DETERMINANTS OF STANDARD ONE PUPILS’ READINESS TO LEARN MATHEMATICS IN PRIMARY SCHOOLS IN KASARANI SUB-COUNTY, KENYA

BY

PHYLLIS M. MAGOMA

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FEBRUARY, 2016
DECLARATION

I confirm that this research thesis is my original work and has not been presented in any other university/institution. The research thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works, including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

Signature.................................. Date. 22.2.16

Phyllis M. Magoma (E55/20067/2012)
Department of Early Childhood Studies

SUPERVISOR

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

Signature.................................. Date 25/2/16

Dr. Teresa Mwoma
Department of Early Childhood Studies

Signature.................................. Date 25/02/16

Dr. Esther Waithaka
Department of Early Childhood Studies
DEDICATION

This thesis is dedicated to my family for the support they gave me during the study. May God bless you abundantly.
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ACRONYMS AND ABBREVIATIONS

APHRC – African Population and Health Research Center

ECD - Early Childhood Development

EFA - Education for All

FPE - Free Primary Education

GER- Gross Enrollment Rate

GoK - Government of Kenya

KICD – Kenya Institute of Curriculum Development

KESSP - Kenya Education Sector Support Programme

MDG- Millennium Development Goals

NAEYC - National Association for the Education of Young Children

NASMLA - National assessment system for Monitoring Learner Achievement.

UPE - Universal Primary Education

UNESCO- United Nations Educational, Scientific and Cultural Organization

UNICEF- United Nations Children’s Education Fund
# TABLE OF CONTENTS

DECLARATION ................................................................................................................... ii  
ACRONYMS AND ABBREVIATIONS ................................................................................ v  
LIST OF TABLES .............................................................................................................. x  
ABSTRACT ....................................................................................................................... xiii

CHAPTER ONE ..................................................................................................................... 1  
1.1 Introduction .............................................................................................................. 1  
1.2 Background to the Study ........................................................................................ 1  
1.3 Statement of the Problem ......................................................................................... 6  
1.4 Purpose of the Study ............................................................................................... 7  
1.5 Objectives of the Study ........................................................................................... 7  
1.6 Research Hypotheses ............................................................................................... 8  
1.7 Significance of the Study ......................................................................................... 8  
1.8 Delimitations and Limitations of the Study ............................................................ 9  
1.8.1 Delimitations of the Study ................................................................................ 9  
1.8.2 Limitations of the Study .................................................................................. 10  
1.9 Assumptions of the Study ....................................................................................... 10  
1.10 Theoretical and Conceptual Frameworks .............................................................. 10  
1.10.1 Ecological Theory ......................................................................................... 10  
1.10.2 Conceptual Framework .................................................................................. 13  
1.11 Operational Definition of Terms ......................................................................... 15

CHAPTER TWO .................................................................................................................... 16  
LITERATURE REVIEW .................................................................................................... 16  
2.1 Introduction .......................................................................................................... 16
2.2 Readiness to Learn Mathematics ................................................................. 16
2.3 Gender of Pupils and Readiness to Learn Mathematics ......................... 21
2.4 Family Economic Class and Pupils' Readiness to Learn Mathematics ........ 22
2.5 Pupils’ School Entrance Age and Readiness to Learn Mathematics .......... 24
2.6 Parents’ Level of Education and Pupils’ Readiness to Learn mathematics .... 25
2.7 Type of Pre-primary School Pupils Attended and Readiness to Learn Mathematics 26
2.8 Summary of Reviewed Literature .................................................................. 27

CHAPTER THREE ................................................................................................. 29
METHODOLOGY ................................................................................................. 29
3.1 Introduction .................................................................................................... 29
3.2 Research Design ............................................................................................ 29
3.3 Variables ........................................................................................................ 29
  3.3.1 Dependent Variable .................................................................................. 30
  3.3.2 Independent Variables .............................................................................. 30
3.4 Location of the Study .................................................................................... 31
3.5 Target Population .......................................................................................... 31
3.6 Sampling Technique and Sample Size ......................................................... 32
  3.6.1 Sampling Techniques .............................................................................. 32
  3.6.2 Sample Size ............................................................................................ 33
3.7 Research Instruments ..................................................................................... 34
  3.7.1 Pupils’ Readiness to Learn Mathematics Check-List ................................ 34
  3.7.2 Questionnaire for Parents ...................................................................... 35
3.8 Pilot Study ....................................................................................................... 36
  3.8.1 Validity .................................................................................................... 36
  3.8.2 Reliability ................................................................................................ 36
3.9 Data Collection Procedures ......................................................................... 37
3.10 Data Analysis .............................................................................................................. 39
3.10.1 Null Hypotheses ................................................................................................. 39
3.11 Logistical and Ethical Considerations ..................................................................... 40
3.11.1 Logistical Considerations .................................................................................. 40
3.11.2 Ethical Considerations ....................................................................................... 40

CHAPTER FOUR ............................................................................................................. 42
FINDINGS, INTERPRETATIONS AND DISCUSSIONS ..................................................... 42
4.1 Introduction ............................................................................................................... 42
4.2 Demographic Information ....................................................................................... 43
4.2.1 Pupils Gender and Age ....................................................................................... 43
4.2.1.1 Type of Pre-Primary School Pupils Attended ................................................ 44
4.2.1.2 Pupils’ Family Economic Class .................................................................... 44
4.2.1.3 Parents’ Level of Education ......................................................................... 45
4.3 Pupils’ Readiness to Learn Mathematics ................................................................. 46
4.4 Pupils’ Readiness to Learn Mathematics and Pupils’ Gender ................................. 52
4.5 Pupils’ Family Economic Class and Pupils’ Readiness to Learn Mathematics .... 57
4.6 Pupils’ School Entrance Age and Readiness to Learn Mathematics .................... 62
4.7 Parents’ Level of Education and Pupils’ Readiness to Learn Mathematics .......... 67
4.8 Pupils’ Readiness to Learn Mathematics and Type of Pre-Primary School Attended 72

CHAPTER FIVE .............................................................................................................. 77
SUMMARY, CONCLUSION, AND RECOMMENDATIONS ............................................. 77
5.0 Introduction ............................................................................................................... 77
5.1 Summary of Findings .............................................................................................. 77
5.2 Conclusion ................................................................................................................ 78
5.3 Recommendations ................................................................................................... 79
5.3.1 School Management .......................................................................................... 79
5.3.2 Pre-Primary School Teachers ................................................................. 80
REFERENCES .................................................................................................. 82
APPENDICES ................................................................................................. 90
APPENDIX I ................................................................................................. 90
PUPILS’ READINESS TO LEARN MATHEMATICS CHECK-LIST .................. 90
APPENDIX II ............................................................................................... 93
QUESTIONNAIRE FOR PARENTS ................................................................. 93
APPENDIX III ............................................................................................... 95
PARENTS’ CONSENT TO PARTICIPATE IN THE STUDY ................................. 95
APPENDIX IV ............................................................................................... 97
PARENTS’ CONSENT FOR THEIR CHILDREN TO PARTICIPATE IN THE STUDY
......................................................................................................................... 97
APPENDIX V .................................................................................................. 99
MAP OF KASARANI ......................................................................................... 99
APPENDIX VI ............................................................................................... 100
APPROVAL OF RESEARCH PROPOSAL GRADUATE SCHOOL .................. 100
APPENDIX VII .............................................................................................. 101
APPROVAL LETTER KENYATTA UNIVERSITY ETHICS COMMITTEE .......... 101
APPENDIX VIII ............................................................................................ 102
RESEARCH AUTHORIZATION NACOSTI .................................................... 102
APPENDIX IX ............................................................................................... 103
RESEARCH CLEARANCE PERMIT NACOSTI ............................................ 103
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1 Sampling Frame</td>
<td>34</td>
</tr>
<tr>
<td>Table 3.2: Reliability Test Results</td>
<td>37</td>
</tr>
<tr>
<td>Table 4.1: Pupils’ Gender and Age</td>
<td>43</td>
</tr>
<tr>
<td>Table 4.2: Type of Pre-Primary School Attended by Pupils</td>
<td>44</td>
</tr>
<tr>
<td>Table 4.3: Pupils’ Family Class</td>
<td>45</td>
</tr>
<tr>
<td>Table 4.4: Parents’ Highest Level of Education</td>
<td>46</td>
</tr>
<tr>
<td>Table 4.5: Pupils Development of Basic Mathematics Abilities</td>
<td>47</td>
</tr>
<tr>
<td>Table 4.6: Number of Pupils Ready to Learn Mathematics</td>
<td>50</td>
</tr>
<tr>
<td>Table 4.7 Pupils Mathematics Abilities by Gender</td>
<td>53</td>
</tr>
<tr>
<td>Table 4.8: Mean Scores of Pupils’ Readiness to Learn Mathematics by Gender</td>
<td>54</td>
</tr>
<tr>
<td>Table 4.9: Independent Samples t-test for Equality of Means by Gender</td>
<td>55</td>
</tr>
<tr>
<td>Table 4.10: Pupils’ Family Class</td>
<td>58</td>
</tr>
<tr>
<td>Table 4.11: Pupils’ Readiness to Learn Mathematics by Family Class</td>
<td>59</td>
</tr>
<tr>
<td>Table 4.12: Relationship between Pupils’ Family Class and Readiness to Learn Mathematics</td>
<td>60</td>
</tr>
<tr>
<td>Table 4.13: Pupils’ Readiness to Learn Mathematics by School Entrance Age</td>
<td>63</td>
</tr>
<tr>
<td>Table 4.14: Relationship between Pupils’ School Entrance age and Readiness to Learn Mathematics</td>
<td>64</td>
</tr>
<tr>
<td>Table 4.15: Highest Level of Education of Mothers and Pupils’ Readiness to Learn Mathematics</td>
<td>68</td>
</tr>
</tbody>
</table>
Table 4.16: Highest Level of Education of Fathers and Pupils’ Readiness to Learn Mathematics

