

**EFFECTS OF HANDWRITING DIFFICULTIES ON ACADEMIC
PERFORMANCE OF LEARNERS WITH LEARNING
DISABILITIES IN PUBLIC PRIMARY SCHOOLS IN NAIROBI
CITY COUNTY, KENYA**

**BY
EMILY N. MULANYA
E55/CE/22901/2011**

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KENYA.**

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DECLARATION

I declare that this research thesis is my original work and has not been presented in any other university for consideration. This research thesis has been complemented by referenced sources duly acknowledged. Where texts, data (spoken words), graphics, pictures or tables have been borrowed from other sources, including the internet, these are specifically accredited and references cited in accordance with anti-plagiarism regulations.

Signature **Date:**

Emily N Mulanya

Department of Early Childhood and Special Needs Education,

SUPERVISORS

We confirm that the work reported in this thesis was carried out by the candidate under our supervision as University Supervisors.

Signature **Date:**

Dr Beatrice Bunyasi Awori

Department of Early Childhood and Special Needs Education,

Kenyatta University.

Signature **Date:**

Dr Stephen Nzoka

Department of Early Childhood and Special Needs Education,

Kenyatta University.

DEDICATION

This research thesis is dedicated to the Almighty God who has made everything possible. My mother Anna Kiriswa who ensured that I received my education. My husband Eric Manyasa and my lovely daughters: Maureen, Mercy, Mavis and Mona for their understanding and support during the many long hours when I had to juggle between work, family, and studies. My brother in law Francis Echessa who supported me through my Education in Secondary and High school.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACT	American College Testing Program
APHRC	African Population and Health Research Center
APA	American Psychological Association
ANOVA	Analysis of Variance
EARC	Educational Assessment and Resource Centre
IDEA	Individuals with Disabilities Education Act
KCPE	Kenya Certificate of Primary Education
KNEC	Kenya National Examination Council
LD	Learning Disabilities
SPSS	Statistical Package for Social Science

ABSTRACT

Handwriting is described as a language by hand. It is a mirror through which individual creativity, abilities, patience, and organization is reflected. To a large extent it's a predictor of learning abilities. Unfortunately, 30% of learners worldwide experience handwriting problems against the background of fading handwriting lessons from the official school programs. Over 60% of learners experiencing handwriting difficulties also suffer from a given form of learning disability. It's against this backdrop that this study was done to assess handwriting difficulties among learners with learning disabilities and determine the effects on academic performance in Makadara Sub County, Kenya. The study objectives were: To assess handwriting characteristics among learners with learning disabilities, to establish knowledge of factors influencing handwriting development among learners with learning disabilities, to find out measures taken to address handwriting problems and lastly to determine the effects of poor handwriting on academic performance. The study employed Logan and Crump's hierarchical two-loop theory for the production of handwriting, that was conceptualized in 2009. This was a two-tier study employing both qualitative and quantitative techniques of data gathering and analysis. The study method used was a mixed research design method which examined in breadth and depth the perspectives, practices, experiences of teachers and learners on the study problem. Purposive sampling was used to get the sample size of 254 respondents which consisted of 5 examiners, 21 language teachers, 25 class teachers, 3 headteachers and 200 learners with learning disabilities who had handwriting difficulties. Qualitative data was collected using in-depth interviews and observations. Quantitative data, on the other hand, was collected using open-ended and closed-ended questionnaire guide. Data was analyzed by the use of SPSS computer software version 19 and results were presented in graphs, tables, pie charts and frequencies. The adversely affected schooling behavior was assignment completion and submission, lesson attendance, participation in learning activities and aggregate mean score. This was vindicated by the ANOVA test that yielded a *p-value* of 0.027 against a significance value of 0.05 implying that handwriting difficulties had a negative impact on the academic performance study. The findings indicated that the majority of the respondents believe that learners with learning disabilities can develop good handwriting. An average number of respondents had a negative perception of learners with handwriting difficulties. 82% had a perception that handwriting difficulties impacted on the learning behaviors of learners with learning disabilities. Over fifty percent strongly agreed that handwriting difficulties affected the academic performance of learners with learning disabilities. The study recommended that teachers should acknowledge the existence of handwriting problems in the regular classroom and have a positive attitude towards learners who have handwriting difficulties; acceleration of research on good practices and pedagogies on handwriting development and lastly the need to institutionalize handwriting lessons in the national curriculum and part parcel of the official learning program

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 Introduction

This chapter presents the background to the study, the statement of the problem, the purpose of the study and objectives of the study, research questions, and significance of the study, assumptions made during the study, limitations and delimitations of the study, theoretical and conceptual framework and definition of operational terms used in the study.

1.1 Background to the Study Problem

Globally some 30-40% of learners experience handwriting problems (Mercer, Mercer, & Pullen, 2011). The majority of the learners experiencing handwriting difficulties are in the lower grades of learning. However, the problem is also present in higher grades. This is according to the American College Testing Program (ACT) report of 2005. The report acknowledges that a third of students joining tertiary colleges had handwriting difficulties. This is happening in an era where there is less emphasis on handwriting intervention measures (Westwood, 2011). It is also happening against backdrops of handwriting lessons fading in prominence as teachers and students embrace electronic writing devices (Mangen, Anda, Gun, & Kallestén, 2015).

Writing or handwriting is an elaborate process (Westwood, 2011). In this process, a learner uses symbols, letters, and numbers to express his or her thoughts (Reid, 2009). The flow and fluent of this elaborate process are tied to some overlapping factors

(Wallen, 2013). These overlapping factors include but not limited to motor problems, faulty visual perception of letters /words and poor visual memory. Also, there's inadequate instruction by educators and limited motivation on the part of learners (Mercer, Mercer, & Pullen, 2011). An understanding of these factors is a precursor to addressing the problem (Westwood, 2008; Mendizabal, Candida, Guzman, Immaculada & Romero, 2016).

Handwriting difficulties problems are complex and varied (Wallen, 2013, Tamara & Frijters, 2015; Mellissa, Anna, Wilmut, & Mandy, 2016). This implies that handwriting difficulties are manifested differently. According to Mercer et al., (2011) handwriting difficulties may be manifested in writing slowly, incorrect directionality of letters and numbers, and too much or little pencil grip. It may also be manifested in spacing difficulty, the messiness of the script, inability to keep horizontal line and illegible letter formation. Similar sentiments were echoed by (Berninger, Abbott, Auguburger, & Garcia, 2009; Charlotte, Parks, & Oslick, 2018; Golley 2015).

A poorly developed handwriting impacts a learner in multiple ways. First and foremost, it negatively impacts on self-esteem and worthiness of a learner (Bamidele, 2017). Second, it affects the physical behavior like lessons attendance, sitting position in the class, completion and submission of the assignment and planning strategies of learners (Limpo, Rui, Alves, & Connelly, 2018). Finally, it impacts on the overall academic performance of an individual learner, through both quality and quantity of persuasive and cognitive writing (Santangelo & Graham, 2016).

Both neuron typical (without a learning disability) and neuron diverse (those with a learning disability) experience handwriting difficulty (Alves, Limpo, Salas, & Joshi, 2018). The problem is much more complex however among the learners with learning disabilities (Kandel, Peereman, Grosjacques, & Fayol, 2011). This is because they are required to balance deficiencies in the brain, visual, linguistic and perceptual with deficiencies in motor control simultaneously (Kandel, Sangosse, Grosjacques, & Perret, 2017). Both the neuron typical and learners with learning disabilities suffer from handwriting difficulties. Meanwhile, over 60% of the learners exhibiting handwriting difficulties suffer from a learning disability (Bishop, 2004). Ideally, writing and letter formation pattern differs across the learning stage and the task beforehand. This variation suggests a high correlation between cognitive and motor functions (Bui, Myerson & Hale, 2013; Berninger, 2008).

Learners experiencing Learning disabilities are confronted with extraordinary barriers when it comes to the complex question of mastering writing skills (Bara & Gentaz, 2011). These learners use more energy on motor functions adversely affecting their cognitive functions (Kandel, et al., 2017). As this happens, some 70% of teachers report inadequate skills to handle the complex problem (Westwood, 2011; Magombo, 2015; & Saskatchewan, 2004). It's worth noting that handwriting difficulties won't disappear without specific intervention measures (Kandel, et al., 2017) and discussed in chapter two of this study, the measures should be rolled out in early stages of learning and must address diversity in abilities and resources.

Most learners with a learning disability are not doing well in school as a result of handwriting difficulties; a problem of expressing thought in written form. Handwriting difficulties cause the work of a learner with a learning disability to be difficult to understand leading to misinterpretation of their communication which may result in failure, underachievement and lack of motivation in academic activities. According to Richards (2009) poor handwriting can have impacted negatively on the success of learners with learning disabilities in schools. Many learning disabilities children with poor handwriting are not able to write symbols well, and they cannot put their thought together coherently or write legibly in the examination and as such it affects their overall performance in the examination. Handwriting difficulty becomes a serious problem for learners with learning disabilities since they will not be able to convey their message accurately and legibly in writing.

Understanding the learning needs of children with a learning disability requires extraordinary planning, strategies, skills, and resources (Westwood, 2011). Unfortunately, these skills, resources and instructional strategies to help navigate the complex problem are limited and wanting (Nyaga & King'endo, 2015; Golley, 2015). The most important factor in the breakthrough nevertheless is the values, beliefs, attitudes, and practice of an educator (Rebecca, 2017, Charlotte, et al., 2018 & Berninger, et al., 2009). Meanwhile, where some levels of commitment to address handwriting problems have been demonstrated, significant change has been reported. This is regardless of whether the learner had a learning difficulty or not (Magombo, 2015; Westwood, 2011 & Mellissa, 2016).

There exist some hurdles to effectively diagnose, treatment and rehabilitation of learners with Learning disabilities (Bara & Gentaz, 2011). Improved procedures and tools for identifying learning disability have seen a sharp drop in handwriting difficulties in America (Rebecca, 2017). In resources constrained context like Makadara Sub County the problem persists and sometimes made complex by integrating learners with learning disabilities in the mainstream schooling system. Therefore, cases of handwriting are hardly diagnosed, reported and remediation sort. More often, than not handwriting difficulties are equated to Learning disabilities.

Yet according to Grskovic and Belfoire (1996) handwriting difficulties should not be equated to Learning disabilities. Educators need to contemplate systematic procedures for diagnosing and treating handwriting problems. These procedures should address the special needs of learners and disparities in learning abilities (Charlotte, et al., 2018). To address this, Santangelo and Graham (2016) have encouraged research on evidence-based practices. Similar sentiments have been voiced by (Alves, et al., (2018). The authors have stressed the “needs for enhanced research testing the impact of handwriting with a wider range of practices and students.”

The existing practices are far much below the scenario contemplated by (Charlotte, et al., 2018, Santangelo & Graham, 2016; Alves, et al., 2018). For instance, handwriting difficulties are discussed as a general writing difficulty problem. This asymmetry has been singled out by Bara and Gentaz (2011). Consequently, applied research on writing difficulties have over-emphasized basic spelling, descriptive and persuasive writing.

Letter formation and handwriting difficulty, in particular, has been accorded a second thought (Kandel, et al., 2017). Again, handwriting difficulties differ across cultures, gender, diversities inability, stage of learning and resources endowment base (Mendizabal, et. al., 2016).

Handwriting acquisition is a generally slow and daunting task, and a number of years of training needs for learners to perfect the art of fluent writing (Bara & Gentaz, 2011). Conversely, handwriting difficulties as already stated hardly disappear without specific interventions. In Kenya, handwriting difficulties have been noted both at school and at the national level (Nyaga & King'endo, 2015). The problem has made it difficult to assess learners' written work, in both the Kenya Certificate of Primary Education (KCPE) and Kenya Certificate of Secondary Education (KCSE) (Rasugu, 2010). In response, teachers were called upon to revitalize handwriting lessons to curb the problem. However, this call has not been matched with the necessary standards, tools, guidelines, and resources (Nyaga & King'endo, 2015).

1.2 Statement of the Problem

Learning disability question is a complex one although there are limited standardized tools to assist affected learners to overcome the barrier. One tool that appears to hold much leverage in identifying and profiling learners with Learning disabilities is the quality of handwriting. A study done by Rasugu (2010) cited the 2008 Kenya Certificate of Primary Education (KCPE) analysis by the Kenya National Examination Council (KNEC) 2009, which revealed that the performance of learners in English and

Mathematics was not good. This was because of most of these learners' experience in reading and writing difficulties. According to Rasugu (2010), children with a learning disability are labeled as hard to teach, lazy, slow learners and careless. This causes teachers in regular schools not to pay attention to such learners due to the negative attitude they have about them.

Responding to the challenge of poor handwriting, the Kenya National Examination Council (KNEC) prevailed upon teachers to reinstate handwriting lessons. This call however has not been complemented with guidelines; resources and standardized parameters (Nyaga & King'endo, 2015). Yet teaching handwriting instructions to children with learning disabilities require extra planning, resources, and strategies. Traditional teaching methods may not help in overcoming the barriers. Secondly, applied research on writing have overemphasized ideas of development, unity and coherence of ideas, vocabulary mastery, sentence structure, grammar and usage (Phakiti & Lulu, 2011). Letter formation and handwriting legibility has received less focus and has been canvassed as a subset of writing difficulties problem. Santangelo and Graham (2016) have thus encouraged more basic studies on handwriting problems. These studies should capture multiple diversities. This is because diversities in learning go hand in hand with diversities in abilities, skills, resources, and practices.

In the year 2011, the Kenya National Examination Council (KNEC) decried widespread handwriting difficulties/challenges that have made objective marking and examining of some learners' scripts a tough task and subsequently called on teachers to embark on

teaching handwriting lessons to help the learners realize their full potentials (KNEC 2011). It was noted that the success in addressing handwriting difficulties lay with teachers in terms of their capacity, attitude as well as intervention measures, design, and implementation. This had happened against the background of limited standardized methods and curricula to enable teachers to handle the situation. There is, therefore, need to evaluate handwriting using a valid, reliable, standardized tool combined with the informal observations, teacher observations and collaboration. Addressing the achievement gap between learners with and without learning disabilities remains a serious challenge in the context of inclusive education. Thus, this study seeks to establish if indeed handwriting difficulties affect the academic performance of learners with learning disabilities in Nairobi County.

1.2.1 Purpose of the Study

The purpose of this study was to assess effects of handwriting difficulties on academic performance of learners with learning disabilities in Makadara Sub-county.

1.3 Specific Objectives of the Study

To achieve the overarching goal of the study, the following research objectives were formulated.

1. To examine handwriting characteristics among pupils with Learning Disabilities in Makadara sub-county.
2. To find out educators' level of knowledge on factors influencing handwriting development among pupils with learning disabilities in the study areas.

3. To determine the impact of handwriting difficulties on the academic performance of pupils with learning disabilities in Makadara Sub-county.
4. To investigate activities undertaken by the educators to address the challenge of handwriting difficulties among pupils with learning disabilities in Makadara sub-county.

1.4 Research Questions and Hypotheses

To address and achieve the specific objectives and the important purpose of this study, the following research questions were pursued;

1. What are the characteristics of learners with Learning Disabilities in public primary schools in Makadara Sub-county?
2. What is the level of knowledge among educators on factors influencing handwriting development among learners with Learning Disabilities in the study areas?
3. What are the effects of handwriting difficulties on the academic performance of pupils with learning disabilities in Makadara Sub-county?
4. What activities are undertaken by the educators to address the challenge of handwriting difficulties among pupils with learning disabilities in Makadara sub-county?

1.5 Research Hypotheses

The following null hypotheses were tested in this study to establish the significance of field findings.

1. H01: There is no relationship between handwriting difficulties and academic performance of learners with learning disabilities.

1.6 Significance of the Study

This study sheds more insight into factors influencing handwriting development among school-going learners with learning disabilities in upper classes of selected public primary schools of Nairobi County. There was a debate in a bid to determine the role of both intrinsic and extrinsic factors in the development of appropriate handwriting. Comparably the study also identified the perception teachers had about learners with poor handwriting. The study was also to help equip teachers with the necessary skills required in aiding learners who have handwriting problems. Such facts include environmental factors, sitting position, poor instructions, age of learners, lack of motivation, perception, motor problems, visual memory and tools and the equipment used for writing.

Understanding signs and symptoms learners with learning disabilities exhibit provided the basis of first-hand intervention measures. To this effect, the study shed light and provided information that may enable curriculum developers within education sectors as they struggle with handwriting problems. Knowledge of the effects of poorly developed handwriting is important in designing corrective measures without the possibility of interfering with creativity and the potential of the learner. The objective of the activities undertaken to address handwriting difficulties will document vital good practices undertaken by teachers to help learners overcome handwriting problems. The document successful practices may be shared with teachers and learners in similar situations.

1.7 Limitations and Delimitations

In this sub-section of the chapter, the scope of the study and forces that negatively impinged on the accuracy of the field findings were discussed. Limitations in terms of knowledge scope and target population were presented.

