ANALYSIS OF TEACHERS’ REMEDIAL STRATEGIES FOR
ENHANCING MATHEMATICS SKILLS TO LEARNERS WITH
DYSCALCULIA IN REGULAR PRIMARY SCHOOLS IN
NYANDARUA COUNTY, KENYA

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E55/20341/2012

A RESEARCH THESIS SUBMITTED IN FULFILMENT
OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF
EDUCATION (SPECIAL NEEDS EDUCATION), AT KENYATTA
UNIVERSITY

JUNE, 2016
DECLARATION

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

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This thesis is dedicated to my wife Jackline Gachihi and my children for their assistance and encouragements during the whole process of this study.
ACKNOWLEDGEMENTS

First and foremost I wish to express my sincere appreciation to my supervisors Dr. Jessina Muthee and Dr. Joel M. Chomba for their guidance and support throughout my research. Secondly I acknowledge Prof. Karugu, Dr. Runo and the late Dr. Njoroge for their wise advice and scholarly input.

I am also thankful to all my respondents from Nyandarua North Sub-county who provided me with the information I required. I also wish to appreciate my family for their moral support and endurance during my time of study. Finally, thanks to God for giving me strength and hope when challenges occurred in the course of my study.
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# ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AT IV</td>
<td>Approved Teacher Four</td>
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<tr>
<td>BC</td>
<td>British Columbia.</td>
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<td>DI</td>
<td>Direct Instruction</td>
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<tr>
<td>EFA</td>
<td>Education for All.</td>
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<td>IDEA</td>
<td>Individuals with Disabilities Education Act.</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency.</td>
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<td>LD</td>
<td>Learning Disabilities.</td>
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<tr>
<td>KCPE</td>
<td>Kenya Certificate of Primary Education</td>
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<td>KNEC</td>
<td>Kenya National Examination Council</td>
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<tr>
<td>MKO</td>
<td>More Knowledgeable Other</td>
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<tr>
<td>MoE</td>
<td>Ministry of Education.</td>
</tr>
<tr>
<td>RtI</td>
<td>Response to Intervention.</td>
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<tr>
<td>SLD</td>
<td>Specific Learning Disabilities</td>
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<td>SMASE</td>
<td>Strengthening Mathematics and Science Education</td>
</tr>
<tr>
<td>SNE</td>
<td>Special Need Education</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom.</td>
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<td>ZPD</td>
<td>Zone of Proximal Development.</td>
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ABSTRACT

The aim of this study was to analyse remedial strategies used by teachers for enhancing mathematics skills to learners with dyscalculia in class four in Nyandarua North Sub-County which is in Nyandarua County, Kenya. The study employed a descriptive research design which used mixed model research with both qualitative and quantitative approaches. The researcher used questionnaires and observation schedule to carry out the study. Pilot study was done in Subuku, Kahindu and Olbolossat Primary Schools in Nyandarua North Sub-county. Population for the main study was drawn from Nyandarua North Sub-County in Nyandarua County. Sample size comprised 20 class four mathematics teachers and 20 head teachers, making a total of 40 respondents. Purposive sampling was used to select mathematics teachers for class 4 and head-teachers of the respective schools. In case a school had double or multiple streams, simple random sampling was used to get one teacher per school. Data from the research instruments was coded and analysed by electronic means using Statistical Package for Social Sciences (SPSS) to attain descriptive statistics. The findings are presented in frequencies, percentages, mean, standard deviation, tables, graphs and pie charts. The study found that head teachers and teachers had their various ways of identifying learners with learning disabilities based on their own criteria. The study also found that though majority of teachers were professionally qualified as teachers, most of them were not competent enough to support learners with dyscalculia. The study further found that most of the schools did not have adequate and suitable resources to support learners with dyscalculia. From the findings, the study recommended the curriculum developers to adapt curriculum in teacher training colleges whereby more emphasis should be directed on areas of special educational needs, in-service training on Special Needs Education should be enforced to teachers who have not trained in the area of special educational needs, seminars and workshop should be held regularly to update teachers on current instructional strategies and finally, government and other stakeholders should provide enough funds to purchase teaching and learning resources suitable for learners with mathematics disabilities.
CHAPTER ONE

INTRODUCTION

1.0 Introduction

This Chapter discusses the background of the study, statement of the problem, purpose of the study, objectives, research questions, significance of the study, limitations and delimitations, assumptions of the study, theoretical framework, conceptual framework and definition of terms and concepts.

1.1 Background to the Study

Mathematics is an essential support of civilization (Bharadwaj, 2010). Society in general takes mathematics as the foundation of scientific and technological knowledge that is crucial in social-economic development of the nation. According to Allosopp, Kyger and Lovin (2007), pupils without appropriate level of competency in mathematics will find it difficult to manage many important aspects of lives and also limit their career opportunities in future. Mathematics disabilities often seem to go unnoticed because mathematics is often seen as a challenging subject where it is taken as normal and thus acceptable for learners to experience difficulties. Inability to perform well in mathematics is taken as a common state of affairs by children as well as adults. Unfortunately, this contentment places pupils with dyscalculia at risk of deteriorating further in mathematics and facing a range of preventable disadvantages throughout their life span (Hannell, 2013).
Impressive courses such as architecture, medicine and engineering just to mention a few, require one to have a good foundation in mathematics (Mbugua, Kibet, Muthaa & Nkonke, 2012). Despite the important role that mathematics plays in the society, the area under study has been performing poorly in the subject at national examination. In most cases, discrepancy in mathematics scoring when learners do the exam leaves the society with queries. Some learners score very high marks while quite a good number attain very low marks. The scenario leads to the society in Kenya shifting blames to teachers in regard to poor performance in mathematics.

Sometimes, teachers try to engage learners in extra tuition in disguise to remedial teaching but the Ministry of Education (MoE) does not allow the exercise. The Basic Education Act, 2013, which came into force in January, 2013, bans pupils from being subjected to weekend, afterhours, and holiday tuition. The ministry claimed that the ban was made in the best interest of the learners and is aimed at having an education system that creates learners who will be problem solvers, critical thinkers and who, during the learning process, have the ability to question or analyze the information they have learned (Buhere, 2013). However, a child with dyscalculia will not benefit from conventional methods of teaching and tuition hence the importance of this study.

A study conducted by Uwezo Kenya that took place in the year 2013, testing over 153000 children across Kenya’s 47 counties, found that 11% of pupils in class
eight, who were expected to sit national examinations at the end of the year, could not solve a class two level mathematical division question. The study noted that despite significant gains in enrolment, pupils were not learning core skills in numeracy expected at their age and grade level. Moreover, preoccupation with mean score was compromising instruction of general knowledge and transmission of skills necessary for life (Mugo, 2013).

One of the sources of mathematics difficulty may be as a result of teaching strategy applied to each learner. According to Onwumere (2009), every learner is unique and learns in a particular approach. Onwumere stated that any teaching which does not take into account learners limiting factors rarely succeeds. The researcher further noted that teachers who realize the learning needs of their pupils are more empowered to provide the kinds of instructions their learners need. Identifying the root cause of a pupil’s struggle to learn, provides a starting point for understanding why particular strategy is efficient for the learner (Onwumere, 2009).

Mathematics difficulty might be as a result of developmental dyscalculia which is a specific learning disability affecting the usual acquisition of mathematics skills (Shalev, 2004). According to Butterworth, Varma and Laurillard (2011), developmental dyscalculia has an estimate of about 5% to 7% in United Kingdom (UK). The UK government concluded that developmental dyscalculia is presently given low deal compared to developmental dyslexia. Butterworth, Varma and
Laurilland (2011) insist that at the moment, dyscalculia is not broadly known by teachers, educational authorities and research funding agencies. The researchers acknowledge that recognition would likely be the beginning for enhanced prospects for learners with dyscalculia. This calls for an urgent societal need to remediate failing learners in order to accomplish a level of numeracy at which they can function adequately in the modern workplace (Butterworth et al, 2011).

According to Berg (2013), learners who do not get their educational needs met in mathematics, not only fail to perform well academically but also fail to trust their own mathematical sense. Berg adds that when these students are faced with any element of mathematics, significant anxiety in their effect and behaviour is noted.

Most of the countries in Africa, very little is known about dyscalculia. Learners with dyscalculia are quite often referred to as low achievers, slow learners or lazy by teachers and parents (Njeru, 2012). The teachers normally ignore them and concentrate on those who do not experience such disabilities.

Poor performance in mathematics has continued to be witnessed despite various government initiatives put in place. For instance, Government of Kenya with the help of JAICA introduced a project called SMASE (Strengthening Mathematics and Science) in primary schools in 2006. The aim of SMASE was to improve teachers’ competence by improving their pedagogical content knowledge and skills in order to attend to learners appropriately, hence improving their abilities in mathematics and science (Kisangi & Ateng’, 2011). Nevertheless, SMASE
programme could be appropriate in dealing with mathematics difficulties but not in mathematics disabilities.

The findings of Uwezo Kenya, where some learners in class eight were unable to solve class two mathematical division question could have been attributed by other factors like presence of learners with dyscalculia, which is a neurological problem. From this scenario, the researcher wished to conduct research in class four to investigate how teachers remediate learners with dyscalculia. According to Butterworth (2004), if pupils are identified at age seven years and above, more reliable results can be attained than in younger children

1.2 Statement of the Problem

Mathematics encompasses modern civilization and the life of a learner who persistently performs badly in mathematics achievement can turn out to be a nightmare (Reusser 2000). Learners with mathematics disabilities perform poorly in mathematics compared to their achieving peers even when accommodations are permitted in the testing situation. The achievement gap can be lessened by practising early intervention (Bryant et al, 2008). Avoiding the learners with the mathematics disabilities may worsen the situation since competency in early grades affects performance in later years (Bryant et al, 2008).

Poor performance in mathematics at Kenya Certificate of Primary Education (KCPE) has been and still is a subject of much debate among politicians, teachers, parents, education experts, among others. For instance, in the year 2010, pupils
who sat for KCPE exam in Kenya attained a mean score of 53.80 in mathematics, while in 2011; pupils who sat for the exam got a mean score of 52.18 (Kiptum, Rono, Too, Bii and Too, 2013). Record from education office in Nyandarua North Sub-county indicates that in the year 2011, pupils who did KCPE obtained a mean score of 48.78% in mathematics. During that year, public schools in the area got a mean score of 45.09% while private schools obtained 62.91%. This is an indication that mathematics was performed poorly in the sub-county and especially in public schools.