Table 4.17: Relationship between Parents’ Level Education and Pupils’ Readiness to Learn Mathematics

Table 4.18: Type of Pre-Primary School Pupils Attended

Table 4.19: Pupils Mathematics Abilities by Type of pre-primary School Attended

Table 4.20: Overall Mean Scores in Pupils’ Readiness to Learn Mathematics By Type of Pre-primary school Attended

Table 4.21: Relationship between Type of pre-primary school pupils’ Attended and readiness to Learn Mathematics
<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1 Conceptual Framework Diagram</td>
<td>14</td>
</tr>
</tbody>
</table>
ABSTRACT

Research has shown that when children enter school ready to learn, they perform better. Readiness for school would help to reduce repetition and school dropout rates in primary schools. The purpose of this study was to establish pupils’ readiness to learn mathematics at the start of primary school. The study was guided by Ecological Theory by Urie Bronfenbrenner. The theory was selected for this study because it is suitable in understanding school readiness processes and contextual elements related to preparing children for school. Correlation research design was used in the study. The dependent variable was pupils’ readiness to learn mathematics. The independent variables were: Pupils’ school entrance age; gender of pupils; type of pre-primary school pupils attended, and parents’ level of education. The target population was standard one pupils enrolled in primary schools in Kasarani sub-county. Purposive sampling was used to select Kasarani sub-county and standard one pupils. Stratified random sampling was used to select 15% (12) primary schools to be involved in the study. The sample of the study consisted of 15% (123) class one pupils, 248 parents, and 12 class one teachers. Pupils’ readiness to learn mathematics check-list and questionnaire for teachers and parents were used to collect data. The researcher pre-tested the instruments in two primary schools, one public and the other private which were excluded in the final study. Content validity (item analysis) was used to test the validity of the instruments, while Guttman split-half test was used to test the reliability of the instruments which was found to be 0.85. Descriptive statistics involving frequencies, percentages and means were calculated. The inferential statistics used were Chi-square and t-test. Results from data analysis were presented using tables and were organized according to objectives and hypotheses of the study. The results showed that more than 25% of the pupils were not ready to learn mathematics and girls were more ready to learn mathematics than boys. However, the difference in pupils’ readiness to learn mathematics between boys and girls was not significant at p<0.05 level of significance. On the other hand, the relationship between pupils’ family economic class; pupils’ school entrance age; parents’ level of education; type of pre-primary school attended and pupils’ readiness to learn mathematics was significant at 0.05 level. It was recommended that school management should fully comply with education policies by not admitting pupils who are underage. Pre-primary school teachers specifically those in public primary schools should regularly assess children’s readiness to learn mathematics so as to enable them to identify pupils with difficulties in mathematics.
CHAPTER ONE

INTRODUCTION AND CONTEXT OF THE STUDY

1.1 Introduction

This chapter presents background to the study, statement of the problem, purpose of the study, objectives of the study and the research hypotheses. It also focuses on significance of the study, delimitations and limitations of the study, assumptions of the study, theoretical and conceptual frameworks, and operational definition of terms.

1.2 Background to the Study

School readiness has become a growing concern in many countries. (UNICEF, 2012). It is therefore, important to note that before children get ready to learn the subjects taught at school, they need to be ready for school. This justifies the need to look at school readiness before embarking on readiness to learn mathematics. School readiness entails various aspects of the child’s development. School readiness may be defined as the child’s attainment of a certain set of emotional, behavioral and cognitive skills needed to learn, work and function successfully in school (Raforth, Buchenquer, Crissman and Halko, 2004). According to Conn-powers and cross (2011), one current definition is that school readiness means children having the skills to achieve later academic success.
Mathematics education in the early childhood years is key to increasing all children’s school readiness and to closing the achievement gap. Within the mathematics field, preschoolers’ knowledge of numbers and their sequence, predicts not only mathematics learning but also literacy skills (2009, NAEYC). Readiness to learn mathematics refers to the development of basic mathematics abilities or skills to help pupils to gain knowledge of the subject (Baroody & Wilkins, 1999). For children to be considered ready to learn mathematics particularly in class one, they ought first to have been equipped with the conventional math skills at the pre-school level. Tinajero and Loizollon, (2012), report that early mathematics abilities are widely regarded as important for pupils’ readiness to learn the subject. Early mathematics readiness is critically important in early childhood, since it is likely to determine children’s later mathematics achievement as well as their disposition to the subject (Jochi, Jill, & Williams, 2008, Locuniak & Jordan, 2008).

A growing body of research also highlights the importance of school-entry-math skills which have been found to influence later academic achievement in both reading and mathematics (Duncan, Dowesett, Claessens & Magnuson, 2008). The skills also help to provide a launching pad for later numeracy learning in complex skills and concepts. Dickerson (2012), says that the development of advanced mathematics skills requires knowledge of mathematics concepts such as addition, subtraction, multiplication and division. This is in agreement with Duncan, et.al (2008) & Jordan, Glutting and Ramineni (2010) who state that early
numerical skills at kindergarten are predictive of mathematics achievement in later grades.

The major concern in early childhood is whether children are ready to learn school mathematics (Jochi et al. 2008). To support children’s understanding of mathematics, it is necessary to measure mathematics readiness in the early years. To be able to establish children’s school readiness, it is important to carry out investigations on readiness for every subject that children are exposed to at school entrance. There is an urgent need to establish readiness to learn, in subjects such as mathematics in which performance has raised much concern.

The Kenyan primary curriculum has not been left behind, when it comes to the need for equipping children with the basic numeracy skills. One of its core objectives is to develop children’s interest towards the subject, and most importantly to furnish pupils from standard one with the basic essential math skills which can help them to learn more complex skills when it comes to the subsequent classes. However we find that this objective has not been fully met, because of the continued dismal performance of mathematics at the lower and upper primary classes. For instance a national survey by Uwezo, 2012 had revealed that more than two thirds of children at the lower primary classes do not have basic numeracy skills. . The report had further shown that pupils at primary school are not acquiring the basic competencies during the early years as it’s required by the national curricula. According to the Education for All (EFA) Global Monitoring Report, at least 250 million primary-school-age children are
not able to read, write or count well enough to meet minimum learning standards (UNESCO, 2012). This may imply that they might not have been ready school.

In Kenya, low achievement in mathematics at primary school level is a long standing problem. The low scores registered in mathematics since independence is of critical concern (APHRC, 2010). Kimani and Mwita, (2010) report that a large part of bad performance in national examinations is contributed by poor performance in mathematics. In their study, they found out that the pupils mean percentage score in mathematics for four consecutive years (2005-2008) was 46.89% which is below the pass mark of 50%.

Recent studies such as Uwezo (2013) an annual learning assessment survey conducted in East Africa found out that many children are in school but they were not acquiring the basic competencies during the early years of pre-primary school. Uwezo (2012) had also found that there were many children in Kenya going to school but they were not learning. The report further reveals that 20% of pupils in standard seven do not have standard two level numeracy competencies and two out of three pupils in standard three fail basic tests in numeracy for the standard two level. This poor performance can be attributed to the fact that the pupils may be starting school without basic mathematics competencies as expected in the national curriculum. To tackle this poor performance in mathematics, several studies have been done in Kenya. Such studies have attempted to establish factors contributing to pupils’ poor performance in mathematics. For example Kananu (2011) in a study on factors contributing to pupils’ poor performance in
mathematics in Isiolo, found out that inadequate teaching-learning resources and culture were some of the major causes. Another study (Aoko, 2012) that focused on teaching methods found out that teaching methods had an influence on pupils’ performance in mathematics in Nairobi, Gachau, (2013) also found out that learners had a negative attitude towards mathematics. Learning is a spiral process, this implies that numeracy competency at primary school level largely depends on the experiential part that prompt readiness. Given the importance of early acquisition of mathematical skills at school, studies on children’s readiness to learn the subject are imperative.

It is evident from above, that most of the studies conducted to try and address the poor performance in mathematics mainly focused on teaching methods, learning resources and attitudes towards the subject by learners. This means that there is limited research in Kenya which has tried to look at the readiness to learn mathematics as an aspect which could be contributing to poor mathematics performance.

Mathematics being a compulsory subject in both primary and secondary schools in Kenya, and being a pre-requisite to major courses, further research is needed to try and address the poor performance. More importantly, the information available concerning the effect of children’s readiness to learn mathematics at school entry is inconclusive. With research acknowledging the benefits of foundational mathematics skills for the development of later complex mathematical concepts and the aspect of being predictive of other academic areas,
therefore; there is need to carry out more research to try and establish how ready children are to learn mathematics at school-entry and that is what the current study sought to establish.

1.3 Statement of the Problem

Early mathematics readiness is critically important in early childhood, since it is likely to determine children’s later mathematics achievement as well as their disposition to the subject. Children that join standard one should have basic mathematics skills or abilities to help them to learn the subject at this level (Baroody & Wilkins, 1999; Tinajero & Loizollon, 2012). Readiness to learn mathematics facilitates the ability to grasp mathematics concepts as a child proceeds from one class to another in primary school. However, there has been a concern on low achievement in mathematics at primary school level.

A few studies have attempted to research on causes of poor performance in mathematics. The studies have however mainly concentrated on methods that teachers use, availability of resources, learners attitudes towards the subject, and the aspect of readiness to learn mathematics has received little attention. Owing to the importance of readiness to learn the subject, the issue needed to be addressed. Consequently, the current study sought to establish pupils’ readiness to learn mathematics at the start of primary school.
1.4 **Purpose of the Study**

The purpose of the study was to establish standard one pupils’ readiness to learn mathematics at the start of primary school education. The study also explored the influence of pupils’ family economic class, parents’ level of education, pupils’ school entrance age, gender, and type of pre-primary school the pupils had attended on their readiness to learn mathematics.

