

**IMPACT OF SELF-EFFICACY ON MATHEMATICS
PERFORMANCE AMONG STUDENTS WITH DYSCALCULIA IN
PUBLIC SECONDARY SCHOOLS IN MURANG'A COUNTY,
KENYA.**

**BY
NICHOLAS MATUNDA MARIERA
E55/CE/23789/2012**

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
MASTER OF EDUCATION (SPECIAL NEEDS EDUCATION) IN
THE SCHOOL OF EDUCATION OF KENYATTA UNIVERSITY.**

APRIL, 2021

**IMPACT OF SELF-EFFICACY ON MATHEMATICS
PERFORMANCE AMONG STUDENTS WITH DYSCALCULIA IN
PUBLIC SECONDARY SCHOOLS IN MURANG'A COUNTY,
KENYA**

**BY
NICHOLAS MATUNDA MARIERA
E55/CE/23789/2012**

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
MASTER OF EDUCATION (SPECIAL NEEDS EDUCATION) IN
THE SCHOOL OF EDUCATION OF KENYATTA UNIVERSITY.**

JUNE, 2021

DECLARATION

I declare that this research thesis is my original work and has not been presented in any other university for consideration. This research thesis has been complemented by referenced sources duly acknowledged, where texts including spoken words have been borrowed from other sources, including the internet. These are specifically accredited and references cited in line with anti-plagiarism regulations.

Signature **Date.....**

Nicholas Matunda Mariera

E55/CE/23789/2012

Supervisors:

This thesis has been submitted with our approval as University Supervisors.

Signature..... **Date.....**

Dr. Margaret Murugami

Department of Early Childhood and Special Needs Education,

Kenyatta University.

Signature..... **Date.....**

Dr. Jessina Muthee

Department of Early Childhood and Special Needs Education,

Kenyatta University, Kenya.

DEDICATION

This thesis is dedicated to my loving parents Mr. Nelson Mariera and my late Mum Eucabeth Moige for their nurturing and Educational foundation inculcated in me. They were my source of inspiration and psychological support through constant prayers. I dedicate it also to my wife Linet Moige, son Einstein Matunda and daughter Eucabella Matunda for their moral and physical support during the study.

ACKNOWLEDGEMENT

Firstly, may I acknowledge the almighty Creator for guiding me during this work. Secondly, I most sincerely also acknowledge with utmost gratitude to my supervisors Dr. Margaret Murugami and Dr. Jessina Muthee who assisted me willingly and tirelessly during the entire period of writing this thesis. Thirdly, I am thankful to the entire staff of Special Needs Education, Kenyatta University for their unwavering support in the course of my study.

TABLE OF CONTENTS

DECLARATION..... iii
DEDICATION..... iv
ACKNOWLEDGEMENT..... v
LIST OF TABLES x
LIST OF FIGURES xii
ABBREVIATIONS AND ACRONYMS..... xiii
ABSTRACT..... xiv

CHAPTER ONE: INTRODUCTION..... 1
1.1 Introduction..... 1
1.2 Background to the Study..... 1
1.2 Statement of the Problem..... 4
1.3. Purpose of the Study 5
1.4. Research Objectives..... 6
1.5. Research Hypothesis..... 6
1.6 Significance of the Study 7
1.7 Limitations and Delimitations of the Study 7
1.7.2 Delimitations..... 8
1.8 Assumptions of Study 8
1.9 Theoretical and Conceptual Framework..... 9
1.9.1 Theoretical Framework..... 9
1.10 Operational Definitions of Key Terms 12

CHAPTER TWO: LITERATURE REVIEW 13
2.0 Introduction..... 13
2.1 The Prevalence of Dyscalculia..... 13
2.1.1 Studies in the United Kingdom (UK) 13
2.1.2 Studies in the United States of America (USA)..... 14
2.1.3 Studies in the Middle East 14

2.2 Common areas of Mathematics difficulties	16
2.3 Determining Students with Dyscalculia.....	18
2.4 Mathematics Efficacy and Academic Performance	20
2.5 Summary	22
CHAPTER THREE: RESEARCH METHODOLOGY	24
3.0 Introduction.....	24
3.1 Research Design.....	24
3.2 Location of Study.....	24
3.3 Target Population.....	25
3.4 Sampling Procedures and Sample Size.....	25
3.4.1 Sampling Procedures	25
3.4.2 Sample Size.....	26
3.5 Research Instruments	26
3.5.2 Dyscalculia Screening Instrument (DSYCALC).....	28
3.5.3 Interview Schedules for the Principal	29
3.6 Piloting.....	29
3.6.1 Validity	30
3.6.2 Reliability.....	30
3.7 Data Collection Procedure	31
3.8 Data Analysis	31
3.9 Logistical and Ethical Considerations.	32
CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION OF FINDINGS.....	33
4.0 Introduction.....	33
4.1.0 General Information and Demographic information	34
4.1.1 General Information.....	34
4.1.2 Demographic Information of Students.....	34
4.1.3 Demographic Information of Teachers.....	38
4.2 Prevalence of Students with Dyscalculia.....	42
4.2.1 Distribution of Students by Mathematics Test Scores.....	42

4.2.2 Identification of Students with Dyscalculia by Teachers	45
4.2.3 Means of Identifying Students with Dyscalculia by Teachers.....	46
4.2.4 Teachers Responses on the Number of Students with Dyscalculia in a Class.....	48
4.2.5 Mean Score of the Previous Year	49
4.2.6 Descriptive Statistics on the Prevalence of Dyscalculia among Students	50
4.2.7 One-Sample Test on the Prevalence of Dyscalculia among Students	50
4.3 Common Areas of Mathematics Difficulties among Students with Dyscalculia	51
4.3.1 Common Areas of Mathematics Difficulties	52
4.3.2 Descriptive Statistics on Common Areas of Mathematics Difficulties among Students.....	53
4.3.3 One-Sample Test on Common Areas of Mathematics Difficulties among Students	53
4.4 Students level of Mathematics Efficacy	54
4.4.1 Students Ratings on level of Self-Efficacy for mathematics Performance.....	55
4.4.2 Teachers Responses on the Whether Dyscalculia Affect Students' Mathematics Performance	57
4.4.3 Teachers Responses on Students' Mathematics Self-Efficacy	58
4.5 The relationship between self-efficacy for Mathematics and Mathematics Performance	62
4.5.1 Students' maths test score vs mathematics self-efficacy score.....	62
4.5.2 Chi-Square Test on the Relationship between Self-Efficacy for mathematics and Mathematics Performance	63

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS .. 66

5.0 Introduction.....	66
5.1 Summary.....	66
5.1.1 Prevalence of Students with Dyscalculia.....	66
5.1.2 Common Areas of Mathematics Difficulties among Students with Dyscalculia	66

5.1.3 The Level of Self-efficacy for Mathematics Performance	67
5.1.4 The Relationship between Self-Efficacy for Mathematics and Mathematics Performance	67
5.2 Conclusions.....	68
5.3 Recommendations.....	68
REFERENCES.....	70
APPENDICES	76
Appendix i: Dyscalculia Screening Instrument. (Dyscalc) Time:30 Mins	76
Appendix ii: Questionnaire Mjses Scale For Students	81
Appendix iii: Questionnaire Mjses Scale For Teachers.....	82
Appendix iv: Interview Schedule For Principals	84
Appendix v: Map Of Kandara.....	85
Appendix vi: Informed Assent For Students	86
Appendix vii: Respondents Informed Consent	88
Appendix viii: Approval Letter From Graduate School	91
Appendix ix: Authorization Letter From Graduate School	92
Appendix x: Authorization Letter From Nacosti	93
Appendix xi : Permit Letter From Nacosti	94
Appendix xii : Ministry of Interior And Co-Ordination of National Government	95
Appendix xiii: Ministry of Education In Murang’a County	96

LIST OF TABLES

Table 1: School Categories and Sample Size for Principals, Teachers and Students.....	26
Table 4.1: Distribution of Students by Gender	34
Table 4.2: Distribution of Students by Age	35
Table 4.3: Distribution of Students by School Type.....	36
Table 4.4: Distribution of Students by Occupation of Guardians/Parents.....	37
Table 4.6 Distribution of Teachers by Gender.....	38
Table 4.7: Distribution of Teachers by School Type.....	39
Table 4.8: Distribution of Teachers by Highest Professional Qualification.....	39
Table 4.9: Distribution of Teachers by Teaching Experience	40
Table 4.10: Distribution of Teachers by Attendance of Seminar on Special Needs Education	41
Table 4.14: Distribution of Students by Mathematics Test Scores.....	43
Table 4.15: Identification of students with dyscalculia by teachers	45
Table 4.16: Means of Identifying Students with Dyscalculia by Teachers	46
Table 4.17: Teachers Responses on the Number of Students with Dyscalculia in a Class	48
Table 4.18: Mean Score of the Previous Year	49
Table 4.19: Descriptive Statistics on the Prevalence of Dyscalculia among Students	50
Table 4.20: One-Sample Test on the Prevalence of Dyscalculia among Students	51
Table 4.20: Common Areas of Mathematics Difficulties.....	52
4.3.2 Descriptive Statistics on Common Areas of Mathematics Difficulties among Students.....	53
Table 4.21: Descriptive Statistics on Common Areas of Mathematics Difficulties among Students.....	53
Table 4.22: One-Sample Test on Common Areas of Mathematics Difficulties among Students.....	53
Table 4.23 Student rating of their self –efficacy for Mathematic.....	55
Table 4.24: Teachers Responses on the Weather Dyscalculia Affect Students’ Mathematics Performance	58

Table 4.25: Teachers opinion on Students' level of Mathematics Self-Efficacy	58
Table 4.26: Students maths test scores vs Mathematics self-efficacy score.....	62
Table 4.27: Chi-Square Test on the Relationship Between students' level Self-Efficacy for mathematics and Mathematics Performance.....	63

LIST OF FIGURES

Fig 1: Conceptual Frameworks. Source Researchers' (2015).....	10
---	----

ABBREVIATIONS AND ACRONYMS

CAT	:	Continues Assessment Test
ET	:	Expectancy Theory
GCSE	:	General Certificate of Secondary Education
ICT	:	Information and Communication Technology
IEPS	:	Individualized Educational Programmes
KCPE	:	Kenya Certificate of Primary Education
KCSE	:	Kenya Certificate of Secondary Education
KNEC	:	Kenya National Examination Council
LD	:	Learning Disability
MD	:	Mathematics Difficulties
LWD	:	Learners with Disabilities
MOEST	:	Ministry of Education, Science and Technology
NCLD	:	National Center for Learning Disabilities
SMASSE	:	Strengthening Mathematics and Science in Secondary Education
SPSS	:	Statistical Package for Social Sciences
TSC	:	Teachers Service Commission
MJSES	:	Morgan and Jinks Self-Efficacy Scale

ABSTRACT

The purpose of the study was to establish the impact of self-efficacy on mathematics performance among students with dyscalculia in public secondary schools in Murang'a, Kenya. The objectives of the study included; to establish the prevalence of students with dyscalculia in public secondary schools in Murang'a County, to find out common areas of mathematics difficulties of students with dyscalculia, determine the students' level of self-efficacy for mathematics performance and to determine the relationship between student's level self-efficacy for mathematics and mathematics performance. The study was guided by expectancy theory of motivation by Victor Vroom. It used a descriptive research design. The population for study was 54 Public secondary schools in Kandara Sub-County, out of the 54 targeted schools 7 public secondary schools were sampled for the study. The target respondents were 7 principals, 7 teachers of mathematics, 1 from each school and 125 students were sampled for dyscalculia screening. Research instruments included; questionnaire for mathematics teachers and students with dyscalculia, interview schedule for the principals, dyscalculia screening instrument and documentary analysis. The study used stratified random sampling and purposive sampling to select the schools, teachers and students with dyscalculia respectively. Pilot study was conducted in Gaichanjiru Mixed and Kenyoho Secondary schools in Kandara Sub-County, Murang'a County. Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) while qualitative analysis was done by organizing variables into themes. The study results revealed that there are various areas of mathematics as a subject where students face common difficulties in the studied secondary schools. The prevalence of students with dyscalculia was found to be 6.4%. The study also established that students with dyscalculia have low self-efficacy in various mathematical areas. Lastly, there exists a relationship between the level of self-efficacy for mathematics and mathematics performance. The researcher recommends more attention to be paid to students with Dyscalculia. There is also a need for regular screening for identification of students Dyscalculia to be implemented in all secondary schools. This calls for the development of assessment tools for use by teachers in schools.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter covers the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, research hypothesis significance of the study, delimitation and limitations, assumptions, theoretical and conceptual framework and operational definition of key terms.

1.2 Background to the Study

The DfES (2001) defines dyscalculia in the following way: “Dyscalculia is an impairment that influences the capacity to obtain mathematics skills. Students with dyscalculia may experience difficulty understanding basic number concepts, do not have an intuitive grasp of numbers, and have difficulties in learning number facts and procedures.” Many students have difficulties in acquiring and using mathematics skills. Mathematics in Kenya is a compulsory subject and a basic for professional job opportunities and hence financial status. However, students’ mathematics performance in Kenya Certificate of Secondary Education Examination (KCSE) has been poor even with the introduction of reviewed examination syllabus by Kenya National Examinations Council (KNEC). A cause of poor mathematics performance by students in particular regions or schools in the country has been creating a heated debate. The competition for opportunities that follow has led to more pressure being exerted on students by teachers and parents to improve their test scores in KCSE and more pressure in mathematics as a

core subject. University College London (2011) found out that “Students with difficulties in math may have a neurocognitive disorder called dyscalculia.”

In the United States, more than 50% of students with learning difficulties have mathematics goals written into their Individualized Education Programs (IEPs) (Jackson, Smith, Cass, & Cates, 2003). Mathematics difficulties that emerge in elementary school often continue through secondary school years. Not only is mathematics difficulties a debilitating problem for students during school but continues to affect them in their adulthood (Cass et al., 2003; Miller & Mercer, 1997; Shalev 2008). Increased high school requirements for one to graduate and the pressure of more testing are likely to adversely affect students with mathematics difficulties (Deshler, & Schumacher, 1986).

In South Africa, mathematics performance is dire as Trends International Mathematics and Science Study (2011) shows that South African learners are among the lower performing among middle income countries. The findings indicated that learners with mathematics comprehension disabilities portray poor competence in mathematical operations, fractions and word problems. The same case is reported by Eksteen (2014) who reported that high-risk students will likely develop delays in regards to basic mathematical skills and concepts among Nigerian students. Onukwufor (2016) claimed that math learning disabilities are the cause of many learning problems encountered in the classes. In Kenya, the lack of enforceable acts for learners with learning incapacities including dyscalculia contributes to the continued poor performance of students with learning disabilities (Rasugu, 2010). With 8-11% of young students having learning

disabilities, the Kenyan learning conditions are not tailored to accommodate the needs of these learners.

Students with learning difficulties go through more than one difficulty in their entire educational career. Also, they encounter difficulties in incentive attribution, self-regard and feel reactions and also challenges in key information and self-observation that can contrarily affect scholastics (Borkowski, 1992). Catt, Rellinger, Pressley & Borkowski (1990) deliberate a combined model of attainment, paying attention on 2 definite dimensions: meta-cognition and touching aspects. Metacognition comprises personal knowledge of instructing plans and the ability to utilize information in a prudent and efficacious way. The affecting element points on attitudes of personal-effectiveness with aspects of incentive, locus of controller and individual attribution (Borkowski et al., 1990).

Self-efficacy is the evaluation of individual abilities to sort out and influence strategies to accomplish objectives. Presented by Bandura (1977), in the area of psychology and education, the idea of personal-effectiveness has been investigated widely. It impacts human working specifically and in a roundabout way as a multi-dimensional development, through its consequences for different determinants (Bandura, 1997), for example, feelings, attributions, self-regulation and inspiration. In the field of research, and specifically in its part in academics has demonstrated positive connection with execution accomplishment (Patrick, Hicks and Ryan, 1997; Covington, 2000; Bandura,

1986; Bempechat and Drago-Severson, 2009; Zimmerman, Bandura and Martinez-Pons, 1992; Pajares, 1996; & Schunk, 1995).