Deprived performance in mathematics could be attributed to poor mathematics skills required from an early grade and develop gradually. The situation might also be caused by the presence of learners who struggle in mathematics and also those with mathematics disabilities (dyscalculia). According to Reusser (2000), learning difficulties with a neuropsychological diagnosis are considerably reinforced and shaped by environmental pressures such as insufficient measures taken by the instructional and support systems. Despite the fact that various researches have been done in areas of learning disabilities, very little effort has been put in remediation of learners with dyscalculia. The current study consequently intended to analyze remedial strategies used by teachers to enhance mathematics skills to learners with dyscalculia.
1.3 Purpose of the Study

The purpose of the study was to analyse remedial strategies used by teachers to enhance mathematics skills to learners with dyscalculia in Nyandarua North Sub-county.

1.4 Objectives of the Study

The objectives of the study are:

i. To establish procedures used by teachers in identifying learners with dyscalculia.

ii. To establish teachers’ professional competence for effective remediation of learners with dyscalculia.

iii. To investigate intervention strategies adopted by teachers that support learners with dyscalculia during remediation.

iv. To explore teaching and learning resources used by teachers educating learners with dyscalculia during remediation.

1.5 Research Questions

The study was guided by the following questions:

i. What are the procedures used by teachers in identifying learners with dyscalculia?

ii. What professional competence do teachers have for effective remediation of learners with dyscalculia?
iii. What intervention strategies do teachers adopt to support learners with dyscalculia during remediation?

iv. What teaching and learning resources are used by teachers educating learners with dyscalculia during remediation?

1.6 Significance of the Study

It was hoped that the results of this study may shed light to the need of early identification of learners with mathematics disabilities. The identification may assist teachers in applying effective instructional strategies suitable to learners with dyscalculia for remedial purpose. The study was expected to make stakeholders have a clear understanding of children affected by dyscalculia. The awareness of the disabilities may help in the provision of the right assistance within and out of classroom environment.

The result of the study may further assist the Ministry of Education, policy makers and curriculum developers to make informed decisions on relevant teaching and learning requirements for learners with dyscalculia as well as formulating and implementing ideal policies. The intervention may help in improving the standard of mathematics as well as helping the learners to have confidence in mathematics and enhanced mathematics skills. The researcher also hopes that future researchers will view the literature of the study as a basis of further studies.
1.7.1 Limitations of the Study

The participants of this study were only head teachers and mathematics teachers in class four from Nyandarua North Sub-county because of financial constrains and inadequate time. The study was confined to primary schools which were easily accessible owing to distance between the schools and substandard weather roads in the sub-county, which sometimes become impassable during rainy season.

1.7.2 Delimitations of the Study

The study focused on remedial strategies for enhancing mathematics skills to learners with dyscalculia. The study confined itself to regular public primary schools in Nyandarua North Sub-County in order to get a clear picture from an inclusive setting. Pupils under study were class four, categorized as learners with mathematics disabilities hoping that they could be identified easily in that class and if interventions measures are put in place at this age, the affected pupils might benefit as expected.

1.8 Assumptions of the study

This study was based on the assumptions that there would be willingness of the respondents to answer the questionnaires appropriately and truthfully. The researcher assumed that the information would be easily accessible to aid the successful completion of the study.
1.9 Theoretical Framework

This study was based on social development theory of learning by Vygotsky (1978). The theory states that social interaction plays a fundamental role in the development of cognition. The theory highlights on the following: social interaction and culture have dramatic impact on cognitive development, cognitive processes develop through social interaction and, learning is largely mediated by social interaction of students and others who are more knowledgeable. According to Vygotsky, individual development cannot be understood without reference to social and cultural context within which it is embedded. Among the principles of Vygotsky’s theories of cognitive development, the main ones are the More Knowledgeable Other (MKO) and the Zone of Proximal Development (ZPD) (McLeod, 2007).

The More Knowledgeable Other refers to a skilful instructor who instills learning to a child through social interaction. MKO includes: teacher, old adult, peer, or electronic tutor. The More Knowledgeable Others, facilitate and guide learners through learning process since they have more knowledge about the topic being learnt than the learner. The Zone of Proximal Development (ZPD) relates to the difference between what a child can achieve independently and what a child can achieve with guidance and encouragement from a skilled partner. This is a gap between what is known and what is not known by the student. The ZPD defines those functions that have not yet matured but are in the process of doing so. According to Vygotsky, a child is only able to take the next
step in their cognitive development if other person typically an adult supports and prompts him/her to do so. Skills too difficult for the child to master on his or her own can be done with guidance and encouragement from knowledgeable person. The assistance is termed as scaffolding as used by other theorists like Bruner (McLeod, 2007).

The current study relied on the social development theory of learning because learners with dyscalculia require an experienced educator, in this case MKO who can identify learners with mathematics disabilities. The educator should be someone who can distinguish between learners with mathematics disabilities and those who just struggle in mathematics, in order to give the right assistance. Moreover, the concept of ZPD to a learner with dyscalculia highly depends on a well trained teacher. The educator is expected to be knowledgeable in remedial strategies that can be used to help learners with dyscalculia, develop their cognitive skills in mathematics hence the fulfilment of the Zone of Proximal Development as expected of them.
1.10 Conceptual Framework

The conceptual framework on analysis of remedial strategies to enhance mathematics skills to pupils with LD in arithmetic:

**Independent variables**

| Identification of learners with dyscalculia |
| Teacher’s professional competence |
| Intervention Strategies e.g.: |
|   • Direct Instruction |
|   • Strategy Instruction |
| Teaching and learning resources |

**Dependent variables**

| Learner with enhanced mathematics skills |

Source: (Researcher’s conceptualization of the problem)

The framework shows that a learner with dyscalculia requires remedial strategies offered by competent teachers who are professionally qualified in assisting learners with LD. The teachers are expected to identify students with dyscalculia, intervene by using appropriate instructional strategies and, use relevant teaching and learning resources. The expected outcome would be enhanced mathematics skills for the learner with dyscalculia.
1.11 Operation Definition of Terms

Key terms were used as follows, for the purpose of this study:

**Dyscalculia**: This refers to mathematics disorders that affect an individual’s ability to acquire arithmetic skills.

**Instructional strategies**: Teaching approaches used by teachers to present subject content to learners during a lesson.

**Intervention**: This refers to action employed by teachers to remediate learners with learning disabilities in mathematics, to improve their mathematics skills.

**Learning Disabilities**: Neurological disorders that affect the brain's ability to process information and causes difficulties in specific areas of learning, to average or above average learners.

**Remediation**: The process of providing additional help to learners who are experiencing difficulties in learning.

**Resources**: Materials used in class that facilitate teaching and learning process, to enhance learning.
CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

The aim of this study was to analyze teachers’ remedial strategies for enhancing mathematics skills to learners with dyscalculia in regular primary school. This chapter contains relevant literature to the study. The areas covered are: learning disabilities and dyscalculia, identification and assessment, teachers’ professional competence, remedial practices and, teaching and learning resources.

2.1 Learning Disabilities and Dyscalculia

Learning disabilities (LD) refers to a set of central nervous system disorders that affect an extensive range of academic and functional skills (Brown, 2009). According to Favre and Ax (2011), LD is a neurologically based disorder in which the nerve-cell connections fail to function properly. The learning disabilities occur due to the intended information not reaching a specific target in the brain. The condition leads to unanticipated under-achievement in learners whose intelligence is average or above average (Favre & Ax, 2011).

Learning disability is one of the least understood and most disputed disabling condition that affects children. Lyon (2003), records that the field continues to be beset by persistent, and occasionally contentious disagreement about the definition of the disorder, diagnostic criteria practices, treatment procedures and education polices.
Kenyon (2003), points out that learners with LD are neither lazy nor dump. They often fall within the average or gifted learners. Their brain just process information differently. Kenyon (2003) further says that a learning disability is not a disease and therefore there is no cure, but there are ways to overcome the challenges it posses through identification and accommodation.

Learners with learning disabilities are rather common, despite the fact that estimates of their occurrence differ according to the meaning and analytic standards used in to categorize them. In British Columbia (2011), the number of learners recognized as getting services for learning is reported to be about 3% of the learners’ population across school district. The number does not comprise learners with mild to moderate LD who are taught within normal learning setting without further special education services.

Mathematical disorder, referred to as dyscalculia is one of the group of the specific learning disabilities whereby learner can be gifted in other academic areas but experience difficulties in mathematics (East & Evans, 2006). Developmental dyscalculia was first documented in United Kingdom by Department for Education and Skills (DfES) in 2001 and defined as “a condition that affects the ability to acquire arithmetic skills” (Bird, 2013). Bird (2013) further explains that dyscalculia learners may have problem in understanding simple number concepts, be short of intuitive grasp of numbers, and have difficulties in learning number facts and procedures. Bird adds that in case they
formulate a right answer or use exact method they might not do so with confidence.

According to Sausa (2007 p 145), common symptoms in mathematical disorders are: “Inconsistent results with addition, subtraction, multiplication and division; inability to remember mathematical formulas, rules or concepts; difficulties with abstract, concepts of time and direction; consistent errors when recalling numbers including transpositions, omissions, and reversal; and, difficulty remembering how to keep score during games”. Sausa (2007) further classifies dyscalculia as quantitative (difficulty in counting and calculation), qualitative (difficulty in conceptualizing of mathematics processes and calculating) and mixed (failure to incorporate quantity and space).

According to Henderson (2012), dyscalculia affects approximately 6% of the population. The researcher states that research into dyslexia has been given more emphasis than research into dyscalculia. Henderson (2012) further noted that a learner who struggles in mathematics often starts to develop fear of mathematics hence much anxiety and loss of self-worth. The researcher noted that if dyscalculia is not recognized at the right time the learner can be affected in all aspects of life and not just mathematics. Henderson’s findings, leads to the call for early identification and use of effective instructional strategies hence the improvement of mathematics skills to learners with dyscalculia.
2.2 Identification and Assessment of Mathematics Disabilities

A child that struggle to learn or lag in class work is mostly noticed by a parent or a teacher. The teacher or the parent may request for an evaluation whereby a comprehensive set of tests are then given to see why the child has difficulty (Gargulio, 2006). The process of assessment should be carried out by teachers who have knowledge on classification and characteristics of LD for appropriate identification.