1.5 **Objectives of the Study**

The objectives of the study were:

i) To establish pupils’ readiness to learn mathematics at the start of primary school in Kasarani sub-county;

ii) To find out if there was a difference in pupils’ readiness to learn mathematics between boys and girls;

iii) To determine the relationship between pupils’ family economic class and their readiness to learn mathematics;

iv) To explore the relationship between pupils’ school entrance age and their readiness to learn mathematics;

v) To find out the relationship between pupils’ readiness to learn mathematics and their parents’ level of education.

vi) To find out the relationship between pupils’ readiness to learn mathematics and type of pre-primary school pupils had attended.
1.6 Research Hypotheses

Ha1: There is a difference in pupils’ readiness to learn mathematics between boys and girls;

Ha2: There is a relationship between pupils’ family economic class and their readiness to learn mathematics;

Ha3: There is a relationship between pupils’ school entrance age and their readiness to learn mathematics;

Ha4: There is a relationship between parents’ level of education and their pupils’ readiness to learn mathematics.

Ha5: There is a relationship between type of pre-primary school pupils had attended and their readiness to learn mathematics.

1.7 Significance of the Study

The study contributes knowledge to the area of pupils’ readiness to learn mathematics and their performance in the same subject. The study also shed light on the factors which strongly correlate with pupils’ readiness to learn mathematics. The findings of the study therefore may be of great benefit to parents, teachers, and Kasarani sub-county.

Findings of this study may help lower primary school teachers to understand how readiness to learn mathematics relates to pupil’s performance in mathematics and thus focus more on readiness to learn mathematics rather than drilling children to pass standard one interview. The findings of the study may also help teachers to
understand the competencies in form of readiness skills which enhance learning of mathematics in standard one.

Pre-primary school teachers may use the findings of the study to better prepare children for primary school in order to have a good start. The findings of this study may also inform Kenya Institute of Curriculum Development (KICD) and the Ministry of Education, Science and Technology on the need to develop and validate a standard tool for assessment of mathematics readiness to be used by schools and future researchers. The Ministry may also use the findings of this study when revising the existing policies to require readiness to learn mathematics as a prerequisite for joining primary one to reduce the number of children starting school when they are not ready to learn mathematics and this in turn may help to improve the performance especially that of mathematics. Findings of this study may also be used to make recommendations to improve pupils’ performance in mathematics in Kasarani sub-county.

1.8  Delimitations and Limitations of the Study

They are described in the following sub-sections.

1.8.1  Delimitations of the Study

The study was delimited to primary schools in Kasarani sub-county. There could be many factors affecting pupils’ performance in mathematics such as methods of teaching, availability of learning resources, and attitudes towards mathematics. However, this study was delimited to pupils’ readiness to learn mathematics. The aspects of school readiness are cognitive, social-emotional, physical and language
development. This study focused on the cognitive aspect (development of basic mathematics abilities or skills) and how it influenced pupils’ performance in mathematics. The study also focused on the factors which influenced pupils’ readiness to learn mathematics including age of the pupils, gender, family economic class, and parents’ level of education.

1.8.2 Limitations of the Study

Due to time constraint the study did not cover all primary schools in the districts in Nairobi County as it might be required for the results to be generalized to all primary schools in the County.

1.9 Assumptions of the Study

This study was based on several assumptions. First, primary school children’s readiness to learn mathematics varies due to diversity of children’s early life experiences. Secondly, pupils are not uniformly prepared to learn mathematics at the start of primary school.

1.10 Theoretical and Conceptual Frameworks

This subsection presents the theoretical and conceptual frameworks.

1.10.1 Theoretical framework

The study was guided by the Ecological Theory by Urie Bronfenbrenner (1970). The theory recognizes that children do not live in isolation but are influenced by the immediate and broader environment in time and space. The theory states that child development occurs within a complex set of nested interconnected systems.
He theorized that there are five environmental factors which influence a child’s growth, development and education. The factors are: Microsystems, Mesosystems, Exosystem, Macro-system, and Chronosystem. Each factor has an effect on the other as they are all intertwined. There are many factors that can affect children’s readiness to learn mathematics beginning from home and extending to the school setting.

Micro-system refers to the immediate environment in which the child lives. The micro system is the most proximal level as it involves the child’s home and environment. It is the primary setting for the child’s development and education in this case enhancing the child’s readiness to learn mathematics (Warren, 2005). This level has the most impact on the child’s school readiness. Parents who put much emphasis on their children’s education make sure they create an environment where school readiness can be achieved and this is later on realized by taking their children to quality pre-primary schools. The child begins to spur at home and takes in what he or she has learned from home to school. School readiness is either enhanced or inhibited at this level. The micro-system is therefore the root that spurs the other functions of the model.

Mesosystem involves interactions or relations between Microsystems. The mesosystem includes experiences at home related to experiences at school. At this level, a child’s school readiness is affected by parental involvement and enhancement of school settings. Parental involvement in children’s education takes a variety of forms. This includes involvement in the home (help with
homework); and involvement in the school (attending school open days and parent-teacher communication). Children whose families are more involved display higher levels of school readiness than those whose families are less involved (Jeynes, 2005). In the enhancement of school settings, children need to be taken to quality pre-primary school settings where their school readiness is enhanced.

Exosystem is the environment in which an individual is not directly involved, which is external to his/her experience but nonetheless affects him/her. The individuals play no role in the construction of experiences, but these experiences have a direct impact on the microsystem the individual is part of. The exosystem is composed of external factors that influence school readiness such as parents’ employment and policy makers who develop education standards for children (Warren, 2005).

The macro-system is greatly influenced by the cultures and society in which a person lives. The belief systems and ideology of the individual’s culture influence the person directly. However the individual does not necessarily have as much freedom in determining his/her surroundings. The cultural beliefs stem from the family and they get extended onto education beliefs which in turn affect school readiness.

Chronosystem reflects the cumulative experiences a person has over the course of his/her lifetime. The Chronosystem affects a child’s school readiness because of what occurs in the change in time, such as parents’ employment and the social
economic situations. It is through time that a child grows to know what he or she would like to become in future.

According to Bronfenbrenner (2006), when all other things are the same in the systems and the interplay between different Microsystems is a compatible one, the child’s development which includes school readiness progresses smoothly. When the relationship between home and school and role expectation are similar, children will be expected to perform well than when role expectation differs.

This theory was selected for this study because it is suitable in understanding school readiness processes and contextual elements related to preparing children for school. The theory helped the researcher to bring to light how the family and school are related and how they affect children’s readiness to learn mathematics.

1.10.2 Conceptual Framework

The literature reviewed discloses some variables that are important in understanding pupils’ readiness to learn mathematics. The variables include family economic class, pupils’ school entrance age, gender of pupils, and parents’ level of education. Figure 1.1
Figure 1.1 Factors Influencing Pupils’ Readiness to Learn Mathematics

**KEY**

- Study Variables
- Non- Study Variables

Figure 1.1 shows the study and non-study variables. The figure also shows the independent and dependent variables of the study. The dependent variable was pupils’ readiness to learn mathematics whereas the independent variables were: Pupils’ family economic class; pupils’ school entrance age; gender of pupils;
parents’ level of education, and type of pre-primary school pupils had attended. It also shows the variables that are likely to influence pupils’ readiness to learn mathematics and which also in turn influences pupils’ performance in mathematics.

1.11 Operational Definition of Terms

Family economic class - It refers to low class, middle class or upper class.

Gender of the pupil - Boys or girls.

Parents’ level of education – The highest level of education parents had attained

Pupils’ readiness to learn mathematics - Development of basic mathematics abilities or skills to help pupils to learn standard one mathematics. Which include number recognition, number value, number writing, counting, addition, and subtraction.

Pre-primary school - Institution for children who are aged 3-5 years before they join standard one in a primary school.

Pupils’ school-entrance age - The pupil’s age by the time he/she joins standard one, in terms of underage, right age and overage.

Readiness - Having the basic knowledge and skills to perform a given set of activities.

Right age – Six years old

Standard one – Class (grade) one which marks the start of formal primary schooling.

Type of Pre-primary School - Public or private pre-primary school.

Overage – Seven years and above.

Underage - Five years and below.
CHAPTER TWO  
LITERATURE REVIEW

2.1 Introduction

The relevant literature reviewed is discussed in this chapter. It covers; readiness to learn mathematics, gender of the pupils and their readiness to learn mathematics, family economic class and pupils’ readiness to learn mathematics, pupils’ school entrance age and readiness to learn mathematics, parents’ level of education and pupils’ readiness to learn mathematics, type of pre-primary school pupils attended and readiness to learn mathematics. The chapter ends with a summary of the reviewed literature.

2.2 Pupils’ Readiness to Learn Mathematics

Pupils’ readiness to learn mathematics refers to the development of basic mathematics abilities or skills to help pupils to learn mathematics (Baroody & Wilkins, 1999). It involves being in possession of various conventional skills namely; rote counting, number recognition, number value, number sequence and basic math operations such as addition, subtraction, division and multiplication. These early mathematics skills are widely regarded as important for pupils’ readiness to learn (Tinajero & Loizollon, 2012).

It is important that as children go through pre-school they get equipped with these skills. The skills are known as foundational math skills and provide a launching pad for later numeracy learning in complex skills and concepts at the subsequent classes. Early exposure to these skills makes children comfortable when it comes
to learning mathematics and in turn helps them to develop a positive attitude towards the subject.