1.7.1 Limitations

The major hurdle in studying learning disabilities problem is inadequate standardized tools and guidelines to facilitate appropriate profiling of the affected learners (Kandel, et al., 2018, & Sousa, 2001). This study did not develop or come across a standardized tool and procedure in the process of identification of learners suffering from learning disabilities. The study relied on the subjective judgment made by the researcher and classroom teachers. This was complemented by the assessment of children's written expression, which was a subjective process. To assess academic performance and continuous assessment tests administered at the school level were employed. Unfortunately, most of these tests hardly capture the six domains of learning limiting their reliability.

1.7.2 Delimitations

To answer the main research question, both numerical (numbers) and letter formation (words) were studied. The study focused on learners in classes 6 and 7. This was necessary because little is empirically established on handwriting processes beyond lower primary school (Westwood, 2011; Mellissa et al., 2013 and Rasugu, 2013). Therefore, focusing on learners in the upper primary level was aimed at providing a continuum

between handwriting development among learners in lower primary and their counterparts in upper primary. Second, learners in the upper primary are tested in both descriptive and persuasive writing which required refined handwriting skills and organizational capabilities compared to their counterparts in the lower primary who are tested on basic writing skills. Data collected from this cadre of learners adequately determined the impact of handwriting difficulties on academic performance.

1.8 Assumptions

While designing and conducting the study, a number of assumptions were made. They were made based on the reviewed theoretical literature and background information, and findings that were inherent in associated studies. These assumptions were;

1. Handwriting difficulties take the form of scribbles, wavy lines, and pseudo letters.
2. Handwriting development is construed as an interaction between lower-level perceptual-motor functions and higher-level mental functions instead of a mere motor mechanical process.
3. Inadequate skills, personnel and time are derailing efforts to adopt intervention measures.
4. Handwriting difficulties impact more on literacy functions compared to the numeracy capabilities of the learners.
5. There are tools that are used to identify learners with handwriting difficulties and at EARCS.

1.9 Theoretical and Conceptual Framework

1.9.1 Theoretical Framework

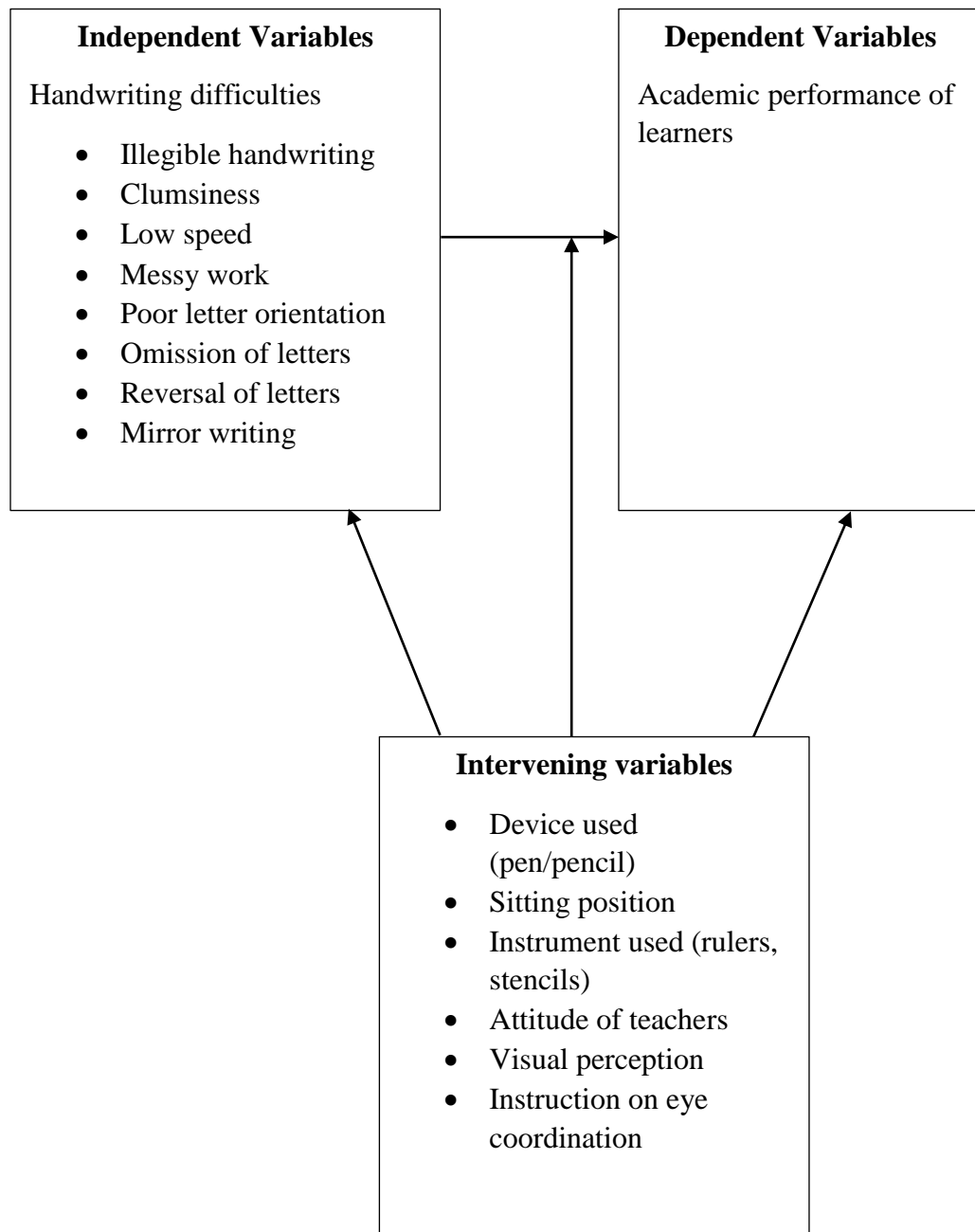
This study employed Logan and Crump's hierarchical two-loop theory for the production of handwriting which was conceptualized in 2009 (Logan & Crump, 2009). According to the theory, handwriting is a complex process that involves several forces. Alternatively, handwriting is a mirror through which a learner's perceptual, motor, cognitive, and linguistic skills may be reflected. This implies that a child's handwriting can be used to understand important brain functions. Accordingly, perceiving accurately the letter, space, shape is essential in the production of quality handwriting (Bara & Gentaz, 2011). In nutshell, handwriting largely depends on the interplay between motor systems and spatial patterns in the brain. The theory suggests that typing skills rely on three kinds of association: word, letter and keystroke i.e. key location, finger movement and direction. Typing relies on the association between words and letters which allow concurrent processing of letters (Crump & Logan, 2010b). Moreover, the association between letters and keys which support implicit knowledge about key location (Logan, 2003) and thirdly the association between key and finger movement, which enable the inner loop to direct the finger to the corresponding keys (Crump & Logan, 2010a)

This theory relates to handwriting in that handwriting is a process that comprises of spatial, Cognitive, motor, perceptual and linguistic processes. The theory notes that handwriting is an anticipatory process (Kandel, et. al., 2017). Therefore, words produced by a free hand and the associated pattern are important in understanding the brain and mental functions. Kandel, et. al., (2011) argue that the anticipatory conception of motor

production is still the most effective way of understanding the handwriting process. Invariably, producing letters, words, numbers, or images using freehand calls for finding the appropriate shape in the memory, inspecting the motor program present, identifying indicators for the program, and consequently executing the program. In summary, motor programs supply data that is used to define the letter shape, stroke, and direction. Based on this theory Van Galen (1991) develop a conceptual framework known as hierarchical and functional stages for the production of handwriting.

1.9.2 Conceptual Framework

Figure 1.1 Conceptual framework illustrating the relationship between the study variables



Source: Researcher, 2020

The preceding conceptual framework illustrates Van Galen's (1999) handwriting production process. As envisaged by the author, handwriting production is a linear process, producing different effects. The locus of the process is the individual's dynamics. Therefore, the knowledge of an individual's dynamics is central in the understanding of handwriting processes. As illustrated in Figure 1.1, an individual's perceptions/attitudes, skills and both intrinsic and extrinsic factors are pivotal to an understanding of the handwriting processes. These factors are modulated by several intervention measures impacting on handwriting attributes like speed, spacing, letter formation and legibility of writing. The inability to address handwriting malaise in the formative stage will inevitably impact on the intellectual and physical behavior of the learner.

1.10 Operational Definition of Terms

Several key terms or words that facilitate a smooth understanding of this thesis are presented in this section.

Academic performance: Educational success, fulfillment, growth, achievement, curriculum performance as per the syllabus.

Age: Chronological maturity in terms of years.

Assessment: The action of evaluating someone or something. It is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand and can do with their knowledge as a result of their educational experiences, the process culminates when assessment results are used to improve subsequent learning.

Gender: Female or male.

Handwriting development: Activity of writing by hand which improves with maturation or the developmental milestones.

Handwriting difficulties: Challenges encountered by learners who express themselves by use of hand or by the activity of writing by hand.

Handwriting: Writing by hand which varies from person to person? On average it must be acceptable and worth rewarding.

Inclusive education: Is when all students, regardless of any challenges they may have, are placed in age-appropriate general education classes that are in their own neighborhood schools to receive high-

quality instruction, interventions, and supports that enable them to meet success in the core curriculum.

Learning disability: A disorder in one or more of the basic psychological processes involved in understanding or using language, spoken, or written. It may be manifested in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations (adopted from the Individuals with Disabilities Education Act of America, 2004)

Legibility: The quality of being clear enough to read.

Motivation: The experience of desire or aversion. It involves the biological, emotional, social, cognitive forces that activates behavior. It is the driving force behind human behavior.

Pedagogical practices: The learning activities that support the unit of content; the instructional approach such as active learning, constructivist model, student-to-student engagement; teaching to multiple learning styles, variety of assessments.

Proficient handwriting: Is that writing which is produced legibly and timely.

Self-esteem: used to describe a person's overall sense of self-worth or personal value.

Writing: The activity or skill of marking coherent words on paper and composing text.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this section, a review of the literature was done guided by the major arguments or propositions introduced in chapter one. The areas reviewed include theory on handwriting difficulties, general literature related to; measures to address handwriting difficulties, teachers' perception of handwriting difficulties, determinants of handwriting difficulties and characteristics of handwriting difficulties in learning. Further, empirical literature on studies conducted related to the case study was also presented.

2.1 Theoretical Review of Literature

Conducting a theoretical review of the literature was essential. First, it helped the research to develop a theoretical framework that was used to valorize findings from the field as canvassed in chapter four. Second, it helped in ascertaining if the findings from the field were valid. Finally, it provided the basis for comparing relevant research findings and later made descriptions, discussions, evaluations, and conclusions (Creswell, 2012). The analysis of the extant literature review was guided by the four propositions and arguments advanced in Chapter one. Also, an attempt was made to understand dysgraphia and by extension learning disabilities. The four propositions guiding this study were an understanding of factors affecting handwriting development among learners with learning disabilities and teachers' perception of handwriting difficulties.

2.2 Determinants of Handwriting Difficulties

There is a strong correlation between fine motor skills and the quality of letters, images and number formation. This implies that fine motor skill is a precursor to good handwriting according to Mangen et al., (2015), and accordingly fine motor control, memory and learning are intertwined and mutually inclusive. Therefore, “the authors note that doing things with a free hand is very important.” Tamara and Frijters (2015) drew the attention of this study to an association that exists between fine motor development and cognitive processes. They observed that handwriting quality and quantity are a by-product of interaction between the lower-level, perceptual, motor processes, and high-level cognitive processes. Grskovic and Belfiore (1996) further highlighted a robust synergy that exists between a fluent handwriting and cognitive or neurological stability as illustrated by the following sentiments.

Students struggle with handwriting challenges, but those with learning disabilities do so for different reasons. They have distinct areas of weakness in their cognitive processing and unique difficulties with the linguistic features necessary for accurate reading and writing. Commenting on the interconnectedness between fine motor and cognitive stability, Golley (2015) drew the attention of this study to four things. The four things are Attention-Deficit Hyperactivity Disorder (ADHD).

Brain function as a captain in letter formation has been given a wide berth in perception and cognitive studies Danili and Reid, (2006) and Souse (2001) have however cautioned against over essentializing brain functions, as much as it is an important factor. The

authors have received a strong commendation from Bishop (2004) when he cautioned teachers that, “Teachers must understand that there are several possible factors that are responsible for children’s failure to read and write.” Echoing similar sentiments, Westwood (2008) reminds researchers that a clear understanding of the multiple causes of poor handwriting might be the initial step in assisting children to progress in reading and writing. This will be achieved only if there are more basic and applied research. The research should examine handwriting difficulties to articulate, and illuminate factors for their development, and pinpoint how to facilitate the acquisition of such an important writing skill (Graham, Berninger, Abbot, R., Abbot, S., & Whitaker, 1997).

2.3 Teachers’ Perception of Handwriting Difficulties

An educator’s values, skills, and attitudes are essential factors in the success of instructional design and intervention (Limpo et al., 2018). A teacher who holds each learner with the highest expectation and regard is more likely to envisage appropriate measures to assist the learner in any difficulty (Berninger & Swanson, 1994). It starts when the teacher acknowledges that teaching methods that are responsive to reading and writing difficulties have the potential to meet the needs of an individual child (Magombo, 2015). In this vein, Westwood (2011) has encouraged educators to adapt teaching child-centered methods, and responsive to learning disabilities of a given child. Saskatchewan (2003) adopts a similar stance when he postulated that; “Teachers need to modify teaching skills, teaching styles, teaching resources and environment to meet the individual learning needs of all learners”.

Another entry point in addressing the handwriting challenge is for the teacher to acknowledge the importance of writing skills. This according to Abbott and Berninger (1993) compels the teacher to acknowledge the following. First and foremost, the teacher must acknowledge that handwriting skills are required for the full participation of a learner in school activities. Second, the teacher must realize that learners spend up to half of their classroom time engaged in paper and pencil tasks daily. Third, understand that handwriting processes impact on a child's academic success. Finally, educators must appreciate the factor that handwriting has a vital role in elevating the child's self-esteem.

“Writing is not intrinsically motivating to many students with learning disabilities.” That is according to (Grskovic & Belfiore, 1996). However, the researchers emphasized the need for teachers to find ways to make writing more interesting to learners, and by extension to those wobbling with learning disabilities. Again, according to Golley (2015), learners with learning disabilities lack the appropriate strategies to use while writing. This leaves them frustrated, and unwilling to continue writing. Suggesting countermeasures against this frustration, Lewis and Rena (1998) called upon the educators to develop specific tools that may enable learners with learning disabilities to overcome the barriers.

Providing an inclusive education is a big dilemma that educators are compelled to address. Making progress on this dilemma calls upon educators to interrogate the status quo, question the existing practices, evolve their praxis, and reflect on their teaching techniques (Berninger et al., 2009). Similarly, educators need to illuminate their beliefs,

values, and practices while at the same time be cognizant of a diversity of the abilities defining learners. In nutshell, educators need to find the most effective research-based practices to adopt. Charlotte et al., (2018) wonders how an educator can improve his or her writing instruction for learners with learning disabilities. Specifically, the author questions how teachers' values, beliefs, and practices in the gaze of dominant pedagogies can achieve the objective of improving learning outcomes for those grappling with handwriting foibles. It's in this regard that this study was done, principally to illuminate the teacher's perceptions, values and practices instead of the research question.

2.4 Characteristics of Handwriting Difficulties in Learning

Writing difficulties influence both learners and teachers. Ideally, an educator handling a learner with a writing difficulty finds himself or herself in an unfamiliar quadrant. The educator may find that the skills he or she wields are redundant, and so are his or her instructional methodologies (Charlotte et al., 2018). This is a recipe for frustration, stagnation, and discouragement. Berninger et al., (2009) agree with the unfolding observations and concludes that writing difficulties create a big dilemma. The authors further opine that writing difficulties result in discouragement and low morale for both learners and teachers.

Overall, writing difficulties have severe results on learning outcomes. Reid, Hagaman, and Graham (2014) have cataloged the negative effects of handwriting problems. The study notes that learners with writing difficulties lack attention and focus. Besides, these learners struggle in remembering the simplest concepts thoughts. They also do not take

credit for their success, meaning that they project everything in their world to external forces. Finally, these learners lack the element of belief, wrongful believing that regardless of any efforts they put in a given activity, they will not succeed. In this breadth, Sousa (2001) examined at length learners with handwriting difficulties. Partly agreeing with Reid et al., (2014), he noted the following about the learners with writing difficulties. He lamented that the learners plagued by handwriting maladies are characterized by slow writing, inconsistent letter formation and reduced legibility. There is also a mix up of letters, unfinished words or letters, inappropriate formatting and spacing and a strange pencil grip and hand position. In the same breadth, Mather, Roberts, Hammill, and Allen (2009) discovered that learners experiencing writing difficulties tired quickly and could not write on a line or within the margins and experienced difficulty in organizing their thoughts on a paper.