Personal-effectiveness in mathematics among students with dyscalculia is an interesting area to explore because it would reveal the motivational needs that should be put in place to encourage students to believe in their capabilities so as to counter difficulties while performing tasks related to mathematics. Although boys generally perform better than girls in mathematics in Kenya, overall performance of all the students in Mathematics is quite low. The national mean grade in mathematics is below 20 per cent (KNEC, 2006).

In Kandara sub-county, the mean score for mathematics has been the mean grade of a D for the last four years. The mean score was 2.926, 3.3660, 3.430 and 3.3211 from the year 2011 to 2014 respectively according to the Ministry of Education Science and Technology (MoEST) Kandara Sub-County (2015). The emphasis placed on good performance in tests by schools or parents generates the high levels of anxiety that interfere with performance (Wrightsmann, 1962). This may lower self-efficacy in tasks at hand. There was therefore a need to explore the effect of personal-effectiveness on arithmetic's excellence amongst students with dyscalculia in Kandara sub-county.

1.2 Statement of the Problem

National Authorities in Kenya (GoK) in attempt to address the problem of poor performance in mathematics has put up measures such as incorporation of ICTs in instructing and studying of arithmetic's, introduction of in-service courses such as

strengthening mathematics and science in secondary education for mathematics teachers and mathematics curriculum review by an introduction of mathematics alternative “B” which is meant for those students who do not intend to pursue mathematics related careers. There are students who transit to secondary school with dyscalculia. They are not identified and their number is not known. Little is known about them or how the disability affects their self-efficacy in Mathematics performance. Students with dyscalculia still perform poorly in mathematics in national examinations countrywide, an indication that the problem has not been adequately addressed. In addition, research on learning disabilities is still scarce at secondary school level of education and especially in Kenya. Consequently, little is known about students with dyscalculia’s anxiety and how the disability affects their self-efficacy in mathematics performance. Research studies in the area of Learning Disabilities have also not concentrated on this issue. In Kandara sub-county the mean score for mathematics has been the mean grade of a D for the last four years. The mean score was 2.926, 3.3660, 3.430 and 3.3211 from the year 2011 to 2014 respectively according to the MoEST, Kandara Sub-County (2015). The current study therefore assessed the effects of personal-effectiveness on arithmetic’s excellence amongst students with dyscalculia in government sponsored high schools in Murang’a Kenya.

1.3. Purpose of the Study

The aim of this survey was to examine the effect of personal-effectiveness in arithmetic excellence amongst students with dyscalculia in government sponsored high schools in Murang’a County, Kenya.

1.4. Research Objectives

The objectives that guided the study were:

- i. To determine the prevalence of dyscalculia among learners in Kandara Sub-county in government administered high schools.
- ii. To investigate common areas of mathematics problems among learners with dyscalculia in government administered high schools in Kandara sub-county.
- iii. To establish the level of personal-effectiveness for arithmetic amongst students with dyscalculia in government administered high schools in Kandara sub-county.
- iv. To establish the association amongst personal-effectiveness for mathematics and mathematics performance in government administered schools in Kandara sub-county.

1.5. Research Hypothesis

The study tested the following hypothesis

H_a1: There exists a significant number of students with dyscalculia in public secondary schools.

H_a2: There are significant common areas of mathematics difficulty among students with dyscalculia in public secondary schools.

H₀1: There is no significant level of personal-effectiveness for arithmetic amongst students with dyscalculia in government sponsored high schools in Kandara sub-county.

H₀2: There is no significant association amongst personal-effectiveness for arithmetic and excellence amongst students with dyscalculia in government sponsored high schools in Kandara sub-county.

1.6 Significance of the Study

In Kenya, students with various capacities learn together in the same classes. The finding of this study might be of incredible significance to school administrators, parents, teachers and other partners in education in that it might:

- i. Assist policy makers in education such as KICD and MOE to know the statistics of students with dyscalculia for planning because they are currently transforming the education system.
- ii. The results on common areas of mathematics may assist the MOE to organize in-service courses for mathematics learning strategies.
- iii. Add data for future research that may be used to address self-efficacy for mathematics performance in secondary schools.
- iv. The results of this study may enrich empirical evidence on the role of personal-effectiveness on arithmetic excellence amongst students with dyscalculia in government sponsored high school in Kandara sub-county.
- v. Be used by training institutions for general and special education teachers to enhance Teacher Education on students with dyscalculia at all levels of learning.

1.7 Limitations and Delimitations of the Study

1.7.1 Limitations

The study was limited to a few selected public secondary schools in Kandara sub-County, in Murang'a County. Hence the findings may not be generalized to further counties. Getting the required respondents was quite challenging because some kept postponing continuously. Other respondents took too long to return the filled research tools. Some public schools were also difficult to access due to bad terrains, bad weather and poor communication network. However, the researcher was able to overcome all these challenges by allocating adequate time for data collection.

1.7.2 Delimitations

Dyscalculia affects all the people regardless of age difference. This survey concentrated only on students in form three in secondary schools because reviewed studies indicate that most students start developing attitudes towards subjects they are taught at this age and the attitudes affect self-efficacy levels. Secondly, this study focused only on public schools because of financial equity of public schools compared to private schools. The study restricted itself to teachers who teach maths and dyscalculic students respectively. Some students left out the study because they could not give the required data.

1.8 Assumptions of Study

The study assumed that:

- i. The entire participants would be co-operative and respond to the questionnaires.
- ii. The students in form three had learned the same amount of content of mathematics as prescribed by KICD

- iii. The members of the teaching staffs who got sampled to take part in this survey had good mastery of subject content and teaching strategies for students with learning disabilities.

1.9 Theoretical and Conceptual Framework

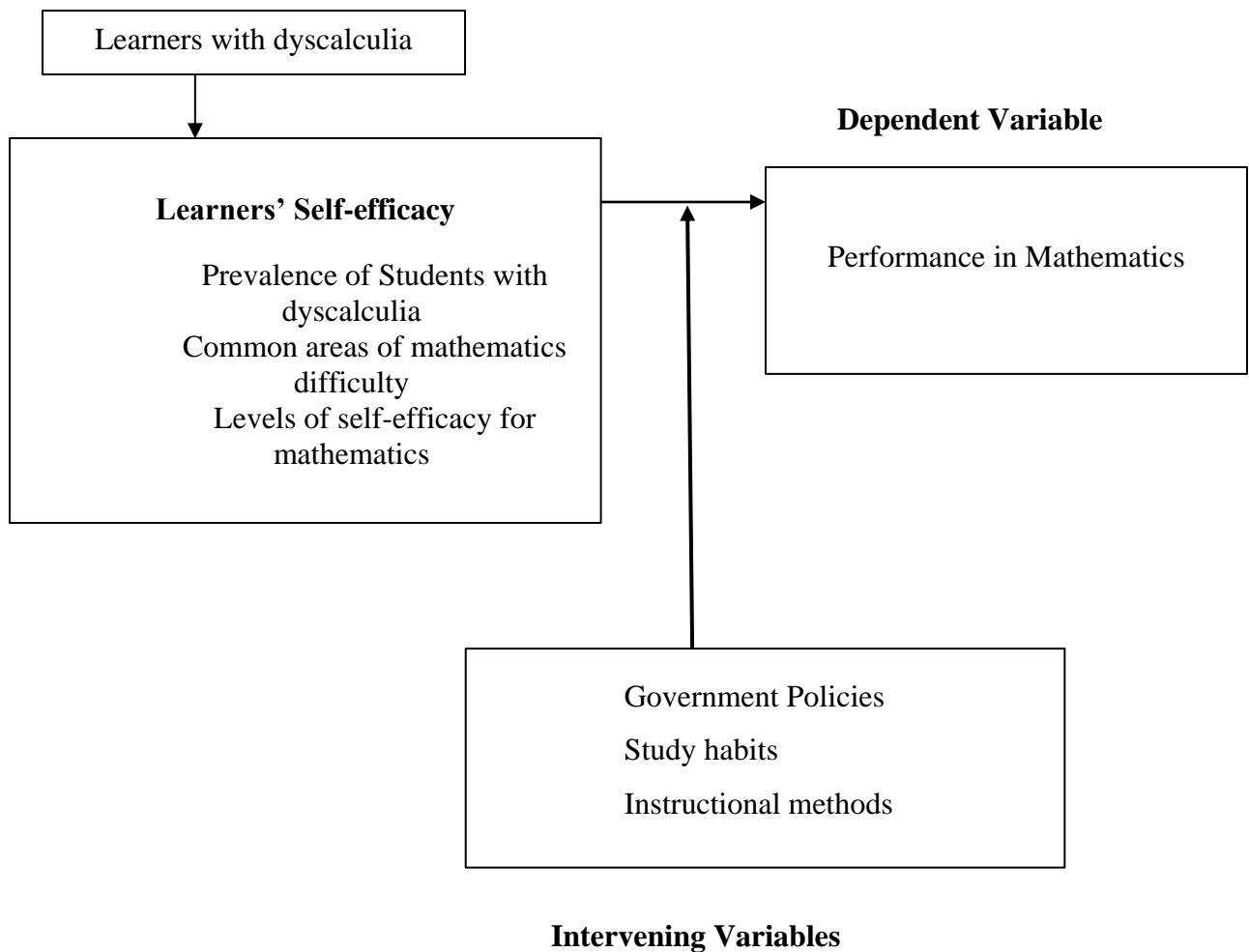
1.9.1 Theoretical Framework

Expectancy Theory (ET) of motivation was developed in 1964 by Victor Vroom. It was developed from the convictions that a man's exertion prompts accomplishment, which in turn, prompts a particular result. In this hypothesis, inspiration is controlled by the prospect that a given course of conduct yields certain outcomes. People follow up on their convictions about what they can do, and additionally on their convictions about the imaginable consequences of accomplishment. The persuading determinant of result anticipations is influenced by one's convictions of adequacy. People make a move when they hold adequacy convictions and result prospects that appear to be beneficial (Bandura, 1997).

As indicated by Redmond and Moser, (2011) "People with high self-efficacy will probably react with recharged exertion (anticipation) when criticism demonstrates that they are not achieving their objectives by growing more fruitful systems. In any case, people with low self-efficacy, given the same circumstances, may perform ineffectively in light of the fact that their low self-adequacy weakens their inspiration and exertion." The implication of this theory to this study was that students with dyscalculia's sense of self efficacy for maths performance is influenced as they work on mathematics tasks by cues that signal how well they are learning. The effect of social and instructional

variables on the learning process has an impact on self-efficacy and achievement behaviors. Empirical evidence supports the idea that self-efficacy predicts students' motivation and outcomes on their performance thus students with low self-efficacy may perform poorly in mathematics compared to those with high self-efficacy because low self-efficacy affects the motivation force and hence the individual's effort. The expectancy theory of motivation was hence used to examine the impact of self-efficacy on mathematics performance as illustrated in figure 1.1 below.

Independent variable



**Fig.1.1: Conceptual Framework Showing the interaction of mathematics self-
efficacy and mathematics performance among students with dyscalculia**

Source: Researcher (2015)

The conceptual framework above shows the relationships between variables of the study. The independent variable is a learner with dyscalculia who is influenced by his/her self - efficacy and mathematics efficacy. The degree of self-efficacy can be affected by the task's level of difficulty, performance expectancy/reinforcement and vicarious experiences. The dependent variable is mathematics performance among students with dyscalculia. As per Victor Vroom's hypothesis, this is controlled by the convictions that an individual's exertion will improve accomplishment leading to a particular result. In this case students with dyscalculia who have a low self-efficacy in mathematics are expected to perform poorly in Mathematics compared to those with high self-efficacy in mathematics.

1.10 Operational Definitions of Key Terms

Dyscalculia: A particular formative inability that influences a persons' capacity to conceptualize and perform in arithmetic.

Mathematics Performance: Is a measurable and observable behavior of a learner's outcomes in mathematics such as class exercise, test and examination results.

Mathematics self- efficacy: A situational evaluation of individual's trust/capacity to effectively perform or finish a specific Numerical assignment or issue.

Public school : This is a school formally bolstered by government particularly as far as instructors' employment and development of physical structures.

Self-concept: Recognition or image of our capacities and our uniqueness. At first one's is extremely broad and variable as we become more seasoned, these self-recognitions turn out to be considerably more sorted out, and specific.

Self-efficacy : A person's conviction in his or her ability to implement manners needed to yield special performance achievements.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed related literature which focused on objectives of the study based on objectives: Prevalence of dyscalculia, diagnosis of dyscalculia, overview of personal-effectiveness, the effect of personal-effectiveness on performance and finally a summary of literature review which was aimed at filling the identified gaps.

2.1 The Prevalence of Dyscalculia

2.1.1 Studies in the United Kingdom (UK)

The estimates on the prevalence of dyscalculia are so varied that one cannot really claim to be sure of the actual figure of occurrence. Butterworth, Varma and Laurillard, (2011) and Waco, Temple and Killeen, (2011) estimated a prevalence of about 5 to 7% and this was almost the same as what Butterworth (2004) had discovered among 6-14-year-old students. Radford (2003) posits that dyscalculia afflicts about one child in 20 in Britain and could make them cases for special treatment. Still another estimate in the UK was at 3% to 6% of the population (Badian, 1999; Butterworth, 2001; Goldman, 2010c; Wilson, 2012). Goldman suggests that this prevalence may be uniform across countries. Wilson (2012) suggests that "The rate of the population experiencing formative dyscalculia is hard to build up, on account of the distinctive criteria utilized for diagnosis. This affirms Butterworth (2004) who conceded that the prevalence of dyscalculia ranged between 3 percent to 6 percent. The Inside Out London (2013), in the Hackney Community College

identified the prevalence at 5% to 6%. The findings correlated with what the Head of mathematics at Hackney College already knew. He had said that around 1 in 20 students (about 5%) need help with numbers.

2.1.2 Studies in the USA

In his study at Missouri University in the USA, Geary (2006) found an estimated prevalence of 3% to 8%. Geary (2006) however, added that "the finding of 3% to 8% of students who have dyscalculia is deluding in some regards. This is on account of the fact that a greater part of these kids have particular shortages in one or a couple of areas, however regularly excel at evaluation stage or improved in different field. Christie (2011) says that one out of each five individuals in America is said to be battling with dyscalculia. "Out of the aggregate number, around three million are youngsters between the ages of 6 and 21 years implying that some students proceed to secondary schools with dyscalculia. Christie (2011) estimate, covers adults too, unlike the other estimates which were more concerned with the school-going age only. This study therefore, sought to bring into rim light the common widespread of dyscalculia in government administered high schools in Murang'a.

2.1.3 Studies in the Middle East

Gross-Tsur, House, and Shalev (1996) in Jerusalem estimated the prevalence of children with dyscalculia at 6% to 7%. Shalev, Auerbach, Estate and Gross-Tsur (2000) also conducted a study to affirm the predominance of 3-6% effectively distributed in Jerusalem. They established that dyscalculia is a steady studying incapacity inherent in about 50% of all the people below 18 years. Rubinsten and Tannock (2010) estimate

children with dyscalculia in Israel was at 3.5% to 6.5% of the school age population. Doyle (2010) asserts that worldwide studies estimate the prevalence of dyscalculia within the range 3% to 11%. However, she admits that there lacks dignified technique of the valuation of dyscalculia and the figures depend on how one interprets his or her findings. These estimates are based on different settings and the researcher intended to find out whether the same situation applied to the population under study. The current survey was attentive on students with dyscalculia in public secondary schools in Murang'a. Thus, this study established the prevalence of dyscalculia among students in public secondary schools.