One of the core skills that children begin with is sorting and classifying, followed by rote counting. These activities help children to reason logically and demonstrate divergent thinking. Number recognition follows next where children get to know how numbers look like and later number value and sequence where children begin to understand the amount each number represents. School-entry-math skills influence later academic achievement in both reading and mathematics (Duncan, et.al, 2006).

Children’s mathematical abilities can vary tremendously due to pre-primary school experiences, social economic status and parental/schooling levels and expectations. These factors can impact on young children’s numeracy skills throughout early childhood (Ginsburg, 2003). Children who are lacking basic mathematics skills and abilities have a much different kindergarten experience. If they were not provided with a foundation for learning through pre-school experiences, children become frustrated and cannot keep pace with their classmates (Olsen, 2010).

Various studies have been conducted both locally and internationally on children’s readiness in different aspects. Studies have been done to try and find out how early mathematics knowledge and skills predict later school success and mathematics achievement.
Claessens and Engel (2013) did a study investigating how early mathematics predict later school success. They explored how early mathematics skills relate to achievement from kindergarten through eighth grade, across areas of reading, mathematics, science and grade retention. Results revealed that early math skills predicted reading, mathematics and science achievement as well as grade retention from kindergarten through eighth grade. While the study focused on how early mathematics skills relate to achievement from kindergarten through eighth grade, across areas of reading, mathematics, science and grade retention, the current study sought to establish how ready children were to learn mathematics at standard one.

Locuniak and Jordan (2008) conducted a study on the use of number sense to predict calculation fluency in second grade. In their study they had found out that early numerical competency measured in kindergarten was a significant predictor of calculation fluency at second grade. They also found out that many pupils with weaker early numerical skills in kindergarten continued to demonstrate lower mathematics performance after kindergarten. Considering the importance of early mathematical skills as discussed above, the researcher sought to establish how ready pupils were to learn mathematics at school entry in Kasarani sub-county.

Aunio and Niemvitra (2010), did a longitudinal study where they examined how children’s early numeracy assessed in kindergarten predicts their mathematical performance in first grade. Participants were 212 Finnish children. Results revealed that the acquisitions of counting and relational skills are predictive of the
acquisition of basic arithmetical skills and overall mathematics performance in grade 1.

In USA, Jordan, Kaplan, Ramineni and Locuniak (2009), did a study whereby children’s number competencies over 6 time points, from the beginning of kindergarten to the middle of first grade were examined in relation to their mathematics achievement. The relation between early number competence and mathematics achievement was strong and significant throughout the period. Early number competence predicted mathematics performance in first grade. These findings revealed the importance of early number competence. Dowker (2008) did a study investigating individual differences in different aspects of early number concepts in preschoolers. Participants were eighty children. They were tested on accuracy of counting, subtraction and addition. Results revealed that most children were proficient in counting and others could carry out either one of the tasks and not the other.

Powell, Fuchs, and Hobbs (2012) did a study whereby children’s early numerical competencies were assessed. Findings revealed that children had started school with varied mathematics skills. The study had also revealed that some children understood numbers, while others struggled with basic counting, number recognition, understanding of symbols, quantity discrimination, and concepts of addition and subtraction.

Duncan et al (2006) conducted a study to investigate the links between three key elements of school readiness: School-entry-academic, attention and social
emotional skills and later achievement. Results showed that early math was a more powerful predictor of later reading achievement than early reading was on later math achievement.

Aoko (2012) carried out a study on the influence of teaching methods on pupils’ performance in mathematics in public primary schools in Kasarani division, Nairobi County. The purpose of the study was to determine the influence of teaching methods on pupils’ performance in mathematics. The findings revealed that teachers’ teaching methods influenced pupils’ performance in mathematics. While the study looked at teaching methods and their influence on pupils’ performance in mathematics, the current study investigated pupils’ readiness to learn mathematics and factors influencing it.

Gachau (2013) conducted a study on factors influencing performance in mathematics among learners in integrated public primary schools in Nairobi County. The purpose of the study was to investigate performance in mathematics. The study adopted a descriptive research design and survey methods. The findings of the study revealed that learners had a negative attitude towards mathematics which did not differ across gender. This study was to investigate pupils’ readiness to learn mathematics.

Kananu (2011) did a study on factors contributing to pupils’ poor performance in mathematics at Kenya Certificate of Primary Education (KCPE) in public primary schools in Isiolo district. The purpose of the study was to identify factors influencing students’ poor performance in selected schools. The research
findings revealed that there were inadequate physical facilities and learning resources. They also found out that their culture did not allow counting especially of livestock for fear of the animals being bewitched. This denied children an opportunity to learn basic mathematics skills for counting, addition and subtractions. While Kananu focused on lack of physical facilities and learning resources as factors contributing to poor mathematics performance, the current researcher focused on pupils’ readiness to learn mathematics as an aspect that could contribute to pupils’ poor performance in mathematics.

2.3 Gender of Pupils and Readiness to Learn Mathematics

According to Boivin and Lemelin (2007), girls start school better prepared than boys. A study conducted by Levine, Huttenlocher, Tylor, and Langrock (1999) on early sex differences in spatial skill found that boys possess better spatial skills than girls at age four. This study explored the influence of pupils’ gender on their readiness to learn mathematics.

Linn (2010) carried out a study on gender and mathematics performance and found that males and females perform in the same way in mathematics. The current study investigated whether there were differences in pupils’ readiness to learn mathematics between boys and girls at standard one entry.

Cvencek, Meltzoff and Greenwald (2011) did a study on math-gender stereotypes in elementary school children in America. A total of 247 American children between 6-10 years of age completed implicit association tests and explicit self-report measures assessing the association. Two findings emerged. First, as early
as second grade, the children demonstrated the American cultural stereotype that math is for boys. Secondly, elementary school boys identified with math strongly than did girls. The findings suggest that the math-gender stereotype is acquired early and influences emerging math self-concepts prior to ages at which there are actual differences in math achievement. Whereas the study focused on stereotypes and mathematics, the current study intended to find out if there existed gender differences in pupils’ readiness to learn mathematics.

2.4 Family Economic Class and Pupils’ Readiness to Learn Mathematics

Family environment is very important in shaping children’s early cognitive development. Some family factors which influence children’s readiness to learn mathematics include; high family economic risk whereby poor readiness to learn mathematics is often associated with poverty.

Several studies have also concurred with the research findings on the effects of pupils’ family class and their readiness to learn mathematics. Brooks-Gunn, Duncan and Maritato (1997) reports that economically disadvantaged families are more likely to provide children with limited educational resources, less stimulation and less optimal learning environments (Shonkoff and Phillips, 2000). These factors have many impacts on children’s development and educational outcomes (Engle and Black, 2008). This is because pupils who come from low social economic status backgrounds enter school far behind their peers who come from higher social economic status backgrounds and understand less
mathematical topics including but not limited to counting and number relations. (Jordan et al., 2007).

The other family factors are stable family structures and enriched home environment (Raforth, Buchenquer, Crissman, and Halko, 2004). The readiness of families to support children’s entry into primary one is an important component to school readiness (Applied Survey, 2007). This study chose to investigate pupils’ family economic class as an important variable that could be influencing pupils’ readiness to learn mathematics in Kasarani sub-county.

Olsen (2010) observes that the readiness to learn is built through experiences prior to kindergarten and a child’s family is important in shaping those experiences. The readiness levels also vary according to socioeconomic setting, and children from disadvantaged settings have more developmental problems than those from privileged socioeconomic settings (Boivin and Lemelin, 2007). Ramey & Ramey (2004) remark that children from economically poor and undereducated families are at risk of lack of school readiness due to less knowledge and skills. This study investigated how pupils’ family class was related to their readiness to learn mathematics.

In Kenya, a study conducted by Ngaruiya (2004) found that children from low Socio-economic Status (SES) neighborhoods had lower school readiness scores compared with children from middle and high SES neighborhoods. Based on the previous studies findings that found family income as the most powerful predictor
of students eventual academic outcomes in mathematics achievement, this study considered family class as a variable to investigate in association with children’s readiness to learn mathematics. The current study was to determine whether pupils’ family class and readiness to learn mathematics were correlated.

2.5 Pupils’ School Entrance Age and Readiness to Learn Mathematics

According to the ECD policy 2006 and Education Act 2013 (MOE, 2013), pupils are to be admitted to standard one when they are six years old. According to Lincove & Painter (2008), the appropriate age for children to begin school is an issue of debate for educators, administrators and parents. This is because young pupils may not be able to compete with older classmates; and be able to meet rigorous academic standards associated with school. This study examined how pupils’ school entrance age influenced their readiness to learn mathematics.

Perry (2010) conducted a study on age at kindergarten and its relationship to early academic achievement. The study was to determine whether age at kindergarten entrance had any effect on future language arts and literacy. Results revealed that younger students were weaker in literacy and language arts achievement in first and second grade. The study also revealed that younger entrants to kindergarten were more likely to be classified eligible for special education. Whereas the study looked at age and its relationship to early academic achievement it did not focus on how age influenced readiness to learn mathematics which the current research did.
Christoffersen (2009) did a study to examine the correlations among age at kindergarten entry and later academic achievement and found that age at entry had little effect on future academic performance or social skills development. This study investigated the relationship between pupils’ school entrance age and pupils’ readiness to learn mathematics. Huey-Huey-Ling, Lawrence, & Gorell (2003) did a study on kindergarten teachers’ views of children’s readiness for school and found that readiness expectations were influenced by their gender, age and the geographic region.