According to (Brown, 2009), learning disabilities can be identified by a combination of intelligence testing, classroom performance and attitude. Other areas of assessment may incorporate perception, cognition, memory, attention and language abilities (Brown, 2009). Brown states that test outcome depends not only in the child’s actual abilities but also the reliability of the test and, child’s ability to pay attention and understand the questions.

Customarily, assessors used the results from the assessments to determine if there was disparity between the learner’s ability and achievement. This often implied waiting for the learner to fail before being confirmed eligible for special education services (Gargiulo, 2006). Individuals with Disabilities Education Act (1997, 2004), approved Response to Intervention (RtI), to be a requirement for the identification of learners with specific learning disabilities. RtI model assists in efficient diagnostic skills and a considerable progress in the ability of practicing educators to differentiate between normal learners who struggle with real
mathematics difficulties and learners with learning disabilities whose challenges with mathematics are rooted in their disability not the mathematics itself (Burton & Kappenberg, 2010).

Learners may be identified at any age, but they are mostly noticed during primary years (Rasugu, 2010). According to Bird (2013), learners with dyscalculia do not have “a feel for numbers”, are unable to estimate small quantities and cannot tell whether an answer to a mathematics problem is logical or not. Bird (2013) further noted that learners with dyscalculia cannot subitise (see without counting) quantities, are unable to guess whether a numerical answer is sensible, have weakness in both short-term and long-term memory, are unable to count backwards consistently, have weakness in visual and spatial orientation, direction (left/right) confusion, have slow processing speed when engaged in mathematics activity, have trouble with sequencing, do not to detect patterns, have a problem with all aspects of money, have noticeable setback in learning to read a clock to tell time and have challenges in daily life management (Bird, 2013).

Assessment aids in carrying out targeted interventions. The interventions should be adapted for learner’s particular pattern of cognitive strengths and weakness (Dowker, 2009). From various studies done in Kenya, identification and assessment of learners with LD remains a challenge. According to Mwangi (2013), teachers are not well trained in assessment and lack the essential facilities to assess learners with special needs. The researcher further noted that the
teachers have restricted understanding of special educational needs beyond physical, sensory and behavioural difficulties. This situation put learners with dyscalculia at a risk of getting low deal in appropriate intervention. Teachers need to be equipped with crucial skills on identification of learners with LD to avoid improper labelling. A study done in Thika West District by Njuguna (2012), using descriptive survey targeted 17 public primary schools with 100 respondents. The study pointed out that though teachers claimed to have knowledge in identification of LD, they did not use any identification tool in class. The researcher found that, 78% of teachers claimed to have knowledge of identifying learners with LD while 22% were unable to identify them. Njuguna’s findings dwelt on identification of learning disabilities at large. The current study wished to explore the procedures used by teachers in Nyandarua North Sub-county to identify learners with dyscalculia, in order to apply the right remedy. As can be seen from literature, most of the studies have dealt with dyslexia which is a condition that affects the ability to process language. The present situation demanded a research be conducted directed to the area of mathematics disabilities which seems to have somehow been neglected.

2.3 Teachers’ Professional Competence

Teachers’ competence in teaching learners with dyscalculia is vital. A teacher requires to be well trained on how to manage the cognitive, social and emotional challenges that learners with special needs have. Wilson (2008), records that a child with dyscalculia will not just catch up on his/her own. The child needs extra
help in mathematics from someone as early as possible which is best done by specialist, either a special education teacher or other qualified therapist.

The Ministry of Education (2009), in Kenya, had a policy that recommended deployment and retention of adequate SNE teachers and other support staff in learning institutions. One of the strategies that the ministry had was to have Key Resource Teachers for SNE in every learning institution. The recommendation supports Education for All (EFA) if implemented and the need for competent teachers in order to impart skills and competence in teaching learners with special needs and disabilities. The situation at present raises queries due to the fact that little if any seems to have been implemented. O’Gorman and Drudy (2011), assert that education and support of learners with special needs demands well educated, experienced and professionally self-directed and dedicated teachers, who can adapt teaching and curricula to the needs and resources of pupils with learning disabilities.

Many teachers are not competent enough to meet the needs of learners with educational needs. The teachers tend to blame the learners regardless of their learning challenges. The learners with learning disabilities need appropriate assistance especially from qualified and competent teachers. They require to be served by designing and delivering intensive high-quality instruction (Westwood, 2008).
Previous studies done in Kenya indicate that teachers are not fully prepared to support learners with Learning Disabilities, and so little is done to accommodate their learning needs. For instance, a study conducted by Gateru (2010), with a sample size of 30 respondents, intended to establish teachers’ academic preparedness for effective inclusive education in Makadara Division using descriptive survey. The study found that teachers were not professionally prepared on how to teach learners in an inclusive setting. From the researcher’s findings, 71% of respondents had no training on how to support pupils with LD. In addition, 62% of head teachers believed that regular schools were not prepared for the pupils with LD. The response on school preparedness depended on adequacy of facilities and qualified teachers to teach pupils with LD. Gateru (2010), recommended that more awareness should be created to ensure that pupils with learning disabilities benefit from education. The current study wanted to compare Gateru’s findings with that of Nyandarua North Sub-county. Moreover, the current study intended to investigate whether there are adequate, competent and qualified teachers who could manage conditions specifically portrayed by learners with dyscalculia.

2.4. Remediation

Remediation is an opportunity to provide supplementary support to those students who still do not understand key concepts in spite of attempts to support them. Remedial instruction aims at correcting problems and supporting individual
learners in areas of difficulties. The instruction removes barriers to learning and eliminates or lessens the challenges a learner has by helping him or her compensate for or overcome difficulties. It caters for individual needs or difficulties and takes into account learning style, maturation, case history and others, in planning and implementing a remedial learning programme (Ogonda, 2002).

According to Berg (2013), learners with math disabilities and learners who struggle, do not have fundamental perceptual and associative processing tools identified as sensory-cognitive tools that facilitate a person to successfully process numbers and mathematics. The researcher stated that the sensory-cognitive tools do not mature with time but develop after an experienced instructor addresses their growth using prescriptive methods. Berg insists that successful remediation highly relies on the delivery of mathematics curriculum particularly to support and develop the processing tools and, delivery of math curriculum based on learners’ individual processing approaches to ensure they efficiently process the curriculum (Berg, 2013). Selecting successful remediation strategies requires that teachers discover why learners are still struggling. The learners may be having gaps in understanding that prevent them from grasping key concepts.

2.4.1 Instructional Strategies

Instructional strategies are methods utilized by teachers during a lesson to ensure the delivery of instruction assists learners to learn. The teachers require a vast
amount of instructional strategies in order to teach information in a variety of ways (Gregory and Chapman 2007). According to Gregory and Chapman (2007), effective teachers believe that all learners can learn and be successful. The researchers assert that the effective teachers usually create conducive situation where all learners feel included. The teachers also believe that there is potential in each learner and so commit to looking for the key that would unlock that potential.

Instructional strategies to be discussed are direct instruction and strategy instruction. According to Swanson (2001), an experiment was conducted based on searching for the best model for instructing learners with learning disabilities on 180 studies and 4860 subjects within 1963-1997. The aim of the research was to find the impact of four different instructional models: “Direct Instruction only, Strategy Instruction only, direct instruction and strategy instruction combined, and neither strategy instruction nor direct instruction”. The study focussed on children and adolescents with learning disabilities. From the findings, academic behaviour improved in spite of instructional model used, but those models merging strategy instruction with direct instruction revealed the greatest impact. Different researchers have found that no one instructional strategy can be recommended for all hence the use of analogy of “one size doesn’t fit all. With this view in mind, the current study conducted in Nyandarua North sub-county sought to establish whether the two approaches were being utilized by teachers during remediation of learners with dyscalculia. This study also wished to explore
other strategies that teachers preferred to remediate pupils with mathematics difficulties.

**2.4.1.1 Direct Instruction**

Direct Instruction (DI) is an approach to teaching where the particular skill or content to be learned is presented clearly (British Columbia, 2011). Direct instruction is also referred to as explicit instruction and involves interactions between learners and their teacher. According to Swanson (2001), teachers clearly state a teaching objective and follow a definite instructional progression when applying DI. The teachers check how much learners already know on the subject and adapt consequent instruction, based upon initial assessment of learners’ skills. Learners move through the curriculum alone or in groups. They practise skills repeatedly at a speed determined by the teacher’s understanding of their requirements and progress (Steady, Dragoo, Arefeh & Luke, 2008).

Swanson (2001), affirms that interventions based on direct instruction integrate; “drills and probes, repeated feedback, rapidly paced instruction, individualized instruction, breaking the task down into a sequence of steps, pictorial diagrams, small-group instruction, and direct questioning by the teacher”. DI is linked with efficient instruction for teaching essential skills such as interpreting and mathematics fact recall (Montague, 2008).
2.4.1.2 Strategy Instruction

Strategy instruction is a learner-centred approach to teaching. The instruction is also known systematic instruction and focuses on teaching learners how to learn by giving them the tools and techniques that competent learners use to comprehend and learn new materials or skills (Steedy, Dragoo, Arefeh & Luke, 2008). In strategy instruction students learn how to incorporate new information with what is already known in a way that makes sense and be able to recall information or skill later, even in a different situation or place. Strategy instruction enables a learner to become independent and self directed. The learners take responsibility for their own learning as well as their own behaviour (Torgesen, 1998).

According Montague (2008), strategy instruction focuses on processes such as metacognition or self-regulation and is related more with efficient instruction in higher order learning such as mathematical problem solving. As viewed by the researcher, cognitive strategy instruction to improve mathematical problem solving for learners with learning disabilities qualifies as an evidence-based practice. Montague query on implementation of the instruction was and still is in this study: ‘How, when, and by whom should cognitive strategy instruction be offered for learners with LD’?
2.4.1.3 Strategy Instruction and Direct Instruction Combined

According to Luke (2006), learners with learning disabilities cannot be supported with a single instruction because their learning style and strength vary. Although strategy instruction and direct instructions are said to be suitable for learners with mathematics disabilities, Luke asserts that the two strategies, work well when combined. Luke argues that, both strategy instruction and direct instruction have fundamental teaching components that brings forth notable teaching and learning gains.