Learners with learning disabilities may find themselves in a challenging school environment. This challenge is aptly captured by Rebecca (2017) when she says, “Students with learning disabilities may not benefit from traditional teaching strategies. In this scenario, those with learning disabilities are already disadvantaged and struggle to learn.” This struggle emanates from the fact that over 75% of educators lack the skills to handle learning disabilities (Reid et al., 2014). This reenergized and prompted further studies to interrogate the impact of poor writing skills. Berninger et al., (2009) identified difficulty in assessment of written work (on the part of educators), as well as decreasing the range of written words and the length and quality of the composition. These findings are in tandem with a report presented by (Graham, Harris, & Adkins, 2018). They pointed

out that handwriting difficulties had an impact on word spelling, length and quality of the composition, sentence construction and vocabulary mastery.

Westwood (2011) drew our attention to the effects of poor handwriting on the physical behavior of learners, which is a long run morphed into a serious learning problem. The author informs the study that learners with writing difficulties are more likely to abstain from classes, take back sit positions in class, hardly submitted their work for assessment, lagged in-class activities and reported high cases of absenteeism from school.

2.1.4 Measures to address Handwriting Difficulties

A learner experiencing writing difficulties deserves extraordinary attention. However, this extraordinary attention is hardly forthcoming. The major reasons why learners with a special learning need land in a difficult situation have already been mentioned elsewhere in this chapter. Nevertheless, it is linked to extra planning and the resources needed (Limpo et al., 2018). Magombo (2015) hasten to add that the success level in addressing handwriting reflects the child's readiness to cooperate and teaching methods that meet the individual learning needs and strengths of a learner.

Westwood (2008) agreed with the author's argument and observed the success of the children's ability to read and write is dependent on appropriate teaching methods and appropriate teaching support. Tankersley (2003) takes the suggestions and follows in the footsteps of his predecessors by saying that handwriting intervention has a massive potential to increase reading and writing skills. Finally, Brooks (2002) sums up the

serious debate on the practical approach of intervention measures by complaining that failing to provide interventions for learners with learning disabilities suggests a failure on part of the teacher and consequently a failure in helping these children to succeed.

Interventions have demonstrated significant results in turning around the fortune of learners, including those struggling with a learning difficulty. Graham and Santangelo (2016) expanded this argument further, “from kindergarten to 9th grade, students with and without handwriting difficulties benefit from clear handwriting instruction.” However, the effectiveness of the adopted measures in remediating handwriting problems differs. Therefore, Charlotte et.al, (2018) called for the increased research on the best practices, whereas Beninger et al., (2009) augmented research that offers models and interventions sensitive to a diversity of the abilities.

Finding effective strategies for planning, composing, and revising pieces will help students with learning disabilities become more proficient writers (Golley, 2015). An argument that is sustained by Saskatchewan (2004) who observed that reading and writing difficulties at times will not change into permanent learning barriers. What is necessary and paraphrasing the study by Rebecca (2017) is for students to be given appropriate strategies in planning, composing and revising written work and pieces. Reid (2007) has cautioned against overelaborating the existing intervention measures. He proposed that the existent measures on handwriting issues were prescriptive, technical and rationale structured. The danger with these measures is that they either deskill the teacher or lower any attachment to the subject matter. He, therefore, rooted for the

measure expressed by Charlotte et al., (2018), when the author stated, “By having an adult work individually handwriting with a student, the adult can correct not only the students’ letter formation and word spacing but also the students’ grip on the pencil which is typically the source of motor control difficulty.”

Examining debates on handwriting problems demonstrated that the problem can be improved. It also advocated for intervention measures which aimed at enhancing teachers’ skills and attachment to the subject matter. There was also a need for evidence and research-based measures that capture diversities placed in cultural, regional, and technological dynamics, and demonstrate their effectiveness in shaping and moderating fluent handwriting.

2.5 Empirical Literature

A well-crafted literature review is a cornerstone of a good paper (Nakono & Muniz, 2018). Inspired by the foregoing argument, an empirical review of the literature to identify gaps was done. These gaps were based on incompleteness, inadequacy, and unfairness of the existing field surveys. Table 2.1 provides a summary of empirical studies captured in this work, and how the identified gaps gave this study a renewed momentum and focus.

Table 2. 1 A Summary of Empirical Studies captured during Literature Review

Author	Problem of study	Study design	Major findings of the study	Gaps in design and findings
Annika and Ake (2013)	Effectiveness of iWTR computer-	Quasi experimental targeting 87	The iWTR program enhanced literacy skills	-Studied neuron typical students

	based method on literacy capabilities of students in Sweden	students	through longer texts, better sentences structure, clear content, and concise language	instead of neuron diverse one. -Focused on executive writing functions at expense of lower level transcription functions.
Magombo (2013)	Integrating learners with reading and writing difficulties in regular schools in Malawi	Qualitative adopting phenomenological approach targeting 6 teachers of languages	-Reported limited knowledge on part of educators on differences between dysgraphia and dyslexia. -Limited of tools and personnel to diagnose learning problems hampered progress	-Small sample size. -Purely qualitative marginalizing quantitative techniques. - Examined higher level writing functions, not lower level transcription functions.
Mellissa et.al, (2016)	Examined factors impacting on compositional quality among children with developmental disorders in America	Exploratory targeting 28 learners and assessed their performance on 6 Wechsler objective language dimension items	-Recorded low performance in 5 out of 6 Wechsler objective language dimension items. -Number of produced words and percentage of misspelled words accounted for 55% in quality differences	-Exploratory in design focusing on executive writing function instead of a lower level transcription. -Small sample size -Only literacy capabilities studied marginalizing numeracy skills.
Metka, Boris and Andrej	Effects of replacing free handwriting	Adopted exploratory approach to	-Adoption of typing haptics or technologies	-Exploratory in design focusing on

(2018)	with typing haptics in Slovenia	isolate factors impacting on understanding of concepts in biology	overloaded mind reducing level of understanding, accuracy and synthesis of learnt topics.	neuron typical instead of mixed research design focusing on learners with learning disabilities. -Examined a higher-level writing or executive functions instead of lower level transcription skills.
Mendizabal, et. al., (2016)	Assessed pros and cons of using free handwriting or computer typing in notes taking in America	Quasi experimental targeting 251 college students	-Better speed for those adopting computer-based typing. -Better recall and memory and understanding for those adopting free handwriting.	-Focused on neuron typical instead of learners with learning disabilities. -Focused on executive writing functions instead of lower level transcription functions. -Quasi experimental instead of mixed design.
Nyaga and King'endo (2015)	Assessment of handwriting difficulties among students suffering from dysgraphia in Embu	Descriptive targeting 220 respondents and employing quantitative techniques	-Handwriting difficulties ranged from illegible writing, inconsistency in letter formation, messy script and poor pencil grip. -Inadequate personnel, skills,	-Focused on one out of 6 known learning disabilities. -Qualitative techniques were not used to argument quantitative

			instructional materials, tools hampered remediation measures.	techniques.
Phakiti and Lulu (2011)	Reading and writing difficulties faced by postgraduate students in an Australian University	Cross-sectional targeting 51 Asian students to determine the effects of background on academic attainment	-A high correlation between reading and writing, and general academic difficulties. -Proficiency in English, students' self-regulation, motivation, self-efficacy and cultural background had robust imprint on academic success.	-Focused on neuron typical students instead of learners with learning disabilities. -Examined a higher-level writing functions instead of lower level transcription functions. Cross-sectional rather than mixed in design.
Rasugu (2010)	Nature and prevalence of learning disabilities among primary school pupils in Nairobi, Kenya	Descriptive targeting 1213 respondents employing quantitative techniques.	-More difficulties recorded in languages compared to arithmetic. -Poor visual-motor coordination accounted for most of learning disabilities. -Largely transcriptional difficulties compared to compositional ones.	-Both neuron typical and neuron diverse pupils were studied. -Both transcriptional and compositional attributes captured in the study.

Rena (1998)	Effectiveness of adopting computer-based technologies in improving literacy skills in San Diego	Experimental targeting 103 students with learning disabilities	-Spell checkers had greatest impact in improving literacy. -Word processing and word prediction had significant impact on writing speed.	-Focused on executive writing functions instead of lower level transcriptional functions. Experimental instead of mixed in design.
Rebecca (2017)	Effectiveness phonetics based and memory-based spelling instructions on students with learning disabilities in Denmark	Experimental in design using a pretest and posttest approach reaching 120 students	-Combining phonetic based and memory-based approaches yielded better results than adopting a single approach. -Success level was pegged to individual preferences of approaches tested.	-Focused on executive writing functions instead of lower level transcriptional functions. -Experimental instead of mixed design.
Uche (2014)	Role of handwriting in mathematics performance in North Central Nigeria	Exploratory reaching 315 respondents to isolate factors influencing scores in a mathematics test	-Negative attitude or teachers' biasness worsened handwriting problems. -A high correlation between handwriting quality and scores in a math test.	Studied neuron typical instead of neuron diverse students. -Marginalized literacy skills by solely examining arithmetic capabilities.
Winkler (2016)	Analysis of patterns in handwritten spelling errors in America	Mixed study approach targeting 33 students with different cases of learning disabilities	-Dysgraphia cases reported mainly addition or omission of phoneme. -Dyslexia reported largely phonological and	-A small sample of 33 students. -Quantitative analysis did not yield any difference in spelling errors

			orthographic errors. -OWL-LD reported omission of vowels in their spelling errors.	across learning disabilities. -Qualitative analysis yielded significant differences in spelling errors across learning disabilities.
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Source: A review of Literature 2018

2.6 Summary and Research Gaps

A review of empirical studies brought to the fore many cogent observations. It's against this background that this study was energized to principally amplify the existing practices and attitudes and knowledge levels of different stakeholders. First and foremost, the review unearthed predominance of handwriting development issues with western perspectives of the problem. In this case, Graham et al., (1997) and Berninger, et al., (2009) have called upon researchers on handwriting problems to carry out guerrilla warfare and ensure every tradition, culture, geographic area and language, and socio-economic underpinnings are captured and represented when debating handwriting difficulties.

Second, the review showed more focus on the effectiveness of intervention measures using haptics-based solutions. While this is laudable, it's worth pointing out that the effectiveness of the intervention measures is as good as the theoretical arguments that inform them, hence the need for the mixed study design. Third, studies on writing difficulties have largely gravitated around the higher level or executive writing functions

i.e. ideas generation, spelling, grammar, vocabulary use, and punctuation among the neuron typical students. The challenge of lower-level transcription functions among the learners with learning disabilities has been marginalized hence this study attempted to breach the gap. Therefore, this study was a deliberate attempt to bridge the knowledge gaps from three fronts. First, the study attempted to bring to the limelight handwriting problems viewed from Afro-centric and a low-level technological society. Second, the study tried to support findings on the effectiveness of existing experimental designs with in-depth theoretical arguments on the practicability of intervention measures as viewed from a different cultural background. Finally, the study strived to reinstate debates on the importance of apportioning more time and attention to lower-level transcription functions.

2.7 Summary

Review of literature has demonstrated that handwriting impacts significantly on the performance of learners and has a great influence on, learners' analytical, cognitive and evaluation skills. However, there is limited information on teachers' perception of the problem, yet successful intervention measures in addressing handwriting difficulties call for understanding how teachers perceive the problem. This situation is a contemporary curriculum with inadequate professional or formal measures to remedy the situation. This gap has seen specific individuals or self-driven efforts of teachers put to question because handwriting difficulties tend to lack standardized definition and therefore come out as perceptual issues.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

As illustrated in chapters one and two, basic research into the problem of handwriting difficulties is developing. There is a high emphasis on applied research. Nevertheless, research on learning disabilities is rapidly expanding although it's a relatively new area of inquiry. This prompted two-tier research to examine the effects of handwriting difficulties among learners with learning disabilities. The study captured the views, principles, behaviors, practices, and perceptions of teachers, learners, and schools' administrators. This study is two-tier research because both qualitative and quantitative techniques were used in data collection and analysis as will be explained later in this section.

The chapter starts with outlining a research design used to answer the research question. The rationale for selecting a given research tool, instruments, and methods are articulated. Methods of data collection and analysis are articulated. Finally, the principles of trustworthiness and ethical considerations are presented. According to Silverman (2010), the methodology section systematically provides a clear and open picture of the steps a researcher takes to arrive at findings.

3.1 Research Design

A research design is a framework that brings together different parts of the research problem in an organized, systematic, and coherent way (Trochim, 2005). According to

Blakstad (2016), research design refers to the overall strategy that a researcher chooses to integrate the different components of the study coherently and logically, thereby, ensuring it effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data.

The design process starts with reflecting on the research question and interrogating the importance of finding reliable observations that assist in the understanding of the phenomenon. Therefore, the choice of a given research design is determined by the nature of the research question. In this study, a mixed research design was employed. It's an emergent methodology of research that advances systematic integration or mixing of quantitative and qualitative data within a single investigation or sustained program of inquiry. The basic premise of this methodology is that such integration permits a more complete and synergistic utilization of data than do separate quantitative and qualitative data collection analysis. Creswell (2014) argued that the fundamental principle of mixed methods research is that multiple kinds of data should be collected with different strategies and methods in ways that reflect complementary strengths and non-overlapping weaknesses, allowing a mixed-methods study to provide insights not possible when only qualitative or quantitative data are collected. Mixed methods research allows for the “opportunity to compensate for inherent method weaknesses, capitalize on inherent method strengths, and offset inevitable method biases” (Greene, 2007). The researcher picked was a mixed research design approach because there was a need to investigate the problem from various angles and also there was not much information on the topic. Quantitative method gives a reliable, statistically verified result. The quality of work of

the researcher in such methods can be easily verified while the virtue of qualitative methods is that they allow the researcher to understand what is difficult to isolate and compute with the help of quantitative methods as they allow you to penetrate the essence of phenomena. Moreover, it provides the researcher the opportunity to use the sharpest and most effective tool of knowledge which is the mind.

In this study it was ideal in building foundational knowledge base (Merriam, 1988) or advancing field of knowledge (Bray, 2010b). In this regard, teachers and learners' beliefs and perspectives on handwriting difficulties were pursued. Equally, practices and measures embraced to address the problem were investigated.

3.1.1 Research Variables

A variable can be understood as any measurable or quantifiable character that can take a different value or dimension (Mugenda & Mugenda, 2003). Variables are predominantly independent or dependent. There were also intervening variables.

Independent Variables

Independent variables refer to the type of variables that the researcher can manipulate to determine its effects on the corresponding variable during the study. This type of variable remains constant or unaffected as the study progresses. In this study, there were a number of independent variables. They included nature/characteristics of handwriting difficulties, knowledge, and awareness on factors influencing handwriting development, measures taken to address handwriting difficulties. The views and responses from the study participants constituted another group of independent variables.

Dependent Variables

The dependent variable refers to specific aspects or items of study that a researcher cannot control, manipulate to attain a given outcome. These variables are affected by any change in corresponding study items. These types of variables keep on changing as the investigation progresses. In this study, the dependent variable was academic performance. The performance of a learner depends on factors highlighted in the preceding section.

3.2 Location of the Study

The study was carried out in Makadara sub-county, Nairobi County. The sub-county has four wards namely, Makongeni/Mbotela, Viwanda, Maringo/Hamza, and Harambee. The sub-county has area coverage of 20.3 kilometers square. According to the African Health Research and Population Council (AHRPC) report of 2016, the majority of the households in the sub-county are engaged in small scale street trading. Over 75% of settlements are designated as informal settlements and lack access to public basic amenities (AHRPC, 2016). The rate of unemployment stands at 80% and most of the service providers are informal settlers (ibid).

The sub-county has both public and private schools. However, most of the learners attend public schools that are funded by the government (Nzau, 2017). The sub-county hosts Education Assessment Resource Center (EARC). The center gives a glimpse into the sordid status of the learning facilities in the country. The EARC is supposed to play a leading role in the screening of disabilities. The centers are equipped with the facilities to

screen children with visual impairment, mental handicaps and physical disabilities (Rasugu, 2010).

Unfortunately, most of the screening tools were outdated and there was inadequate calling for their upgrading and validation. In Makadara, and Nairobi County by extension, tools for diagnosing children with learning disabilities, giftedness, talented and behavioral difficulties are lacking (ibid). Consequently, children with special learning requirements are inappropriately profiled and accorded wrong placement (Mwangi, 2013).

Makadara sub-county was purposively chosen as a study area because of its diversity in socioeconomic representation and its high population density. The population of the sub-county is diverse capturing low, middle- and high-income households. This aspect enabled the study to examine the role of family background and early exposure to reading and writing culture in shaping the quality and quantity of handwriting. Second, limited data on special learning needs and learning disabilities in Kenya compelled the researcher to conveniently select the sub-county.

3.3 Target Population

Majorly, the study targeted pupils with handwriting difficulties and learning disabilities. This cadre of the respondents was to enable the study profile and characterize major handwriting flaws among the target population. This cadre in the lower primary was the target because learning disabilities are usually diagnosed before the age of 9 years

(Mwangi, 2013). Second, treatment and intervention measures are more effective if introduced in the early stage of learning. Finally, the national academic curriculum in Kenya notes that by class 7 or upper primary, learners are supposed to have cemented writing, communication, and reading skills to facilitate more critical learning and persuasive writing in upper primary school. In nutshell, learners with handwriting difficulties in grade 4 of their course study were studied.