A study conducted by Mwaura and Nyamwaya (1996) on transition of children from pre-school to primary school, found that there was a high dropout rate, repetition and absenteeism in lower primary school classes. There was also low degree of linkage and interaction between pre-primary and primary school. The study also found that children were entering school earlier or later than the legal age and that 50% of children in pre-schools were older than expected, while 16% of the children enter school at earlier age than the official school entry age of six years. The current study explored the influence of pupils’ school entrance age on pupils’ readiness to learn mathematics.

2.6 Parents’ Level of Education and Pupils’ Readiness to Learn mathematics

Parents serve as role models and guides in encouraging children to pursue learning. The educational attainment of parents serve as an indicator of attitudes
and values which parents use to create a home environment that influences children’s readiness to learn mathematics.

Onzima (2011) did a study on parents’ socioeconomic status and pupils’ educational attainment in selected primary schools in Malaba town council, Uganda. The results showed that there was a positive correlation between parents’ level of education and pupils’ performance in school. This study investigated the relationship between parents’ level of education and how it influences pupils’ readiness to learn mathematics.

Williams (2002) investigated the relationship between home environment and kindergarten readiness. The variables of the study included family income and structure, parents’ education, availability of home learning tools, and participation in literacy activities. The sample of the study consisted of 338 children and parents. Results indicated that family income and parents level of education influenced children’s kindergarten readiness. While the study focused on the relationship between home environment and kindergarten readiness, this study focused on parents’ level of education and pupils’ readiness to learn mathematics.

2.7 Type of Pre-primary School Pupils Attended and Readiness to Learn Mathematics

Ngaruiya (2004) did a study on preschool education and school readiness. The purpose of the study was to examine the impact of various pre-school models in promoting school readiness and effective transition from pre-primary school to primary school. The population of the study was pre-school teachers and their
children. Results from data analysis revealed that pre-school children who had attended private schools outperformed their peers from public pre-schools. Previous studies have shown the importance of children attending pre-primary schools; however, evidence on how pre-primary school attendance relates to children’s mathematics readiness was limited. Thus, the current study sought to investigate the relationship between type of pre-primary school pupils attended and readiness to learn mathematics.

2.8 Summary of Reviewed Literature

Early mathematics readiness is critically important in early childhood, since it is likely to determine children’s later mathematics achievement as well as their disposition towards the subject. Early mathematics abilities are widely regarded as important for pupils’ readiness to learn mathematics. School-entry-math skills influence later academic achievement in both reading and mathematics.

The studies reviewed have shown that entering class one ready to learn has become a growing concern in many countries and that many children are ill-prepared for formal education. Readiness to learn mathematics refers to the development of basic mathematics abilities or skills to help pupils to learn standard one mathematics. The readiness skills include: Sorting and classifying, rote counting, number recognition, number sequence, number value and recognition of shapes.
The readiness of families to support their children’s entry into standard one is an important component of readiness to learn mathematics. Readiness to learn mathematics requires children to have mastery of basic numerical concepts that can prepare them to learn more complex mathematics. Consequently, to support children’s understanding of mathematics, it is necessary to measure the children’s readiness to learn the subject in the early years.

The literature reviewed from Kenya, had shown that there has been low achievement in mathematics at primary school level for a lengthy period of time. A few studies have attempted to research on causes of this poor performance in mathematics. The studies have mainly concentrated on methods that teachers use, availability of resources, learners attitudes towards the subject, and not on readiness to learn mathematics (Aoko, 2012; Gachau, 2013). Owing to the importance of readiness to learn the subject, the problem had not been adequately addressed. The literature reviewed did not also indicate how children’s readiness to learn mathematics was related to pupils’ family class, school entrance age, and gender of the pupils. The methodology used in this study is described in the following chapter.
CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The chapter presents the research methodology that was used in this study. It deals with the research design, research variables, location of the study, target population, sampling technique and sample size, and research instruments. Pilot study, data collection procedures, data analysis, and logistical and ethical considerations are also described.

3.2 Research Design

This study employed a correlation research design. According to Vanderstoep and Johnson (2009) a correlation design is a non-experimental technique which involves the measurement of variables and there is no manipulation of variables. The design is used to measure the extent to which variables are related. The design was suitable for this study because the researcher was to find out the relationships between pupils’ readiness to learn mathematics and pupils’ family class, school entrance age, parents’ level of education, and type of pre-primary school the pupils’ had attended.

3.3 Variables

The dependent and independent variables of the study are described in the following subsections.
3.3.1 Dependent Variable

The dependent variable was pupils’ readiness to learn mathematics. It was measured using the pupils’ readiness to learn mathematics checklist. The checklist was used to assess the pupils’ development of basic mathematics abilities. The skills tested included; classification, number recognition, number value, number sequence, time concept skills, number writing, addition, subtraction, and money value. Pupils’ readiness to learn mathematics was to be determined by the number of times pupils were able to do the given activities correctly.

3.3.2 Independent Variables

The independent variables were:

(i) Pupils’ school entrance age. It referred to the age of the pupils when they are joining standard one. It was obtained from their birth certificates or well baby clinic cards. It was measured by indicating whether the pupil was under age (below six years), right age (six years) and overage (seven or more years).

(ii) Gender of the pupil. It referred to boys or girls and was measured by indicating whether the pupil was a girl or boy.

(iii) Parents’ Level of education. It was measured by establishing highest level of education attained by parents and it ranged from: No Primary Education Certificate, Primary Education Certificate, Secondary Education Certificate, Diploma, Bachelors Degree, Masters Degree and PhD Degree.

(iv) Pupil’s Family Economic Class. It was measured using the pupil’s family’ monthly approximate house expenditure ranging from: Kshs. 23, 669 and below
(low class), Kshs. 23 670- 199, 999 (Middle class), More than Kshs. 200, 000 (upper class). The house monthly expenditure range is according to Kenya Bureau of Standards (2013). Parents were to select their monthly approximate house expenditure.

(v) **Type of Pre-primary School attended.** It was measured by indicating the last pre-primary school preceding class one the pupil attended. That is public or private pre-primary school.

### 3.4 Location of the Study

The study was conducted in Kasarani sub-county, Nairobi County. In Nairobi County there are eight districts. Kasarani sub-county was selected because public primary schools in the district performed poorly in mathematics when compared with other public primary schools in other sub-counties in Nairobi (Aoko, 2012). Another reason for selecting Kasarani sub-county was because pupils are drawn from different family socioeconomic environments

### 3.5 Target Population

The target population was standard one pupils enrolled both in public and private primary schools in Kasarani sub-county. There were 79 primary schools in the district, consisting of 25 public and 54 private primary schools. The religious organizations managed schools were categorized as private. The sampled schools had 820 pupils of which I sampled 15% (123) of the pupils to participate in the study.
3.6 Sampling Technique and Sample Size

The sampling technique and sample size of the study are described as follows;

3.6.1 Sampling Techniques

(i) Selection of Location and Standard One

Purposive sampling was used to select Kasarani sub-county. This is because the locality has a heterogeneous population economically. The area carries schools in the informal settlements and also in the well of estates. This provided the researcher with participants (pupils) from various social economic backgrounds. Another reason for selecting the area was due to the fact that, Kasarani sub-county when compared to other sub-counties in Nairobi county was found to perform poorly in mathematics (Aoko, 2012).

Standard one pupils’ were also purposively sampled. This is because standard one marks the start of formal primary schooling. Another reason was that the mathematical skills children have at that time, become the stepping stone for learning complex mathematics in the subsequent classes.

(ii) Selection of schools and pupils

Stratified random sampling was used to select 12 primary schools in the district to be involved in the study. The sampling method was appropriate because the population was stratified (public and private primary schools, boys and girls) and it ensured that every stratum in the population was represented in the sample. According to Anderson (1988) 10-20% of a study population is adequate for
descriptive studies. I chose to use 15% of the total population because that percentage was representative enough for the study given the limited time to conduct the study. To fulfill the purpose of the study, six of the primary schools were those in low socioeconomic environments, while the remaining six primary schools were from high socioeconomic environments. From each school, the researcher used stratified random sampling to select 15 pupils enrolled in standard one.

(iii) Selection of Parents
Parents of the sampled pupils were automatically sampled. This means that for each pupil selected to participate in the study, his or her parents were included as participants in the study due to the variables (parents’ level of education, and family monthly income). The parent who was available (either father or mother) filled the questionnaire for parents.

(iv) Inclusion and Exclusion Criteria
It refers to a set of standards that were used to determine whether a subject was to be allowed to participate in the study. In this study the inclusion and exclusion criteria for pupils were type of school, gender of pupils, and standard one.

3.6.2 Sample Size
The sample size used in this study is presented in Table 3.1.
Table 3.1 Sampling Frame

<table>
<thead>
<tr>
<th>Type of schools</th>
<th>Number of schools</th>
<th>Sample size of Schools (15%)</th>
<th>Sample size of Pupils (15%)</th>
<th>Sample size of Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>54</td>
<td>8</td>
<td>79</td>
<td>158</td>
</tr>
<tr>
<td>Public</td>
<td>25</td>
<td>4</td>
<td>44</td>
<td>88</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>12</td>
<td>123</td>
<td>246</td>
</tr>
</tbody>
</table>

The sample of the study consisted of twelve primary schools, eight private and four public primary schools. The sample of pupils was also 15% of standard one pupils in the primary schools sampled in both private and public primary schools. In the schools with more than one stream, one stream was randomly sampled. The sample of parents consisted of the total number of parents of the sampled pupils which totaled to 246 parents.

3.7 Research Instruments

The instruments used to collect data were pupils’ readiness to learn mathematics checklist, birth certificates and questionnaire for parents.