2.1.4 Studies in Kenya

A study was done in Kenya by Kinyua (2007) on "Seeking Ways to Promote Parent-Teacher Collaboration in Providing Education for Students with LD in Kasarani Division of Nairobi County". The outcomes of the survey showed that there were about twenty per cent learners with LD in common basic education level. Nevertheless, majority ordinary members of the teaching staffs did not have the requisite abilities to recognize these students. A different survey carried out by Wafula (2009) on initial detection of grade 3 Students with learning defects in the government administered basic education level in Butere discovered that almost twenty four per cent of pupils registered in the government administered basic education schools had LD. Going by this survey, majority of students encountered a lot of mathematical difficulties as compared to the less experienced to language associated challenges. Thus, the reason to look out for the wide-spread of pupils with dyscalculia in GoK administered high schools in Kenya.

2.2 Common areas of Mathematics difficulties

There are diverse types of challenges that students with mathematics difficulties experience. Fuchs, Prentice, and Fuchs (2002) and Jordan, Hanich, Dick and Kaplan (2001) uncover that students who display arithmetic challenges incorporate those performing great underneath normal reach or students experiencing issues in mathematics achievement. A certain group of the pupil facing arithmetic problems may excel in linguistics but not arithmetic and quantitative studying. They encountered difficulties in arithmetical working out and arithmetical cognitive (IDEA- 2004) in Civic Regulation no one hundred and eight to four hundred and forty six. Mathematical disabilities begin in preparatory level and proceeds into high school period if the learner is not given an opportunity to number, match, categorize and gather protests, look at and comprehend man to man communication (Mill operator and Mercer, 1997; Cass et-al, 2003; Shalev et al., 1998). Arithmetic problems demonstrate as: calculation and cognitive (reasoning) glitches.

A student with arithmetic problems will encounter the following hardships: the pupil cannot add (+), minus (-), distribute (divide) and times (x) (Gearheart, 1985). The pupil is unable to use arithmetical laws, leaves problems incomplete, unable to peruse numbers with many digits, unable to tell numbers such a 2,5,6,9, unable to tell which coins is which and there values, unable to write down numerals or mathematical signs clearly. The pupils experiences difficulties with verbal and repetitive exercises and verbs difficulties. The student is unable to scribe down digits when dictated to him/her or put down numerals on pen and paper clearly and readably (Chadha, 1999). The pupils take a

lot of time and does not get things correctly, is not conversant with time, have difficulties in tackling problems with several steps. The people cannot accurately utilize mathematical terminologies, demonstrates a lot of negligence in calculation errors, is not interested and sign up quickly in talking arithmetic queries (Lerner, 2006; Chadha, 2001; Mercer, 1991; Lyon, 1996).

The student with arithmetic problems will demonstrate wholly or part of the difficulties: - low conceptualization of questions, weak figures differentiation, low quantity differentiation, low position and size recognition, low command of arithmetic principles, inability to see the interval between numerals on measuring device, cannot differentiate between; high– low, on top of – underneath, top – bottom, up –down. The pupil equally is unable to say number of items in an order

The pupil could not count items in a sequence without internalizing them, cannot see figures as complete entries, and has trouble with numbers. (Vande Walle, 2004; Lerner, 2006 & Blay Thornton, 2001). Equally, a pupil with MD portrays low awareness of time and bearing, goes astray with ease and finds it difficult to get home from school and have low time calculation (Lerner, 2001). Bad at logical thought, ordering objects, and forming connections such as large, tiny, extra, fewer; low at following instructions and responding rapidly but incorrectly in verbal exercises; erases their work frequently; and loses vigour of tackling queries (Lyon, 1996; Mercer, 1992 & Gear heart, 1985). As a result, the aim of this survey was to determine the most common types of MD students recognized and experienced.

2.3 Determining Students with Dyscalculia

Different researchers use different criteria to diagnose dyscalculia among students. Craig (2009) observed that dyscalculia is not difficult to diagnose. To add on to this, Geary (2003) and Shalev (2008) point out that measures that are particularly intended to identify mathematical disabilities are not accessible. Logsdon (2013) suggests that schools can determine if a child has a learning disability in Mathematics by identifying the types of errors each individual child makes. He adds that teachers can also use general types of diagnostic mathematics assessments, review of students' work and cognitive assessments. National Center for Learning Disability (2006) in the UK suggests meeting around a full scope of math-related aptitudes and practices keeping in mind the end goal to identify dyscalculia. NCLD adds that written tests and an evaluation help in the detection of dyscalculia.

The other suggestion on how to diagnose dyscalculia is the use of computer-based assessment tools online developed in the UK. The 'Dyscalculia Screener' was developed by Butterworth (2003) and the 'DyscalculiUM' is a product of the Arithmetic academia Centre at Loughborough College. Whilst the 'DyscalculiUM' is typically for adults, the 'Dyscalculia Screener' caters for children from 6 to 14 years of age. Inside Out London (2013) used the 'Dyscalculia Screener' in Hackney Community College to test for dyscalculia in 31 students aged 14 and 21 and of all abilities. Their findings concurred with Butterworth (2003) that an estimate of 3% to 6% of students in the London community is dyscalculic.

In the UK, Dehaene, Cohen, Wilson and Revkin, (2006) recommend that appraisal of formative indications ought to look at number sense disability; both typical and non-typical assignments (for example examination, estimation or surmised expansion of spot clusters). Geary (1993), in the US, identification of a math disabilities ought to be considered in the event that one keeps on experiencing these challenges at secondary level and past, since difficulties with Arithmetic in the primary school are common. However, the studies were conducted in the UK, and the US, whose economic and social challenges differ from the local ones hence the findings may not be generalizable to the local context.

Ayo, Kelechi and Abiodun (2013) carried out a correlational survey study in Ibadan, Nigeria among 477 primary school pupils within the age range of eight to twelve and in Grades 4 and 5. It was on analyzing the predominance of dyslexia and dyscalculia among pupils with learning deficiencies in maths in Ibadan city public schools. They utilized the Mathematical Abilities Test (MAT). They found that dyscalculia was not peculiar to any sex and reasoned that persons with learning difficulties ought to be screened for dyscalculia. Additionally, they ought to be taught by carefully created Individualized Education Plans. Thus, in this current study, the researcher used a standardized test (Dyscalculia Screening Instrument 2013), and existing documentary analysis to identify students with dyscalculia.

2.4 Mathematics Efficacy and Academic Performance

Liu and Koirala (2009) carried out a connection examination and a research linear regression analysis study in sophomores across the United States among 11726 secondary school learners in 752 government administered schools and non-governmental schools. The aim of this survey was to learn more about the correlation between arithmetic personal- effectiveness and 10th-grade arithmetic attainment, as well as to see whether arithmetic personal-effectiveness could forecast arithmetic performance in a meaningful way. Students opinion poll base year 10th grade was utilized as the instrument of the study. Findings on relationships investigated demonstrated that arithmetic personal-effectiveness and arithmetic attainment were pessimistic associated. Learners with high arithmetic personal-effectiveness were associated with high arithmetic attainment. This study did not find whether mathematics self-efficacy can predict arithmetic attainment amongst students with dyscalculia in government administered high schools in Murang'a, hence, the need for the current study to fill this gap in literature.

Bonne (2012) carried out a mixed-methods quasi-experimental methodology in Wellington, New Zealand among 152 primary school students' year four and five learners ages seven years and seven months to nine years and six months. The study tried to identify connections between primary-school convictions about intellect, arithmetic personal-effectiveness and accomplishment, by examining the impacts of two intercessions. The researcher found that concerted intrusions lacked critical impact on learners' convictions about the flexibility of intellect, arithmetic effectiveness, or accomplishment. This study was done in Europe and did not exclude students with

dyscalculia's arithmetic personal-effectiveness therefore there was a need to venture into the effect of personal-effectiveness on arithmetic achievement amongst learners with dyscalculia.

Ayotola and Adedeji (2009) did a correlation study in Oyo State, Nigeria with 352 old high school learners. It analyzed the connection amongst arithmetic's personal-effectiveness and accomplishment in arithmetic. The instruments used to gather information were arithmetic personal- effectiveness scale and arithmetic attainment Test. The survey recommended that teachers should find ways of enhancing Self- Efficacy in Mathematics in students and should place emphasis on students' confidence to succeed in Mathematics achievement. Although the findings from this research showed that there is no disparity amongst male and female arithmetic efficacy, there was a need to investigate the difference among boys and girls with dyscalculia in government administered high schools in Murang'a, Kenya.

Simiyu (2010) carried out a correlation research study in Bungoma, Kenya among 115 secondary school students. The researchers looked at the effects of test anxiety and personal-effectiveness on arithmetic success in form 3 learners in Kenya's Western Province's Kanduyi Division. The Test Anxiety Inventory Questionnaire (TAIQ) and the arithmetic personal-effectiveness (MSE) scale were used to gather information. During exams, learners were found to be anxious, according to the report. In terms of personal-effectiveness, there were no sex parities. According to the findings, learners encountered

examination nervousness during arithmetic exams. Leaders, especially instructors and guardians, are the key sources of nervousness. The influence of peer perception on exam nervousness was also crucial. However, the researcher did not find out the impact of mathematics efficacy on maths performance among students with dyscalculia in public secondary schools which this study sought to establish.

Pajares and Mill operator's (1994) study in Atlanta, USA on self-efficacy and mathematics had suggestions for instructors who endeavor to remediate low math accomplishment. They found that students' judgments of their capacity to take care of particular sorts of arithmetic issues were valuable indicators of their real capacity to tackle those issues. Since most of the identified studies were carried out in the western world, the current study ventured into the effect of personal-effectiveness on arithmetic achievement amongst students with dyscalculia locally.

2.5 Summary

From the literature reviewed, it confirms that prevalence of dyscalculia in the US, UK and Middle-East has been established. Instructors in Kenya only classified pupils with common studying problems either in linguistic s or arithmetic, not explicitly dyscalculia, according to investigation. Henceforth, this survey established the prevalence of students with dyscalculia and the common area of Mathematics difficulties most students with dyscalculia experience. Similarly, literature outlines different diagnostic tools which have been proved effective in diagnosis of dyscalculia, they include: Computer based assessments tools, standardized achievement tests, dyscalculia screener and

Neuropsychological test Battery. The researcher adapted a standardized achievement test to identify students with dyscalculia. Research studies done in countries like USA, New Zealand, Nigeria and Kenya from the reviewed literature on the mathematics efficacy and mathematics performance did not isolate the impact self-efficacy on students' mathematics performance. Therefore, this research study found out the effect of personal-effectiveness on the arithmetic achievement amongst students with dyscalculia in an attempt to fill the apparent research gap in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The research design, study site, target population, sampling techniques and sample size, and research instruments and how they would be tested for reliability and validity, information gathering and analysis, ethical and logistical considerations were all covered in this chapter.

3.1 Research Design

This survey applied descriptive survey design to enable the investigator obtain pertinent and precise information concerning the impact of mathematics self-efficacy on dyscalculia in government administered schools in Kandara sub-county and draw valid conclusions for the facts discovered. The researcher adopted this design because it helps the researcher to determine and report the way things are and also tried to explain likely norms, morals, attitudes and features according to Kombo & Tromp (2006).

3.2 Location of Study

The location of the survey was Murang'a County, Kandara Sub-county. The MOEST Kandara Sub-County Education Office (2015), indicates secondary schools' enrolment was 17,858 students in 54 public secondary schools. The sub-County was purposely sampled because the mean score for mathematics has been the mean grade of a D for the last four years. The mean score was 2.926, 3.3660, 3.430 and 3.3211 from the year 2011 to 2014 respectively according to the MOEST, Kandara Sub-County (2015), thus it is thought to be more representative and the findings may be a bit generalizable.

3.3 Target Population

The target populace for this survey comprised of 54 secondary school learners in Kandara Sub-County who are estimated to be at 17,858, according to information obtained from the Kandara Sub-County Education Office (2015). The study sample was drawn from form three students whose population is estimated at 4473. The form three was chosen because the researcher was content with this class because already attitudes have been formed towards mathematics and activities affecting the attitudes of students will consequently affect their self-efficacy. In addition, the form three would have been exposed to much of the mathematics content as per the syllabus.

3.4 Sampling Procedures and Sample Size

3.4.1 Sampling Procedures

Since the target population was too big and practically impossible to study, sampling was necessary. To obtain the required sample from the target population, three sampling measures were used; stratified random sampling, simple random and purposive sampling. Schools were divided into relevant groups using stratified random sampling (boys boarding, girls boarding, mixed boarding, mixed day, and mixed day and boarding). To pick the participants, simple random sampling was used, 1 school in each of the five categories except for mixed day schools which selected 3 schools out of the 35 schools proportionally, to make a total of 7 schools sampled for the study. This was 13% of the target populace. Mugenda & Mugenda, (1999) claim that in the descriptive studies, 10% of the accessible population is an enough sample to be used. This sample was therefore more than the minimum and thus it was thought to be representative of the group. Seven

headteachers from every school were chosen using purposeful sampling 7 mathematics teachers were teaching the form three class and 125 students were sampled for screening during data collection using dyscalculia screening instruments. Total sample size was 139.

3.4.2 Sample Size

The sample size is shown in Table 1.

Table 1: School Categories and Sample Size for Principals, Teachers and Students

School category	No. of schools	Sampled schools	Students' Sample	Teachers' sample	Principals' sample	Total sample
Mixed day	35	3	45	3	3	51
Mixed day & Boarding	3	1	15	1	1	17
Mixed Boarding	5	1	20	1	1	22
Boys Boarding	3	1	20	1	1	22
Girls Boarding	8	1	25	1	1	27
Total	54	7	125	7	7	139

3.5 Research Instruments

Data was collected by administration of Dyscalculia screening instrument, documentary analysis, Mathematics self-efficacy scale (MSE) for students and an interview schedule for principals. The information gathered was used to establish the extent of dyscalculia in

our schools and the impact of self-efficacy on Mathematics performance. The instruments that were used for this study included the following: Mathematics self-efficacy scale for students Dyscalculia screening instrument; interview schedule for principals.

3.5.1 Mathematics Self-Efficacy Scale (MJSES) for Students

The researcher adapted a scale from Morgan and Jinks Student Efficacy (1999) scale, measuring the student's efficacy. Its goal is to learn more about learners' effectiveness beliefs and how they relate to academic excellence. It's a more comprehensive questionnaire that includes school grades as a dependent variable. Using Devillis's (1991), the scale has experienced enormous growth to ensure validity and reliability.

the researcher made use of only thirteen out of thirty four items contained in the original MJSES which were on the scale that are explicit to arithmetic personal-effectiveness.

Consequently, it was critical to assess the materials' reliability and validity, as only a component of the MJSES was utilized to assess learners' personal-effectiveness. Utilizing Cronbach's alpha in the SPSS. All materials were intended for a Likert scale intervals of five scales of "Strongly disagree", "Disagree", "Undecided", "agree", and "strongly agree" (Jinks & Morgan, 1999). The mathematics self-efficacy scale for students is presented in appendix ii.

Responses to each item was scored from 1-5. Agreement with favorable item was portrayed 5 marks and disagreement with unfavorable was portrayed 1 mark. Scoring was

overturned for unfavorable items whereby disagreement with unfavorable items was portrayed 5 marks and agreement with unfavorable materials of 1 mark. A total of 19 items were used. The highest total expected was $13 \times 5 = 65$. The lowest score expected was $13 \times 1 = 13$. The median score was $(65/2) + (19/2) = 39$. Hence a score between 39-65 was grouped as having a high self-efficacy. A score of between 13-38 was grouped as having low self-efficacy (Jinks & Morgan, 1999).

3.5.2 Dyscalculia Screening Instrument (DSYCALC)

The researcher adapted a dyscalculia screening instrument (2013) to identify learners prone to Mathematics difficulties. Dyscalculia screening instrument is a standardized test by Wadson Street Dyslexia Centre, the directors of Educational Psychologist Ltd, issued this information. This screen was created for learners over the age of 14 who have above-average academic skills. The researcher adopted some few questions to suit our 8.4.4 curriculum.

Dyscalc started as a list of questions created by a group of professional and skilled working academic therapists during a brainstorming session. A host of questions was turned into software and distributed through social media. They requested that people participate in the examination only if they were 14 years of age and over, of moderate educational qualification (as measured by GCSE grades C and over, NVQ grade two qualification and over), had qualified from high school academic level, and realized their basic number capabilities were in line with the rest of their aptitudes (among other things).