Mathematics and language teachers constituted the second cadre of the research participants. They were chosen because of their high contact hours with pupils in lower primary. They were chosen also because of their onerous task of shepherding learners while developing literacy and numeracy skills. Teachers from other subjects were used as an important source of corroborating views echoed by the mathematics and language teachers. Consequently, teachers' experiences, knowledge and attitudes and remediation measures deployed were necessary for this study. The schools' administrators and officials from the ministry of education, and specialists in learning disabilities, and neuron therapists were also considered for this study. This cadre of the respondents helped in understanding the complex problem of learning disabilities, measures enacted to tackle the problem and teaching practices within the school to foster the learning needs of the affected learners.

3.4 Sampling Techniques and Sample Size

The use of an appropriate sampling technique is very important to make a research project beneficial, meaningful, and successful. The preceding statement from Alvi (2016)

informed the researcher about the sampling technique that would yield a representative sample size and sample population. Consequently, sampling techniques and sample size are discussed next in this chapter.

3.4.1 Sampling Techniques

Non-probability sampling approach was employed to zero down on a representative study sample. This approach was chosen because the intention of the study was an exploration of handwriting difficulties and not the provision of an in-depth understanding of the problem. Non-probability sampling techniques were handy in getting the necessary study population for this task. Specifically, a purposive sampling technique was deployed in this research. The criteria for inclusion were developed during the pilot stage of the research, and extensive interrogation of the literature.

3.4.2 Sample Size

According to Mugenda and Mugenda (2003), a sample size representing 10% of the target population is adequate. The study is limited to pupils and teachers in Makadara Division, Makadara Sub-county, Kenya. From a population of 2,532 (2000 learners with LD and 532 teachers), the sample size was 254 respondents. This sample size was distributed as shown in Table 3.1 below.

Table 3. 1 Sample Size Distribution

Category	Population	Percent	Sample size
Examiner teachers	45	10	5
Language teachers	208	10	21
Class teachers	253	10	25
Head teachers	26	10	3
Learners with HD	2000	10	200
Total	2532	10	254

Source; Fieldwork, 2018

Table 3. 2 Sample Population Distributed per School

Schools	Language teachers	Examiners	Class teachers	Headteachers	Learners with LD	TOTAL
St. Michael	3	1	3	-	23	30
Jogoo	2	1	3	1	24	31
Kaloleni	3	-	3	-	29	35
St Annes	3	1	3	1	15	23
Bakhita	2	-	3	-	21	26
Ofafa	2	-	2	-	18	22
Martin	2	-	3	-	22	27
St Paul	2	1	2	-	20	25
Apudo	2	1	3	1	28	35
TOTAL	21	5	25	3	200	254

Source; Fieldwork, 2018

3.5 Data Collection Instruments

As already mentioned, the study employed both qualitative and quantitative techniques in the data collection. Denzin and Lincoln (2002) provide explicit scope and understanding of qualitative techniques; Qualitative researchers are committed to the naturalistic perspective and the interpretive understanding of human experience. Field observation and intensive interviews were employed as data collecting techniques.

Consequently, the study used semi-structured interviews to grasp the views, beliefs and perspectives of the respondents. Meanwhile, the semi-structured interviews were open-ended and flexible enough to accommodate respondents' input and encourage the generation of diverse ideas. Follow up interviews were necessary. They were conducted to seek clarification on issues that appeared unclear during the first round of interviews. Semi-structured interviews were complemented by field observation. Table 3.2 provides a summary of data collection instruments.

Observation guide/checklist capturing physical facilities, physical behavior of learners and instructional materials was developed. Documents were sought and played an essential role in studying handwriting problems and academic performance. They included written materials, promotional documents, work samples and school reports. The learners were given a written assignment on good handwriting to get their views on the handwriting process. This exercise helped to establish rapport with the learners. Punch (2005) notes that such documentary data is important for triangulation and can be

used together with data obtained during the interview. A discussion on triangulation as a tool is presented later in this section.

A Closed ended questionnaire constituted a quantitative data collection method. It yielded data on intervention measures and effects on academic performance. Greasley (2007) notes that quantitative techniques are primarily concerned with statistics and numbers and are principally aligned with positivism and therefore closed-ended questionnaire yielded data crucial in testing the research hypothesis.

Table 3. 3 A summary of data collection instruments

Objectives	Data type and study variable	Method of data collection	Tool for data collection	Data analysis
Characteristics of handwriting difficulties among learners with learning disabilities	<ol style="list-style-type: none"> 1. speed 2. Letter formation 3. Reduced legibility 4. Letters mix up 5. Spacing 6. Formatting 7. Pencil grip 	<ol style="list-style-type: none"> 1. Interviews 2. Observation 	<ol style="list-style-type: none"> 1. Questioning 2. Discussion 3. Observation 	Thematic
Factors influencing handwriting difficulties among pupils with learning disabilities	<ol style="list-style-type: none"> 1. Gender 2. Age 3. Motivation 4. Technology 5. Resources 6. Disabilities 7. Background 	<ol style="list-style-type: none"> 1. Questionnaires 2. Interviews 	<ul style="list-style-type: none"> ➤ Questioning ➤ Discussion 	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ ANOVA
Measures taken to address handwriting difficulties among pupils with learning	<p>Handwriting lessons</p> <ul style="list-style-type: none"> ➤ Teachers attitudes ➤ Teaching methods ➤ Facilities 	<ul style="list-style-type: none"> ➤ Interviews ➤ Questionnaires ➤ Observation 	<ul style="list-style-type: none"> ➤ Questioning ➤ Observation 	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ ANOVA

disabilities	➤ Instructional materials			
Effects of handwriting difficulties on academic performance of learners	<ul style="list-style-type: none"> ➤ School attendance ➤ Participation ➤ Task completion ➤ Notes taking ➤ Personality ➤ Average scores ➤ Class rank 	<ul style="list-style-type: none"> ➤ Interviews ➤ Questionnaires ➤ Observation 	Questioning Discussion	<ul style="list-style-type: none"> ➤ Descriptive statistics ➤ ANOVA

Source; Fieldwork 2018

3.6 Pilot Study

Data collection instruments were piloted two months before actual fieldwork. The exercise helped the researcher to refine and simplify data collection methods. For example, a high rate of incomplete open-ended questionnaires compelled the researcher to adopt closed-ended questionnaires. The pilot exercise facilitated the development of participatory criteria for purposively sampling pupils to be studied. Some 21 participants disaggregated as 12 pupils, 4 teachers, 2 administrators of schools and an official from the ministry, specialists on special needs education formed part of the pilot study. The pilot study was done at St Johns Primary School in Viwanda Zone of Makadara Sub-County

3.7 Validity and Reliability of the Study

Research findings should be replicable, dependable and findings that can be generalized (Alvi, 2016). Achieving these feat calls for embedding in design process mechanisms that check biases and sampling errors. Succeeding sections illuminate two strategies that were deployed to address the challenge of prejudgment as energized by the statement from

Merriam (1988). A researcher is the primary instrument of data collection and analysis. The researcher should be careful about allowing bias to affect the design and findings of the study.

3.7.1 Validity

The design process and research tools were validated by the critical readers conversant with both qualitative and quantitative approaches to surveys and well-grounded in special education issues. Their views and ideas were complimented by teachers and colleagues in the department of special education. They significantly contributed to mapping out potential elements of biases seeping up in the study. Clinical guidance and feedback from the thesis supervisors immensely insulated this study from biases, sampling errors and contextualizing handwriting problems within the motor-cognitive research area. Regular contacts and feedbacks throughout the problem contextualization, design process, data collection, analysis and eventual thesis writing enabled the researcher to contextualize handwriting problem as a transcriptional skill impinging on writing, reading and numeracy capabilities of a learner.

3.7.2 Reliability of the Study

As already mentioned in the preceding section, triangulation was embedded in the study design to increase the veracity of the collected data. Triangulation is a tool that deploys and agitates for the use of multiple sources of data, adopting divergent perspectives or theories, different investigations, or different methods in research (Silverman, 2010). Inspired by the preceding statement, the study complimented semi-structured interviews

with observations. Alternatively, the reliability of quantitative data was attained by deploying Pearson's correlation co-efficiency statistical tool.

Reliability is the degree to which a research instrument produces stable and consistent results (Oso & Onen, 2011). In this case, if a test is administered to a subject twice at different times or intervals, the scores should be the same. The reliability in this study was checked using the test re-test method whereby data collection instruments were administered to the respondents who were not included in the actual study. The same instruments were administered to the same respondents under similar conditions after two weeks. The test reliability was estimated with the Pearson correlation coefficient between the two results. If the correlations coefficients between the two tests were 0.7 or more, then the instruments are acceptable. (<http://sportsci.org/resource/stats/relycalc.html>). A Pearson correlation coefficient of .85 was found and the research instruments were reliable.

3.8 Data Collection Techniques

The researcher proceeded to the field to collect data from the identified sites and maintained a daily log of all activities and deliverables for each day during the data collection. The researcher collected data by use of interview guides, observation checklists and questionnaires and tape recorders.

Interview guides were used to gather information from headteachers. The researcher tape-recorded the interview and took notes during the interview to avoid losing the information gathered. The recorded interviews were transcribed, and information

compared with the field notes. Questionnaires were used to collect data from teachers and examiners. The questionnaires were delivered to the teachers on the day agreed upon by the researcher and the respondents. They were collected after they had fully been filled by respondents. Data was collected between October 2018 and January 2019.

3.9 Data Analysis

The study yielded both qualitative and quantitative data as described in the previous section. This called for qualitative and quantitative data analysis. The following verbatim by Greasley (2007) captures the process involved in qualitative data analysis; Qualitative analysis is about meaning. The social meanings people attach to their experiences, circumstances, and situations, as well as the meanings people embed into texts and other objects, are the locus of qualitative analysis. Therefore, at the heart of their work, qualitative analysis tries to extract meaning from data. The focus of research is generally words and texts, as opposed to numbers or statistics.

The data collected using semi-structured interviews and observation were analyzed. The recorded interviews were transcribed, and each transcription was given a number. A transcript had a number of lines. These lines were subsequently numbered to facilitate references and retrieval of data. Data captured using observation were coded and filed. A transcript based on data collected using qualitative instruments was made and assigned value. The recurrent themes were identified from the transcripts. The themes were coded based on their similarities and differences. The identified themes were clustered and

finally a conversation based on field experience, reviewed literature and conceptual and theoretical framework for the study.

Quantitative data analysis, by comparison, entailed creating a database using SPSS. This process is about figures, numbers, and graphic representations (Greasley, 2007). Consequently, questionnaires were checked for consistency, later cleaning of the questionnaire was done to iron out inconsistencies. Coding was done using SPSS software version 19. This process allowed the generation of graphs, means, percentages and standard deviation. The resulting descriptive data was subjected to inferential analysis using the Analysis of Variance (ANOVA) technique to ascertain the significance and deviation from the expected mean.

3.10 Ethical Considerations during the Research

The researcher adhered to the children Act of 2014 CAP 4, section A which provides for guidelines when interacting or dealing with children. The act cautions against using words or languages that may impact negatively on the self-esteem, self-worthiness and dignity of any given child. This is in addition to engaging in any activity that may physically, mentally, or emotionally harm a child. In this sense, the researcher observed a high degree of sensitivity to individual child dynamics while interacting with them. Consent was also sought from parents of the children in the study by requesting them to sign a consent form which is found in appendix IV. The study process kicked off with the approval of the proposal by the graduate school. A research permit was obtained from the department of higher education and science and technology.

The participants in the study were taken through the aims and the overall purpose of research. This was done before the commencement of the data collection exercise. Consent was sought from the school's administration before any discussion with learners was initiated. The study's participants were assured of confidentiality. Interviews were conducted in the participants' preferred venue. Meanwhile, the participants were encouraged to voice their criticisms of the process and express an independent mind without any form of fear. The participants were reminded of their sovereign right to withdraw at any stage of the study, nullify or revoke their already uttered remarks. The researcher promised to seek the participants' consent before sharing out the information obtained from them with a third party.

CHAPTER FOUR

PRESENTATION OF DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.0 Introduction

The purpose of conducting this study was to assess handwriting difficulties among neuron diverse pupils and determine its effects on their academic performance. The study was carried out in Makadara Sub-County and canvassed the perspectives, views and practices of teachers, and learners on the study problem. As argued out in chapter three, the study was a two-tier design, exploiting both qualitative and quantitative techniques to answer research questions. Ideally, mixed design was instrumental in canvassing the perspectives of the respondents and the existing practices on the problem.

Learners with learning disabilities encounter extraordinary challenges while learning. Their situation is compounded further by the inadequate diagnosis tools and paucity of skilled personnel to remediate the problem. In this scarcity of effective diagnostic tools and personnel, researchers have contemplated the efficacy of using characteristics of handwriting in diagnosing inherent learning disabilities. This chapter presents firsthand accounts of teachers, and learners using both qualitative and quantitative data. Qualitative data was collected using semi-structured interviews, and observation. Alternatively, a questionnaire guide was instrumental in collecting quantitative data. To answer the main research question, the following sub-questions were pursued;

1. Which handwriting difficulties characterize learners with learning disabilities?

2. What is the educator's knowledge on factors influencing handwriting difficulties among learners with learning disabilities in Makadara Sub County?
3. Which activities do teachers undertake to help learners with learning disabilities to cope with handwriting difficulties in Makadara Sub County?
4. What are the effects of handwriting difficulties on the academic performance of pupils with learning disabilities?

As already mentioned, this study employed both qualitative and quantitative techniques. The qualitative analysis started after two sets of participants had been studied. A set in this study constituted of a teacher and a learner. Data was coded to identify common or recurring themes. Themes or major propositions were singled out to draw out similarities or differences across respondents using a constant comparison tool (Anfara, Brown & Mangione, 2002). This means that in qualitative analysis, the data analysis process commences as soon as it is collected and the focus or interest is on the meaning and value individuals attach to a given phenomenon or lived experience (Litchman, 2006). This approach allows the researcher to be interactive and humanistic while openness and flexibility are essential to safeguard measures embedded in this approach. The strategy employed in this analysis was inductive and the output was descriptive.

The qualitative analysis started with the creation of the SPSS database. This was preceded by cleaning of data by checking out completeness and accuracy of questionnaires. Consequently, coding was done, and the strategy employed in this process was deductive. The descriptive analysis involved the calculation of frequencies, mean, Standard Deviation (SD) and percentages. Tables, graphs, and charts were used to

summarize and present field findings. Later, they were subjected to inferential analysis to determine their statistical significance. Having described the design process and data analysis procedure, reporting commenced by highlighting the demographic characteristics of the respondents.

4.1 Demographic Characteristics of Respondents

The study found that there were more female handwriting teachers in upper primary. However, 3 male teachers had a P1 qualification compared to 10 female teachers. Among handwriting teachers with diploma qualification, 2 were male and 13 were female. The study also found an equal number of male and female teachers with a bachelor's degree qualification; each consisting of 4 teachers. Professional training influences the effective teaching and instructional methods design. In the study, it was found that all the teachers obtained a normal type of training 16 except 7 among those who were more than 10 years in the teaching profession. A few of the teachers 8% (3) and 22% (4) were less than 3 years and 4-6 years in the teaching profession. It was also noted that 6% of the handwriting teachers who underwent a normal type of training were within a bracket of 7-10 years in the teaching profession. In the teaching profession, teachers take various responsibilities. In this study the handwriting examiners who also taught Mathematics were equal to those who taught languages, each was 3% (1). It was also noted that most of the teachers were class teachers though those who taught Mathematics 14% (5) were less than those who taught languages 67% (24). There was 1 subject teacher who taught Mathematics compared to 4 who taught languages.

4.2 Characteristics of Handwriting Difficulties among Learners with Learning Disabilities

The main objective of this study was an assessment of characteristics of handwriting difficulties exhibited by the learners with learning disabilities. Data was collected from learners, teachers and headteachers. The aim was to compare and contrast the perspectives of the different cadre of respondents on what constitutes handwriting difficulties among learners with learning disabilities. The research question for this objective was, which handwriting difficulties characterize learners with learning disabilities? Alternatively, an assumption was made to enliven debate. For this objective, an assumption made was text legibility and writing speed largely characterized handwriting difficulties among learners with learning disabilities.

4.2.1 Description of Good or Poor Handwriting by Respondents

To assess characteristics of handwriting difficulties exhibited by learners with learning disabilities, respondents were encouraged to describe what constituted good or poor handwriting manifested among some learners. This was to yield a varied perspective by probing the mind of the respondents from different angles. The perspectives about good or poor handwriting together taken constituted significant or salient features of handwriting difficulties among the study population. Table 4.1 illustrates a summary of major themes gathered from the respondents' conception of good or poor handwriting. Among the teachers and headteachers, legibility was an outstanding feature of good or poor handwriting. This was not the case with the studied learners who ranked speed and neatness as core functions of fluent handwriting. However, the three cadres of

respondents concurred that the speed was an essential aspect of good handwriting. Movement entailing both body posture or script orientation of letters and numbers was least popular among the teachers and learners.