3.7.1 Pupils’ Readiness to Learn Mathematics Check-List

The check-list was used to assess development of basic mathematics skills in the pupils. It consisted of two sections: Section ‘A’ collected data on pupils’ background information. Section B consisted of items that measured development of basic mathematics skills including classification, number recognition, number value, number sequence, time concept, number writing and addition, subtraction, and money value.
Scoring Of the Check-List

The check-list was scored before analysis as follows:

Section A: Background Information.
It was analyzed using descriptive methods (Frequencies and Percentages).

Section B: Mathematics Abilities.
It was used to determine pupils’ readiness to learn mathematics. It consisted of 10 basic mathematics readiness activities. As the pupils were performing the activities the researcher selected the appropriate response on the checklist: ‘Yes’ for skill developed or ‘No’ for skill not developed. The items were then quantified as follows: Yes = 1, No=0. There were a total of 10 items on the checklist, each worth 1 point and out of the 10 points, a pupil’s readiness to learn mathematics was determined by the number of times he/she had scored ‘Yes’. The pupils who scored six points or more out of ten on the checklist were considered ready to learn mathematics, while those who had scored five or less points were considered not ready to learn mathematics. Simple arithmetic mean was then used to calculate the overall pupils’ readiness to learn mathematics. Whereby the overall mean was obtained by adding up the scores and dividing them with the total number of pupils.

3.7.2 Questionnaire for Parents
The questionnaire was used to collect data on the highest level of education attained by parents of the pupils and their approximate family monthly expenditure. The questionnaire was analyzed using frequencies and percentages.
3.8 Pilot Study

The researcher tested the pupils’ readiness to learn mathematics check-list and questionnaire for parents with pupils and parents in two primary schools, one public and the other private which were excluded in the final study. Piloting helped to detect ambiguous questions which would have been interpreted differently by the respondents. Teachers’ and parents’ comments and suggestions helped to improve the instruments by removing ambiguous items.

3.8.1 Validity

Content validity was used to ensure that the instruments are well founded. Content validity is a non-statistical method used to authenticate the content employed in a research instrument. It refers to how accurately an instrument measures what it is supposed to measure.

Content validity of the instruments was established in a variety of ways including matching items’ content to Kenya Institute of Education (KIE) syllabus, and seeking experts’ opinion (my supervisors). It was also achieved by ensuring that items in the instruments covered all the important areas, variables, and objectives of the study using item analysis.

3.8.2 Reliability

Internal consistency reliability method was used to test the reliability of the instrument. The method was used to assess the consistency of the results across
items. Guttman Split-Half test was used to calculate the reliability coefficient in order to determine the correlation between the total score for the two halves. The acceptable reliability coefficient was 0.7. The results have been presented in Table 3.2.

Table 3.2: Reliability Test Results

<table>
<thead>
<tr>
<th>Reliability Statistics</th>
<th>Part 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
<td>Value</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Part 2</td>
<td>Value</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total N of Items</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Spearman-Brown Coefficient</td>
<td>Equal Length</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unequal Length</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>Guttman Split-Half Coefficient</td>
<td></td>
<td>.85</td>
<td></td>
</tr>
</tbody>
</table>

a. The items were: Classifies objects; rote counts 1-50; recognized number symbols; able to march numerals; able to say which number is bigger.
b. The items were: Able to recognize time; able to write numerals dictated; able to put together objects; able to take away; able to give names of Kenya currency.

Table 3.2 shows that the Split-half coefficient was 0.85 which is above the acceptable reliability coefficient of 0.7. The results imply that the instrument used was reliable.

3.9 Data Collection Procedures

The researcher after obtaining permission from the District Education Officer’s office visited the sampled schools and introduced herself to the head teachers. The researcher explained purpose of the research and requested the head teacher to
allow her to administer the pupils’ readiness to learn mathematics check-list to pupils and questionnaire to parents’ of the sampled respondents. Data was collected in two stages as follows:

**Stage One: Administration of Pupils’ Mathematics Abilities Check-list**

The data on pupils’ mathematics abilities was obtained from standard one pupils using a mathematics abilities check-list in their respective schools. The check-list was used to measure pupils’ basic mathematics knowledge and skills which are components of readiness to learn mathematics. Pupils’ mathematics abilities were determined by the researcher after giving the pupils basic mathematics readiness activities to do. If a pupil was able to do the activity, the researcher ticked ‘Yes’ and if not able the response was ‘No’. A pupil’s overall readiness to learn mathematics was determined by counting the number of times the pupil had successfully performed the activities.

**Stage Two: Administration of the Questionnaire to Parents**

The questionnaire was administered to parents in the sampled schools during parents’ day and open day. The parents who did not attend were invited to the school to fill the questionnaire with the help of the head teachers. The questionnaire was used to collect data on parents’ family monthly expenditure and level of education. The parents were required to select the approximate range of their family monthly expenditure which ranged from Kshs. 23, 669 and below for Low class; Kshs. 23, 670 – 199,999 for Middle class; and Kshs. 200,000 or more for Upper class family. The parents were also required to select the highest level
of education attained by the father or mother of the pupil which ranged from no primary education certificate to post-graduate degree. The researcher sought to establish how the variables influence pupils’ readiness to learn mathematics.

### 3.10 Data Analysis

Data was sorted out, cleaned, coded and then entered into the Statistical Package for Social Sciences (SPSS) computer programme for analysis. The data was then analyzed using descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages and means were calculated. The inferential statistics used were for H0₁ t-test, while H₀₂-H₀₅ were tested using Chi-square. Results from data analysis were presented using tables and figures and was organized according to the objectives and hypotheses of the study.

#### 3.10.1 Null Hypotheses

The null hypotheses tested were:

H₀₁: There is no significant difference in pupils’ readiness to learn mathematics between boys and girls.

H₀₂: There is no significant relationship between pupils’ family economic class and their readiness to learn mathematics.

H₀₃: There is no significant relationship between pupils’ entrance age and their readiness to learn mathematics.

H₀₄: There is no significant relationship between parents’ level of education and their pupils’ readiness to learn mathematics.
H05: There is no significant relationship between type of pre-primary school attended and pupils’ readiness to learn mathematics.

3.11 Logistical and Ethical Considerations

3.11.1 Logistical Considerations

First the researcher got an introductory letter from Kenyatta University Graduate School and clearance from Kenyatta University Ethics and Review Committee. The researcher then proceeded to the Council of Science and Research to obtain a research permit. Permission to visit the schools was sought from the County Director of Education, District Education Officer and the head teachers of the sampled primary schools before meeting the respondents.

3.11.2 Ethical Considerations

(i) Care and Protection of Research Participants

To protect the participants’ confidentiality, they were identified using codes instead of names. Teachers were not required to write names of pupils and those of parents. The information obtained from the respondents was also kept confidential and was not used against the respondents but only for research purpose.

(ii) Informed Consent

The researcher also sought the respondents’ informed consent before administering the instruments. Consent for standard one pupils to participate in the study was obtained from their parents because they were under age.
(iii) Community Considerations

In this study the community referred to pupils, teachers, parents, and schools in Nairobi County. The findings of the study may be of great benefit to pupils, parents, teachers, and schools in Nairobi County. Findings of this study also may be used to make recommendations to improve pupils’ performance in mathematics in the County (community).
CHAPTER FOUR
FINDINGS, INTERPRETATIONS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the research findings, their interpretations and discussions. The demographic results are presented first and then followed by descriptive and inferential results which are organized and presented according to the study objectives and hypotheses.

The study sought to achieve the following objectives:

- To establish pupils’ readiness to learn mathematics at the start of primary school in Kasarani sub-county;
- To find out if there was a difference in pupils’ readiness to learn mathematics between boys and girls;
- To determine the relationship between pupils’ family economic class and their readiness to learn mathematics;
- To explore the relationship between pupils’ school entrance age and their readiness to learn mathematics;
- To find out the relationship between pupils’ readiness to learn mathematics and their parents’ level of education.
- To find out the relationship between pupils’ readiness to learn mathematics and type of pre-primary school pupils attended.
4.2 Demographic Information

The demographic information of the pupils focused on gender and age. From the parents’ sample the focus was on level of education and family class. The demographics are presented and discussed under the following sub-section:

4.2.1 Pupils Gender and Age

The gender and age of pupils who participated in the study were determined and the results are presented in Table 4.1 below.

Table 4.1: Pupils’ Gender and Age

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pupils Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>45.5%</td>
</tr>
<tr>
<td>Male</td>
<td>67</td>
<td>54.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>123</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Pupils Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right age (6 years)</td>
<td>71</td>
<td>57.7%</td>
</tr>
<tr>
<td>Under age (below 6 years)</td>
<td>24</td>
<td>19.5%</td>
</tr>
<tr>
<td>Over age (7 years and above)</td>
<td>28</td>
<td>22.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>123</td>
<td>100%</td>
</tr>
</tbody>
</table>

As shown in Table 4.1 out of the 123 pupils who participated in the study 56 pupils were females, while 67 were male. The results imply that there were more boys who participated in the study than girls. The age of the pupils was also ascertained from their birth certificates and then categorized as under age if they were below six years; right age if they were six years; and overage if they were
seven or more years. As shown from the table, more than 15% of the pupils who participated in the study were underage.

4.2.1.1 Type of Pre-Primary School Pupils Attended

The researcher categorized the pre-primary schools as either private or public. Table 4.2 presents the number of pupils according to the two categories.

Table 4.2: Type of Pre-Primary School Attended by Pupils

<table>
<thead>
<tr>
<th>School</th>
<th>Number of Pupils</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>75</td>
<td>61%</td>
</tr>
<tr>
<td>public</td>
<td>48</td>
<td>39%</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>100%</td>
</tr>
</tbody>
</table>

The number of private pre-primary schools was higher than the public pre-primary schools. Similarly the population of pupils who had attended private pre-primary schools was high (61%).