The screener has 20 mathematics questions and is available online. However, the researcher provided the same adopted test in hard copy. The results are available at the end of answering the last question on an online test. The computer analyses the correct and incorrect answers attempted versus the time taken to answer them and identifies those students at risk of dyscalculia. The dyscalculia screening instrument is presented in appendix i.

3.5.3 Interview Schedules for the Principal

Interviews, according to Yin (2003), are one of the major significant sources of materials, and the interview is defined as a two-way conversation in which the interviewer can actively participate. The interview is organized and focused on the investigator predetermined questions. Face to face interview was used for the study where the interviewer asked the questions with regard to the objectives of the study. The main focus of this interview was to establish the statistics of learners with dyscalculia and their mathematics performance. The interview questions mainly focused on whether self-efficacy affects mathematics performance. Interviews were audio-recorded and retrieved during data analysis. The interview schedule is presented in appendix iv.

3.6 Piloting

A pilot test was undertaken in two schools that is Kenyoho secondary school and Gaichanjiru Mixed secondary school outside the sampled schools for the actual study using simple random sampling procedure. This involved pre-testing on the suitability of the data collection instruments in the attempt to disclose if the anticipation diagnostic procedures were suitable to enhance validity. The specific areas that were checked

included suitability of language, clarity of questions and choices in the responses, the adequacy of the spaces provided for the written responses and ambiguity. After carrying out validity and reliability tests, some of the items in the instruments like the dyscalculia screening instrument and interview schedules were revised with the purpose of refining them so as to improve the validity and reliability.

3.6.1 Validity

The degree to which an instrument calculates is referred to as validity, that which it is designed to measure (Nkpa, 1997). The instruments which were used for this study were first tried in a pilot study which helped in clarification of ambiguities prevalent before data collection. The relevance of the intended test and scale was assessed by the researcher with the assistance of two experts who were experienced in this area. The final test and scale that was used for data collection took into account the input and suggestions.

3.6.2 Reliability

The dependability of the research tools in this study was determined using internal consistency and test-retest techniques. The dyscalculic and MSE were directed to the same participants double in a span of three weeks and their coefficients of reliability was determined. According to Mugenda (1999), a correlation coefficient greater or equal to 0.75 was considered to imply a high reliability of the instrument. The results of the two measures from the participants had a high coefficient of 0.779, which was deemed rational by using the Pearson product moment correlation coefficient method.

3.7 Data Collection Procedure

The investigator toured the identified schools for authority letter from the Headteachers. The researcher consulted with tutors of mathematics so as to discuss the aim of the survey, how he intended to carry out the study and more importantly the secrecy of the information which was gathered. The investigator made prior visits before the actual collection of data basically to create a rapport with the teachers and to avoid Hawthorne effect among teachers and students at the same time the researcher requested for documents of the form three students to identify those at risk of dyscalculia. On the very day the investigator issued the questionnaire to mathematics tutors and carried out an oral interview with the principal. Responses from the principals were recorded in pieces of papers guided by the research objectives. On the agreed upon time the researcher administered a dyscalculia screening test to students first, to identify those who were dyscalculia and then followed by the mathematics self-efficacy scale for those students identified as dyscalculia after 2 hours.

3.8 Data Analysis

Data gathered was verified for finalizing. It was then edited, coded, tabulated and entered in the computer for final analysis. Dyscalculia screening test, general efficacy scale, mathematics self-efficacy was thoroughly inspected for accuracy. Data from the research instruments was analyzed both quantitatively and qualitatively. Analysis was prepared by means of SPSS. Descriptive statistics was organized in a meaningful way for presentation, interpretation and discussion. Inferential statistics were done in testing association between self-efficacy and math performance using independent t-tests and

chi-square tests. The analyzed data was presented using percentages and frequency tables and figures.

3.9 Logistical and Ethical Considerations.

The investigator attained permission to collect data from the MOEST through the NACOSTI and a research permit. The researcher also acquired authorization and consent to implement the survey from the Ethics Committee from institution. The principals or deputy principals in the selected schools were contacted before using school records and administering the questionnaire and the interview schedules to principals, mathematics teachers and learners.

The aim of the investigator was explained to the MOEST, principals/Deputy principals, mathematics teachers and students in order to ensure that there was full disclosure. Written informed consent was sought from the respondents by requesting them to sign a letter of consent which the researcher clearly stated the intentions of the study. Finally, the respondents were assured of confidentiality of their responses in the questionnaire through anonymity as well as exercising voluntary participation.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.0 Introduction

This chapter focuses on analysis of information obtained from the field and discussions. Mathematics self-efficacy scale for students and teachers, dyscalculia screening instruments for students and interview schedule for principals were used. Data is presented in the form of frequency, percentages and inferential statistics in tables and figures. Data is computed from 125 student questionnaires, 7 teacher questionnaires and 7 principals' interview guides. The research objectives listed below guide on the presentation and analysis of data:

- v. To determine the prevalence of dyscalculia among learners in Kandara Sub-county in government administered high schools.
- vi. To investigate common areas of mathematics problems among learners with dyscalculia in government administered high schools in Kandara sub-county.
- vii. To establish the level of personal-effectiveness for arithmetic amongst students with dyscalculia in government administered high schools in Kandara sub-county.
- viii. To establish the association amongst personal-effectiveness for mathematics and mathematics performance in government administered schools in Kandara sub-county.

4.1.0 General Information and Demographic information

The researcher pursued the respondent's demographic and general information. These variables were important since they had potential to influence the nature of the responses provided as well as the discussion and implications of the findings.

4.1.1 General Information

General information in this chapter includes students and teachers, school types, students' gender and age, occupation of students' guardians/parents, students repeating their current class, teachers' highest professional qualifications, teachers teaching experience, and lastly attendance of special needs education seminars by teachers. A total of 125 questionnaires from sampled students and questionnaires from 7 tested tutors were returned. There was a 100 percent return rate. This may be due to the investigator giving the participants ample time.

4.1.2 Demographic Information of Students

a) Gender of Students

Results on students' gender are presented in table 4.1 that follows in the form of percentages. Frequency is also included.

Table 4.1: Distribution of Students by Sex

	F	%
Male	57	45.6
Female	68	54.4
Total	125	100.0

According to the results in table 4.1, among the students studied, a slight majority of 54.4% were females while the remaining 45.6% were males. This shows that by gender,

there was a slightly higher number of girls who partook to this study as compared to boys. This was important because the conclusions that we reach with one group might not be representative.

b) Age of the Students

In table 4.2, information gathered from the students on their age is presented in frequencies and percentages.

Table 4.2: Distribution of Students by Age

	Frequency	Percent
16 years	31	24.8
17 years	53	42.4
18 years	29	23.2
19 years	4	3.2
20 years	4	3.2
Above 20 years	2	1.6
15 years	2	1.6
Total	125	100.0

Majority of students 42.4% from Kandara sub-county secondary schools were aged 17 years. About a fifth (24.8%) were aged 16 years and almost the same number (23.2%) were aged 18 years. Very few of the students who participated were above 19 in age as illustrated above. This implies that the majority of the form three students were within the required age with a few slightly below and quite a number above 17 which is acceptable

for form three students. The age was appropriate because the dyscalculia screening instrument requires students of this age group.

c) The Type of School Attended by Students

In table 4.3, data gathered from students on the type of schools they attend is presented in frequencies and percentages.

Table 4.3: Distribution of Students by School Type

	Frequency	Percent
Girls schools	25	20.0
Boys schools	20	16.0
Mixed day schools	80	64.0
Total	125	100.0

The table 4.3 above presents that the majority (64.0%) of the students attended mixed secondary schools. A fifth of the students (20.0%) attended girls only schools with the remaining (16.0%) attended boys schools. Therefore, fewer students in Kandara sub-county attend boys' only secondary schools implying majority prefer mixed schools which are day schools as findings in table 4.3 shows. However, the results on the sampled schools showed diversity required which captured student's self-efficacy towards the performance in mathematics

d) Occupation of Guardians/Parents

Findings on the occupation of students' parents or guardians are as presented in table 4.4 below in frequencies and percentages.

Table 4.4: Distribution of Students by Occupation of Guardians/Parents

Parent/Guardian's Occupation	Frequency	Percent
Accountant	3	2.4
Businessman	63	50.4
Engineer	2	1.6
Farmer	30	24.0
Sales and marketing	1	.8
Health practitioner	9	7.2
Police officer	4	3.2
Teacher	5	4.0
Chef	2	1.6
Surveyor	1	.8
Lawyer	3	2.4
Magistrate	1	.8
Driver	1	.8
Total	125	100.0

Results on the occupation of students' parents or guardians were numerous and were as follows: Majority of the parents (50.4%) were businessmen and women, more than a fifth (24%) were farmers while the rest were other professionals such as 9(7.2%) were health practitioners. Teachers were 5(4.0%), 4 (3.2%) were police officers while lawyers and accountants tied at 3(2.4%). Chiefs and engineers were 2(1.6%) while sales and

marketing, magistrate, driver and surveyor were all at 0.8%. A significance to be noted is that the majority of parents' occupation was from the informal sector that is those involved in business and farming with few parents' occupation being formal employment. This fact can help understand the kind of support students with dyscalculia get at home. Juma (2016) argues that when parents have a well-paying occupation, they are in a better position to make adequate provisions for their children's education by providing economic, social, psychological and emotional support for their children enabling them to perform well in their educational attainment.

4.1.3 Demographic Information of Teachers

a) Gender of Teachers

In table 4.6 data gathered from teachers on their gender are presented in frequencies and percentages.

Table 4.6 Distribution of Teachers by Gender

	Frequencies	Percentages
Male	4	57.2
Female	3	42.8
Total	7	100.0

For the teachers who participated in this study, a slight majority of 57.2% were male while 42.8% were females. Hence a slightly higher number of male teachers took part in the study as compared to their female counterparts as shown in table 4.6 above. This was in line with the researcher's expectation to sample both male and female teachers in order to establish different opinions on students' self-efficacy for mathematics performance.

b) Distribution of Teachers by School Type

In table 4.7, data gathered from teachers concerning the type of secondary schools they teach in are presented in frequencies and percentages.

Table 4.7: Distribution of Teachers by School Type

	Frequencies	Percentages
Girls school	2	28.6
Boy school	2	28.6
Mixed school	3	42.8
Total	7	100.0

Information presented in table 4.7 shows that most teachers 42.8% taught in mixed schools, 28.6% taught in boys school while the remaining 28.6% taught in girls schools. This shows that Maths teachers who participated in this study were from mixed secondary schools of Kandara sub-county Kenya. There were more teachers sampled from mixed schools compared to girls and boys schools because there were more of such schools in Kandara sub-county in Murang'a County.

c) Distribution of Teachers by Highest Professional Qualifications

In table 4.8, data gathered from teachers on their highest professional qualification are presented in frequencies and percentages.

Table 4.8: Distribution of Teachers by Highest Professional Qualification

	Frequencies	Percentages
--	--------------------	--------------------

DIP	3	42.8
B. ED	1	14.4
PGDE	3	42.8
Total	7	100.0

Data presented in the above table shows that most teachers from Kandara sub-county secondary schools 42.8% have either a diploma in education or 42.8% postgraduate education while the remaining 14.4% have bachelor of education degrees. The results therefore indicate that the majority of the teachers in the study area have diploma level of education and above with most of them having either diploma or postgraduate degree as findings in table 4.8 reveals. This could be attributed to the fact that TSC has denied teachers with higher qualifications promotions. Several studies have shown that teachers' academic qualification is the most crucial element in determining students' performance. For instance, the qualification of teachers impacts the academic performances for students according to Asikhia (2010). However, Dahar, Faize and Niwaz, (2010) they did not agree on the difference in teacher quality and student academic achievement.

d) Distribution of Teachers by Teaching Experience

In table 4.9, data gathered from teachers on their teaching experience are presented in frequencies and percentages.

Table 4.9: Distribution of Teachers by Teaching Experience

	Frequencies	Percentages
1-3 years	3	42.8
4-6 years	2	28.6
7-9 years	1	14.3

Over 10 years	1	14.3
Total	7	100.0

According to Table 4.9 above, most secondary school teachers in Kandara sub-county 42.8% have taught for a period of 1-3 years, 28.6% have taught for 4-6 years, 14.3% have taught for 7-9 years whereas the remaining 14.3% have taught for over 10 years. These findings suggest that most teachers have taught for less than 6 years as shown in table 4.9 above. On his part, Armstrong (2007) contended that teachers with an experience of 26 to 30 years can influence their students positively. This opinion was shared by Kosgey and Kimutai (2011) who concluded that students' academic achievement increases as the number of teachers' year of experience progresses.

e) Distribution of Teachers by Attendance of Seminar on Special Needs Education

In table 4.10, data gathered from teachers on their highest professional qualification are presented in frequencies and percentages.

Table 4.10: Distribution of Teachers by Attendance of Seminar on Special Needs Education

	Frequencies	Percentages
Yes	2	28.6
No	5	71.4
Total	7	100.0

As results in table 4.10 reveal, the majority of teachers 71.4% have not attended any seminar on special needs education whereas only 28.6% had attended such seminars.

Therefore, the majority of teachers in Kandara sub-county are yet to attend seminars on special needs schooling. The study made a revelation that revealed that the majority of the sampled tutors did not have appropriate skills to teach and identify learners with dyscalculia. Kinyua (2007) conducted research in Kenya to find ways to promote guardian-tutor relationship in offering learning environment for learners with LD in the Kasarani Division of Nairobi County. The results of the survey discovered that most regular teachers lacked necessary skills to identify these students.

4.2 Prevalence of Students with Dyscalculia

In the second objective, the study sought to figure out how many learners in government administered high schools have dyscalculia in Kandara sub-county.

The learners were given a quiz to take and assessed in order to identify students with dyscalculia. However, all the sampled learners were involved in the survey as they were found to experience difficulties in mathematics as results in this section indicate. Frequencies and percentages under descriptive statistics have been applied to present the quantitative data. A narrative form has been used to present qualitative data in this form.

4.2.1 Distribution of Students by Mathematics Test Scores

Data based on the test scores on test items administered to the students are as presented in table 4.14 below. The performance of students on the test is scored in percentages as follows.

Table 4.14: Distribution of Students by Mathematics Test Scores

Scores	Frequency	Percent
55%	48	38.0
65%	21	16.8
50%	20	16.0
45%	6	4.8
75%	13	10.4
60%	10	8.0
10%	1	.8
80%	1	.8
70%	3	2.4
0%	2	1.6
Total	125	100.0

Out of the 125 students who sat for the mathematics test, 10 (8%) scored 60%, 1 (0.8%) scored 80%, 1 (0.8%) scored 10%, 3 (2.4%) scored 70%, 6 scored 45%, 2 (1.6%) scored 0%, 20 (16%) scored 50%, 21 (16.8%) scored 65%, 48 scored 55%, and 13 (10.4%) scored 75%. The results as in table 4.14 reveal that out of the 125 learners who participated in the examination, a minority of eight learners scored less than 50% in the administered test. In addition, the research discovered that the majority of learners in Kandara sub-county performed well in mathematics as 116 (92.8%) out of 125 scored 50% and above

in the exams hence were not dyscalculic. Therefore, 9 (7.2%) of the studied students were Dyscalculic as they scored less than 50% according to Kelly (2018).

These findings lend credence to those from other researchers around the world. For instance, Butterworth, et al. (2011) and Waco, et al. (2011) estimated a prevalence of dyscalculia among students of about 5 to 7% which was almost the same as what Butterworth (2004) had discovered among 6-14-years old students. Another estimate in the UK is at 3% to 6% of the population (Goldman, 2010c; Wilson, 2012). Doyle (2010) also asserts that worldwide studies estimate the prevalence of dyscalculia within the range 3% to 11%. The following were reports from Principals

One principal stated that;

“Dyscalculic students in this school always perform below average in mathematics examinations and they are about 4-10 in a class”

Upon further questioning, another principal stated that;

“3-4 students per stream have been identified to suffer from dyscalculia and they often perform below average in mathematics”

Yet another principal stated that:

“in this institution, an average of 5 per stream have been identified as dyscalculic and perform poorly in mathematics.”