Swanson (2001) further conducted other studies in order to identify the best instruction that could suit learners with learning disabilities. The researcher used eight clusters of instructional components that employed direct or strategy instruction these are: “explicit or direct instruction (sequencing & segmentation), explicit strategy instruction, monitoring, individualized training, small interactive group instruction, verbal questioning, and technology-mediated instruction”.

From the studies, explicit instruction was found to have the most considerable impact on learner’s performance (Luke, 2006). The current study wished to find out whether teachers incorporate the stated strategies when they remediate learners with dyscalculia.

2.5 Teaching and Learning Resources

One of the major requirements for curriculum implementation is the resources, both human and material. As Garnett (1998) observed, materials do not teach by
themselves. They work together with teacher direction and learners interactions, as well as with repeated demonstrations and explanations by both teachers and learners. Equipments and materials ought to be adequate and accessible to enable teachers and pupils achieve success in the teaching and learning process (Makumi, 2012). Lack of appropriate mathematics materials compounds the problem of poor curricula and instruction (Miller & Mercer, 1997). In most cases inadequate educational materials negatively affects pupils learning.

According to Njuguna (2012), teachers should construct opportunities for real world problem solving so that pupils with learning disabilities can generalize and apply what they are learning. The teachers should choose teaching materials that: “help to support active learning of target skills, add interest to the lesson, are age appropriate, closely match the learners’ ability level and lead directly to skill acquisition” (Njuguna, 2012). Learning aids assist in encouraging greater participation by learners hence supporting a Chinese saying which says, “What I hear I forget, what I see I remember, and what I do I understand”.

According to Garnett (1998), actual materials are more detailed teaching tools than pictorial representation because they can be moved, held, physically grouped and separated. The researcher adds that pictures are semi-abstract symbols and if introduced too early they easily confuse the delicate connections being formed between existing concepts, the new language of mathematics, and the normal world of written number problems.
According to Emerson and Babtie (2014), learners ought to work with concrete resources to construct visual images. The researchers assert that the learners need sufficient time with the concrete equipments to experience, talk about quantities and make connections, consequently establish the meaning of numbers and their relationship. Findings from most of the researches done in Kenya investigating on the availability of teaching and learning resources are that many schools have inadequate resources especially for students with LD. In order to get the required outcome, resources should not only be adequate but also suitable to the concept being emphasized during remediation. For instance, Njuguna (2012) conducted a study in Thika West District with a sample size of 100 respondents. The study had 32 teachers as respondents. The researcher sought to know the materials used by teachers during remediation of learners with learning disabilities. The study found that 57% of teachers used similar materials they had been using during normal teaching while 43% changed the materials. The current study intended to explore further the resources used by teachers, their adequacy and suitability to teach learners with dyscalculia during remediation.

**Summary of Literature Review**

The review of related literature focused on students with dyscalculia, a wide variety of long life learning disabilities concerning mathematics. Dyscalculia affects normal achievement of arithmetic skills. From the reviewed literature it is clear that there have been efforts to support learners with dyscalculia in developed
countries. According to Njeru,(2012), British National Curriculum have several preparatory schools in Nairobi County that have adopted differentiated teaching support strategies with the hope of improving performance of learners with dyscalculia.

Most of the researches conducted in Kenya are mainly on learning disabilities which is an umbrella term for various specific learning disabilities. The researches done includes, Njuguna (2012) on teaching and learning strategies used by teachers to educate learners with LD, Gateru (2010) on teachers awareness and intervention for primary school pupils with learning disabilities, Rasugu (2011) on nature and prevalence of learning disabilities, Runo (2010) on identification of reading disabilities and Njeru (2012) based on influence of support strategies on academic performance of learners with dyscalculia. These studies among others have not explored on remedial strategies directed to pupils with dyscalculia. The current study intended to fill the gap and focused on analysis of teachers’ remedial strategies for enhancing mathematics skills to learners with dyscalculia. The research dwelt on identification and assessment of students with mathematics disabilities, teachers’ professional competence, intervention strategies and, teaching and learning resources.
CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

The aim of this study was to analyse teachers’ remedial strategies for enhancing mathematics skills to learners with dyscalculia in regular primary schools. This chapter presents the methods used in the study. It contains research design, variables, location of the study, target population, sample techniques and sample size, research instruments, pilot study to determine the validity and reliability of the instrument used, data collection techniques, data analysis, and finally logistical and ethical considerations.

3.1 Research Design

This study used a descriptive survey research design. The descriptive survey research design attempts to answer immediate questions about the current state of affairs and enables a researcher to collect a large amount of data across a wide variety of topic areas (Matthews & Kostelis, 2011). The design was considered appropriate for this study because it allowed the researcher get information on remedial strategies used by teachers, for enhancing mathematics skills to learners with dyscalculia in regular public schools in Nyandarua North Sub-County by finding out what was actually happening on the ground. The design employed mixed model research in which quantitative and qualitative approaches were used in construction of instruments and in data analysis.
3.2. Variables

Variables are characters under study. They are entities that take diverse values and appear from constructs through the process of operationalization (Hartas, 2010). Cresswell (2005) identified independent, dependent and extraneous or confounding variables as the three main types of variables. This study had dependent and independent variable

3.2.1 Independent Variables

Independent variables influence or affect the outcome, that is, dependent variable. They can be treatments or measured variables which are controlled as part of interventions (Hartas 2010). The independent variables in this study were teachers’ professional competence, identification and assessment of mathematics disabilities, remedial strategies and, teaching and learning resources used by teachers.

3.2.2 Dependent Variable

A dependent variable is the effect or outcome that relies on the independent variable (Hartas, 2010). In this research the dependent variable was, enhanced mathematics skills which may help to improve mathematics performance for learners with dyscalculia. The outcome depended on effectiveness of the stated factors from independent variables, that is, teachers’ professional competence, identification, remediation and teaching and learning resources.
3.3 Location of the Study

The study was conducted in public primary schools in Nyandarua North Sub-county formally known as Ndaragwa Division. It is in Nyandarua County which is in central region of Kenya. The sub-county occupies 655 square kilometres. The researcher chose the area under study for two reasons. First, there was no proof that the study on remedial strategies for enhancing mathematics skills to pupils with mathematics disabilities had been conducted in the area before. Second, Nyandarua North Sub-county was convenient, because the researcher is familiar with the area.

3.4 Target Population

Target population includes the individuals or group to which you wish to generalize your outcomes (Mertens & Wilson, 2012). For this study the target population was mathematics teachers in Nyandarua North Sub-county who teach standard four in public primary schools as well as the head-teachers of the schools. According to April 2014 records from Nyandarua North District Education Office, there were 65 public primary schools and 23 private schools making a total of 88 primary schools. The number of participants in the target population was 176 which included 88 head teachers and 88 mathematics teachers. The class four mathematics teachers were chosen because they are the one who were in direct contact with the pupils under study. The school head teachers of the respective schools assisted in giving information on qualification
of teachers. The head teachers were also chosen for they are part and parcel of providing teaching and learning resources required by learners in the schools.

3.5 Sample Size and Sampling Techniques

A sample size is the part of the sample in relation to the accessible population. Sampling technique involves the method used to get a sample group from identified population.

3.5.1 Sample Size

In this study, the sample size consisted of 20 head-teachers out of the 65 public schools from the area and 20 class 4 mathematics teachers. This made a total of 40 respondents. The sample was used to make generalization on the actual population size in Nyandarua North Sub-county.

3.5.2 Sampling Techniques

The study used purposive sampling techniques to select mathematics teachers for class 4 and head-teachers of the respective schools as respondents. These respondents had the necessary information which fits the objectives of the study. Simple random sampling was used to select teachers from double or multiple streamed schools. The researcher selected the schools that would represent the schools of the target population based on convenience in terms of accessibility. This was due to harsh geographical conditions of Nyandarua North Sub-county, where weather roads which dominate the area are usually affected by rainfall and the situation could hinder easy movements.
3.6 Research Instruments

The research instruments used for gathering data for this study were two sets of questionnaires and an observation schedule. The instruments are discussed below.

3.6.1 Questionnaires for Head Teachers and Teachers

The researcher used two sets of questionnaires, one for head-teachers and the other for teachers. Questionnaires help in collecting data over large sample as well as saving time. The questionnaires are also preferred because the respondents remains anonymous hence confidentiality is upheld. The questionnaires had two parts. Part 1 was on personal information while part 2 was on teachers’ professional competence, identification of learners with dyscalculia, intervention strategies and teaching and learning resources. The head teachers’ questionnaires had 14 questions while teachers’ questionnaires had 18 questions. The questionnaires included both open-ended and close-ended questions. The open ended questions gave respondents freedom to put across their ideas and provide their views where required. The closed ended questions enabled the researcher to get precise responses from the respondent.

3.6.2 Observation Schedule

Observation schedule was used to evaluate interaction between the teacher and learners, as well as the usage of teaching and learning resources during the ongoing lesson. The schedule tried to help the researcher to get the actual picture
of the remedial strategies that took place during the lesson and the classroom environment.

3.7 Pilot Study

After constructing research instruments, the researcher piloted them in Subuku, Kahindu and Olbolossat Primary School in Nyandarua North Sub-county. The schools had similar characteristics as the schools under study. The schools were not included in the main study after piloting. Piloting was done in order to prepare for the main study. Pilot study assists in refining or modifying research methods or testing out research techniques (Thomas, 2012). The aim of piloting was to determine validity and reliability of the research instruments. The pilot study helped the researcher to find errors in the research instruments which were corrected and some items deleted prior to the main study. The head teacher’s questionnaire contained a misspelled word which was corrected after piloting. From observation guide, one question which seemed not useful for data analysis was deleted.

3.7.1 Validity of Research Instrument

Validity is the degree to which the instrument measures what it is intended to be measuring (Thomas, 2012). The researcher sought professional consultation from the supervisors in order to get their comments and suggestions. The researcher coordinated the supervisors’ consideration and included relevant remarks and suggestions while developing and revising the research instruments to ascertain
their content validity before collecting the data. The two supervisors from the department of Special Needs Education later inspected and approved the instruments.

**3.7.2 Reliability of Instrument**

Reliability is the property of uniformity of a measurement that gives the similar result on different times (McBurney & White, 2010). The current study used split-half technique to test questionnaires. This involved dividing the instruments into two halves, that is, even and odd items after administrating it. The two halves were scored separately then correlation coefficient for the two sets of scores calculated. If the test is reliable the two halves should have a high positive association coefficient of about 0.8 (Orodho, 2005). Correlation coefficient of 0.81 was attained, therefore the researcher considered the instruments reliable for data collection.