Table 4.1 Features of Poor Handwriting

Themes	Description	Frequency	Disaggregated count by respondents	
			Teacher (54)	Learners (200)
Legibility problems	Size, letter shape, letter formation, pseudo letters, cursive letter, style, awkward lettering, invisible letters		44	77
Neatness problems	Crowded, inconsistency in spacing, letter proportion, inappropriate placement, scribbles wavy lines, mix up, clumsiness, poor sequencing, irregular		25	189
Speed problems	Dragging, sluggish, slowly, unfinished words/numbers, gaps in notes, incongruence between spoken and writing process, longer pausing, request for repetition during dictation, gazing/peeping at neighbor's work, give up on following dictation		42	182

Motor Movement problem	Poor muscular adjustment, poor control of fingers, wrist and hand, strange pencil grip, inappropriate hand position, tire quickly, zigzag lettering, incorrect letter directionality, inability to stay horizontal, too much or too little pressure on pencil		25	49
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Source; Fieldwork 2018

The subsections below provide a detailed description of the four major themes that constituted respondents' conception of handwriting difficulties. In qualitative data analysis vignettes, verbatim and paraphrasing (*in vivo* terms) is an important tenet or pillar of the analysis process. The *in vivo* terms are vivid imagery, inclusive of much local interpretative meaning (Jenny, 2013). These terms are hardly forgotten because they are outstanding or imposing. They bring to the report much analytical force since the respondents use them with an impeccable flair and attach passionate connotation to them (Hermann, 2013). The subsections below provide a clear and systematic path undertaken by the researcher in arriving on the four themes appearing in Table 4.2.

Legibility

A number of variables constituted handwriting fluency or legibility. These were the size and shape of letters or numbers. Respondents also mentioned pseudo letters, writing style, cursive letters when discussing legibility questions. "Some pupils write very tiny, microscopic letters or words or exceptionally large ones. This makes their written work to

appear awkward or a challenge when reading it” one learner who was participating in this study observed. A respondent representing the position of teachers lamented, “A large fraction of those experiencing handwriting difficulties have problems with appropriate proportioning of the letters or words. They produce either very small or very large letters. Their lettering or numbering seldom conforms to the basic conventional standards.” A class teacher who participated in this study noted that “Learners with handwriting difficulties lack a sense of proportionality in their numbering or lettering. They alternate between very tiny and large letters. They lack congruence in their letters formation which is linked to inadequate development of letter or words automaticity.”

In the question of handwriting legibility, some essential similarities were noted across the respondents. In the perspective and wisdom of those interviewed, the handwriting process can be described as either legible or illegible. Consequently, when the respondents were talking about legible handwriting, they had certain benchmarks or indicators in the mind to ascertain their claim. Principally, they had in mind the shape and size of letters or numbers, dexterity in letters/words formation and adherence to the conventional symbols of the letters/words.

Neatness

Neatness as a theme yielded immense responses that were both convergent and divergent. Ideally, when discussing the theme, participants used a wide range of terminology to describe it. There was inconsistent spacing, letter proportion, scribbles, wavy lines, awkward style, or orientation. In addition, there was poor mix up of letters and work,

crowded and clumsiness. Last but not least participants singled out inconsistent lettering, irregular formatting and inappropriate sequencing of letters and words.

The following response by a learner participating in this study eloquently isolates the theme of neatness. “A section of my classmate crowds the books with sentences or numbers. They find it difficult to create space between sentences or words. To them, writing in a straight line or within a provided space is quite challenging. They produce irregular and zigzag sentences whereas a good handwriting should be linear, hierarchical and smooth.” At this point, a participating examiner took the nod and weighed in on the theme of neatness. “I find it a tough task assessing scripts that are inappropriately formatted and lacking presentation and style. I am referring to scripts that are messy, clumsy, dirt, congested, squeezed up and sentences or letters haphazardly done. This type of writing is nauseating and boring when examining.” At this juncture, the study turned to yet another teacher to document the perspective of examiners and he had this in response. “Presentation is a key component in a handwriting process. The flaw in this aspect may be manifested through inappropriate letter placement, low sense of linearity or hierarchy, improper spacing, messy and clumsy work. At face value, it may imply that a learner is lazy, but in reality, it may be a developmental disorder.” In this study, when canvassing the theme of neatness respondents appeared to draw a thin line between the theme and the sister theme of legibility. Nevertheless, the study found it appropriate to discuss the two entities differently. The principle reason for doing is clearly explained in chapter four of this study and rotates around cognitive functions and visual-perceptual functions of handwriting production (Kandel et. al., 2017).

Speed

The participants reported the number of words produced per minute argued that it's an important aspect of handwriting production. However, the speed implied the production of a few words per minute or slow handwriting process. Practically, Phrases like exceptionally slow writing pace, low pace, lagging when copying notes, or doing a written work, sluggish hand movement captured the position of the participants. Equally, respondents singled out incomplete words or letters, and a large gap between spoken and written ability as an inference of speed problems. A learner representing the voice of participating learners echoed the following sentiments on the speed theme. "A good number of us are unable to cope with the speed when taking handwritten notes. The situation is compounded further when the teacher resorts to the dictation of the notes. This process generates a lot of tension, profuse sweating and frustration." A language teacher interviewed lamented about writing. She noted that when giving out notes orally, she observes learners merely gazing over blank space and other skipping words or sentences. Unless vindicated otherwise, she notes that her observation may point to the inability to cope with notes giving speed. One teacher echoing the position of other subject teachers talked about gaps between words or sentences or a series of uncompleted assignments. He added that if the teacher is moving at a normal speed, then there is an urgent need to examine the handwriting faculties of the learner with learning disability.

Body Posture

Movement as a theme, though nearly similar to the speed, neatness and legibility were worthy discussing as a different theme. The movement largely covered letters orientation

or angle of inclination, sitting style, degree of the tire, pencil grip, position of the pencil in index finger and pressure on the writing materials. Participants identified a tendency to tire very fast and linked it to too much pressure on the pencil, inappropriate sitting style and poor pencil grip. Elsewhere the participants singled out too much or too little slant position of the pencil or hand. However, debating the theme of body movement demonstrated a narrow divide between the already discussed or contemporary themes. Meanwhile, the persistent aspect of sitting position, pencil grip, pressure on writing materials convinced the author of the normative ground to discuss it as a distinct theme. The grounds on which the assumption of this objective was accepted or disputed are provided in this chapter. In the next section, the analysis of the participants' knowledge on the factors influencing the handwriting development is presented.

4.3 Knowledge on Factors influencing Handwriting Development Process among learners with Learning Disabilities

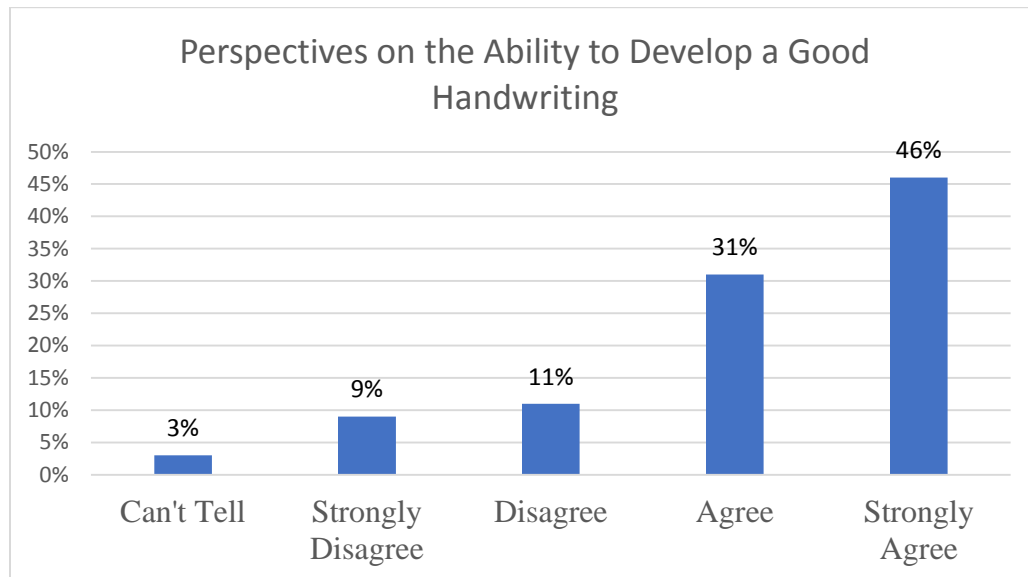
This objective was achieved by administering a questionnaire guide and conducting in-depth interviews with the teachers and headteachers. The collected data were substantive in answering the question, what is the educator's knowledge on factors influencing handwriting difficulties among pupils with learning disabilities in Makadara Sub County. This question yielded qualitative data calling for hypothesis formulated, although this did not negate the need for an assumption. The overall goal of this objective was to establish if the respondents perceived a handwriting development process as a purely mechanical process or as an interplay of several factors i.e. perceptual, motor, cognitive and linguistic factors (Bara & Gentaz, 2011). Doing this was significant because the teachers'

knowledge, behavior, principles, and practices are the most important factors influencing a learning process (Graham, 2000; Berninger, 2008).

4.3.1 Ability of the Learner to Develop good Handwriting Skills

As described early in this chapter, the crucial factor in achieving progress when tackling learning problems among children with learning disabilities is practice. It adds and informs the choice of intervention measures and sustains the momentum until the desired results are achieved (Reid et al., 2014). On the ability of learners to develop a good handwriting style, less than fifty percent of the respondents strongly agreed, but some 9% stated that pupils with learning disabilities can develop good handwriting. Meanwhile, those who had a positive conviction on the ability to develop good handwriting were the majority. A smaller percent had contrary conviction as illustrated in Figure 4.1

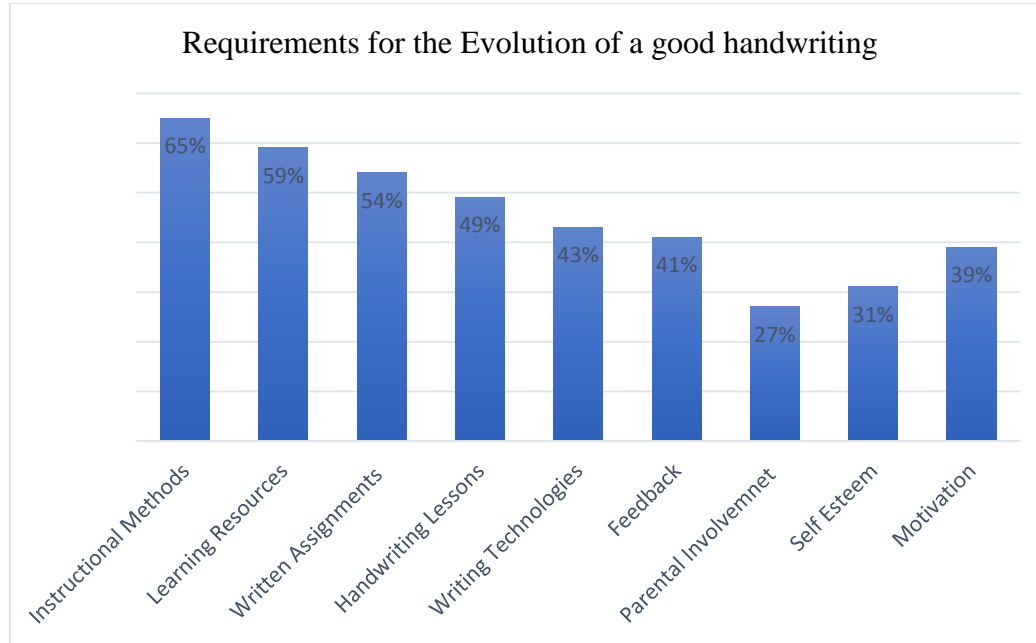
Figure 4.1 Perspectives on the Ability to Develop a Good Handwriting



4.3.2 Requirements for the Evolution of a Good Handwriting

Having established that majority of the respondents had positive convictions about achieving change with learners suffering from learning disabilities, the researcher indulged them to understand their perspective on the evolution of systematic steps required to achieve good handwriting. The responses were varied and revolved around learner's sensitive instructional methods, allocating more time to handwriting lessons, adoption of multiple teaching methodologies, and provision of a wide range of teaching and learning resources. Participants also mentioned working on the self-esteem of learners, access to facilitative writing technologies, parental involvement, the motivation of the learner, strengthening handwriting competitions, and establishing feedback mechanisms in the teaching and learning process. Figure 4.2 provides statistics on handwriting development as visualized by the respondents. Over sixty percent of the respondents were unequivocal that an instructional method tailored towards learner's uniqueness and needs was a potent strategy. Over fifty percent of the respondents identified the adoption of multiple teaching and learning resources, while handwriting lessons and handwriting competition at 54% and 49% respectively. Parental involvement and nurturing self-esteem of the involved learner though imperative lagged with 27% and 31% respectively.

Figure 4. 2 Requirements for the Evolution of a Good Handwriting



4.3.3 Perspectives on Selected Handwriting Factors

Respondents were presented with a list of factors perceived to be influencing the handwriting development process. Their perspectives were captured using a Likert Scale. This tool helps to bring out the strongest or deepest conviction on the study phenomena. Therefore, Table 4.4 presents the perspectives on the handwriting development factors to capture the strongest position of the respondents on the listed factors. The responses reflected a high level of congruence with the factors given the highest percentage in Figure 4.2. Essentially, teaching methodologies emerged as an outstanding factor with a majority of the respondents strongly agreeing, followed by learning materials whereby most of them agreed on it. Accordingly, sitting position or body posture and manipulation of hands elicited the least positive responses with a small number of the respondents strongly agreeing on it. Respondents were also called upon to state their stance on

motivation as a factor, learner’s health, a learning disability and language background, age, gender, and parental involvement as summarized in Table 4.2.

Table 4. 1 Perspectives on Factors for a good Handwriting Development

Factor	Strongly agree	Agree	Strongly-disagree	Disagree	Can’t tell
Teaching-Methodology	63%	22%	6%	4%	5%
Learning Resources	49%	37%	5%	6%	3%
Sitting position/posture	7%	21%	31%	27%	14%
Movement of hands	12%	19%	44%	19%	6%
Motivation	45%	23%	14%	11%	7%
Health Status	42%	18%	15%	13%	11%
Learning Disability	37%	12%	35%	14%	2%
Background Language	29%	15%	46%	7%	3%
Age	22%	25%	28%	18%	7%
Gender	47%	29%	11%	9%	4%
Parental Involvement	15%	17%	45%	19%	4%

In relation to handwriting development perspective, the study attempted to find out if the respondents saw handwriting development as a product of a single factor or interplay of multifaceted factors. Therefore, the respondents were to demonstrate knowledge on whether environmental factors, individual uniqueness, body coordination, health and learning support were given to the learner. From the responses, it's apparent that learners' regardless of their uniqueness were capable of, mastering good handwriting skills. They simply need appropriate instructional methods tailored to address their deficiencies.

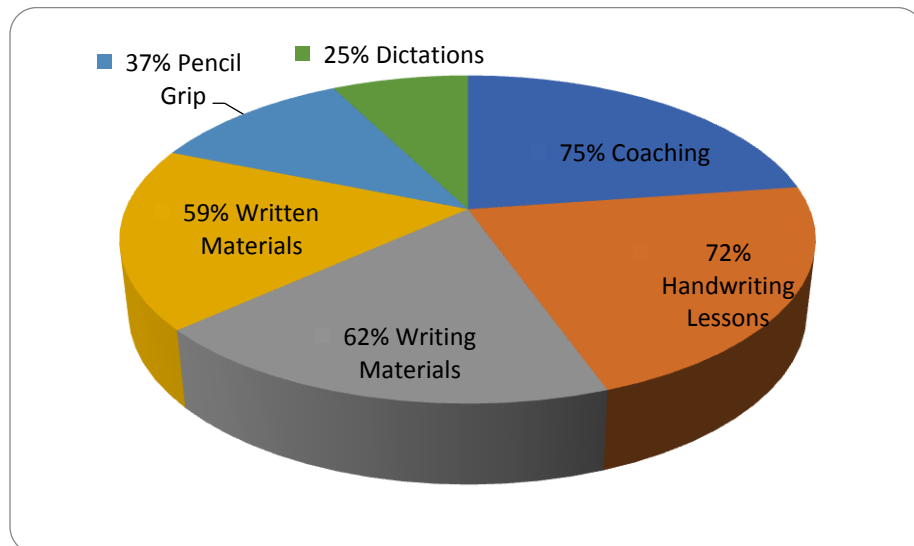
There is a tendency to frame handwriting processes as a purely mechanical process. Respondents however appeared to think contrary when sitting position and body movement received the least positive affirmation. Although the researcher contemplated the learner's health and learning disabilities as central to the handwriting development process, the respondents strongly noted that a well-organized instructional strategy could help in solving the problem.