Another principal stated that;

“about 4-6 students per stream have been identified as dyscalculic from form one to form four and their grades are poor.”

A principal stated that;

“on average, each stream in this school has between 10-15 students who are dyscalculic”

Another principal stated that;

“my school has about 10 dyscalculic students with regards to mathematics performance but they always attain poor grades in one class.”

The last principal stated that;

“in my school, from one to four, there are 30 students identified as Dyscalculic and their performance is below average”

From the interviews, all principals noted that dyscalculic students performed below average, in mathematical tests. On the identification of dyscalculic students had less than 10 dyscalculic students per class in majority of schools whereas, in one school was found to have almost 30 dyscalculic students in all classes as the interviewed principals noted. However, all the principals revealed that they do not have a standard way of identifying students with dyscalculia as they use the regular continuous assessment test. These results indicate that less than 10 students per stream in Kandara sub-county are dyscalculic.

4.2.2 Identification of Students with Dyscalculia by Teachers

In table 4.15, data gathered from teachers on identification of students with dyscalculia are presented in frequencies and percentages.

Table 4.15: Identification of students with dyscalculia by teachers

	Frequencies	Percentages
Yes	4	57.2
No	3	42.8
Total	7	100.0

As presented in the above table, most of tutors 57.2% identified students with dyscalculia while 42.8% did not. Therefore, in Kandara sub-county, the majority of teachers identified students with dyscalculia in their classrooms using the CATS, therefore there was lack of a standard way of identification of students with dyscalculia. Kinyua (2007) conducted research in Kenya to find ways to promote guardian-tutor relationship in offering learning environment for learners with LD in the Kasarani Division of Nairobi County, revealed that even though there were students with Dyscalculia students, most regular teachers lacked necessary skills to identify these students which is similar in Kandara Sub-county.

4.2.3 Means of Identifying Students with Dyscalculia by Teachers

In table 4.16, data gathered from teachers on means of identifying students with dyscalculia are presented in frequencies and percentages.

Table 4.16: Means of Identifying Students with Dyscalculia by Teachers

	Frequencies	Percentages
Maths exam	2	28.6
No particular method	2	28.6
CATs	3	57.2
Total	7	100.0

According to the results presented above, majority of teachers 57.2% use continuous assessments Tests, 28.6% of the teachers used maths exams to test for dyscalculia while another 28.6% didn't have any particular method to test for dyscalculia. Therefore, a

majority of teachers in the study area use CATs to test for dyscalculia among students as results in table 4.16 show, this reveals that there was no standardized way of identifying students with dyscalculia. The current study results are similar to Doyle (2010) who found out that there were no formalized methods of the assessment of dyscalculia and the figures depend on how one interprets his or her findings. Different researchers use different criteria to diagnose dyscalculia among students. Craig (2009) observed that dyscalculia is not difficult to diagnose. To add on to this, Shalev (2008) points out measures that are particularly intended to identify mathematics disabilities are not accessible. Logsdon (2013) suggests that schools can determine if a child has a learning disability in Mathematics by identifying the types of errors each individual child makes. He adds that teachers can also use general types of diagnostic Mathematics assessments, review of students' work and cognitive assessments. The findings from above on ways of identifying dyscalculia through continuous assessment tests can be partly supported by National Center for Learning Disability (2006) in the UK which suggest that written tests and evaluation tests help in the detection of dyscalculia.

One participant's opinion on ways of identifying students with dyscalculia:

The participant said that;

"In my school, no specific test for dyscalculia is administered; however, we identify students with poor mathematics performance"

Another principal had this to say;

"I believe that those teachers in the maths department have the ways of identifying learners with dyscalculia."

In another school the principal stated;

“We use continuous assessments tests (CATs) administered monthly to identify students with dyscalculia and difficulties in other subjects.”

This was the opinion of another principal;

“This school is yet to identify a method that can identify students with dyscalculia”

The principal from a different school had this to say;

“We don’t have any standard maths test to identify these students with dyscalculia”

Another said;

“I think it the responsibility of the ministry to provide us with the means of identifying such students with dyscalculia”

Finally, another principal stated;

“In this school, we don’t have specific screening instruments to identify students with dyscalculia”

Findings from the above interviewed principals reveal that majority of schools do not have a standardized way of identifying students with dyscalculia, the ones which identifies use continuous assessment tests (CATs),

4.2.4 Teachers Responses on the Number of Students with Dyscalculia in a Class

In table 4.17, data gathered from teachers on the number of learners with dyscalculia in a class are presented in frequencies and percentages.

Table 4.17: Teachers Responses on the Number of Students with Dyscalculia in a Class

	Frequencies	Percentages
0-5	3	42.8
6-10	4	57.2

Total	7	100.0
--------------	----------	--------------

More results presented in the table reveal that a majority of teachers 57.2% had between 6-10 students with dyscalculia while 42.8% had not more than 5 students with dyscalculia. Therefore, most teachers in Kandara sub-county have between 6-10 students with dyscalculia in their classes. A survey carried out by Wafula (2009) on initial detection of grade 3 Students with learning defects in the government administered basic education level in Butere discovered that almost twenty four per cent of pupils registered in the government administered basic education schools had LD. Most of the children from sampled schools exhibited learning disabilities in maths (52%). Despite that finding, most of the tutors lacked knowledge in SNE. However, most teachers were deficient in training on special needs education. Additionally, there was a high teacher-student ratio and crowding.

4.2.5 Average marks of the Previous Year

Table 4.18: Average marks of the Previous Year

	F	Percentage
1-2	2	28.6
2-3	2	28.6
3-4	3	42.8
Total	7	100.00

Results from the principals as shown in table 4.18 revealed that most schools, 42.8%, had average marks of 3-4, 28.6% had a mean score of 2-3 while 28.6% had a mean score of 1-2 in mathematics last year. Therefore, a slight majority of 42.8% had the highest mean

score in mathematics as shown in the above table. However, it indicates that those schools with a mean score of a D plain and below (mean score of 1-3) were the majority 57.2%. The findings show that mathematics was performed poorly in Kandara sub-county. In the interviews, all principals who were interviewed stated that their schools had no specific test for identifying students with dyscalculia, however, poor mathematics performance in CATS was often used.

4.2.6 Descriptive Statistics on the Prevalence of Dyscalculia among Students

Table 4.19: Descriptive Statistics on the Prevalence of Dyscalculia among Learners

	N	M	Std. D	Std. EM
Prevalence of dyscalculia among	125	2.57	1.376	.123

On the prevalence of students with dyscalculia within studied schools, descriptive statistics reveal that there was a mean score of 2.57 and std. deviation of 1.376 indicating that there were students with dyscalculia in the studied secondary schools. The findings show that on average, approximately 8 children out of 125 had dyscalculia. A standard deviation of 1.376 meant that the distribution of this disability was close to the mean, hence there was no skewed distribution by class or school.

4.2.7 One-Sample Test on the Prevalence of Dyscalculia among Students

The study further sought to establish whether the observed prevalence of dyscalculia was statistically significant. A one-sample t-test was therefore carried at 95% confidence interval to test whether the prevalence was significantly different from '0'

Table 4.20: One-Sample Test on the Prevalence of Dyscalculia among Students

Test Value = 0						
				95% Confidence Interval of the Difference		
	t	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Prevalence of dyscalculia among students	20.870	124	.000	2.568	2.32	2.81

The results presented in table 4.20 show that the observed prevalence of dyscalculia cannot be equated to zero ($t=20.870$, $df=124$, $p=0.000<0.05$), hence the number of students with this condition cannot be assumed to be insignificant in class. It therefore implies that dyscalculia is a disability that is significantly present amongst learners in public high schools in Kandara sub-county. A survey by Bonne (2012) also found dyscalculia being a significant problem among schools in New Zealand, signaling that the condition is world over.

4.3 Common Areas of Mathematics Difficulties among Students with Dyscalculia

In the first objective, the study sought to find out the common fields of arithmetic problems among students with dyscalculia in public secondary schools in Kandara sub-county. School principals availed qualitative data. Different sets of quantitative data were gathered from the teachers and students. The collected quantitative data is described through descriptive statistics in the form of frequencies and percentages.

In general, results showed that students had common difficulties in 63.16% of the questions asked as they scored less than 50% in 12 out of 20 set test items in this study.

4.3.1 Common Areas of Mathematics Difficulties

Specific results on common areas of mathematics difficulties among students in frequencies and percentages are as shown in the following tables 4.11.

Table 4.20: Common Areas of Mathematics Difficulties

	F	%
Abstract thinking	15	12.0
Mastery of maths concept	40	32.0
Language difficulties	20	16.0
Difficulties in time and direction	15	12.0
Arithmetic weakness	30	24.0
Visual-spatial aspects of maths	5	4.0
Total	125	100.0

Table 4.20 above reports a majority of students 32% have difficulties with mastery of maths concept, 12% had difficulties in time and direction, 16% had difficulties in language of maths, 12% had difficulties with abstract thinking, 24% had arithmetic weakness while 4% had difficulties in visual-spatial aspect of maths. Therefore, students in the study area had difficulties in various areas of mathematics in common with the main common area being mastery of maths concepts followed by arithmetic difficulties. Other authors across the globe have also supported the results. For instance, studies have shown that there are diverse types of challenges that students with MD experience Fuchs,

Prentice, and Fuchs (2002) and Jordan, Hanich, Dick and Kaplan (2001). The implication of these difficulties implies that maths failure is common among the indicated skills and therefore, students require diverse classroom intervention to understand some of the maths concepts.

4.3.2 Descriptive Statistics on Common Areas of Mathematics Difficulties among Students

Descriptive statistics in the arrangement of means and standard deviation are presented in table 4.21 below.

Table 4.21: Descriptive Statistics on Common Areas of Mathematics Difficulties among Students

	N	Mean	Std. Deviation	Std. Error Mean
Common areas of mathematics difficulties	125	4.40	1.529	.137

In table 4.12, descriptive statistics reveal that common areas of mathematics difficulties had a mean score of 4.40 and a std. 1.529 revealing that there are numerous areas in mathematics that students face difficulties with.

4.3.3 One-Sample Test on Common Areas of Mathematics Difficulties among Students

Table 4.22: One-Sample Test on Common Areas of Mathematics Difficulties among Students

	Test Value = 0
	95% Confidence Interval of the Difference

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Common areas of mathematics difficulties	32.168	124	.000	4.400	4.13	4.67

In table 4.22, the study reveals that there are numerous common areas of mathematics difficulty among students with dyscalculia in public secondary schools in Kandara sub-county. These areas include: Mental Computation, Computation skills, Quantitative Reasoning and Math fluency. At $t=32.168$ and $df=124$, the p-value $p=0.000$ is lower than the p-value $p=0.05$ indicating an existence of common areas of mathematics difficulties among students as shown in table 4.22. The student with arithmetic problems will demonstrate wholly or part of the difficulties: -low conceptualization of questions, weak figures differentiation, low quantity differentiation, low position and size recognition, low command of arithmetic principles, inability to see the interval between numerals on measuring device, cannot differentiate between; high– low, on top of – underneath, top – bottom, up –down. The pupil equally is unable to say number of items in an order (Lerner, 2006; Vande Walle, 2004; & Blay Thornton, 2001).

4.4 Students level of Mathematics Efficacy

In the third objective, the study sought to determine the level of self-efficacy for mathematics performance in public secondary in Kandara sub-county. Various quantitative data was gathered from the students and teachers. From the principals, qualitative data was gathered. Frequencies and percentages, which are forms of

descriptive statistics, have been used in presenting qualitative data whereas a narrative form has been adopted to present qualitative data in this section.

4.4.1 Students Ratings on level of Self-Efficacy for mathematics Performance

In Table 4.23, data gathered from students on their self-efficacy for mathematics performance are presented in frequencies and percentages.

Table 4.23 Student rating of their self –efficacy for Mathematic

	SA		A		Neither A Nor D		D		SD	
	F	%	F	%	F	%	F	%	F	%
In math class, I still give it my all.	42	33.6	48	38.4	26	20.8	3	5.6	6	4.8
I enjoy taking maths	54	43.2	32	25.6	32	25.6	8	6.4	0	0.0
In college, I'd like to focus on math.	31	24.8	63	50.4	23	18.4	0	0.0	8	6.4
My tutor believes that I struggle with math.	8	6.4	0	0.0	25	20.0	52	41.6	34	27.2
Math isn't my strong suit	4	3.2	4	3.2	21	16.8	21	16.8	75	60.0
What I study in arithmetic class, I assume, will be applicable in real life.	72	57.6	34	27.2	11	8.8	0	0.0	8	6.4
I get good grades in mathematics	63	50.4	20	16.0	34	27.2	0	0.0	8	6.4
I am an excellent mathematician.	49	39.2	20	16.0	42	33.6	2	1.6	6	6.4

Going to arithmetic class is something I despise.	3	5.6	5	4.0	18	14.4	30	24.0	69	55.2
When I'm trying to solve arithmetic difficulties, I usually give up.	8	6.4	0	0.0	25	20.0	60	48.0	32	25.6
During arithmetic class, I am perplexed.	0	0.0	8	6.4	18	14.4	19	15.2	80	64.0
When I'm older, I'd like to work in a field that doesn't need me to use math.	33	26.4	17	13.6	14	11.2	23	18.4	38	30.4
It is simple for me to concentrate in arithmetic class.	76	60.8	31	24.8	12	9.6	8	6.4	0	0.0

Majority of the respondents exhibited high self-efficacy in mathematics according to table 4.22. On the scale of 1 (lowest self-efficacy to 5 (highest self-efficacy). Most students' scores ranged from strongly agreed to agree for 7 positive questions items similarly on negative questions, the majority of their responses in the 6 questions items ranged between strongly disagreeing to disagree.

Table 4.23's findings show that 38.4% of the students agreed that they always try their best in maths class, 43.2% of the students strongly agreed that they enjoyed taking maths, 50.4% agreed that they would like to learn more about maths in college, 57.6% of the students strongly agreed that what they study in maths class is valuable in day to day life, 50.4% of the students strongly agreed that they got good grades in mathematics while 39.2% of the students strongly agreed that they are good at solving maths

problems. Finally, 60.8% of the students strongly agreed that it is simple for them to concentrate in maths class. The above responses were on positive questions on self-efficacy in mathematics.

On negative questions; 41.6% of the students strongly disagreed that their teachers thought they do not understand maths very well, 60% of the students strongly disagreed that they are not good at maths, 55.2% of the students strongly disagreed that they do not like going to a maths class, 48.0% of the students disagreed that they usually give up when solving a maths problem, 64.0% of the students strongly disagreed that they feel confused during a maths lesson. Finally when asked whether they want not to do a job that will use maths, 30.4% of them strongly disagreed.

In a rejoinder, Liu and Koirala (2009) carried out association analysis and a study linear regression analysis study in sophomores across the United States among 11726 high school students in 752 public and private schools. Just like the present study, their findings demonstrated that mathematics achievement and mathematics self-efficacy were positively related. Students recording high mathematics self-efficacy were positively correlated with high achievement in mathematics

4.4.2 Teachers Responses on the Whether Dyscalculia Affect Students' Mathematics Performance

In table 4.24, data gathered from teachers on whether dyscalculia affects students' mathematics performance are presented in frequencies and percentages.

Table 4.24: Teachers Responses on the Weather Dyscalculia Affect Students' Mathematics Performance

	F	%
Agree	4	57.2
Strongly disagree	3	42.8
Total	7	100.0

As the findings in the above table show, a majority of 57.2% agreed that dyscalculia affects students' mathematics performance while 42.8% strongly disagreed that dyscalculia affects students' mathematics performance as findings in table 4.24 reveal. This indicates that a few teachers in Kandara sub-county do not understand about students with dyscalculia and how self-efficacy affects learner's mathematics performance.