**3.8 Data Collection Procedures**

The researcher visited the sampled schools after making appointments with the head-teachers. Questionnaires were administered to head-teachers and the mathematics teachers, and ample time was given fill them. The researcher explained further how to respond to the given questions. All questionnaires were later collected. The researcher also observed mathematics lessons to find out status of teaching and learning resources, interaction and participation of learners during the ongoing lesson, interventions directed to the learners for remedial
purpose, and class progress records. Information collected from the lesson observation was recorded in the observation guide.

3.9 Data Analysis

Data collected from the field was coded then keyed into the computer and processed using Statistical Package for Social Sciences (SPSS) in order to present descriptive statistics. SPSS allows one to analyze fast huge amount of data in a few moment. The study generated both qualitative and quantitative data which were analyzed using descriptive statistics. Qualitative data was derived from open-ended questions in the questionnaires whereas the quantitative data was derived from closed-ended questions. Information got from open ended questions was quantified by organizing the data, grouping into categories then coding it. The information was afterward keyed into the computer and analyzed using descriptive statistics. Quantitative data from closed ended questions was tabulated and analyzed using descriptive statistics. Frequencies tables, percentages, mean, standard deviation, pie charts and bar graphs were used when presenting the information.

3.10 Logistical and Ethical Consideration

The researcher sought permit from National Commission for Science, Technology and Innovation after being cleared by the Graduate School at Kenyatta University. The researcher then took the letter of authority to Nyandarua North Sub-county Education Officer. The researcher sought appointment from head teachers of
respective schools before the actual visit. The researcher explained to the respondents the purpose of the study. He assured the respondents that the information would be treated as confidential and would be used only for the purpose of the study. For confidentiality purpose, the names of respondents were not included in the research instruments.
CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0. Introduction

This chapter presents the findings, interpretation and discussions according to the objectives and research questions. The study aimed at analyzing teachers’ remedial strategies for enhancing mathematics skills to learners with dyscalculia in regular primary schools in Nyandarua North Sub-county. The following will be discussed in this section: demographic information, procedure used by teachers in identifying learners with dyscalculia, teachers’ professional competence, intervention strategies adopted by teachers, and teaching and learning resources used by teachers for learners with mathematics disabilities.

4.1 Demographic information

This part presents demographic data gathered from 20 head teachers and 20 teachers. The information from the respondents enabled the researcher to establish their characteristics in the study. The data variables were gender, age, professional qualification and teaching experience. The demographic has two parts, with the first one presenting gender and age bracket of head teachers and teachers. The second part presents professional qualification and teaching experience of head teachers and teachers.
Table 4.1 Gender and age bracket of head teachers and teachers

<table>
<thead>
<tr>
<th>Variables</th>
<th>Head teachers</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Age bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>21-30</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>31-40</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>41-50</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>51-60</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

The gender distribution of head teachers from the sampled population shows that majority were male as indicated in Table 4.1. This shows that the area under study does not have gender balance in administrative position. On the other hand, though most of the teachers were male, female teachers were also near to be at par with their male counterpart. This indicates that there is gender balance in teaching profession. According to the table, majority of the head teachers were within age bracket of 41-50 years. Very few were below 41 years or above 51 years. The table shows that a tenth of the head teachers were in 30-40 years and a fifth was in 51-60 years. This is an indication that quite a good number of the respondents had adequate experience to administer schools. From the table, many teachers were in the age bracket of 31-40 years while only one was below 21 years. This shows that teachers in the area had sufficient experience in teaching considering that those that were between 40-60 years were slightly more than a third.
Table 4.2 Professional qualification and teaching experience

<table>
<thead>
<tr>
<th>Variables</th>
<th>Head teachers</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Professional qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ATIV</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Diploma</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Others(untrained)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>6-10</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>11-15</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>16-20</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>21-25</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Over 25</td>
<td>19</td>
<td>95</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Regarding professional qualification as it is in Table 4.2 above, the head teachers in the area under study were; Approved Teacher Four (AT IV), diploma or bachelor degree holders. The record shows that more than two third were bachelors’ degree and diploma holders while the rest had acquired approved teacher status. These findings show that the area had knowledgeable and able head teachers who could motivate other teachers in furthering education. On the side of teachers, most of them were P1. From the table, more than a third of the teachers had upgraded their education to degree and diploma level, while a tenth had undergone teachers’ proficiency test and got ATIV status. The table also shows that two teachers had not trained as teachers. The table further reveals that majority of the head teachers had teaching experience of over 20 years. Only one head teacher was between 16-20 years in teaching. The long experience can play a
major role on effective teaching as well as in administrative duties. Information from the table also indicates that most of the teachers had teaching experience ranging from 0-25 years. From the table, a small number of the teachers had taught for more than 25 years.

4.2 Professional competence

The study sought to establish teachers’ professional competence for effective remediation of learners with dyscalculia. In relation to professional competence, the study wanted to find out whether head teachers and class four mathematics teachers had undergone SNE training, the number of teachers trained in SNE compared to total number of teachers in the sampled schools and level of training of class four mathematics teachers.

4.2.1 Whether head teachers and class four mathematics teachers had undergone SNE training

With regard to the question on whether head teachers and the mathematics teachers had trained in Special Needs Education, the responses are as tabulated in Table 4.3.

Table 4.3 Whether trained in SNE

<table>
<thead>
<tr>
<th>Trained in SNE</th>
<th>Head teachers</th>
<th>Class 4 Mathematics Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
From Table 4.3 above, it is clear that majority of both head-teachers and teachers had not trained in Special Needs Education. Only one head teacher and one teacher had undergone training in SNE. Research conducted by Gateru (2010) in Makadara Division whereby the researcher found that majority of teachers were not professionally prepared to support learners with learning disabilities, corresponds to what was found in Nyandarua North Sub-county. This situation poses a major hindrance in assisting learners with mathematics disabilities in an inclusive setting.

4.2.2 Number of teachers from the sampled population compared to those with SNE training

The study sought to find out the total number of teachers trained in special needs education compared to the total number of teachers from the sampled schools. A teacher trained in SNE in a school with inclusive setting plays a vital role as a consultant. The information of the trained teachers’ verses the total number is displayed in Table 4.4.

<table>
<thead>
<tr>
<th>Total number of teachers from the sampled schools</th>
<th>Number of teachers trained in SNE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>179</td>
<td>3</td>
</tr>
</tbody>
</table>
Based on the results in Table 4.4, only 3 out of 179 teachers had trained in SNE. This number is too small owing to the fact that quite a good number of learners with special educational needs are in regular primary schools. The findings are contrary to the Ministry of Education (2009) policy. The Ministry of Education had intention of ensuring deployment and retention of adequate SNE teachers and other support staff in learning institutions. The ministries’ expectation was that every school should have Key Resource Teacher for SNE.

4.2.3 Class four Teachers level of training in SNE if trained

With regard to question on level of training in SNE for class four mathematics teachers, the responses are shown in Table 4.5.

<table>
<thead>
<tr>
<th>Level of Training</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>N/A</td>
<td>19</td>
<td>95.0</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table 4.5 on level of training in SNE in regard to class four mathematics teachers, majority had not undergone any special needs education training. Only one teacher had trained in SNE and attained diploma level. This situation disadvantages children with special needs in the regular schools. According to Wilson (2008), a child with dyscalculia needs more support. Wilson asserts that the child requires extra help in mathematics from someone as early as possible.
which is best done by specialist, either a special education teacher or other qualified therapist.

4.3 Identification and assessment of mathematics disabilities

The researcher sought to find out the presence of learners with mathematics disabilities and the procedure used to identify them. In relation to the presence of learners with dyscalculia, both head teachers and class four mathematics teachers confirmed that they had learners with mathematics disabilities. This is according to their criteria of identification and assessment at school level. The presence of learners with LD in regular schools is in line with government policy which embraces inclusive education whereby all pupils learn together in one classroom and community in spite of their strengths or weakness in any area. In an inclusive setting children with special needs are expected to take part equally in all educational activities together with their peers with no special needs (Manzi, 2011).

In relation to rating of the cases of learning disabilities in schools, the findings from head teachers are tabulated in Table 4.6 below.

Table 4.6: Head teacher rating the cases of LD their schools

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Not serious</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
Head teachers’ rating as indicated in Table 4.7 above shows that three quarters of the schools did not have serious cases of LD. Only a quarter of the respondents mentioned that they had serious cases. The prevalence of learning disabilities depends on the criteria used in identification and knowledge on the characteristics of learners with LDs. This implies that the response from the head teachers could have been attributed to their level of training in SNE. From the findings only one head teacher had trained as a special needs education teacher.

In relation to whether class four mathematics teachers had adequate knowledge on how to identify learners with learning disabilities, the responses were as in Figure 4.1 below.

**Figure 4.1: Teachers adequate knowledge on identification LD**

Findings as revealed in Figure 4.1 above are that almost all teachers claimed that they had adequate knowledge on how to identify pupils with LD. Only one
teacher accepted not to have enough knowledge of identifying learners with learning disabilities. Though majority of teachers stated that they had adequate knowledge, researchers recommend that proper identification and assessment should be done by a team of experts. Most teachers are aware of slow learners and believe that they are the one referred to as children with learning disabilities. According to Gargiulo (2006) the experts should have sufficient knowledge on classification and characteristics of learners with LD. In order to have proper identification, Gargiulo (2006) records that the teachers with the knowledge on classification and characteristics of the learners with LD should give a child with difficulties a comprehensive set of tests.

The researcher also sought to find out total number of pupils a teacher teaches in a class and the number of learners identified as learners with dyscalculia. Table 4.7 shows teachers’ responses on the number of pupils in the sampled schools.

**Table 4.7: Teachers’ response on number of pupils**

<table>
<thead>
<tr>
<th>Sum</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of pupils.</td>
<td>619</td>
</tr>
<tr>
<td>Pupils with Mathematics Disability</td>
<td>55</td>
</tr>
</tbody>
</table>

From Table 4.7 above, class four mathematics teachers found that 8.89% learners had mathematics disabilities. From the findings, the figure is not far from other
researchers who tried to carry out similar studies elsewhere. For instance, Butterworth, Varma and Lauriland (2011) recorded that developmental dyscalculia has an estimate of 5% to 7% in UK. From literature review, prevalence of learning disabilities differs due to disagreement about the definition of the disorder, diagnostic criteria practices, treatment procedures and education policies as recorded by Lyon (2003).