4.2.1.2 Pupils’ Family Economic Class

Pupils’ family class was determined using family monthly house expenditure estimates. According to Kenya Bureau of Statistics (2013) low class family monthly expenditure was stipulated as between Kshs. 23, 669 and below; middle class family monthly expenditure Kshs. 23 670 and 199, 999; while upper class family monthly expenditure was estimated at Kshs. 200, 000 and above. To ascertain the pupils ‘family economic class parents were required to indicate their approximate family monthly expenditure by selecting the appropriate expenditure range and the results have been presented in Table 4.3.
Table 4.3: Pupils’ Family Economic Class

<table>
<thead>
<tr>
<th>Monthly House Expenditure</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Class (Monthly expenditure Kshs. 23, 669 and below)</td>
<td>75</td>
<td>61</td>
</tr>
<tr>
<td>Middle Class (Monthly expenditure Kshs. 23, 670 - 199,999)</td>
<td>47</td>
<td>38.2</td>
</tr>
<tr>
<td>Upper Class (Monthly expenditure more than 200, 000).</td>
<td>1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

The results show that out of 123 pupils who participated in the study, 75 pupils were from low class economic families, 47 pupils from middle economic class families; while only one pupil was from upper economic class family. The results imply that the majority of the pupils hailed from low and middle economic class families.

4.2.1.3 Parents’ Level of Education

The highest level of education attained by parents of the pupils was established and the results have been presented in Table 4.4.
Table 4.4: Parents’ Highest Level of Education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Mothers</th>
<th>Fathers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>No primary Education Certificate</td>
<td>4</td>
<td>3.3</td>
</tr>
<tr>
<td>Primary Education Certificate</td>
<td>35</td>
<td>28.5</td>
</tr>
<tr>
<td>Secondary Education Certificate</td>
<td>30</td>
<td>24.4</td>
</tr>
<tr>
<td>Diploma</td>
<td>30</td>
<td>24.4</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>21</td>
<td>17.0</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>3</td>
<td>2.4</td>
</tr>
</tbody>
</table>

From Table 4.4 it is evident that the highest level of education attained by majority of the mothers was primary certificate (28.5%), while majority of the fathers had secondary level of education.

4.3 Pupils’ Readiness to Learn Mathematics

The study sought to establish pupils’ readiness to learn mathematics at the start of primary school. The objective was stated as:

Objective 1: To establish pupils’ readiness to learn mathematics at the start of primary school

To achieve this objective, the researcher had first to assess the pupils’ basic mathematics abilities. This was done by use of a readiness to learn mathematics check-list. The items on the checklist included ability to classify, rote count, number recognize number sequence and number value. Other aspects looked at
simple number operations in addition as well as subtraction and recognition of the Kenyan currency (coins). The researcher asked the pupils to do ten basic mathematics readiness activities. The pupils’ development of various mathematics abilities was accordingly assessed and the results were as presented in Table 4.5 below.

**Table 4.5: Pupils Development of Basic Mathematics Abilities**

<table>
<thead>
<tr>
<th>Abilities (skills)</th>
<th>Those with various abilities</th>
<th>Those without the abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Classify objects</td>
<td>103</td>
<td>83.7</td>
</tr>
<tr>
<td>Rote count 1-50</td>
<td>92</td>
<td>74.8</td>
</tr>
<tr>
<td>Recognize number symbols</td>
<td>97</td>
<td>78.9</td>
</tr>
<tr>
<td>match numerals</td>
<td>91</td>
<td>74</td>
</tr>
<tr>
<td>Say which number is bigger</td>
<td>85</td>
<td>69.1</td>
</tr>
<tr>
<td>Recognize daily routine</td>
<td>71</td>
<td>57.7</td>
</tr>
<tr>
<td>Write numerals dictated</td>
<td>84</td>
<td>68.3</td>
</tr>
<tr>
<td>Put together objects</td>
<td>105</td>
<td>85.4</td>
</tr>
<tr>
<td>Take away</td>
<td>86</td>
<td>69.9</td>
</tr>
<tr>
<td>Give names of Kenya currency</td>
<td>65</td>
<td>52.8</td>
</tr>
</tbody>
</table>

As presented in Table 4.5 on pupils’ development of mathematics abilities, the results show that majority of the pupils had acquired basic mathematics skills to enable them to learn mathematics. The results also revealed that some pupils were poor in time recognition and money value, specifically those from low economic class families.
The current study findings are consistent with those reported by Powell, Fuchs, and Hobbs (2012) which revealed that children had started school with varied mathematics skills. The study had also revealed that some children understood numbers, while others struggled with basic counting, number recognition, understanding of symbols, quantity discrimination, and concepts of addition and subtraction. The results also concur with those of a study conducted in USA by Jordan, et al. (2009) which had shown that some children at the onset of schooling came to school with an established set of early numerical competencies while others demonstrated much lower performance on early numerical tasks.

The findings of this study are also consistent with those reported by Aunio & Niemvirta (2010), whose results demonstrated that the acquisition of counting and relational skills was predictive of the acquisition of basic arithmetical skills. The current study findings also are similar with those reported by Dowker (2008). The study investigated individual differences in different aspects of early number concepts in preschoolers and found that there were marked individual differences for most tasks and most children were reasonably proficient in counting.

The current study findings are inconsistent with those reported by Clark, Pritchard, and Woodward (2010), in the study that sought to investigate children’s preschool executive functioning abilities that predict early mathematics achievement. The results had shown that early measures of executive functioning were useful in identifying children who may experience difficulties learning mathematics skills and concepts. The current study findings are similarly
inconsistent with the study findings of Lefvere, Clarke & Stinger (2002) who conducted a study on the influence of language and parental involvement on the development of counting skills among the French and English speaking Canadian children. Results had shown that French speaking pre-schoolers performed more poorly on the rote counting and number recognition tasks than English speaking pre-schoolers. Results had also revealed that both groups did not differ on counting objects. The reasons for this inconsistency could be attributed to the fact that the study was conducted in a different setting with children speaking different languages.

After the assessment of pupils’ mathematics abilities, the researcher proceeded to determine the number of pupils’ ready to learn mathematics. This was achieved in two stages; in the first stage, pupil’s readiness to learn mathematics was measured through counting the number of activities each child performed correctly. In stage two, those who had scored six points or more out of ten on the readiness to learn checklist were considered ready to learn mathematics. Results have been presented in Table 4.6.
Table 4.6: Number of Pupils Ready to Learn Mathematics

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready to Learn</td>
<td>89</td>
<td>72.4</td>
</tr>
<tr>
<td>mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not ready to learn</td>
<td>34</td>
<td>27.6</td>
</tr>
<tr>
<td>mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>100</td>
</tr>
</tbody>
</table>

As shown on Table 4.6 more than 25% of the pupils were not ready to learn mathematics as they entered standard one. This study finding confirms results from other studies such as the Uwezo (2013) learning assessment survey which had found out that many children in East Africa though they are in school, they were not acquiring the foundational skills of literacy and numeracy. The survey had further found that less than a third of the children enrolled in grade three had basic grade two level numeracy skills.

The current study findings are also consistent with another study done by the Uwezo (2012) in Kenya, which had found that eleven out of a hundred children in standard eight were not able to do simple class two mathematics. From the above results, it can be concluded that lower levels of readiness to learn mathematics at school entry, could be one of the major factors contributing to pupils poor performance in the subsequent classes. The existing literature further supports this whereby general mathematics achievement measured around kindergarten has been found to be highly predictive of subsequent mathematics achievement around third grade and eight grade (Duncan, 2007 & Jordan, 2009).
This study finding is similar to the study done by Donna (1999) that focused on the effects of pre-kindergarten and kindergarten readiness and achievement in mathematics. The intent of the study was to determine if attendance of pre-kindergarten had a positive effect on kindergarten mathematics readiness skills. Results had shown that attending pre-school had a positive effect on kindergarten mathematics readiness skills.

The current study findings also correspond with those of a study done in Bangladesh, by Aboud and Hassan (2011). Whose results revealed that pre-primary school graduates outperformed their peers with no pre-primary attendance in grade 1 and 2 in speaking, writing, oral and written mathematics. The current study similarly found that children who had attended pre-primary did better in the mathematics readiness activities.

Zhang (2013) did a study on pre-school experience and academic achievement in China. The study examined the influence of pre-school learning experiences on children’s school readiness and academic achievement. Participants were 190 children from southwest China and their teachers. Results indicated that children with some form of pre-school experience outperformed those with none thus, agreeing with this current study findings.

The current research findings concur with that of Kashkary & Robinson, (2003) who conducted a study to determine how kindergarten attendance affects pupils' mathematics achievement of primary school in Makah, Saudi Arabia. The result of the study indicated that pupils who had attended kindergarten significantly out-
performed their peers who had not attended kindergarten and was a strong indication that attending kindergarten has been shown to be effective in supporting the mathematical education of primary age children.

The current study findings are inconsistent with those of Jochi, (2008) whose findings had revealed that children without pre-kindergarten experience outperformed children with kindergarten experiences.