4.4.3 Teachers Responses on Students' Mathematics Self-Efficacy

In table 4.25, data gathered from teachers on students' mathematics self-efficacy are presented in frequencies and percentages.

Table 4.25: Teachers opinion on Students' level of Mathematics Self-Efficacy

	SA		A		Neither A nor D		D		SD	
	F	%	F	%	F	%	F	%	F	%
They always try their best in math's class	6	85.7	0	0.0	0	0.0	0	0.0	1	14.3
They look forward to arithmetic class.	4	57.1	2	28.6	0	0.0	1	14.3	0	0.0

They want to study much about mathematics in college.	3	42.8	3	42.8	1	14.4	0	0.0	0	0.0
Their tutors believe they don't grasp arithmetic quite well.	1	14.4	0	0.0	0	0.0	3	42.8	3	42.8
They are not mathematicians.	1	14.3	0	0.0	0	0.0	2	28.6	4	57.1
They assume that what they study in arithmetic class will help them in their everyday lives.	1	14.3	4	57.1	0	0.0	1	14.3	1	14.3
They score well in arithmetic.	2	28.6	4	57.1	0	0.0	0	0.0	1	14.3
They are good at solving math problems	2	28.6	4	57.1	0	0.0	0	0.0	1	14.3
They do not like going to maths class	1	14.3	1	14.3	1	14.3	3	42.8	1	14.2
They usually give up when solving math problems	1	14.3	0	0.0	0	0.0	4	57.1	2	28.6
They feel confused during maths class	1	14.3	1	14.3	0	0.0	3	42.8	2	28.6
When they are older, they will want a job that does not use maths	1	14.3	1	14.3	0	0.0	4	57.1	1	14.3
It is easy for them to pay attention in maths class	2	28.6	3	42.8	1	14.2	0	0.0	1	14.3

Results as shown in table 4.25 reveal that majority of teachers 85.7% strongly agreed that students always try their best in maths class, a majority of teachers 57.1% strongly agreed that students enjoy taking maths class, 42.8% of the teachers strongly agreed another 42.8% of the teachers agreed that students would like to learn more about maths in

college while a majority of 57.1% agreed that students believe that what they learn in maths class is useful in the real world. More than half of the teachers 57.1% agreed that students get good grades in maths at the same time the same number of teachers agreed that their students are good at solving maths problems and that it is easier for them to pay attention. The above 7 positive question items reveal a high self-efficacy ranging from strongly agreed to agree in terms of number of teachers involved.

The findings from table 4.23 on 6 negative questions reveal a high self-efficacy ranging from strongly disagree to disagree as follows; majority of the teachers 42.8 %strongly disagreed that their students do not understand maths very well while most of the teachers 57.1% strongly disagreed that the students are not good at maths. Majority of the teachers 42.8% disagreed that students do not like going to maths class and another 57.1% of teachers disagreed that students usually give up when solving maths problems. Similarly,57.1% of the teachers disagreed that students in future will not want a job that does not use maths. Finally, 42.8% of teachers disagreed that students feel confused in maths lessons.

Simiyu (2010) carried out a correlation research study in Bungoma, Kenya among 115 secondary school students. The survey examined the impact of examination nervousness and personal-effectiveness on the educational achievement in Arithmetic among form three learners in Kanduyi Division, Bungoma District of Western Province of Kenya. The finding was that students had high self- efficacy which is supported by the current research. The principals interview on their comments on self- efficacy on performance of mathematics, had this to say:

Principal from one school had this to say;

“Good self-efficacy leads to good performance in maths while poor leads to failure in math.”

Principal from another school had this to say;

“Definitely, self- efficacy has a relationship on performance of mathematics”

Another one had this to say;

“A good self-efficacy impacts on very good grades in mathematics”

The principal from a different school had this to say;

“For a student to perform well, he/she must have a positive self -efficacy”

A different principal from another school had this to say;

“Positive self -efficacy is important especially for students with dyscalculia in performance of mathematics.”

Another principal had this to say;

“Levels of performance in mathematics is affected by the degree of self- efficacy.”

The last principal stated;

“For a school to attain good grades in their performance, the students must have a good self- efficacy.”

From the above interview of principals, it is apparent that entire 7 principles were in agreement that mathematics performance is affected by self-efficacy. The findings support Liu and Koirala (2009) who confirmed that arithmetic personal-effectiveness and arithmetic attainment were clearly correlated.

4.5 The association amongst personal-effectiveness for Mathematics and Mathematics achievement

In the fourth objective, the study sought to test the association amongst self-efficacy for mathematics and mathematics performance in public secondary schools in Kandara Sub-County. Students and teachers were polled for quantitative information, while headteachers were polled for qualitative information. The quantitative information was presented using descriptive statistics in the form of frequency and percentage, while the qualitative information was presented verbally format in this section. Based on results presented in section 4.3 students' mathematics self-efficacy is generally good as out of the 125 students who took the test, a majority 94% scored more than 50% while 6% scored less than 50 indicating high mathematical self-efficacy.

4.5.1 Students' maths test score vs mathematics self-efficacy score

Students were asked to indicate the Mathematics skills they felt they were good at (Table 4.26)

Table 4.26: Students maths test scores vs Mathematics self-efficacy score

Maths test Score (%)	Frequency	MSE Score range	Percentage
0	2	13-20	1.6
10	1	21-24	0.8
45	6	25-30	4.8
50	20	39-42	16.0
55	48	43-45	38.4
60	10	46-49	8.0
65	21	50-52	16.8
70	3	53-55	2.4

75	13	56-60	10.4
80	1	62	0.86

Results presented in the above table 4.26 reveal that a majority of 38.4% of the students scored 55% and their MSE score was ranging 42-45, 16.8% scored 65 with MSE score of ranging 50-52,16% scored 50% and their MSE score was ranging 39-42,10.4% scored 75% and their MSE score was ranging 53-55,8% scored 60% and their MSE score was ranging 56-49,4.8% scored 45% and their MSE score was ranging 25-30,2.4% scored 70% and their MSE score was ranging 53-55,1.6% scored 0 and their MSE was ranging 13-20,0.8% scored 10% and their MSE was 23 and finally 0.8% scored 80% and their MSE was ranging was 62. Given the results, the researcher opines that students with low MSE scored marks ranging 0%-45% while those students with high MSE scored marks ranging 50%-80%, therefore, 92.8% of students had MSE score levels high ranging 39-62 while 7.2% of students were found to have low levels of MSE score ranging 13-30 as findings in table 4.26 established.

4.5.2 Chi-Square Test on the Relationship between Self-Efficacy for mathematics and Mathematics Performance

This is presented in the table below.

Table 4.27: Chi-Square Test on the Relationship Between students' level Self-Efficacy for mathematics and Mathematics Performance

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	500.000(a)	64	.000

Likelihood Ratio	344.450	64	.000
Linear-by-Linear Association	.068	1	.794
N of Valid Cases	125		

The chi-square test results on the correlation between students' level of self-efficacy for mathematics and mathematics performance revealed that there exists a significant correlation between students' mathematics self-efficacy and their mathematics performance. This is due to the fact that p-value $p=0.000$ is less than $p=0.05$ hence the null hypothesis H_0 : "There is no significant relationship between students' level of self-efficacy for mathematics and mathematics performance" is rejected by this study. This is because the study has revealed that the $df=64$, there exists a significant connection between the studied variables.

The results of the chi-square test indicate that arithmetic personal-effectiveness level and arithmetic performance were absolutely interconnected. Learners with great arithmetic personal-effectiveness were related with great arithmetic performance. The findings suggest that learners who were self-assured of their achievement in arithmetic tended to have better mathematics test scores. Precisely, learners who believe that what they study in class is valuable in the existent life. This survey offers experiential indication of the impact of arithmetic personal-effectiveness on arithmetic performance among students with dyscalculia

The researcher sought the principal's opinions on adequacy of teaching and learning materials for students with dyscalculia. The principals had this to say:

Principal from one school had this to say

“The teaching and learning facilities for students with dyscalculia is inadequate because we need a computer lab to facilitate ICT integration in teaching these students”

Upon further questioning, another principal stated that;

“Students with mathematics difficulty need special books and classroom boards which the school doesn’t provide”

Principal from one school had this to say

“The school doesn’t have enough teachers to enable us provide individualized attention to students with dyscalculia”

The principal from a different school had this to say;

“Teaching and learning facilities for dyscalculia students were inadequate in their schools”

Another principal had this to say;

“There is available learning and teaching materials adequate to accommodate for the needs of dyscalculic students”

Another said;

“the learners with dyscalculia can be catered for in our school because we have adequate facilities”

Finally, another principal stated

“Our school is equipped with ICT equipment to cater for students with mathematics difficulties”

Sentiments from the principals show that four schools had inadequate learning and teaching materials while the other three schools had adequate learning and teaching supplies. These findings imply that lack of sufficient facilities and resources is a factor leading to the poor attainment of learners with dyscalculia. Liu and Koirala (2009) argue that self-efficacy that is contributed by the adequacy of resources determine student performance.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

In this part, the researcher presents a summary, draws conclusions and recommendations based on the findings of the study as follows.

5.1 Summary

The survey's goal was to see how personal-effectiveness affected arithmetic achievement among dyscalculic learners in Murang'a, Kenya's government administered high schools. The study was conducted using a descriptive survey while information was gathered by means of questionnaires and interviews.

5.1.1 Prevalence of Students with Dyscalculia

The study investigated the prevalence of students with dyscalculia in government administered high schools in Kandara sub-county and results revealed that out of the 125 students who sat for the mathematics test, 8 had Dyscalculia. This 8 out of the 125 students present a prevalence of 6.4% which is within the range of other researchers globally.

5.1.2 Common Areas of Mathematics Difficulties among Students with Dyscalculia

While addressing the first objective, which was to determine the most common fields of arithmetic difficulty among dyscalculic learners in Kandara sub-county government administered high schools, the study revealed that a most of high school students failed in 12 questions out of 20 set mathematical test items. Common areas where students had

difficulties included difficulties with mastery of maths concepts, difficulties in time and direction, difficulties in language of maths, difficulties with abstract thinking, arithmetic weakness and difficulties in the visual-spatial aspect of maths. Therefore, students in the study area had difficulties in various areas of mathematics in common with the main common area being mastery of maths concepts followed by arithmetic difficulties.

5.1.3 The Level of Self-efficacy for Mathematics Performance

Results on students' level of personal-effectiveness for arithmetic performance in government administered high schools in Kandara sub-county reveal that most of the respondents exhibited high self-efficacy in mathematics. On the scale of 1(lowest self-efficacy to 5(highest self-efficacy). Most students' scores were ranging (strongly agreed) for the 7 positive questions items similarly on the negative questions, majority of their responses in the 6 questions items ranged between (strongly disagree to disagree). Teachers perception from 7 positive questions reveal a high self-efficacy ranging from strongly agreed to agreed in terms of the number of teachers involved. The findings on 6 negative questions reveal a high self-efficacy ranging from strongly disagree to disagree too.

5.1.4 The Association amongst personal-effectiveness for Arithmetic and Arithmetic Performance

The results of the chi-square test indicate that there is a connection amongst personal-effectiveness levels of students and their mathematics performance. Learners with great

arithmetic personal-effectiveness were related with great arithmetic scores. Arithmetic personal-effectiveness was a significant optimistic forecaster of arithmetic performance.

5.2 Conclusions

The following conclusions are drawn from the results;

- a) Prevalence of students with dyscalculia results revealed that out of the 125 who sat for the mathematics test, 8 had dyscalculia. This 8 out of the 125 students present a prevalence of 6.4% which is within the range of other researchers globally.
- b) On common areas of mathematics difficulties among students with dyscalculia a majority of secondary school's students failed in 12 questions out of 20 set mathematical test items. Main common area being mastery of maths concept followed by arithmetic difficulties.
- c) Results on levels of personal-effectiveness for arithmetic achievement reveal that learners with dyscalculia had low personal-effectiveness.
- d) Lastly, there is a connection amongst mathematics personal-effectiveness levels and arithmetic achievement.

5.3 Recommendations

Given the results, the researcher recommends that;

1. Mathematics teachers need to adopt better strategies for content delivery as the current methods do not seem to yield tangible results as students have numerous areas in mathematics subject that they find difficult to comprehend

2. Given the prevalence of students with dyscalculia, the researcher recommends that teachers make more effort to assist individual students understand mathematics
3. Students mathematics efficacy should be improved by inviting mentors or people who have succeeded in mathematical field to help boost their morale in the subject

5.4 Suggestions for Further Study

- a) The scope of this research was limited to government administered high schools in Kandara sub-county only. Further and related study should be carried out in the entire Murang'a county Kenya.
- b) A comparative study is also necessary in both private and public secondary schools in order to show a clear picture of dyscalculia in these two types of secondary schools in all the sub-counties of Murang'a.
- c) Attention needs to be paid on effective strategies for aiding students with dyscalculia to pass in mathematics.

REFERENCES

- Ayo, O., Kelechi, L. & Abiodun, A. (2013). Manifestations of dyslexia and dyscalculia. *Journal of International Special Needs Education* Vol. 16, (1) pp. 40-52.
- Ayotola, A. & Adedeji, T. (2009). The relationship between mathematics self-efficacy and achievement in mathematics. *Procedia Social and Behavioral Sciences*, 1:953-957
- Badian, N. A. (1999). Persistent arithmetic, reading, or arithmetic and reading disability. *Annals of Dyslexia*, 49, 45-70.
- Bandura, A. (1974). Behavior theory and models of man. *American Psychologist*, 29, 859-869.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*. Retrieved from <http://des.emory.edu/mfp/PajaresSchunk2001.html>
- Bandura, A. (1986). Social foundations of thought and action: *A Social Cognitive Theory*. Englewood cliffs. Prentice-Hall.
- Bandura, A. (1997). Self-efficacy: The exercise of self-control. New York: NY. W.H. Freeman. Retrieved from <http://des.emory.edu/mfp/PajaresSchunk2001.html>.
- Bonne, L. (2012). The effects of primary students Mathematics self-efficacy and beliefs about intelligence on their mathematics achievement: A mixed-methods intervention study. Unpublished PhD thesis, Victoria University of Wellington.
- Borkowski, J.G (1992). Metacognitive theory: A framework for teaching literacy, writing and math skills. *Journal of Learning Disabilities*, 25, 253-257.
- Borkowski, J., Catt, G., Rellinger M., & Pressley, M. (1990). Self regulated cognition: Interdependence of metacognition, attributions, and self-esteem. In B. Jones & L. Idol (Eds.) *Dimensions of thinking and cognitive instruction* (p p. 53-92). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Bley, N. Thornton, C. (2001) *Teaching Mathematics to Students with Learning Disabilities*. Austin, Tx; Pro-ed
- Butterworth, B. (2001). *The Mathematical Brain*. London: Macmillan.
- Butterworth, B. (2003). *Dyscalculia screener: Highlighting students with specific learning difficulties in mathematics*. London, Nelson Publishing Company Limited.

- Butterworth, B., Varma, & Laurillard (2011). Dyscalculia: From Brain to Education : *Science Magazine*.(Vol 332: Number 6033: pp 1049 - 1053).
- Butterworth, B. (2004). Developmental dyscalculia. In J.I.D. Campbell (ed.). *Handbook of Mathematical Cognition*. Hove: Psychology Press (pp. 455-467)
- Cass, M, Cates, D; Smith, M. Jackson (2003). *Effects of Manipulative Instruction* Learning Disabilities research & practice, 18(2), 112-120.
- Chadha, A, (2001). *A Guide to Educating Children with Learning Disabilities*. Vikas publishing house; PVT Ltd.
- Chadha, A. (1999). *A Handbook for Primary School Teachers of Children with Learning Disabilities*, Educational consultant of India Limited, New Delhi, India. Sona Printer pvt. Limited, New Delhi India.
- Christie, J. (2011). How to teach a child with dyscalculia. Retrieved June 20,2015,from [Http://www.buzzle.com/articles/](http://www.buzzle.com/articles/).
- Covington, M.V. (2000).Goal theory, motivation, and school achievement: An integrative review. *Annu.Rev.Psychol.51:171-200*.
- Craig, H. (2009). *Dyscalculia-Why numbers don't make sense?* Kuala Lumpur, Hills Learning.
- Deshler, D.D. & Schumaker, J.B. (1986)Learning strategies: An instructional alternative for low achieving adolescents. *Exceptional Children,52,583-500*.
- De Vellis, R. (1991). *Scale Development: Theory and Application*. Newbury Park,CA. Sage
- DfES (2001) *Guidance to support students with dyslexia and dyscalculia*.
- Drago-severson, E. (2009). *Leading adult learning: support adult development in our schools*. Thousand oaks, CA: Corwin/Sage Press
- Doyle, A. (2010). *Dyscalculia and mathematical difficulties: Implications for transition to higher education in the Republic of Ireland*. (pdf).
- Fuchs, L.S & Fuchs, D (2002). Mathematical problem-solving profiles of students with mathematics disabilities and without Comorbid reading disabilities. *Journal of learning disabilities*, 35, 563-573.