With regard to question asked to head teachers on procedure they used to identify learners with learning disabilities in their schools, the responses are displayed in Table 4.8.

Table 4.8: Head teachers’ procedures on identification of LD

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing through evaluation tests</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Observing and evaluating learners when given class work tasks</td>
<td>10</td>
<td>50.0</td>
</tr>
<tr>
<td>Analysis of progress records</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Learner’s attitude towards certain subjects and teachers</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Group work participation and individual assignments</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to Table 4.8, head teachers from the sampled schools had various ways of identifying children LD. Half of them said that they observed and evaluated learners when given class work tasks. Almost a third of the respondents assessed the learners through evaluation tests. A tenth of the head teachers indicated that
they identified them through group work participation and individual assignments. One head teacher used analysis of progress record and another one based his identification on learner’s attitude towards certain subjects together with the teachers teaching the subjects. Some of methods used during identification as indicated by head teachers are the traditional methods that use results from assessments which mean waiting for a child to fail before being confirmed qualified to have disabilities (Gargiulo, 2006).

Concerning a question directed to class four mathematics teachers on procedures they used to identify learners with dyscalculia, they responded by giving various ways as represented in Figure 4.2.

**Figure 4.2: Teachers’ procedures on identification of learners**
Figure 4.2 above shows various procedures used by teachers to identify learners with dyscalculia. Majority of the teachers said they observed pupils while performing class tasks during class time. About a third claimed that they assessed the learners through assessment tests to get the learners with difficulties. One teacher commented on analysing mathematics progress record then comparing it with other subjects while another teacher used group work and individual participation in class work. Referring to classroom observation, conducted by the researcher, quite a good number did not have any class progress record that could show previous exams done by learners. Only one teacher had records that could be referred to, in order to identify learners according to their academic strength. The various ways indicated by the teachers also seemed to lack technical point of view on the process that could actually be used to get the right cases of learners with dyscalculia. This also implies that teachers in the area under study had inadequate knowledge of identifying learners with learning disabilities. According to Burton and Kappenburg (2010), IDEA (1997, 2004) recommended Response to Intervention to be a requirement for the identification of children with specific learning disabilities. The method helps in effective diagnostic skills that ascertain the disability clearly and at an early stage.

After identifying that a learner has learning disabilities in mathematics, steps should be taken to support the learner based on weak area. The researcher hence
sought to find out the steps that teachers take after identifying learners with mathematics disabilities. Views of the teachers are shown in Figure 4.3.

**Figure 4.3: Teachers’ steps after identifying learners with dyscalculia**

According to Figure 4.3 above, different teachers had their own ways of dealing with the identified cases of learners with dyscalculia. About two third (65%) of the teachers stated that they planned remedial teaching to individual learners with difficulties. One fifth said that they revisited the difficult areas with the learners. A tenth of the teachers claimed that they availed essential materials on the affected learners. The rest collaborated with other teachers and parents for further action. The teachers’ initiatives were in line with Vygotskys’ theory where a teacher is the More Knowledgeable Other who can assist learners with mathematics disabilities to master skills which are too difficult for them.
4.4 Remediation (intervention strategies) used by class four mathematics teachers

The study sought to find out intervention strategies that teachers adopt to support learners with dyscalculia during remediation. During remediation, a learner is given extra support in order to understand key concepts. Remediation requires teachers who have adequate knowledge and skills on teaching strategies. Another requirement is that teachers should keep on upgrading their knowledge and skills, through In-service Training (INSET), seminars and workshops. The researcher sought to find out whether teachers had adequate knowledge and skills on teaching strategies for learners with learning disabilities. Views from teachers and head teachers are presented in Table 4.10.

Table 4.9: Head teachers’ and teachers’ responses on teaching strategies

<table>
<thead>
<tr>
<th></th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers (Adequate knowledge</td>
<td>Yes</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>and skills on teaching</td>
<td>No</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>strategies)</td>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Teachers (Attend INSET)</td>
<td>Yes</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Head teachers (Whether teachers</td>
<td>Yes</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>attend seminars and workshops)</td>
<td>No</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 4.9 above, more than half of the teachers claimed that they had adequate knowledge and skills of teaching learners with mathematics difficulties.
The same table shows that most of the teachers in the area under study had not been attending In-service Training on current ways for instructing pupil with mathematics disabilities. Only a small number of the respondents stated that they sometimes attend such trainings that are mostly conducted through SMASE programme. The programme is usually directed towards general teaching of mathematics for all learners at large. This failure to update teachers on ways of assisting learners with mathematics difficulties poses a major drawback in an attempt to assist learners who struggle in mathematics as well as in improving mathematics standards. Head teachers’ response concurs with the results from teachers. About three quarters stated that teachers do not attend seminars and workshop to upgrade their knowledge and skills on teaching strategies for pupils with LD. Only a quarter of the respondents stated that their teachers attend such seminars.

With regard to question on teaching and learning strategies that teachers use during remediation, the teachers responded by giving several strategies that they applied. Teachers’ responses are illustrated in Table 4.10.
Table 4.10: Teaching and learning strategies

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual attention based on weak area.</td>
<td>9</td>
<td>45.0</td>
</tr>
<tr>
<td>Using real objects and practices</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Peer teaching and teaching basic facts</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Giving more exercise and revision questions</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to Table 4.10 above, different strategies appeared to be utilized by the teachers. Almost a half of the teachers stated that they gave learners with dyscalculia individual attention based on the weak area. About one third of the respondents said that they used peer teaching together with teaching basic facts. A fifth of the teachers used the strategy of giving more exercise and use of revision questions. One teacher claimed to use real objects and more practices.

At the same time, head teachers were asked to rate their teachers based on how they apply knowledge and skills in assisting pupils with mathematics disabilities. Their responses are as indicated in the Table 4.11.

Table 4.11: Rating of teachers’ application of knowledge and skills

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>16</td>
<td>80.0</td>
</tr>
<tr>
<td>Low</td>
<td>3</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
From the Table 4.11 above, majority of the head teachers revealed that their teachers’ application of knowledge and skills is moderate. A small number felt it as low while only one head teacher stated that it is high. This situation goes contrary to the views of Ogonda (2002), that learners with difficulties should have opportunity for supplementary support in order to understand key concepts hence correcting their problems.

The researcher sought to examine teachers’ application of knowledge and skills in assisting pupils with mathematics disabilities during classroom observation. Table 4.12 present data from the classroom observation.

**Table 4.12 Teachers’ application of knowledge and skills**

* A-Adequate: M-Moderate: I-Inadequate: N-None

<table>
<thead>
<tr>
<th>Observed area</th>
<th>Responses</th>
<th>Mean</th>
<th>Std-Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Level of interaction between teacher and learners.</em></td>
<td>F 4</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>% 20</td>
<td>70</td>
<td>10</td>
</tr>
<tr>
<td><em>Learner’s participation during the lesson.</em></td>
<td>F 6</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>% 30</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td><em>Intervention directed to the learners with dyscalculia for remedial purposes.</em></td>
<td>F 0</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>% 0</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td><em>Traits of Instructional strategies incorporated during the lesson that may assist pupils with dyscalculia, like Direct Instruction &amp; Strategy Instruction: for instance; drills and probes, individualized instruction, breaking down a task, repeated feed.</em></td>
<td>F 0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>% 0</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
Table 4.12 above shows that most of the teachers showed moderate interaction with the learners during the teaching session. Learners also participated well during the lesson though in some schools it was inadequate. From the table, learners with mathematics disabilities got low deal on intervention measures directed to them. From the observation, about a third of the teachers did not show any attention towards learners who seemed to have difficulties. About a half of the teachers tried to intervene, but still it was inadequate. Only a quarter of the teachers showed moderate intervention to learners with disabilities in mathematics. During the teaching session teachers used various teaching methods though they were not actually adequate to learners with dyscalculia. The instructional strategies employed by the teachers were not adequate for assisting learners with dyscalculia. Only about a half had moderate traits of strategies that could assist learners with difficulties in learning. According to Onwumere (2009), any teaching which does not take into account students limiting factors rarely do well. Onwumere (2009) asserts that every individual is unique and learns in a particular way.

The study thought it important to find out challenges that teachers face during the process of remediating learners with dyscalculia. Teachers’ responses are displayed in Figure 4.4.
When teachers were asked to point out the challenges they faced while remediating students with dyscalculia, they gave different encounters. As reflected in Figure 4.4 above, about one third of the teachers commented on lack of enough time due to workload, hence unable to assist learners who portray traits of mathematics disabilities properly. A quarter of the respondents said that the nature of learners with dyscalculia, that is, inability to grasp concepts easily, is another bother. A fifth of the teachers remarked on inadequate facilities and resources citing it as a major hindrance for effective passing of knowledge and skills to the affected learners. Several teachers said that lack of interest in mathematics by the learners with math disorders is also a major challenge. One
teacher stated that lack of cooperation from parents of children with mathematics disabilities contributes negatively smooth flow of assisting the victims.

A question was posed to head teachers to state challenges that teachers encounter when teaching children with learning disabilities. The head teachers’ comments are in Table 4.13.

**Table 4.13: Head teachers’ comments on challenges that teachers face**

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of knowledge and techniques of teaching learners with LDs</td>
<td>11</td>
<td>55.0</td>
</tr>
<tr>
<td>Inadequate teaching and learning resources to cater for learners with LDs</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Dragging the completion of syllabus</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>High enrolment in classes</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Parents ignorance and their failure to cooperate</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table 4.13, head teachers had their own views on challenges that face their teachers when assisting pupils with LD. More than half felt that their teachers lack knowledge and techniques of teaching pupils with learning disabilities. Dragging of the completion of syllabus due to the assistance given to pupils with LD was noted by a quarter of the respondents. A tenth of the head teachers claimed that high enrolment was a challenge to teachers. One head teacher said that teachers lacked teaching and learning resources suitable for learners with learning disabilities.
disabilities. Parents’ ignorance and their failure to cooperate with respective teachers was another challenge as stated by one of the respondents.

4.5: Teaching and learning resources

The study also sought to explore teaching and learning resources used by teachers educating learners with dyscalculia during remediation. In regard to the resources the researcher wanted to know whether they were adequate, available and suitable. The researcher gathered information from teachers and head teachers on teaching and learning resources the status.