4.3.4 Activities Key to the Developmental of a Good Handwriting

In figure 4.3, respondents demonstrated a firm understanding that good handwriting is achievable among pupils with learning disabilities. They equally demonstrated high knowledge of factors influencing handwriting development. In this case, the study sought to establish the specific activities undertaken within their confinement and jurisdiction that were instrumental in handwriting development. In response, the participants proposed coaching and modeling on handwriting and letter formation, coupled with a myriad of handwriting lessons, providing appropriate materials to write on (ruled or lined

papers) in addition to providing pencil with enabling font/width. Training on pencil grip and written assignments and dictations emerged. Practically coaching on letter formation received most backing, followed closely by handwriting lessons. Other activities scoring above average were providing ruled or lined writing materials and written assignments. Least popular were training on pencil grip and a series of dictation. Their responses as summed up in Figure 4.3 illuminated a handwriting process more of a perceptual phenomenon than a mechanical problem. Kandel, et al., (2013) and Bara and Gentaz, (2011) principally agree that handwriting is a perceptual phenomenon although they hasten to add that other body and cognitive faculties are equally important to a handwriting development. Nevertheless, letter formation and writing using free handwriting were indeed perceptual and cognitive and motor coordination. These functions must be coordinated and flow in sequence to achieve a fluent writing process.

Figure 4.3 Activities undertaken to Improve Handwriting among Respondents



Source, Fieldwork, 2018

4.3.5 Ranking of Effectiveness of Handwriting Development Factors

A quantitative approach to research is about rigor, and it entails asking the same question from different angles (Kumar, 2013). In this case, the respondents were asked to rank on a scale of 1 to 5 what they perceived to be the most effective factor in the handwriting development process. Table 4.5 captures the ranking of the most effective factors in the handwriting development process and educators' practices were predominant in the first rank with 21 counts out of possible 36. Next, there were instructional materials with 9 counts in the first position, learner's intrinsic motivation with 10 counts and quality of learning support materials at 6 counts. Learning environment and age and learning disabilities were ranked least in the handwriting development process. The ranking of the effectiveness of the factors further reaffirmed the pivotal role that educator's practices, instructional materials and to a significant extent intrinsic motivation on the part of the learner play when it comes to handwriting development. Data hardly elevated learning disabilities or environment (physical facilities within the learning environment) in the handwriting development process. In nutshell, the genesis of fluent writing squares lies in teacher's attitudes which are manifested in instructional strategies he or she adopts.

Table 4. 3 Ranking of the most Effective Factors in Handwriting Development

Factor	Ranking Count					Total
Ranking scale 1-5	1	2	3	4	5	36
Teachers' Attitudes	21	9	4	1	1	36
Learning Materials	9	14	7	2	4	36
Learner's motivation	6	11	8	5	6	36
Gender	6	13	7	5	5	36
Age (Grade)	5	4	5	3	19	36
Learning disabilities	4	9	8	4	11	36
Learning environment	3	2	3	4	24	36

Source; Fieldwork, 2018

4.4 Measures taken to address Handwriting Difficulties among Pupils with Learning Disabilities

How is the challenge of poor handwriting addressed among the pupils with learning disabilities question enabled the researcher to gather data on the third objective of this study? The question targeted teachers and employed in-depth interviews, and observations to collect data. An assumption that handwriting difficulties intervention measures are limited to handwriting lessons was made. This approach yielded qualitative data prompting thematic analysis through the inductive process. Handwriting problems won't disappear without deliberate measures taken to address the problem (Westwood, 2011).

4.4.1 Tools for Assessing Handwriting Difficulties

The most important step in the treatment of handwriting problems is proper diagnoses which also require appropriate tools to hasten the diagnosis process (Reid, et. al., 2013).

To this effect, the study sought to establish the participants' perspectives on developing tools to isolate the problem or their access to any conventions handy in isolating the problem. The data yielded mainly qualitative tools for assessing handwriting problems. The Minnesota handwriting assessment standardized tool was used in mapping out handwriting problems as discussed in the sub-sections that follow. Practically, observation of the learner's writing behavior was the most outstanding tool used to isolate handwriting difficulties among the study population. Also, there were referrals to specialists, administering a written test and last but not least conducting family and schooling background.

4.4.2 Learners Physical Behavior

The participants had developed a checklist that assisted in the identification process of handwriting problems. They mentioned late or non-submission of written work, uncompleted words/letters or sentences, recurring gaps in written texts, regular change in sitting position and uncomfortable with handling the given writing materials or writing style. Others were absenteeism from the class, tense, inattentiveness and peeping or snooping randomly at the neighbor's work during notes taking exercise. They also catalogued physical isolation, aloofness, lack of participation and repulsiveness as manifest indicators of a malfunctioning writing process.

4.4.3 Administering a Written Test

Dictations, a written test, adopting both closed and open-ended questioning were singled out by the participants. Teachers noted that subjecting a learner to a written exercise can

unearth a number of concealed handwriting problems. By testing using either oral, written or objective items or adopting both approaches, the aspect of the speed is established. The testing process also establishes the ability to form letters, visuals or listening faculties. A participating teacher had this to say regarding various aspects of speed, “writing is a linear process that matches perfectly with breathing pace, mental processes, and the necessary body intervals. If there is any difference with the heartbeat, then there is a serious problem. When matched against the writing speed of other learners, and sensitivities exemplified by the teacher, we need to rethink and initiate the treatment process. All these can be known by taking the time to examine the writing process of a learner.”

4.4.4 Referrals to Specialist

Participants reported being consulting experts on learning disabilities where necessary. Special education teachers, doctors, neuron therapists and professional counselors were mentioned. Referrals helped to unearth deep-rooted problems, beyond the scope of physical observation or test administration. Referrals were done to ascertain the learners’ general health condition and functioning of various body faculties. The involvement of the referral system was affirmed by the following observation from a teacher; “sometimes handwriting problems can be too complex, endemic and beyond our projection. In this scenario, tools at our disposal become blunt, ineffective, or redundant in diagnosing the ills. At this juncture, we seek help from other quarters.” Elsewhere, a participant teacher quipped in and observed, “Dictating notes to learners induce them to behave in a certain manner. As this happens, a keen and sensitive teacher will note the writing pace,

posturing, attentiveness, frustrations, distraction, missing words, gaps in the text or staring at a blank space.”

4.4.5 Learners Background

Participants highlighted the important role that prior schooling experience and family background played in profiling handwriting difficulties. Prior schooling encompassed past instructional methods, learning support, child’s readiness to start writing, evaluation methods, learning resources and last but not least learning environment. Alternatively, family background called for an assessment of language experience, motivation, exposure to books and reading culture and socio-economic characteristics of the household in general. It is important to note that prior schooling and family background as tools for analysis are interwoven and mutually complementary. They signify the role played by various support systems in undermining handwriting problems.

4.4.6 Response to Handwriting Difficulties

The existence of tools to diagnose handwriting problems was an important milestone during data collection exercise. It compelled the researcher to explore if there were any specific remedial measures adopted thereafter to address the problem. Responses in Table 4.4 aptly capture the magnitude of the problem and remediation schema of the respondents. From the table, instructional and teaching methods were most adopted coping and mitigation measures. The least population was teachers’ capacity development occurring among 16 teachers out of 36 that participated.

Table 4.4 Response to Handwriting Difficulties

Theme	Description	Count	Disaggregated by counts	
			Teachers	headteachers
Instructional materials	Size and thickness of pencil, thick chunky crayons, makers, paint brushes, sidewalk chalk, pavements, play dough, squirt toys, sponges, bread dough to knead, eraser, ruled or lined paper, word cards are provided.		38	3
Teaching methods	Modeling, coaching, demonstration, guided practices, adapted teachings, exposure to more words/letters, learners centered, illustrations/displaying written words, integrating lettering and wording, plenty of independent exercises, allowing learners to explore and discover, frequent daily handwriting lessons, explicit and direct instructional methods.		40	3
Evaluation methods	Use of feedbacks on letter formation, regular checking of notes/assignments, encourage learner self-evaluation, interplay between closed and open-ended questions, short and long quizzes, oral assignments		35	3
Capacity development	Change in attitude/practices, seminars, workshops, orientation, induction, refresher courses, benchmarking, motivational speakers, short term courses		21	3
Self-belief and patience	Plenty of time, more time to exercise, assignment in phases/stages, frequent lessons, don't be in hurry when writing, accept that mistakes occurs, create supportive enabling environment, involvement in writing activities, use positive statements or comments		30	3

Source; Fieldwork, 2018

A detailed description of the five themes gathered from the respondents follows in the subsections below.

4.4.6.1 Instructional Materials

The nature and type of writing materials emerged as an outstanding theme during the data analysis process. When discussing the theme, respondents identified the size or pencil's thickness, adoption of thick chunky crayons, markers, and paintbrushes to be vital in letter formation. The respondents reported providing surfaces and space that allow learners to scribble, paint, and print as their disposition or convenience. The materials or surfaces included pavements, sidewalk chalk, and portable chalkboard. Apart from the materials that enhance letter formation, respondents also described the materials that strengthen motor functions as a core component. They were clay and play dough, squirt toys, sponges to squeeze, bread dough to knead and cookies dough to stir. Lastly, providing an eraser and ruled or lined paper, word cards were mentioned as essential in the handwriting development process.

4.4.6.2 Teaching Methods

The instructional method determines the degree to which a change and progress are made when engaging the learner with a learning difficulty (Graham, 2007). The participants in this study agreed with this algorithm. When canvassing the proposition, statements like modeling on a paper and pencil grip and paper placement were used. There were also guided practices, adapted teaching, learner-centered, displaying written work, use of feedbacks on letter formation, integrating teaching on lettering/wording concurrently and

independent exercises allowing learners to explore different writing styles, frequent daily handwriting lessons, explicit and direct instructional methods.

4.4.6.3 Evaluation Methods

Related to the theme of teaching methods, there emerged an evaluation method as an important theme. The debate on the theme revolved around regular checking of learners' handwritten work, more assignments that promote handwriting development, assessing the learner's readiness to write, use of positive feedback mechanisms, and encouraging learners to make self-evaluation. In addition, the respondents proposed interplay between short and long written assignments, oral and written tasks and the adoption of both closed and open-ended quizzes were being adopted as coping and mitigation measures against handwriting problems.

4.4.6.4 Teachers Capacity Development

The participants were in tandem with the existing literature that the educator's practices, attitudes, and knowledge were crucial in attenuating handwriting problems. Important milestones during the study that pointed to the teacher's capacity development included but were not limited to attendance of seminars/workshops, refresher courses, benchmarking, and coaching. Others were consulting more experienced personnel, the involvement of a motivational speaker and short-term courses on the emerging themes in special education. To this effect, one respondent had this to chip in. "Teacher's skills and capacity are a robust cornerstone in helping struggling learners. We sometimes however realize that our national curriculum does not articulate enough on learning disabilities

issues. As a solution to this gap, we encourage collegiality, lifelong learning and systematic networking and capacity development.” Similarly, a participating teacher weighted in and said, “as the population of the school expands, we note a linear change in learners’ learning dynamics, unique behavior patterns emerge that negatively impinge on learning and teaching effectiveness. The starting point to this dilemma is usually introspection followed by wide consultation and capacity assessment.”

4.4.6.5 Self-confidence and Patience

Handwriting difficulties will not disappear dramatically as does a raisin on the sunshine. It requires patience and confidence in the capacity of the learner to respond to the interventions put in place. Participants were cognizant of this banal argument and the following narration espoused their profound conviction on the theme of self-belief and patience. They talked about giving learners plenty of time to copy and exercise, apportioning more time for handwriting lessons, frequent daily lessons and encouraging the learner to take time while forming letters. Teachers and learners should appreciate the pivotal role that the right attitude and confidence play in the evolution of fluent handwriting. The participants noted that the child should be encouraged that handwriting problem or making mistakes is an ordinary thing and it’s not confined to any particular individual. Practically, simple gestures like suggesting or encouraging a child to write a thank you statement to a friend or a family member, creating an enabling environment to practice at home, activities that stimulate muscle development and body coordination were being encouraged. Activities that impact positive self-esteem were being

encouraged and included recognition, praising, joint activities and involving the learner in decision making on addressing the problems he or she has.

The analysis and discourses on the four themes indicated the role of both value-laden and pragmatic measures participants were embracing to help learners cope with handwriting odds. The analysis indicated that the teachers were not complacent but embraced extraordinary measures to address the problem of handwriting. They indicated to have transcended the traditional handwriting approach and envisioned both value-laden and empirical measures. It is on these grounds that the assumption made before the analysis process was negated and consequently the study concluding that there existed a wide range and multi-layered approaches to handwriting problems in the study area. Having analyzed and made the conclusion on the preceding objective, the curtain falls on the study problem by focusing on the effects of poor handwriting on the academic performance of pupils with handwriting difficulties. In the consequent section, data and discussion on the effects of handwriting difficulties on the academic performance of the study population is presented and analyzed.

4.5 Effects of Handwriting Difficulties on the Academic Performance of Pupils with Learning Disabilities

To answer the overarching question on this objective, quantitative data were collected using a questionnaire guide, teachers, and learners were involved. The analysis of the objective involved the descriptive statistics that were later subjected to inferential analysis to determine the significance of the hypothesis. Both imperceptible and

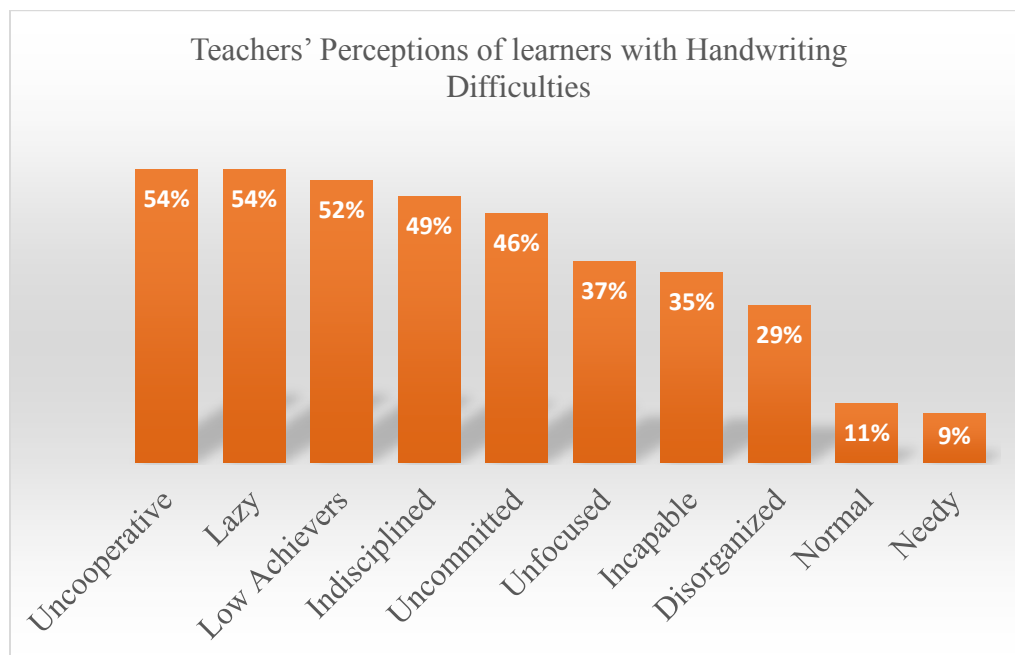
perceptible learner behaviors were scrutinized to determine if they predisposed or compromised learner's ability to focus on the task at hand. Imperceptible data denoted the effects on composure or confidence in executive tasks. On the other hand, physical behaviors that impinge on school or lesson attendance and average grades or mean scores entailed perceptible effects of poor handwriting. Data on average grades was imperative in testing the hypothesis on the objective to determine their statistical significance. Class means ranging from 2015 to 2017 were compared using ANOVA test to determine how the mean performance of learners experiencing learning disabilities differed from their counterparts without learning disabilities but also beset with handwriting difficulties. The presentation of data on the effects of poor handwriting is preceded by Shield (2013) caution that how we perceive learners to be is what they become in long run, or how learners perceive themselves to be is what they become eventually as described in the subsection below.

4.5.1 Teachers' Perception of Learners with Poor Handwriting

As already mentioned in the preamble, attitudes or perception is a formidable tool in the learning process. It frames the subsequent steps or measures adopted to redress the anomaly (Graham, 2000; Reid et. al., 2007). Responses on perception were largely negative presenting stakeholders in education a daunting task as only 2% of the respondents perceived handwriting problems positively. Nevertheless, respondents employed pejorative terms when describing learners with poor handwriting. Uncooperative and lazy lots were mentioned on an average basis in each case. Similarly, low achievers, undisciplined and uncommitted were mentioned on an average. Other

demeaning terms used included unfocused, incapable and disorganized. The only positive words used to describe learners with handwriting difficulties were ordinary with 11%, needy at 9% and measly 6% as neglected learners as presented in Figure 4.4. More pejorative terms were used to describe learners with handwriting difficulties translating into a negative stance on the phenomena. If learners are perceived negatively, then the problem is more likely to morph into a bigger problem. Poor handwriting should be construed as an opportunity for engagement that accentuates the learning process. It should not stifle learning opportunities and prospects for positive engagement.