- Hackett, G., & Betz, N. (1989). An exploration of mathematics self-efficacy/mathematics performance correspondence. *Journal for Research in Mathematics Education*, 20,261-273
- Gearheart, R. C. (1985). *Learning Disabilities Educational Strategies*, Missouri Times Mirror Mosby College Publishing, U.S.A.
- Geary, D.C. (1993). Mathematical disabilities: Cognitive, neuropsychological and genetic components. *Psychological Bulletin*, 114(2), 345-362.
- Geary, D.C. (2006). Dyscalculia at an early age: Characteristics and potential influence on socio-emotional development. In R.E. Tremblay, R.G. Barr, & R.D. Peters (Eds.), *Encyclopedia on Early Childhood Development*. (pp.1-4) Montreal, Canada: Centre of Excellence for Early Childhood Development.
- Goldman, J.G. (2010). Blind item: Developmental learning disorders. Retrieved July 17, 2015, from [Http://.www.cedarlenelabs.com](http://www.cedarlenelabs.com).
- Gross- Tsur, V, Manor, O. & Shalev, R, S (1996). Developmental dyscalculia: Prevalence and demographic features. *Developmental medicine and child neurology*, 38, 25-33.
- Hanich, L.B, Jordan, N.C, Kaplan, D & Dick, J (2001). Performance across different areas of mathematical cognition in children with difficulties. *Journal of educational psychology*, 93, 615-619.
- Inside Out London. (2013). Can't count, don't count: Number blindness retrieved June 13, 2015, from [Http//www. Cbeebies.com/cbbc/?cdrid](http://www.Cbeebies.com/cbbc/?cdrid)
- Individuals with Disabilities Education Act (IDEA) of 2004, Public Law 108 – 446, 108th Congress 1st Session (December 3).
- Jinks, J., & Morgan, V. (1999). Children's perceived academic self-efficacy: An inventory scale. *Clearing- House*, 72(4), 224-230.
- Kenya National Examination Council (2006). *The year 2006 KCSE Examination Performance Report*. Nairobi. KNEC
- Kiamanesh, A., Hejazi, E. & Esfahani, Z.(2005). *The Role of Math Self-Efficacy, Maths Self-Concept, Perceived Usefulness of Mathematics and Maths Achievement*. Tehran, Iran: Teacher training University. Retrieved from http://self.uw.edu.au/Conferences/2004_Kiamanesh_Hejazi_Esfahani.pdf

- Kinai, T. K. (2002). Relationship between parental behaviors towards adolescents and their manifest aggression in Nairobi secondary schools. Unpublished PhD thesis, Kenyatta University. Nairobi.
- Kinyua, J, N. (2007). Promoting Parent- Teacher Collaboration in providing Education For Students with LD in primary schools in Kasarani Division, Nairobi, Kenya. Unpublished Master's Thesis Kenyatta University.
- Kosc, L. (1974). Developmental dyscalculia. *Journal of Learning Disabilities*, 7, 165-171
- Kombo, D.K., & Tromp, D.L.A., (2006). *Proposal and thesis writing; an introduction*: Pauline publications Africa.
- Lerner, J. W. (2006) *Learning Disabilities and Related Disorders*. Characteristics and Teaching Strategies. Houghton Mifflin Company Boston New York.
- Liu, X. & Koirala, H. (2009). The effects of mathematics achievements of high school students. In: proceedings of the NERA Conference 2009.
- Logsdon, A. (2013). What is dyscalculia? Mathematics learning disabilities. Retrieved June 13, 2015, from [Http://www. about.com/ guide/](http://www.about.com/guide/)
- Lyon G. R. (1996). *Learning Disabilities*. In child Psychopathology. E. Marsha and R. Barkley Eds New York: Guilford Press. Pp 390-434.
- Mercer, C.D., & Miller, S.P. (1992). Teaching students with learning problems in maths to acquire, understand, and apply basic maths facts. *Remedial and special education*, 13(3), 19-35
- Mercer, D. (1991). *Students with learning disabilities*. New York, Merrill Publishing Company, New York, USA.
- Miller, S.P., Mercer, C.D. (1997). Educational aspects of Mathematics disabilities. *Journal of Learning Disabilities* 30:47-56
- Mugenda, O.M., & Mugenda; A.G. (1999). *Research Methods: quantitative and qualitative approaches*. Nairobi, African Centre for Technology Studies.
- National Center for Learning Disabilities. (2006). *Dyscalculia*, 6(1), Article 2.
- Nkpa, N. (1997). *Educational Research for Modern Scholars*. Enugu, Nigeria: Fourth Dimension Pub.
- Parajes, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66, 543-578.

- Pajares, F., & Kranzler, J. (1997). Self-efficacy beliefs and general mental ability in mathematical problem-solving; *Journal of Contemporary Educational Psychology*, 26, 426-443.
- Pajares, F., & Miller, M.D. (1994). Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis; *Journal of Educational Psychology*, 86, 193-203.
- Patrick, J., Hicks, L., & Ryan, A.M. (1997). Relations of perceived social efficacy and social goal pursuit to self-efficacy for academic work. *Journal of Early Adolescence*, 17, 109-128
- Radford, T. (2003). Number dyslexia hits one in twenty children. *The Guardian*, 11.
- Redmond, B., & Moser, C. (2011). *Self-Efficacy and Social Cognitive Theory*. Retrieved November 2015, from theory and cases in school based consultations: <https://wikispaces.psu.edu/display/>
- Rubinstein, O. & Tannock, R. (2010). Mathematics anxiety in children with developmental dyscalculia. *Journal of Behavioral and Brain Functions*. Vol.6.
- Simiyu, M.G.M. (2010). Influence of test anxiety and self efficacy on mathematics performance on secondary school students in Kanduyi division of Bungoma district, Unpublished M.Ed Thesis, Kenyatta university. Nairobi.
- Shalev, R. & Manor, O. (1998). *Persistence of Developmental Dyscalculia: what counts*. *The Journal of Pediatrics*, 133(3), 358 – 362.
- Shalev, R.S., Auerbach, J., Manor, O. & Gross-Tsur, V. (2000). Developmental dyscalculia: Prevalence and prognosis. *European Child & Psychiatry Journal* 9:58-64
- Shalev, R. S. (2008). Using Understanding of Dyslexia for Early Identification and Intervention *Schatschneider and Torgesen* 765.
- Schunk, D.M. (1995). Self-efficacy and education instruction. In J.E Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research and application* (pp. 281-303). New York: NY. Plenum
- The Education Act, Chapter 211 of Laws of Kenya (1980).
- Van de Walle, J. A. (2004). *Elementary and Middle School Mathematics; Teaching Development*. Boston; Allyn and Bacon.

- University College London. (2011, May 28). Students struggling with math have a neurocognitive disorder called dyscalculia: Disorder affects as many people as dyslexia. *Science Daily*. Retrieved February 27, 2016 from www.sciencedaily.com/releases/2011/05/110526141414.htm
- Vroom, V.H. (1964). *Work and motivation*. New York: NY. Wiley
- Waco, T. Temple, C.M. & Killeen, R.L. (2011). Bad at math... or is it dyscalculia? Retrieved from <http://kcentv.com>
- Wafula, R. W. (2009). Early identification of learning disabilities amongst class three students of public primary schools of Butere district, Kenya. Unpublished Master's Thesis Kenyatta University.
- Waime, T.W. (2007). The conflict between modern and traditional parenting behaviors as perceived by students in some selected secondary schools in Nairobi province: counselling implications. Unpublished PhD thesis, Kenyatta University. Nairobi.
- Wilson, A. J., Revkin, R. S., Cohen, D., Cohen, L. and Dehaene, S. (2006). An open trial assessment of “The Number Race”, an adaptive computer game for remediation of dyscalculia. *Behaviour and brain function* 2, p. 19-20.
- Wrightman, L.S.(1962). The effects of Anxiety, Achievement-motivation and Task Importance Upon Performance on Intelligence Test. *Journal of Educational Psychology*,53,150-156.
- Yin, R.K. (2003). *Case Study Research Design and Methods*, Sage, Newbury Park, CA.
- Zimmerman, B.J. Bandura, A. & Martinez-Pons, M. (1992). Self-motivation for Academic Attainments: The Role of Self-efficacy Beliefs and Personal goal setting. *American Educational Research Journal*, 29, 663 – 676.

APPENDICES
APPENDIX I: DYSCALCULIA SCREENING INSTRUMENT. (DYSCALC)
TIME:30 MINS

Date-----Name of school-----

Gender-----Age-----

Instructions

This Test contains 20 Multiple choice questions. Choose the correct answer by circling from the choices provided, *without using a Calculator.*

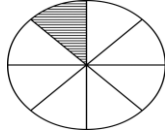
1. **Multiply 18,975 by 1/1000**

- A.0.18975
- B.1.8975
- C.18.975
- D.189,750.
- E.I would be guessing.

2. **What does the symbol \geq mean?**

- A. Greater than or equal to
- B. Turn right
- C. Go to the next page
- D. More than

3. **The shaded segment of this circle represents**



- A. One Quarter
- B. One Eight
- C. One fifth
- D. I would be Guessing.

4. **0.5 is the same as saying**

- A. Half
- B. 5
- C. I would be guessing
- D. 50

5. **It is approximately 45 Km from Nairobi to Thika. If you are able to drive at average 80Km per hour, approximately how long would it take to complete the journey.**

- A. 80 minutes
- B.35 minutes

- C. Two hours
- D. An hour and half.
- E. I would be guessing.

6. Approximately how long would it take a healthy person to walk one mile

- A. One hour
 - B.10 minutes
 - C. Twenty minutes
 - D. would be guessing.
-

7. Count these stars.

* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *

- A.70
- B.80
- C. 90
- D.LostCount.

8. Ksh89.50 - Ksh.126.50+Ksh39.50 =

- A. Ksh-2.50
 - B. Ksh2.50
 - C. Ksh 4.50
 - D. I would be guessing.
-

9. Do you have difficulty managing money?

- A. Yes
 - B. No
-

10. Which is the greater?

- A. One Quarter.
 - B. 0.95
 - C. 28%
 - D. I would be guessing.
-

11. What is the length of a standard ruler ?

- A. 30 Inches
- B 30.Millimetres

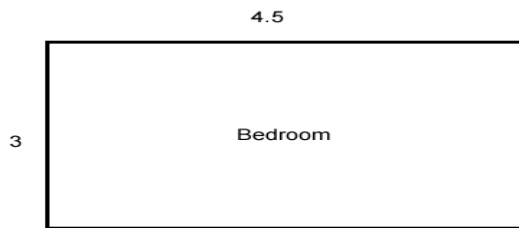
- C.12.Centimetre
- D. 30Centimetre.

12. Add these numbers

2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2

- A.130
- B.160
- C.140
- D.180
- E. Lost count.

13. The numbers in the diagram probably refer to:



- A.Inches
- B.Metres
- C.Decimetres
- D.Centimetres
- E. I would be guessing.

14. How many Companies sold more vans than cars?

Company	Cars	Vans	Total
Thika Motors	78	50	128
General Motors	106	98	204
Nakuru Motors	47	66	113
Toyota Kenya	18	18	36
DT-Dobie	8	12	20
CMC Motors	27	36	63
TOTAL	284	280	

- A.1
- B.2
- C.3
- D.4
- E.5

15. What is the equivalent of 2 in logarithmic notation?

- A.log10
- B.log 100
- C.log 1000
- D.log 10000
- E. I would be guessing.

16. Log a^0 is equal to?

- A.0
- B.10
- C.1000
- D.1
- E. I would be guessing.

17. The symbol $\sqrt{\quad}$ means

- A. Greater than
- B. Square root
- C. correct
- D. I would be guessing.

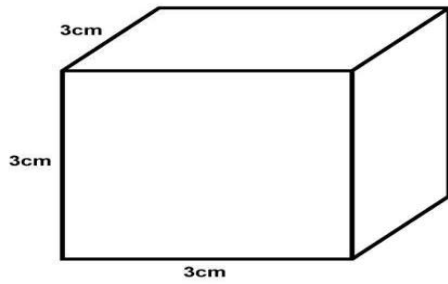
18. This symbol π means

- A. pi
- B. Infinity
- C. Square root.
- D. I would be guessing

19. 8^2 is the same as:

- A. One hour
 - B. .64
 - C. $8+2$
 - D. Eight minutes
-

20. What is the volume of this cube?



- A. 33cm^3
- B. 27cm^3
- C. 9 cm^3
- D. I would be guessing.

Thanks for answering the questions.

APPENDIX II: QUESTIONNAIRE MJSES SCALE FOR STUDENTS

Form/Class.....Date.....

Section A :Biodata

Please provide responses to the following items. Your answer will remain strictly confidential and WILL NOT affect your grade in this subject.

1. School name _____

2. Type of school (tick one) Girls school Boys school Mixed school

3. Gender (tick one) Male Female

4. Age (in years)(fill in):.....

5. What is your guardian/parents occupation? _____

6. Number of terms completed in high school (can be this school or another).do not include this term (fill in).....

7. Are you repeating this class? (tick one) Yes No

Section B: Level of confidence in Mathematics.

1. I always try my best in Maths class.

Strongly disagree Disagree Neutral Agree strongly agree

2. I enjoy taking Maths. Class (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

3. I would like to learn more about Maths in College. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

4. My teachers think I DO NOT understand Maths very well. (Tick one).

Strongly disagree Disagree Neutral Agree Strongly Agree

5. I am Not good at Maths. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

6. I believe that what I learn in Maths class is useful in the real world. (Tick one)

Strongly disagree Disagree Neutral agree Strongly Agree

7. I get good grades in Mathematics. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

8. I am good at solving Maths problems. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

9. I do not like going to Maths class.(Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

10. I usually give up when solving a Maths problem. (Tick one) Strongly disagree

Disagree Neutral Agree Strongly Agree

11. I feel confused during Maths class.(Tick one).

Strongly disagree Disagree Neutral Agree Strongly Agree

12. When I am older,I want a job that does Not use Maths.(Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

13. It is easy for me to pay attention in Maths class (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

Thank you for answering these questions

APPENDIX III: QUESTIONNAIRE MJSEs SCALE FOR TEACHERS

Form/Class you teach.....Date.....Survey

Number.....

This questionnaire seeks to establish the impact of self efficacy on performance in Mathematics on students with Dyscalculia. It has 2 parts ;namely ; A:Biodata of the teacher and B : Confidence levels of the students with dyscalculia.

Section A: Biodata

Please provide responses to the following items by filling the blanks or ticking. Your answer will remain strictly confidential.

1. Name of the School

.....2. Type of school (tick one) Girschool Boys shool
ixed school

3. Gender (tick one) Male Female

4. What is your highest Professional Qualification?
DIP ED B.ED PGDE M.ED Other

Specify.....