Teachers were asked question in relation to adequacy of teaching and learning resources for learners with dyscalculia. Teachers’ responses were as in Figure 4.5.

Figure 4.5: Teachers’ responses on adequacy of resources
Most of the teachers as is indicated in Figure 4.5 above, acknowledged that teaching and learning resources were not enough. A small number of the teachers said that they had enough resources. Teaching and learning materials play a major role for a learner to be able to generalize and apply what they learn. As highlighted by Miller and Mercer (1997), lack of appropriate materials compounds the problem of poor instruction. Moreover, inadequacy of the educational materials affects students learning.

Head teachers were also asked to rate the availability and utilization of teaching and learning resources for learners with mathematics disabilities. Their responses are presented in table 4.14.

**Table 4.14: Rating the availability/utilization of teaching/learning resources**

<table>
<thead>
<tr>
<th></th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Availability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Very low</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td><strong>Utilization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Very low</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.14 above shows how availability of teaching and learning resources were rated by the head teachers in their respective schools. About one third of the head
teachers indicated that the resources were very low. Another one third of the respondents said they were moderate while low was mentioned by one fifth of the respondents. Some head teachers revealed that their schools had no resources for teaching learners with mathematics disabilities. From the head teachers’ views as in Table 4.14 above, slightly above one half stated that their teachers are moderate when using resources. About one third of the respondents said that the rate of using the resources is low while one tenth established that their teachers’ usage of resources is very low.

As head teachers gave out their opinions on teaching and learning resources, the researcher also observed the lesson for verification purpose. The observation results are presented in table 4.15.

**Table 4.15: Teaching and learning resources as observed during the lesson.**

_A-Adequate: _M-Moderate: _I-Inadequate: _N-None._

<table>
<thead>
<tr>
<th>Observed area</th>
<th>Response</th>
<th>MEAN</th>
<th>Std-Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of teaching and learning resources: e.g. books &amp; teaching and learning aids.</td>
<td>F 0 1 18 1</td>
<td>2.00</td>
<td>0.324</td>
</tr>
<tr>
<td></td>
<td>% 0 5 90 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilization of the teaching and learning resources.</td>
<td>F 0 4 6 10</td>
<td>1.70</td>
<td>0.801</td>
</tr>
<tr>
<td></td>
<td>% 0 20 30 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suitability of teaching and learning resources.</td>
<td>F 0 4 6 10</td>
<td>1.70</td>
<td>0.801</td>
</tr>
<tr>
<td></td>
<td>% 0 20 30 50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Record from classroom observation, Table 4.16, revealed that most of the classes had inadequate resources. Only one teacher had moderate availability of the
resources. From the observation schedule, half of the teachers did not use any teaching aids while teaching. About a third tried to utilize them but still they were inadequate. A small number had moderate usage according to the rating of the researcher. Moreover, for those who used the resources basing on suitability of the resources, a third was inadequate while only a fifth was somehow moderate. From the reviewed literature, teaching and learning aids are paramount to learners with mathematics disabilities in order to help them generalize and apply what they learn. According to Emerson and Babtie (2013), learners should work with concrete equipment to build visual images.

In relation to the resources, teachers were asked to state the ones they used when teaching learners with dyscalculia during remediation. The teachers gave the information as tabulated in Table 4.17.

**Table 4.16 Resources used by teacher during remediation**

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplication tables and number cards</td>
<td>3</td>
<td>15.0</td>
</tr>
<tr>
<td>charts, drawings and books</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>Resource persons and pupils in class</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Counters e.g. pebbles, sticks and bottle tops</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>Games applied in mathematics</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to Table 4.16 above, teachers indicated that they used various resources during remediation. About a third of the sampled teachers quoted that
they used charts, drawings and books. Another third mainly used counters e.g. pebbles, sticks and bottle tops. Several teachers used multiplication tables and number cards. A tenth of the respondents stated that they used resource persons and pupils in class. The remaining one teacher made use of games applied in mathematics. The resources that were mentioned could play a good role if the teachers used them appropriately and at the right time. As Garnett (1998) posits, resources go hand in hand with teacher’s guidance and students’ interaction.

The study further sought to find out challenges that teachers face in the process of acquiring teaching and learning materials especially for learners with dyscalculia. The teachers’ responses are displayed in Table 4.17

**Table 4.17: Challenges faced by teachers in acquisition of materials**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of knowledge on best resources</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>Inadequate funds to buy materials</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>Time consumed while preparing learning aids</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Some resources are not long lasting</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4.17: shows that quite a good number of teachers lacked knowledge on appropriate teaching and learning resources that are suitable to leaners with dyscalculia. Some teachers said that they had inadequate funds to purchase materials. A fifth of the teachers stated that preparing learning aids consume a lot
of time hence leading to failure to have them at the right time. One of the teachers claimed that some resources are not long lasting.

With regard to the question on solution on how to alleviate the challenges encountered when acquiring the resources, the teachers gave their opinions as tabulated in figure 4.6.

**Figure 4.6: Solutions from teachers on how to alleviate the challenges**

![Bar chart showing solutions from teachers](chart)

Different opinions arose from teachers as is indicated in Figure 4.6 above. More than a third of the respondents said that teachers should be trained on knowledge and skills on usage of suitable resources. A quarter of the teachers stated that school and parents should provide more teaching and learning resources. Another
quarter of the respondents felt that government should offer more support in regard to learning materials. A tenth of the teachers said that more time should be allocated in mathematics as a subject to give enough time on usage and acquisition of materials. One teacher proposed that long lasting material should be provided.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents summary of the main findings, conclusions, recommendations and suggestions for further research.

5.1 Summary

This descriptive survey was carried out in regular public primary schools in Nyandarua North Sub-county. The study focused on analysis of teachers’ remedial strategies for enhancing mathematics skills to learners with dyscalculia. The objectives of the study were to establish procedure used by teachers in identifying learners with dyscalculia, to establish teachers’ professional competence for effective remediation of learners with dyscalculia, to investigate remedial strategies adopted by teachers that support learners with dyscalculia during remediation and to explore teaching and learning resources used by teachers for learners with dyscalculia during remediation.

5.1.1 Procedures used by teachers in identifying learners with dyscalculia

The study revealed that head teachers and their teachers already knew that they had learners with learning disabilities. Most of the teachers claimed that they have adequate knowledge of how to identify learners with dyscalculia. According to teachers teaching mathematics in class four, the number of the learners with
mathematics disabilities was a bit higher than that got by other researchers who had done the same kind of study in other places. The difference may be attributed to the criteria used in identification or teachers level of knowledge regarding learners with dyscalculia.

The main procedures used in identification of the learners with difficulties were observing and evaluating learners when performing classroom tasks, and assessment through various evaluation tests. Other methods used were learners’ individual and group work participation, analysis of progress records and attitude of learners towards subjects with their respective teachers.

From the findings, teachers stated that they usually take steps to alleviate the problem by planning remedial teaching to the affected learners, giving more exercises and practical work, availing essential materials when teaching and revisiting difficult areas. The steps mentioned are positive indicators that the teachers are trying to support learners with difficulties. However, it is not clear whether the teachers incorporate other specialists to put their initiatives in assisting the learners with mathematics disabilities.

5.1.2 Teachers’ professional competence in assisting learners with mathematics disabilities

The study established that majority of teachers who taught mathematics had not undergone any training in Special Needs Education. Out of 179 teachers in the sampled schools, only 3 had trained in SNE. The situation is in some ways serious
due to the fact that the schools have learners with special needs in education. Despite the fact that most of the teachers claimed that they had adequate knowledge to support learners with mathematics disabilities, teachers trained in SNE are equally required in all schools to assist regular teachers in giving informed decision concerning learners with learning difficulties.

5.1.3 Intervention strategies (remediation)

From the findings, various strategies were mentioned by the teachers. A good number mentioned individual attention based on learner’s weak area. The strategy can be very effective if it is utilized properly. Also mentioned are: teaching basic facts and incorporating peer teaching, giving extra exercises and revision questions, and use of real objects together with giving more practices. Findings during classroom observation contradicted what teachers had indicated in the questionnaires. Most of the teachers did not employ strategies that could favour learners with dyscalculia. They did not preserve some time to the affected learners during the lesson. Further findings revealed that majority of the teachers do not attend seminars or workshop to help them upgrade knowledge and skills on teaching strategies that could work well to learners with dyscalculia. The situation leaves the learners at a disadvantage hence failing to improve their mathematics capabilities.
5.1.4 Teaching and learning resources

The study established that teachers used various teaching and learning resources. Some of the resources include: charts, drawings and books; counters such as pebbles, sticks and bottle tops; multiplication tables and number cards; and games related to mathematics. From the findings, the resources were inadequate as stated by majority of the teachers. Comments from head teachers showed that utilization of resources by the teachers was low and only about a half said that it was moderate. Head teachers’ findings concur with what was found during classroom observation. Half of the teachers did not use any teaching aid during the lesson. Those who used them were either inadequate or moderate. The study further established that teachers had various challenges on acquisition of teaching and learning resources. Some challenges stated by teachers as hindrances to acquire the resources were: teachers’ lack of knowledge on best resources, inadequate fund to purchase materials and, time consumption during preparation of teaching and learning aids.

5.3 Conclusions

The conclusions of this study were drawn based on the objectives and the finding of the study. Considering that learners with dyscalculia require appropriate remedial strategies, proper identification of the learners is paramount. From the findings teachers had different ways of identifying learners. However, it is clear that they did not have adequate knowledge and skills to distinguish between learners with dyscalculia and those who struggle in mathematics. This implied
that there were no proper judgments to get the right pupils with the disabilities under study, hence leading to incorrect steps to support them.

In order to apply the right remedy, learners with mathematics disabilities require competent and professionally qualified teachers in areas of learning disabilities. From the findings, majority of teachers had professional qualifications ranging from degree to primary school certificate. Nevertheless, teachers were not competent enough to assist students with dyscalculia due to the fact that majority of them had not undergone any Special Needs Education training. From the findings only one teacher had trained in SNE.

When a learner is identified to have dyscalculia, intervention strategies are applied depending on the nature of the challenge. From the study findings, teachers employed different strategies within their reach. Most of them said that they attended learners individually depending on the weak area and use of peer teaching. Though teachers seemed to have good strategies they did not utilize them adequately. This finding is reflected on the classroom observation carried out during the study. The strategies employed by teachers were not also adequate since majority of the teachers had not upgraded their skills, especially towards learners with learning disabilities mathematics.