Figure 4.4 Teachers' Perceptions of learners with Handwriting Difficulties

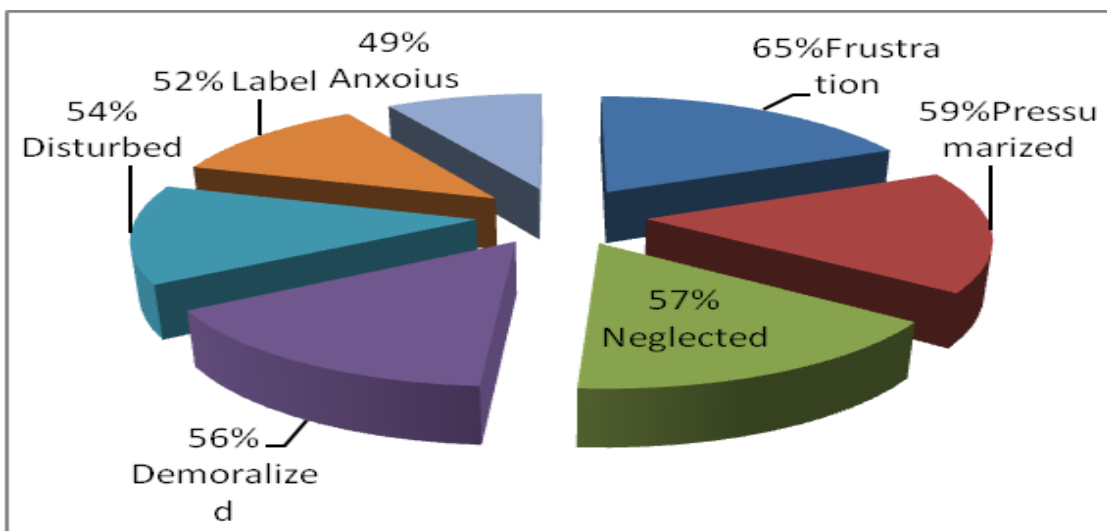


4.5.2 Experience of Learners with Poor Handwriting

Ordinarily, the handwriting writing process puts the involved learners under intense pressure. The situation is much more complex for learners grappling with learning

difficulty. This cadre of learners is challenged in balancing the demands of cognitive functions and motor functions. Presciently, the data in Figure 4.5 attest to the argument that balancing cognitive and motor functions present an extraordinary challenge to learners with handwriting difficulties. These learners endure lots of frustrations when taking notes according to a majority of the respondents. Some learners feel pressurized, neglected, demoralized, and disturbed, stressed, anxious and fatigued according to an average number of the respondents. This experience does not bode well for the learning process. For learners to effectively learn, they must be calm and assert control over their body and cognitive functions. When they become and cede to negative body functions, it means they lack control over their body schema by easily succumbing to external stimuli.

Figure 4.5 Experiences of Learners with Handwriting Difficulties.

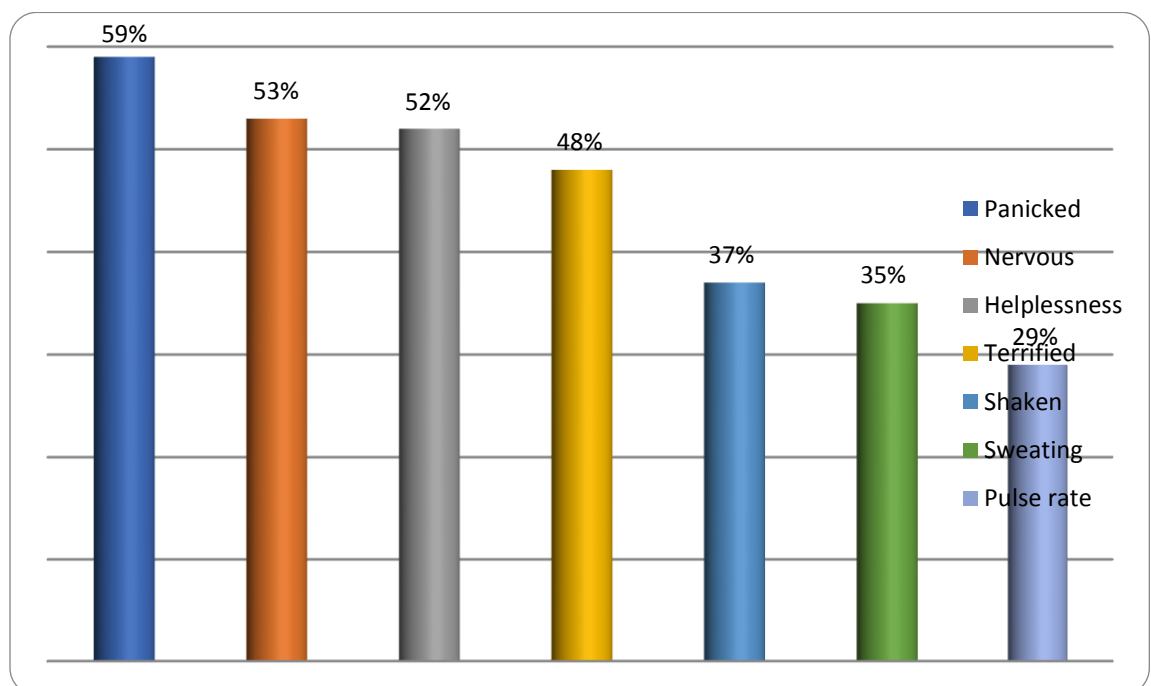


Source; Fieldwork, 2018

4.5.3 Response to a Written Assignment

Learners spent over 60% of their time while in school doing pencil and paperwork (Feder, 2007), and even if pencil and paper were to be replaced by writing devices still learners will be obliged to write when answering questions in an examination or filling mandatory forms or documents. In short, free handwriting is inevitable or inescapable. In this vein, respondents were challenged to give their independent thought about how pupils with handwriting difficulties respond to a written assignment. Responding to this question, an average number of the respondents talked about panicking, nervousness and helplessness. Other responses were terrified, shaken, sweating and high pulse rate as summed up with statistics in Figure 4.6

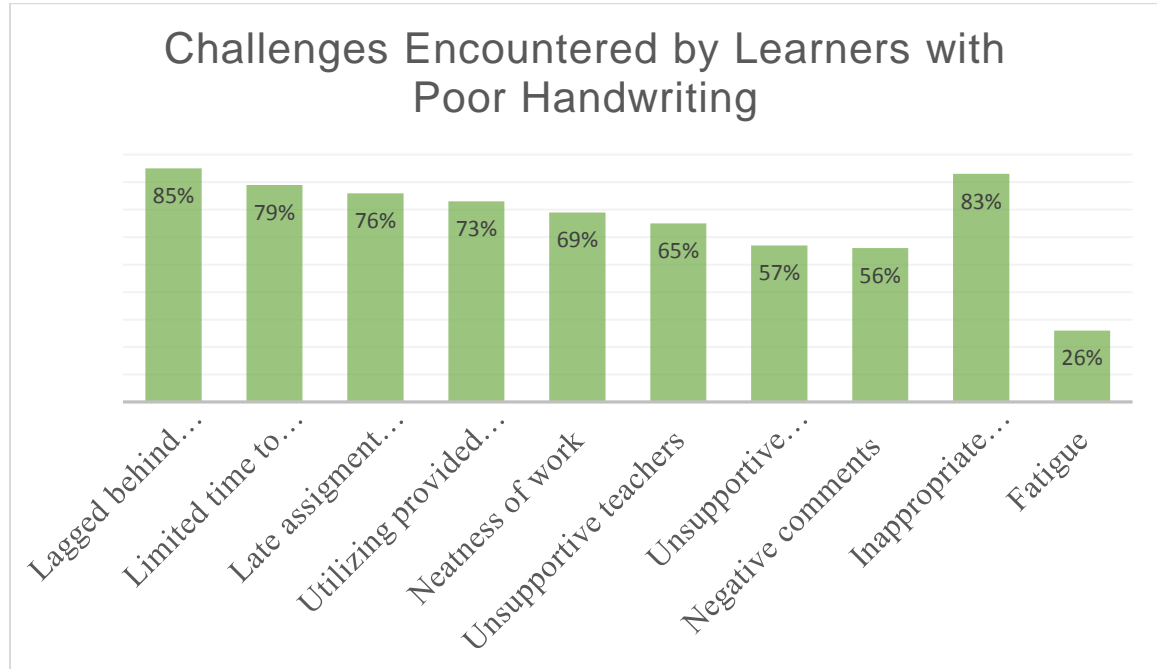
Figure 4. 6 Responses to a Written Assignment



4.5.4 Challenges Encountered by Learners with Handwriting Difficulties

Learners with poor handwriting face a plethora of problems. These problems ranged from lagging during notes taking exercise, un-presentable work, and more time to write notes or complete assignment, to submitting assignments late as singled out by a majority of the respondents. They also decried the inability to write in the provided space or properly utilize the provided space to be a problem as well as neatness of their work according to an average number of the respondents. Lack of support from the teachers, uncooperative classmates, negative comments from teachers, instructional strategies that were not accommodative were also listed. On the list of problems, there were fatigues, limited instructional materials and lastly limited time to complete tasks as captured in Figure 4.7. The resulting responses suggest that problems learners with poor handwriting largely originate from the inadequate instructional materials and the teacher's practices. In nutshell, instructional strategies and teacher's practices are major protagonists in handwriting development problems.

Figure 4.7 Challenges Encountered by Learners with Poor Handwriting



4.5.5 Association between Handwriting Difficulties and Learning Behaviors

Respondents were put to task to echo their perspectives on how handwriting difficulties impacted on a selected aspect of schooling. Among the identified aspects of schooling, we had assignment completion that emerged the most affected. The respondents' perspectives were captured using a Likert scale that illustrates the strongest and most ingrained sentiments on a given study problem. Therefore, averagely, some of the respondents strongly agreed whereas the least somehow agreed that assignment completion was at receiving end of poor handwriting. Apart from assignment completion, the quality of written texts and the quantity of produced texts were rated above 75% each in terms of either strongly agreeing or somehow agreeing. Least popular on Likert scale was class attendance at 25% and sitting position that scored 9% and a summary of this information is found in Table 4.5

Table 4.5 Problems Encountered by Learners with Poor Handwriting

Ranking of factors affected	Strongly Agree	Agree	Strongly Disagree	Disagree	Can't tell
Assignment completion	55%	35%	11%	3%	1%
Number of written letters	52%	36%	10%	2%	-
Number of written numbers	44%	37%	12%	5%	2%
Quality of written texts	42%	41%	11%	3%	3%
Class attendance	37%	23%	29%	10%	1%
Sitting position	12%	11%	72%	5%	-
Association with peers	5%	2%	83%	8%	2%
Writing speed	45%	23%	28%	3%	1%

Source; Fieldwork, 2018

4.5.6 Results of a Poor Handwriting

This item gathered data on how a poor handwriting impact on the physical behavior of the learner while in school and overall impact on classroom learning activities. This is so because if handwriting problems are not properly identified and framed, the situation may culminate into a more intricate problem (Worthington, 2011). Low grades and low participation in learning activities were each ranked first by over 69% of the study problem. The two responses were followed closely by absenteeism and frustration whose response was average. Hardly does poor handwriting result in school dropout as observed by over ninety percent of the respondents who ranked it least. Neither does it lead to indiscipline, fatigue, and isolation.

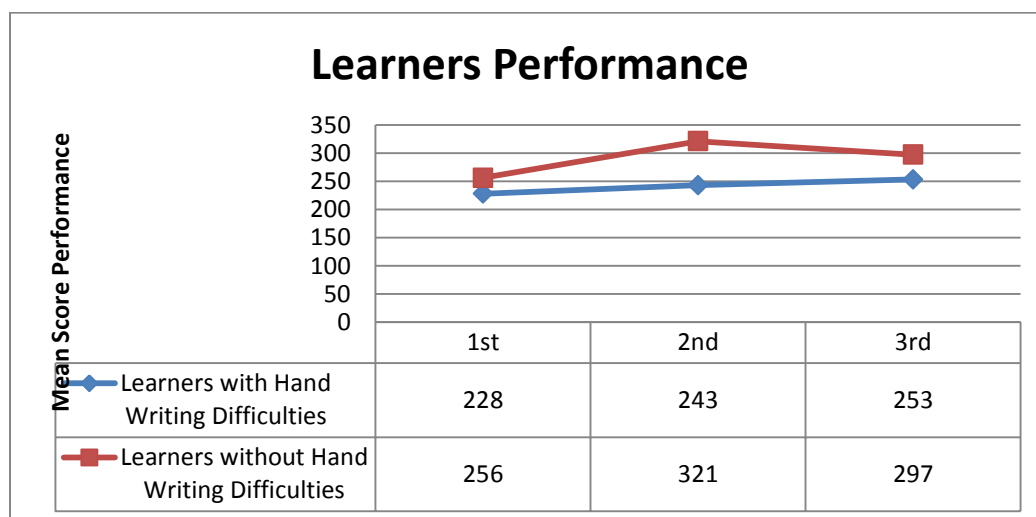
Table 4.6 Average Score of Learners with Learning disabilities with/without handwriting difficulties

Term	Mean Score Performance		
	1 st Term	2 nd Term	3 rd
Learners with H/Writing Difficulties	228	243	253
Learners without hand H/W Difficulties	256	321	297

Source; Fieldwork, 2018

Figure 4.8 provides information and a clear visual impression of mean attainment between learners with learning disabilities who have handwriting difficulties and their counterparts without handwriting difficulties. Data represented in Table 4.6 and Figure 4.8 were later subjected to ANOVA tests to determine the statistical significance of the collected data.

Figure 4.8 Mean Score Performance for the Year 2018



For visual impression and clarity, the line graph did indicate that the performance for learners with LD without handwriting difficulties outsmarted those learners with LD who had handwriting difficulties in the 1st, 2nd and 3rd term in the year 2018. It was also shown in the figure that the performance for learners with handwriting was almost constant in the three terms. From the contingency table and the line graph above, differences in performance were noted. It was, therefore, imperative for the study to test these differences statistically. Since learners were a dichotomous variable (learners with handwriting and learners without handwriting) and the performance had three variables (performance for 1st, 2nd and 3rd term) it resulted in a 2x3 factorial research design. As a result, a univariate analysis of variance was conducted to test whether there was or was not a statistically significant effect of learners with LD with handwriting difficulties and learners with LD without handwriting difficulties in their educational performance and table 4.7 below indicate the results.

Table 4.7 Results for ANOVA test on Significance Differences between Learners with LD with handwriting difficulties and those with LD without handwriting Difficulties

Source	Type III Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	8167.500 ^a	1	8167.500	5.487	.027
Intercept	1989187.500	1	1989186.500	1336.242	.000
Learner	8167.500	1	8167.500	5.487	.027
Error	41682.000	194	214.856		
Total	2039037.000	196	10403.25		
Corrected Total	49849.500	195			

Source; Field work, 2018

A one-way between subject's ANOVA was conducted to compare the effect of the educational performance of learners with LD with handwriting difficulties and learners with LD without handwriting difficulties. The results indicated a statistically significant effect of communication disability on educational performance at the $p < .05$ level [$F(1, 28) = 5.487, p = .027$]. However, the learners with LD who had handwriting difficulties scored significantly lower than learners with LD without handwriting difficulties. Therefore, the study concluded that a communication disability affected the learners' educational performance. Learners with LD who have handwriting difficulties have a lot of challenges in writing to communicate their ideas. They may present difficulties in making sentences, using punctuation in sentences and using grammatically accepted

vocabulary and paragraph organization. It may be difficult for someone to read their handwriting as some of them write letters upside down or mirror writing. Most of them have many spelling mistakes in their writing. With these problems, they are always faced with poor academic achievement as cited by (Ogano, 2012).

4.6 Chapter Summary

In this chapter, findings on the study problem were presented to principally determine the effects of poor handwriting on the academic performance of pupils with learning disabilities. The study yielded data that called for qualitative and quantitative analysis. The qualitative analysis called for the clustering of recurring statements to arrive at the major themes. Alternatively, quantitative analysis necessitated employing descriptive statistics and later testing of the hypothesis to determine the statistical significance of the collected data. Letter formation or legibility, writing speed, script neatness and body orientation emerged as key indicators of handwriting difficulties. Strategies adopted by the teachers in response to handwriting difficulties were allocating more time for handwriting exercises, providing appropriate writing materials, rooting for learners' sensitive instructional materials and exposure to a wide range of written exercises. On knowledge about factors for handwriting development, teacher's practices and beliefs, a wide range of instructional materials, a variety of teaching methodologies and learners' motivation were identical to good handwriting. Effects of poor handwriting centered on late submission of written work, incomplete assignments, low grades, absenteeism, truancy, isolation and lack of participation. Other aspects of schooling affected were learner's confidence, poor control of the body's body functions leading to multiple

learning problems. These findings are discussed at length in Chapter 5 and corroborated with findings from other studies.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter provides a summary of the study findings which were presented on the basis of the research objectives. It also consists of the conclusions made and recommendations for future implementation and suggestions for further research in education. Handwriting is described as the language by the hand and it is a mirror through which an individual's creativity, abilities and organization is reflected (Feder, 2007, Graham, 2000). Despite this fact, handwriting lessons are fading from the official curriculum and sporadically embraced as ad-hoc measures among the teachers (Waring, 2007). Most of the learners experiencing handwriting problems also suffer from learning disabilities (Reid, et al., 2003).