5. How many years have you taught Mathematics?
Less than 1 1-3years 4-6years 7-9years 10years and more

6. Have you ever attended any Seminar/training in Special Needs Education
Yes No

Section B: Level of confidence in Mathematics for students with Dyscalculia

1. They always try their best in Maths class.
Strongly disagree Disagree Neutral Agree strongly agree

2. They enjoy taking Maths. Class (Tick one)
Strongly disagree Disagree Neut gree Strongly gree

3. They would like to learn more about Maths in College. (Tick one)
Strongly disagree Disagree Neutral Agree Strongly Agree

4. Their teachers think they DON'T understand Maths very well. (Tick one).
Strongly disagree Disagree Neutral Agree Strongly Agree

5. They are Not good at maths. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

6. They believe that what they learn in Maths class is useful in the real world. (Tick one)

Strongly disagree Disagree Neutral agree Strongly Agree

7. They get good grades in Mathematics. (Tick one)

Strongly disagree Disagree Neutr Ag Strongly Agree

8. They are good at solving Maths problems. (Tick one)

Strongly disagree Disagree Neutra Agree Strongly Agree

9. They do not like going to Maths Class.(Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

10. They usually give up when solving a Maths problem. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

11. They feel confused during Maths class.(Tick one).

Strongly disagree Disagree Neut Agree Strongly Agree

12. When they are older, they will want a job that does Not use Maths. (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

13. It is easy for them to pay attention in Maths class (Tick one)

Strongly disagree Disagree Neutral Agree Strongly Agree

Section C: Knowledge about Dyscalculia

1. Do you identify students with dyscalculia in your school

Yes No?

If yes ,How do you identify

them.....

2. How many students with dyscalculia are there in your class?

0-5 6-10 11-15 16-20

3. Do you believe that students with dyscalculia' self-efficacy affect their performance in mathematics?

Strongly disagree Disagree Neutra Agree Strongly Agree

Thank you for answering these questions

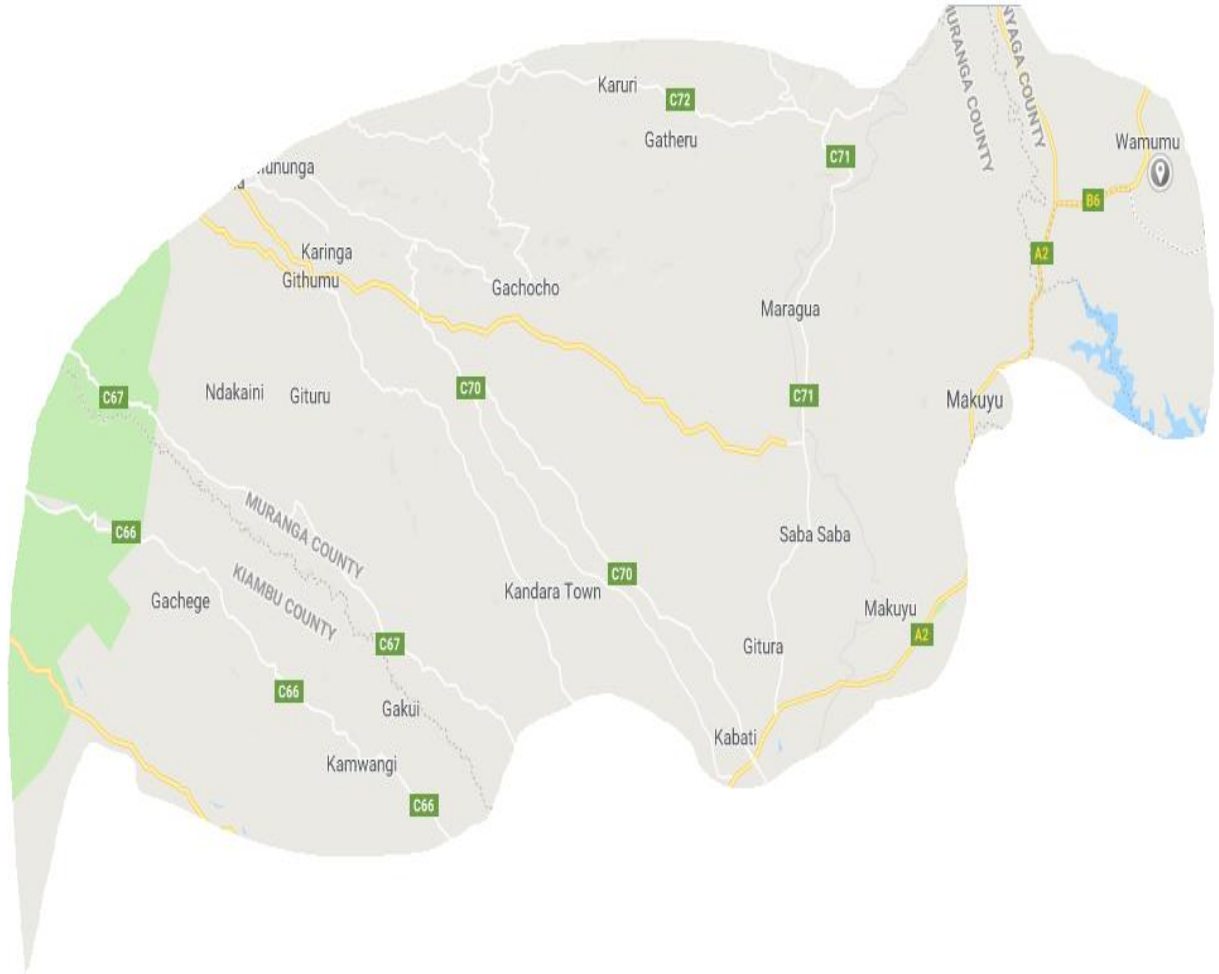
APPENDIX IV: INTERVIEW SCHEDULE FOR PRINCIPALS

This study seeks to determine the effects of personal-effectiveness on arithmetic achievement amongst learners with dyscalculia in government administered high schools. You have been chosen to take part in the survey as your views are considered in reaching at desirable conclusions. I am therefore going to ask you a few questions related to the study.

1. What was the mathematics mean score of the previous year?
2. Do you identify students with dyscalculia in your school?
3. How is their academic performance?
4. How many do you think they are in your school?
5. Comment on these students' self- efficacy on mathematics performance
6. Comment on the adequacy of teaching/learning facilities for this group of students

Thanks for your participation

APPENDIX V: MAP OF KANDARA



APPENDIX VI

INFORMED ASSENT FOR STUDENTS

Project Title: Effects of personal-effectiveness on arithmetic achievement amongst learners with dyscalculia in government administered high schools in Murang'a County, Kenya.

Protocol Number:

Principal Investigator: Nicholas Matunda Mariera

The investigator, Nicholas Matunda Mariera, is conducting a research study

These are a few things he wants you to know about studies

Through research, new ideas are tested. It is through research that we learn new things. On this occasion, I am requesting you to be participants in research.

Research is voluntary and that remains the same option for you. You can either Yes or No. Either option is acceptable.

Why does the investigator want me in this research study?

You are being requested to be in the study as you have been assessed and found to have difficulties in mathematics performance.

What is the study about?

The investigator wants to identify you and fellow learners so that he can find out the impact of your self-efficacy on mathematics performance to assist you to learn maths.

What will take place in course of this survey?

If you accept to participate in this survey, you will sit for a 30 minutes maths test and a questionnaire to fill. You will be required to choose one answer among the choices given in the maths test. For the questionnaire you will be required to honestly pick one best choice among the 5 given.

What other thing should I be informed about the survey?

If you feel afraid or uncomfortable, feel free to tell the investigator.

suppose I decline to participate in this research?

If you don't want to be in the report, that's fine.

To whom should I direct questions to incase they arise?

In case of any queries about this research, you or your parent's can call Mr. Nicholas Matunda Mariera 0705219151, Supervisors Dr. Margaret Murugami 0720385567 and Dr. Jessina Muthee 0734613941.

It necessary for me to participate in the survey?

No, you are not needed to be present in the report. You can change your mind later, even though you say yes now. It is entirely up to you. If you don't want to join, no one would be offended.

Signature

Before deciding if you want to be in the study, ask any questions you have. You can also ask questions during the time you are in the study.

You consent to participate in this research study if you sign your name below.

_____	_____
Your Name (printed)	Age
_____	_____
Your Signature	Date
_____	_____
Signature of Person Obtaining Consent	Date
_____	_____
Signature of Witness	Date

APPENDIX VII: RESPONDENTS INFORMED CONSENT

I am Nicholas Matunda Mariera, pursuing Masters degree course in KU. Am undertaking a survey on *“Effect Of personal-effectiveness On arithmetic achievement Amongst students With Dyscalculia In government administered high Schools In Murang’a County, Kenya.”* This literature material will be utilized by the MoE and other closely related interested participants to advance the learners’ education attainment for students with dyscalculia in high schools in Kenya.

Observed procedures

To take part in this research, I'll send you questionnaires/arithmetic Tests to fill out, and you'll have to answer specific questions about your school's arithmetic results. You have the right to reject to take part in this research without facing any consequences. Regardless of whether you took part or not, you would given the same care. It is entirely up to you whether or not you want to take part in this report. You can ask any questions you have about this research at any time.

Consequences and inconveniences

Any of the questions in the survey might make you feel uneasy. You have the option of refusing to answer these questions. Before you resume your regular services, you can spend about 10 minutes answering this questionnaire and 30 minutes taking the arithmetic exam.

Advantages

You will assist fellow teachers and other related stakeholders in providing an optimal learning atmosphere in the teaching and learning process if you participate in this report. This will assist learners with Math problems in achieving successful grades in general academic achievement. You'll also hear from the findings of this study what techniques other teachers are using to help students increase their academic performance.

Bonuses

Lunch and free writing materials will be offered if you agree to participate in this research.

Trustworthiness

The findings of this research will be kept private and used only for the purposes of this research. The investigator and his superiors will have access to the results of this analysis, which will be held at Kenyatta University's library.

Contact information

If you have any questions you may contact DR. Murugami on 0720385567 or DR. Muthee on 0720711896

Statement of the Respondents

I understand the above details about my role in the report. I was given the opportunity to ask questions, and my questions were satisfactorily answered. It is entirely up to me whether or not I participate in this report. I accept that my information will be kept confidential and that I am free to leave the research at any time. I recognize that whether I want to quit the research or not, I will receive the same level of care and treatment, and

that my choice will have no bearing on the care I receives from the investigator today or from any other investigator at any other time.

Name of participant..... Signature or
thumbprint.....Date.....

Statement of the investigator

The protocols to be followed in the research, as well as the costs and rewards associated, have been explained to the participant in a dialect he or she knows by the undersigned.

Name of the researcher.....

Researcher's signature.....Date.....

APPENDIX VIII: APPROVAL LETTER FROM GRADUATE SCHOOL



**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Website: www.ku.ac.ke

Internal Memo

FROM: Dean, Graduate School

DATE: 19th January, 2017

TO: Nicholas Matunda Mariera
C/o Special Needs Education
Department.

REF: E55/CE/23789/12

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting of 11th May 2016, approved your Research Proposal for the M.Sc. Degree Entitled, "Impact of Self Efficacy on Mathematics Performance among Learners with Dyscalculia in Public Secondary Schools in Murang'a County, Kenya".

You may now proceed with data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking forms per semester. The form has been developed to replace the previous forms. The supervision Tracking Forms are available at the University's website www.ku.ac.ke under the heading "Special webpage downloads".

Thank you.


GIDEON KAIMENYI
FOR: DEAN, GRADUATE SCHOOL



c.c. Chairman, Department of Special Needs Education

Supervisors:

1. Dr. Margaret Murugami
C/o Department of Special Needs Education
Kenyatta University
2. Dr. Jessina Muthee
C/o Department Of Special Needs Education
Kenyatta University

GE/mn

APPENDIX IX: AUTHORIZATION LETTER FROM GRADUATE SCHOOL



**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: E55/CE/23789/12

DATE: 19th January 2017

Director General,
National Commission for Science, Technology
& Innovation
P.O Box 36023-00100
NAIROBI

Dear Sir/Madam,

**RE: RESEARCH AUTHORIZATION FOR NICHOLAS MATUNDA MARIERA- REG.
NO. E55/CE/23789/12.**

I write to introduce Mr. Nicholas Matunda Mariera who is a Postgraduate Student of this University. He is registered for M.Ed degree programme in the Department of Special Needs Education.

Mr. Mariera intends to conduct research for a M.Sc. Proposal entitled, "Impact of Self Efficacy on Mathematics Performance among Learners with Dyscalculia in Public Secondary Schools in Murang'a County, Kenya".

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL



ck/nm

APPENDIX X: AUTHORIZATION LETTER FROM NACOSTI



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No: **NACOSTI/P/17/32063/15652**

Date:

14th February, 2017

Nicholas Matunda Mariera
Kenyatta University
P.O. Box 43844-00100
NAIROBI..

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Impact Of Self Efficacy On Mathematics Performance Among Learners With Dyscalculia In Public Secondary Schools In Muranga County, Kenya.”* I am pleased to inform you that you have been authorized to undertake research in **Muranga County** for the period ending **13th February, 2018**.

You are advised to report to, **the County Commissioner and the County Director of Education, Muranga 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.


BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Muranga County.

The County Director of Education
Muranga County.


National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified

APPENDIX XI : PERMIT LETTER FROM NACOSTI

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 Officer will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming 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.

REPUBLIC OF KENYA



National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A **12868**

CONDITIONS: see back page

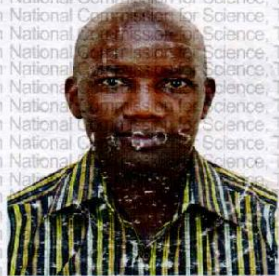
THIS IS TO CERTIFY THAT:

MR. NICHOLAS MATUNDA MARIERA
of KENYATTA UNIVERSITY, 1538-1000
thika, has been permitted to conduct
research in Muranga County

on the topic: "IMPACT OF SELF
EFFICACY ON MATHEMATICS
PERFORMANCE AMONG LEARNERS WITH
DYSCALCULIA IN PUBLIC SECONDARY
SCHOOLS IN MURANGA
COUNTY, KENYA"

for the period ending:
13th February, 2018

Permit No : NACOSTI/P/17/32063/15652
Date Of Issue : 14th February, 2017
Fee Received :Ksh 1000



[Signature]
Applicant's Signature

[Signature]
Director General
National Commission for Science, Technology & Innovation

**APPENDIX XII : MINISTRY OF INTERIOR AND CO-ORDINATION OF
NATIONAL GOVERNMENT**

REPUBLIC OF KENYA



THE PRESIDENCY

MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT

Telephone: 060-2030467
Email: cc.muranga@interior.go.ke

When replying please quote

**COUNTY COMMISSIONER
MURANG'A COUNTY
P. O. BOX 7-10200
MURANG'A**

REF.NO.PUB.24/11/VOL.II/228

28th September 2017

Nicholas Matunda Mariera
Kenyatta University
P.o Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION.

In reference to a letter NACOSTI/P/17/32063/15652 dated 14th February, 2017 from the National Commission for Science, Technology and Innovation regarding the above subject, You are hereby authorized to carry out research on “***Impact of self efficacy on mathematics performance among leaders with dyscalculia in public secondary schools***” for a period ending 13th February, 2018.

APPENDIX XIII: MINISTRY OF EDUCATION IN MURANG'A COUNTY



**MINISTRY OF EDUCATION
STATE DEPARTMENT OF BASIC EDUCATION**

Email: cdemuranga@gmail.com
Telephone: 060 2030227
When replying please quote

COUNTY DIRECTOR OF EDUCATION
P.O BOX 118 - 10200
MURANG'A

REF: MGA/CTY/GEN./64/VOL.II/36

28th September, 2017

Nicholas Matunda Mariera
Kenyatta University
P.O.Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

The County Education office is in receipt of your request and authority letter from the National Commission for Science, Technology and Innovation, reference No. NACOSTI/P/17/32063/15652 dated 14th February, 2017 to carry research on **"Impact of Self Efficacy on Mathematics Performance among Learners with Dyscalculia in Public Secondary Schools in Murang'a County Kenya"**.

Authority is hereby granted to carry out research in **Murang'a County** for a period ending **13th February, 2018**.

PP 
Charles Khayira
County Director of Education
MURANG'A