Teachers should be well equipped with adequate and suitable resources when remediating students with mathematics difficulties. The findings shows that the resources were not adequate and teachers did not have sufficient knowledge on
the right materials that could help learners with dyscalculia to grasp mathematics concept well. There is therefore dire need to address these issues in order to give the right assistance to these learners. The right support may help the learners with dyscalculia enhance their mathematics skills that would subsequently transform to improved academic performance.

5.3 Recommendations

5.3.1 General recommendations

The following recommendations were made based on research findings:

i. In-service training on should be enforced to teachers who have not trained in the area of special needs education. The training will equip teachers with adequate knowledge of identifying learners with mathematics disabilities and competence in attending all learners in an inclusive setting.

ii. Ministry of education should plan and organize frequent seminars and workshop for all teachers to keep them updated on the current instructional strategies that would fit all learners and most preferably for those with mathematics disabilities.

iii. Government and other stakeholders should provide enough funds to purchase teaching and learning materials suitable for learners with dyscalculia. Teachers should also be in-serviced in preparing locally made materials for teaching mathematics.

iv. Curriculum developers should adapt the curriculum in primary teachers training colleges by enriching areas of special educational needs. The
curriculum should give room to remedial strategies that can accommodate learners with dyscalculia. Most of the learners with mathematics disabilities are enrolled in regular primary schools.

v. Curriculum for early childhood development education should be enriched in areas of special needs education so that teachers graduating from institutions offering the programmes should be well equipped with adequate knowledge on strategies that can support learners with mathematics disabilities. This would be of much help on early identification and intervention even before a learner joins primary school.

vi. The study noted that the area under study had shortage of teachers. The study recommends that more teachers should be employed to reduce teacher/pupil ratio. The reduced ratio might help teachers to offer quality education especially to learners with dyscalculia.

5.3.2 Recommendations for further research

i. The study covered only one sub-county. A similar study should be replicated in other sub-counties and in other counties.

ii. The study was limited to class four to represent primary schools. There is need to do a similar study in pre-primary schools to establish whether there are other strategies that can work better with younger children before they reach class one.
REFERENCES


IDEA (1997), Individuals with Disabilities Education Act Amendments of 1997 (Public Law 105-117).
IDEA (2004), Individuals with Disabilities Education Improvement Act of 2004 (Public Law 108-446).


APPENDIX I

Questionnaire for Head Teachers

The role of this questionnaire is to assist the researcher to gather information on remedial strategies for enhancing mathematics skills to learners with dyscalculia in class four. Kindly answer each question as honestly, appropriately and accurately as possible. All information given shall be treated with utmost confidentiality. Do not write out your name in this questionnaire. Please answer all sections by ticking or filling in appropriate response.

Part 1: Personal information.

1. Gender: Male [  ] Female [  ]

2. Age bracket: 21-30 [  ] 31-40 [  ] 41-50 [  ] 51-60 [  ]

3. Professional Qualification.

   P1 [  ] AT IV [  ] Diploma [  ] Bachelors degree [  ] Masters Degree [  ]
   Any other specify_______________________________

4. Teaching experience:

   0-5 yrs [  ] 6-10 yrs [  ] 11-15 yrs [  ] 15-20 yrs [  ] Over 20 yrs [  ]

Part 2:

5. Have you trained in Special Needs Education? Yes [  ] No [  ].

6. Do you have pupils with learning disabilities in your school? Yes [  ]: No [  ].

7. Which procedure do you use to identify pupils with learning disabilities in your school?

   ____________________________________________________________________
   ____________________________________________________________________

8. How can you rate the cases of learning disabilities in your school?

   Very serious [  ] Serious [  ] Not serious [  ] No learning disabilities [  ]

9. a). How many teachers do you have in your school? [  ] (Give in figures).

   b). Do you have trained teachers in Special Needs Education? Yes [  ]: No [  ].
c). If yes, how many? _________________

10. What challenges do teachers in your school encounter during the teaching of children with LD?

__________________________________________________________________________

11. Do teachers in your school attend seminars and workshop to upgrade their knowledge and skills on teaching strategies for pupils with learning disabilities in order to give the right remediation?

Yes [ ]: No [ ].

12. How can you rate your teachers in applying their knowledge and skills in assisting pupils with mathematics disabilities?

(i) Very high [ ]: (ii) High [ ]: (iii) Moderate [ ]: (iv) Low [ ]. Very low [ ]

13. How can you rate the availability of teaching and learning resources especially for learners with learning disabilities in mathematics?

(i) Very high [ ]: (ii) High [ ]: (iii) Moderate [ ]: (iv) Low [ ]: (v) Very low [ ]: (vi) None [ ].

14. How can you rate your teachers in utilizing teaching and learning resources to learners with mathematics disabilities?

(i) Very high [ ] (ii) high [ ] (iii) moderate [ ] low [ ]. Very low [ ].
APPENDIX II

Questionnaires for Teachers who Teach Mathematics, in Class Four

This questionnaire is meant to assist the researcher in gathering information on remedial strategies for enhancing mathematics skills to learners with dyscalculia in class four. Kindly answer each question honestly, appropriately and accurately as possible. All information given shall be treated with utmost confidentiality. Do not write out your name in this questionnaire. Please answer all questions in all sections by ticking or filling in appropriate responses.

Part I: Personal information.

1. Name of school: _________________________________.

2. Gender: Male [ ]  Female [ ].

3. Age bracket:  20 & below [ ];  21-30 [ ];  31-40 [ ];  41-50 [ ];  51-60 [ ].

4. Highest professional qualification:
   Masters degree [ ];  Bachelors degree [ ];  Diploma [ ];  AT IV [ ];  P1 [ ];
   Any other specify ________________________________

5. Teaching experience:
   0-5 [ ]  6-10 [ ]  11-15 [ ]  16-20 [ ]  21-25 [ ]  Over 25 [ ]

Part 2:

6. (a) Have you ever trained in Special Needs Education? Yes [ ]  No [ ].

   (b) If yes, what is the highest level of training did you attain?
   Degree [ ];  Diploma [ ];  Certificate [ ];  Month In-service [ ];  Workshop & Seminars [ ];

7. How many pupils do you teach in class four? [ ]. (Give the figures).

8. Do you have adequate knowledge on how to identify children with learning disabilities?
   Yes [ ]  No [ ]
9. (a). Are there pupils in your class who have **mathematics disabilities** (dyscalculia)?

Yes [   ]. No [   ].

(b). If yes, how many? [   ]

10. Which procedure do you use to identify learners with dyscalculia in your class?

__________________________________________

11. After identification if any, what steps do you take?

__________________________________________________________________

12. Do you have adequate knowledge and skills on how to teach learners with math difficulties? Yes [   ] No [   ].

13. What teaching and learning strategies do you apply as a remedy to learners with dyscalculia?

__________________________________

14. Do you attend In-service Training (INSET) on current ways for instructing pupils with mathematics disabilities for remedy purpose? Yes [   ]. No [   ]

15. What challenges do you encounter when remediating learners with dyscalculia?

__________________________________________________________________

16. Do you have enough teaching and learning equipments and, resources for learners with math disorders? Yes [   ]. No [   ]

17. What types of resources do you apply when teaching the learners with mathematics disabilities?

__________________________________________________________________

18. (a) What challenges do you encounter in acquisition of teaching and learning materials especially for learners with mathematics difficulties?

(b). In your own opinion, what do you think should be done to alleviate the challenges encountered if any?
APPENDIX III

Observation Schedule

Lesson Observation

Name of school: _____________________________________

Class: ______________________________________________

Number of pupils in the class: ___________________________

Subject: ____________________________________________

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Inadequate</th>
<th>Moderate</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1). Availability of teaching and learning resources: E.g. books &amp; teaching and learning aids.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2). Utilization of the teaching and learning resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3). Suitability of teaching and learning resources.</td>
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</tr>
<tr>
<td>4) Level of interaction between teacher and learners.</td>
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<tr>
<td>5). Learners participation during the lesson.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6). Intervention directed to the learners with dyscalculia for remedial purposes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7). Traits of Instructional strategies incorporated during the lesson that may assist pupils with dyscalculia, like Direct Instruction &amp; Strategy Instruction: for instance; drills and probes, individualized instruction, breaking down a task, repeated feedback, pictorial diagrams, verbal questioning, systematic prompts and cues, cognitive modeling using “think aloud”, among others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8). Class progress records that include learners with dyscalculia.</td>
<td></td>
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</table>
APPENDIX IV
Nyandarua County location map.png
From Wikipedia, the free encyclopedia

Sub-counties in Nyandarua County
Nyandarua North Sub-county
APPENDIX V

RESEARCH AUTHORIZATION LETTER

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacost.go.ke
Website: www.nacost.go.ke
When replying please quote
Ref: No.

NACOSTI/P/15/9908/6105

Daniel Gachihi Tuchura
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Analysis of remedial strategies for enhancing mathematics skills to learners with dyscalculia in regular primary schools in Nyandarua County, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Nyandarua County for a period ending 31st October, 2015.

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

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

DR. M. K. RUGUTT, PhD, HSc,
DIRECTOR-GENERAL/CEO

Copy to

The County Commissioner
Nyandarua County.

The County Director of Education
Nyandarua County.

APPENDIX VI

RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MR. DANIEL GACHIRR TUCHURA
of KENYATTA UNIVERSITY, 0-10100
nyeri, has been permitted to conduct
research in Nyandarua County
on the topic: ANALYSIS OF REMEDIAL
STRATEGIES FOR ENHANCING
MATHEMATICS SKILLS TO LEARNERS
WITH DYSCALCULIA IN REGULAR
PRIMARY SCHOOLS IN NYANDARUA
COUNTY, KENYA.

for the period ending:
31st October, 2015

Applicant’s
Signature

Director General
National Commission for Science,
Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and
the County Education Officer of the area before
embarking on your research. Failure to do that
may lead to the cancellation of your permit.
2. Government Officers will not be interviewed
without prior appointment.
3. No questionnaire will be used unless it has been
approved.
4. Excavation, felling and collection of biological
specimens are subject to further permission from
the relevant Government Ministries.
5. You are required to submit at least two (2) hard
copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to
modify the conditions of this permit including
its cancellation without notice.

RESEARCH CLEARANCE
PERMIT

Serial No. A 5265

CONDITIONS: see back page