Against this background, this study was done to assess the effects of handwriting difficulties on the academic performance of pupils with learning disabilities in Makadara Sub-County. The study was mixed in design and canvassed the perspectives, beliefs and practices of teachers, and learners. Their views yielded both qualitative and quantitative data on the study problem. In this chapter, a discussion of field findings is done and aligned with the findings from other studies. Thereafter, the conclusion is drawn, areas requiring further studies are identified and lastly, the recommendations are made. The discussion follows next guided by the reviewed literature and the overarching research questions that facilitated the data collection and analysis process.

5.1 Summary

The study revealed that teachers' uncaring attitude about how learners write in mathematics could contribute to their poor handwriting. Most teachers observed that handwriting was not reflected in the school timetable as a subject. Lack of handwriting lessons in subjects like mathematics will always be inundated with learners who are academically underprepared. Some handwriting deficiencies were attributed to the physical environment which greatly contributes to handwriting development. Teachers also reported that learners with LD who have handwriting difficulties usually do not complete assignments. Such learners also indicated slowed progress. Learners with LD with handwriting difficulties take notes at a slowed speed/pace. Lastly, such learners have poor class attendance. The headteachers reported that class teachers refer to learners with handwriting difficulties as careless, lazy and slow learners. Handwriting difficulties contribute to poor grades in-class tests. This was supported by the majority of the teachers. Learners without handwriting difficulties feel motivated to learn. Examiners on their part reported frustrations in marking work for learners with handwriting difficulties. The study further established that teachers form a negative attitude on learners with learning disabilities.

5.2 Conclusion

The study concluded pertinent factors affecting learners with LD who have handwriting difficulties such as quality of handwriting tools which contribute to handwriting development and writing speed which affect handwriting performance. Adequate and poor acquisition handwriting skills involve the spacing of letters and words.

Letter/number shape was also found to be a difficulty affecting learners with learning disabilities who have handwriting difficulties. First, the agreement between the joint examination performance and the teacher's categorization of LD learners with handwriting difficulties correlated highly. In addition, the learners with LD without handwriting difficulties performed significantly higher on all the terms of performance component. It was discovered that handwriting difficulty has become a serious problem that hinders learners with LD to express themselves accurately and legibly in a written form. Thus, proper correction is necessary to assist learners with LD who have handwriting difficulties.

5.3 Recommendations

The study established that learners with handwriting problems face large issues in their academic pursuits. Nevertheless teachers, values, and practices are the core of finding lasting solutions to the problem. However, teachers' efforts must be complemented through policy formulation. Invariably, sound policies are anchored on applied research and sound theoretical augments that underpin the research. The research is as good as the theory that underpins it. Consequently, recommendations are drawn targeting three cadres of practitioners in the field of education and human development. The first level of recommendation is directed at the teachers and the administrators of the schools. Policymakers and researchers are other cadres of stakeholders targeted with recommendations.

5.3.1 Recommendations to Teachers

Teachers are major players in the learning process and helping learners acquire good transcriptional skills has a profound impact on their academic achievement. For teachers to productively engage learners with handwriting problems the following recommendations are made:

1. There is a need to acknowledge that handwriting difficulties are part and parcel of the learning process. Acknowledging this will increase acceptance level and demystify fears learners have about the problem leading to constructive and fruitful engagement in finding lasting solutions.
2. Learners with handwriting problems should be construed positively and their situation should accentuate learning rather than stifling it.
3. There is a need for teachers to examine how their own teaching practices and may be exacerbating handwriting problems and respond by embracing instructional methods that reflect the capabilities and the uniqueness of the learners.

5.3.2 Recommendations to Researchers

Researchers have a crucial and substantive role to play in finding sustainable and acceptable solutions to the problems of handwriting. They have a role to play by;

1. Accelerating research on good practices and pedagogies on handwriting development and strengthen information sharing and dissemination mechanisms.
2. Develop standard local tools and evaluative procedures to accentuate profiling and helping learners experiencing handwriting problems.

3. Expanding research field and document how cultural factors, differences in abilities, individual background, languages and level of technological mastery and resources endowment impact on handwriting process.

5.3.3 Recommendations to Policy Makers

Policy framework reflects the official stance on the problem and communicates acceptable norms, practices and offer normative grounds on which the official discussion is conducted. The followings recommendations are therefore made.

1. There is a need to institutionalize handwriting lessons in the national curriculum and part and parcel of the official learning program.
2. Increase incentives to handwriting programs through the official writing competition, designing instructional materials and staff's capacity development programs.
3. Find alternative mechanisms of assessing and evaluating learners with handwriting problems to tap the inert potential they could be harboring.

5.4 Areas of Further Research on the Study Problem

1. How handwriting characteristics impact on lifelong learning, vocational development, and career choices.
2. A comparison of handwriting characteristics of learners with and without learning disabilities.
3. How handwriting characteristics impact on performance across individual subjects in school.
4. Perception of learners on poor handwriting corrective measures.

5. Learners' perception of colleagues with poor handwriting.
6. The effectiveness of handwriting corrective measures across different learning abilities.

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

Emily Mulanya,

P.O BOX

Nairobi.

June 2015

Dear Sir/Madam,

RE: DATA COLLECTION

I am Mulanya Emily, a student of Kenyatta University (KU) pursuing a Master of Arts degree in Education. One of my academic outputs before graduating is a thesis and for this reason, I have chosen the research topic “Assessment of Handwriting Difficulties on Academic Performance of Learners with Learning Disabilities in Selected Public Primary Schools in Makadara Sub-County, Nairobi, Kenya”.

You have been selected to form part of the study. This is to kindly request you to assist me collect the data by responding to the questionnaire (copy attached). The information you provide will be used strictly for academic purposes and will be treated with utmost confidence.

A copy of the final report will be available to you upon request.

Your assistance will be highly appreciated.

Yours sincerely,

.....

Emily N Mulanya

E55/CE/22901/2011

APPENDIX II

INFORMED CONSENT FORM FOR HEADTEACHERS

My name is Emily Mulanya from Kenyatta University. Thank you for agreeing to participate in this study, which will take place in May 2018. This form details the purpose of this study, a description of the involvement required and your rights as a participant. The purpose of this study is to find out effects of handwriting difficulties on the performance of learners with learning disabilities in Nairobi county Kenya.

The benefits of the research will be: -

- Help improve quality of handwriting in primary schools in Makadara.

The method that will be used to meet this purpose include:

- Your participation in the interview designed for the study

You are encouraged to ask questions or raise concerns at any time about the nature of the study or the methods I am using. Please contact me at any time at the e-mail address or telephone number listed above.

Our discussion will be audio taped to help me accurately capture your insights in your own words. The tapes will only be heard by me for the purpose of this study. If you feel uncomfortable with the recorder, you may ask that it be turned off at any time. All information will be treated with utmost confidentiality. You also have the right to withdraw from the study at any time. In the event you choose to withdraw from the study, all information you provide including tapes will be destroyed and omitted from the final dissertation.

By signing this consent form, I certify that I agree to the terms of this agreement.

(Signature)

(Date)

APPENDIX III: INFORMED CONSENT FORM FOR TEACHERS

My name is Emily Mulanya from Kenyatta University.

Title of research project:

EFFECTS OF HANDWRITING DIFFICULTIES ON ACADEMIC PERFORMANCE OF LEARNERS WITH LEARNING DISABILITIES IN SELECTED PUBLIC PRIMARY SCHOOLS IN NAIROBI COUNTY, KENYA

By filling out this questionnaire / answering the questions put to me: -

- I agree to participate in this research project.
- I have read this consent form and the information it contains and had the opportunity to ask questions about them.
- I understand that I was selected to participate in this study due to my expertise
- I understand that I was selected randomly from a larger group of people with my expertise
- I agree that my responses be used for education and research on condition my privacy is respected. I understand that my responses will be used in aggregate form only, so that I will not be personally identifiable.
- I understand that I am under no obligation to take part in this research.
- I understand I have the right to withdraw from this research at any stage.
- I understand that this research might be published in a research journal or book. In the case of dissertation research, the document will be available to readers in a university library in printed form, and possibly in electronic form as well.

Name of Participant: _____

Signature: _____

Date: _____

APPENDIX IV: INFORMED CONSENT FORM FOR PARENTS

My name is **Emily Mulanya** from Kenyatta University. I am pursuing a Master of Arts degree in Education (Special Needs). My research topic is “Effects of Handwriting difficulties on academic performance of learners with learning disabilities in selected public primary schools in Makadara sub-county, Nairobi, Kenya.”

Your child has been selected to form part of this study. Kindly assist me by allowing your child to participate. I will ensure that your child is handled in an appropriate manner according to the children Act of 2014 CAP 4, Section A.

By signing this consent form, I certify that I agree to the terms of agreement.

Signature.....Date.....

APPENDIX V: ASSESSMENT TOOL 1

**TOOL FOR IDENTIFICATION OF LEARNERS WITH LEARNING
DISABILITY**

The checklist is adapted from the National Dissemination Center for Children with Disabilities (NICHCY).

Specific learning disabilities affects skill areas of:

ITEM	YES	NO
Reading (dyslexia)		
Writing (dysgraphia)		
Listening		
Speaking		
Reasoning		
Math (dyscalculia)		

A learner experiencing difficulties in ONE or more of the above areas was identified as having learning disability.

Copyright (C) 2013-2020 Special Education Guide.

APPENDIX VI: ASSESSMENT TOOL 2

IDENTIFICATION OF LEARNERS WITH HANDWRITING DIFFICULTIES

MHA-Minnesota Handwriting Assessment (Reisman 1999).

This is a standardized tool used for assessing handwriting in the USA.

- ✓ Takes 5-10 minutes

Assesses:

- ✓ Rate/speed
- ✓ Legibility
- ✓ Form
- ✓ Alignment
- ✓ Size and spacing

Scores are assigned to the following categories:

- i) Performing like peers
- ii) Performing below peers
- iii) Performing well below peers

Age	Method of administration format	Approximate time to administer(mins)	Performing like peers (X)	Performing below peers (X)	Performing well below peers (X)
	Rate(speed)	2			
	Legibility	2			
	Form	2			
	Alignment	2			
	Size	1			
	spacing	1			

Adapted MHA (1999)

APPENDIX VII: HANDWRITING ASSESSMENT EXERCISE

A sentence that contains all letters of the alphabet.

“The quick brown fox jumps over the lazy dog.”

The above sentence was given to all learners who were involved in this study.

The researcher observed the learners written class work.

Prior to the above exercise the learners suspected to have learning disability were identified by class teachers.

APPENDIX VIII: QUESTIONNAIRE

EFFECTS OF HANDWRITING DIFFICULTIES ON ACADEMIC PERFORMANCE OF LEARNERS WITH LEARNING DISABILITIES IN SELECTED PUBLIC PRIMARY SCHOOLS IN NAIROBI COUNTY, KENYA.

Dear Respondent,

This structured questionnaire is for collecting data to help in assessing handwriting difficulties and how they influence learner's performance. You are kindly requested to participate in the survey by completing the questionnaire to the best of your knowledge. The process will take you only about 8 minutes. The information that you will provide will remain confidential and is sought exclusively for academic purpose.

Please do not indicate your name in the questionnaire.

Thank you very much for taking your time to complete this survey. Your input will go a long way in enhancing academic performance on learners with learning disabilities and are experiencing handwriting difficulties. If you would like to receive a copy of this report please indicate so by writing your email address on the back of the questionnaire.

PART A

PERSONAL DATA

Please tick or circle the most appropriate answer according to you in respect to the following:

1. Gender

- (a) Male (b) Female

2. Length of time in the teaching profession

- (a) Less than 1 year
(b) 1-3 years
(c) 4 –6 years

(d) 7-10 years

(e) Above 10 years

PART B

The statements in numbers 1, 2 and 3, are based on Likert scaling of 5-1.

Where: 5=Strongly Agree, 4 = Somehow Agree, 3 = Neutral, 2=Somehow Disagree, 1=Strongly Disagree.

Please indicate your views on each of the following statements by ticking the choice that best represents your opinion.

1. Factors influencing the development of learner's handwriting

	Parameter	1	2	3	4	5
a	Teachers' uncaring attitude about the way students write in mathematics could contribute to their poor handwriting					
b	Handwriting is not reflected in the school timetable by many teachers as a subject.					
c	Lack of proper supervision of student's work at early stage of schooling could contribute to their poor handwriting formation.					
d	Lack of trained teachers to teach handwriting could affect student's handwriting fluency in mathematics.					
e	Many teachers do not see handwriting as a skill that students should be taught to enable them to do well in mathematics.					
f	Physical environment contributes to handwriting development					
g	Quality of writing tools e.g. pen, paper etc. contributes to handwriting development					

2. Signs/ symptoms learners are likely to have handwriting difficulties exhibit

	Parameter	1	2	3	4	5
a	They usually do not complete assignments					
b	They indicate slowed progress					
c	They do not take notes					
d	They have poor class attendance					

3. How does quality of handwriting impact an overall development of a learner?

	Parameter	1	2	3	4	5
a	Poor handwriting contributes to poor grades in class tests					
b	Pupils with good handwriting feel motivated to learn					
c	Examiner are frustrated in marking work with poor handwriting					
d	Teachers form negative attitude on pupils with poor handwriting					

4a. Are there any measures put in place to help learners with handwriting difficulties realize their full potential and overcome this challenge_____?

4b. If yes in 4a above, what are these measures?

4c. If NO, what measures do you think should be put in place?

THANK YOU

APPENDIX IX: INTERVIEW GUIDE

1. How long have you worked with LD _____?
2. Are there measures undertaken to improve learners handwriting _____
3. If yes in 2 above, what are these measures

4. Do you think teachers have a role to play in developing learners handwriting?

5. Should handwriting be included on school timetable?

6. What is your opinion about learners who write poorly?

APPENDIX X: OBSERVATION GUIDE/SCHEDULE

Kindly comment on the following based on the observations made

1. Quality of device used (pen/pencil) _____
2. Sitting position _____
3. Quality of instruments used (eg geometrical instruments, stencils etc)

4. Lighting of classroom _____
5. Size of class _____
6. Mode of instruction _____
7. Class attendance _____
8. Any interference with teaching and learning

**APPENDIX XI: RESEARCH AUTHORIZATION IN STATE DEPARTMENT OF
BASIC EDUCATION**



**Republic of Kenya
MINISTRY OF EDUCATION
STATE DEPARTMENT OF BASIC EDUCATION**

Telegrams: "SCHOOLING", Nairobi
Telephone: Nairobi 020 2453699
Email: rceairobi@gmail.com
cdairobi@gmail.com

**REGIONAL COORDINATOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 - 00200
NAIROBI**

When replying please quote

Ref: **RCE/NRB/GEN/1 VOL. I**

DATE: **22nd January 2018**

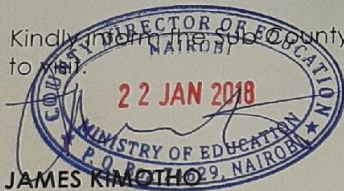
Emily Narotso Mulanya
Kenyatta University
P O Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on "**Assessment of handwriting difficulties on academic performance of learners with learning disabilities in selected public primary schools**".

This office has no objection and authority is hereby granted for a period ending **30th October, 2018** as indicated in the request letter.

Kindly inform the Sub County Director of Education of the Sub County you intend to visit.



JAMES KIMOTHO
FOR: REGIONAL COORDINATOR OF EDUCATION
NAIROBI

C.C

Director General/CEO
Nation Commission for Science, Technology and Innovation
NAIROBI

APPENDIX-XII: RESEARCH AUTHORIZATION FROM NACOSTI



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 020 400 7000,
0713 788787, 0735404245
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Wariyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/24183/19597**

Date: **30th October, 2017**

Emily Narotso Mulanya
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Assessment of handwriting difficulties on academic performance of learners with learning disabilities in selected public primary schools in Nairobi City County, Kenya*" I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **30th October, 2018**.

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, NBI
TEL: 341666

The County Director of Education
Nairobi County.

APPENDIX XIII: RESEARCH PERMIT FROM NACOSTI

**THIS IS TO CERTIFY THAT:
MS. EMILY NAROTSO MULANYA
of KENYATTA UNIVERSITY, 0-100
NAIROBI, has been permitted to conduct
research in Nairobi County**

**Permit No : NACOSTI/P/17/24183/19597
Date Of Issue : 30th October,2017
Fee Recieved :Ksh 1000**

**on the topic: ASSESSMENT OF
HANDWRITING DIFFICULTIES ON
ACADEMIC PERFORMANCE OF LEARNERS
WITH LEARNING DISABILITIES IN
SELECTED PUBLIC PRIMARY SCHOOLS IN
NAIROBI CITY COUNTY, KENYA**

**for the period ending:
30th October,2018**



.....
**Applicant's
Signature**

.....
**Director General
National Commission for Science,
Technology & Innovation**