenya. Therefore, a study can be done in other areas especially those that are ethnically

different from the locale of study to establish whether the same findings will emerge with a different population.

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APPENDIX I: OBSERVATION CHECKLIST

This research instrument is meant to assess how well the learners with DS respond to tasks on language learning particularly phonology. It will help the researcher record the occurrence and frequency of phonological errors in language learning.

OBSERVATION CHECKLIST

Class: _____

Date: _____ Time: _____

1. General rating on the learners with DS level of language compared to their peers.

   Very poor___ poor_____average_____good_____very good

2. General rating on the learners with DS progress on phonology acquisition.

   Very poor___ poor_____average_____good_____very good

3. Frequency of phonological error.

   The errors will be recorded as per the type, the following letters will be used; b-backing, c-cluster reduction, d-depalatalization, de-devoicing, f-fronting, o-omission, p-palatalization, st-stopping s-substitution

GENERAL OBSERVATION

Student	Occurrence of Phonological Error
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

APPENDIX II: QUESTIONAIRE FOR TEACHERS

a) **Instructions**

1. Please respond to all the questions.

2. Tick and give appropriate and correct response according to your experience.

3. Some items may be having more than one response

4. Your responses will be treated with confidentiality.

b) Personal Profile

1. Professional training

i. What is your level of training?

P3 P2 P1 S1 Diploma Bed

Other (specify)

ii. Have you got any training in handling learners with learning difficulties?

Yes No

If yes, what level of training?

- Short courses attendance (seminars or workshops)
- Certificates (3 months or more training)
- Diploma

- Degree

iii. What further training could be useful?

iv. The size of class population, teacher-pupil ratio is adequate Agree Strongly Agree ( ) Agree ( ) Strongly disagree ( ) Disagree( )

v. As a teacher, how do you prepare yourself to teach language to learners with Down syndrome in your school?

vi. Are there adequate and suitable teaching/learning equipment and resources to cater for the language learning of learners with Down syndrome?

Yes No

If no, how do you handle the learners?

What teaching materials and aids do you prefer to use in language teaching? Why?

What ACC Devices are available to ensure effective language learning?

vii. What are some of the main instructional objectives you set to determine the strengths and challenges of learners with Down syndrome?

viii. What are some of the main disorders that learners with Down syndrome have when learning language?

ix. It is very common for learners with Down syndrome to make phonological errors when learning language.

Strongly agree ( ) Agree ( ) Disagree ( ) strongly disagree ( )

x. What factors contribute to this errors in phonology in language learning of learners with DS?

xi. What remediation strategies do you use to help learners with phonological disorders?

xii. What challenges do you face when teaching phonology to learners with DS?

xiii. Suggest possible solutions that can help minimize the phonological disorders in language learning by learners with Down syndrome?

Thank you for your cooperation.

APPENDIX III: TEST OF PHONOLOGY

Name_____

School_____Class_____

Test Date _____ _____ _____

Birth date _____ _____ _____

Sound	Target Word	Realization of the word	Type of Phonological Process
g/n	green /gri:n/		
b/d	bread /bred/		
z	zip /zip/		
g	gas /gas/		
sp	spoon /spu:n/		
k	key /ki:/		
v	very /veri/		
dr	dress /dres/		

APPENDIX III: PART B: PICTURE NAMING

Picture	Name	Phonological Process