4.4 Pupils’ Readiness to Learn Mathematics and Pupils’ Gender

The researcher also sought to ascertain whether there were gender differences in pupils’ readiness to learn mathematics. The objective to be achieved was:

*Objective 2: To find out if there was a difference in pupils’ readiness to learn mathematics between boys and girls.*

To achieve the objective, pupils’ readiness to learn mathematics in the different categories of mathematics abilities was assessed. The pupils were asked to rote-count, recognize numbers classify objects, write number symbols and recognize Kenyan currency in form of coins. This was to shed more light on pupils’ readiness to learn mathematics by gender. The results are presented in Table 4.7.
Table 4.7 Pupils Mathematics Abilities by Gender

<table>
<thead>
<tr>
<th>Abilities (skills)</th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Able</td>
<td>%</td>
<td>Not able</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>f</td>
</tr>
<tr>
<td>Classifying objects</td>
<td>55</td>
<td>82.1</td>
<td>12</td>
<td>17.9</td>
</tr>
<tr>
<td>Rote counting 1-50</td>
<td>45</td>
<td>67.2</td>
<td>22</td>
<td>32.8</td>
</tr>
<tr>
<td>Recognizing number symbols</td>
<td>48</td>
<td>71.6</td>
<td>19</td>
<td>28.4</td>
</tr>
<tr>
<td>Matching numerals</td>
<td>47</td>
<td>70.1</td>
<td>20</td>
<td>29.9</td>
</tr>
<tr>
<td>Comparing number values</td>
<td>43</td>
<td>64.2</td>
<td>24</td>
<td>35.8</td>
</tr>
<tr>
<td>Narrating daily routine</td>
<td>40</td>
<td>59.7</td>
<td>27</td>
<td>40.3</td>
</tr>
<tr>
<td>Writing numerals dictated</td>
<td>42</td>
<td>62.7</td>
<td>25</td>
<td>37.3</td>
</tr>
<tr>
<td>Putting objects together</td>
<td>58</td>
<td>76.8</td>
<td>9</td>
<td>23.2</td>
</tr>
<tr>
<td>Taking away</td>
<td>43</td>
<td>64.2</td>
<td>24</td>
<td>35.8</td>
</tr>
<tr>
<td>Recognizing the denominations of Kenyan currency</td>
<td>32</td>
<td>47.8</td>
<td>35</td>
<td>52.2</td>
</tr>
</tbody>
</table>

According to the results, girls were better than boys in all numerical abilities except in recognizing daily routine.

To find out whether there was a difference in pupils’ readiness to learn mathematics between boys and girls, overall mean scores in pupils’ readiness to learn mathematics were calculated using Simple Arithmetic Mean which was done by adding up scores for all pupils and then divided by the total number of pupils. Table 4.8 presents the results.
Table 4.8: Mean Scores of Pupils’ Readiness to Learn Mathematics by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readiness to Learn Mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>56</td>
<td>7.63</td>
<td>3.00</td>
</tr>
<tr>
<td>Boys</td>
<td>67</td>
<td>6.75</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Table 4.8 shows that the mean score of pupils’ readiness to learn mathematics for girls was higher than that of boys (7.63 and 6.75 respectively). The result implies that girls were more ready to learn mathematics than boys.

After generating the overall mean scores, the researcher was also interested to ascertain whether the difference in pupils’ readiness to learn mathematics between boys and girls was significant. Consequently, the following null hypothesis was formulated and tested.

\( H_0 \): There is no significant difference in pupils’ readiness to learn mathematics between boys and girls.

The researcher used t-test to determine whether the difference in readiness to learn mathematics between boys and girls was significant and the results have been presented in Table 4.9.
Table 4.9 shows that the difference between the mean scores for boys and girls in readiness to learn mathematics was 0.878 with 0.128 level of significance (2-tailed). The results imply that the difference in pupils’ readiness to learn mathematics between boys and girls was not significant at p<0.05 level of significance. The null hypothesis was therefore accepted and it’s alternate which states that there is a significant difference in pupils’ readiness to learn mathematics between boys and girls rejected.

The current study finding concurs with those reported by Uwezo (2012) on numeracy and literacy across East Africa which had found out that there were minimal differences in literacy and numeracy between boys and girls. However boys lagged behind girls in learning competencies. The study findings also concur with the findings of NASMLA (2010) which had shown that girls in Nairobi achieved more than boys in numeracy.
The current study findings are consistent with those reported by Jochi, Murray, Jill and Williams (2008) who conducted a study to investigate children’s mathematics readiness in Texas, USA. Findings had shown that girls scored higher than boys but the performance gap was insignificant.

The current study findings similarly disagree with those of Unodiaku (2012) who investigated the influence of sex and ability level on students’ Mathematics Readiness in Nigeria. Results had shown that in general boys were more ready than girls. This disagreement can be attributed to the fact that the study in Nigeria was done in first year university students unlike the current one in which readiness was being assessed at primary school entry.

The current study findings similarly disagree with those of Unodiaku (2012) who investigated the influence of sex and ability level on students’ Mathematics readiness in Enugu State. The results had indicated that the mean difference in mathematics readiness between boys and girls was significant at P<0.05 level of significance across the three ability level (high, average and low). It was also found that sex factors influenced mathematics readiness of students. The current study findings are also inconsistent with those of a study done by Linderberg, Hyde and Peterson (2010) which had shown that males and females perform similarly in mathematics.

A number of studies have also identified differences between males and females in academic performance across the areas of reading, writing and mathematics. A
study done by Dickerson (2012) titled gender differences in mathematics curriculum-based measurement in third through eighth grade students, examined whether or not gender differences existed when mathematics curriculum-based measurement [M-CBM] probes were used to assess basic mathematics computation skills. Findings had revealed that females performed better than male students, results observed in the current study.

On the contrary, the current study findings are inconsistent with those reported by Voyles (2011) who did a study that examined the possible relationship between students’ age and gender on academic achievement. The study results had indicated that student gender did not impact on academic achievement for students in their first years in mathematics. Finally, the study findings are dissimilar with those reported by Below, Skinner, Fearington and Sorell (2010) who examined gender differences in reading skills for 1,218 kindergartens through fifth grade students. At the kindergarten level they found that girls scored significantly higher than boys but the differences were small. The current study however established that in first grade there were no significant differences between boys and girls in reading skills the trend observed in the current study.

4.5 Pupils’ Family Economic Class and Their Readiness to Learn Mathematics

The researcher sought to find out whether family economic class influenced pupils’ readiness to learn mathematics as objective three below indicates.

Objective 3: To explore the relationship between pupils’ family Economic class and pupils’ readiness to learn mathematics.
To achieve the objective, pupils’ family class was determined using family monthly house expenditure estimates. According to Kenya Bureau of Statistics (2013) low class family monthly expenditure was stipulated as between Kshs. 23,669 and below; middle class family monthly expenditure Kshs. 23,670 and 199,999; while upper class family monthly expenditure was estimated at Kshs. 200,000 and above. To achieve the objective parents were required to indicate their approximate family monthly expenditure by selecting the appropriate expenditure range and the results are presented in Table 4.10.

**Table 4.10: Pupils’ Family Class**

<table>
<thead>
<tr>
<th>Monthly House Expenditure</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Class (Monthly expenditure Kshs. 23, 669 and below)</td>
<td>75</td>
<td>61</td>
</tr>
<tr>
<td>Middle Class (Monthly expenditure Kshs. 23, 670 - 199,999)</td>
<td>47</td>
<td>38.2</td>
</tr>
<tr>
<td>Upper Class (Monthly expenditure more than 200,000)</td>
<td>1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

The results show that out of 123 pupils who participated in the study, 75 were from low class families, 47 pupils from middle class families; while only one pupil was from upper class family. The results imply that majority of the pupils hailed from low economic class families.

To understand how pupils’ family economic class influenced pupils’ readiness to learn mathematics, the number of pupils ready to learn mathematics in each of the categories were established and the results were as presented in Table 4.11.
Table 4.11: Pupils’ Readiness to Learn Mathematics by Family Class

<table>
<thead>
<tr>
<th>Pupils family class</th>
<th>Readiness to learn mathematics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ready</td>
<td>Not ready</td>
</tr>
<tr>
<td>Low Class</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>64.0%</td>
<td>36.0%</td>
</tr>
<tr>
<td>Middle Class</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>85.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Upper Class</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>89</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>73.0%</td>
<td>27.0%</td>
</tr>
</tbody>
</table>

As shown in Table 4.11 more than 30% of the pupils from both low and middle class families were not ready to learn mathematics. The results further reveal that the higher the family economic class, the more ready to learn mathematics the pupils were.

To determine whether there was a significant relationship between pupils’ family class and pupils’ readiness to learn mathematics the following null hypothesis was generated and tested.

*H0₂: There is no significant relationship between pupils’ family class and pupils’ readiness to learn mathematics.*
Chi-square was used to find out the significance of the relationship between pupils’ family class and pupils’ readiness to learn mathematics and the results are in Table 4.12.

**Table 4.12: Relationship between Pupils’ Family Class and Readiness to Learn Mathematics**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>7.989*</td>
<td>2</td>
<td>.018</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance at p<0.05

Table 4.12 shows that the chi-square statistic for pupils’ readiness to learn mathematics and family class was 7.989, degrees of freedom (2) and associated p-value was (0.018). The results imply that the relationship between pupils’ family class and pupils’ readiness to learn mathematics was significant at 0.05 level and thus the null hypothesis was rejected.

The current study findings are consistent with those found by Jochi, Murray, Jill and Williams (2008) who conducted a study to investigate children’s mathematics readiness in Texas, USA. Findings from the study had shown that children from higher income families scored higher in mathematics readiness assessment tests than those from low income families. The current study findings also concur with those reported by Uwezo (2012), which had found that children from socio-economically disadvantaged families performed poorly in numeracy tests.
The study findings similarly agree with those reported from a study done in USA by Jordan, etal (2009). The researchers had established that low income families contributed to differences in early numerical competencies. Results had further indicated that students from lower income families demonstrated significantly lower early numerical scores than middle income peers. Brooks-Gunn, Duncan & Maritato (1997) also reveal that economically disadvantaged families are more likely to provide children with limited educational resources, less stimulation and less optimal learning environments.

Research further indicates that children from low-income families usually attend programmes that are of low quality (Huston and Bentley, 2010). Consequently, the children from such families are not equipped with school readiness skills like those from high-income families. UNESCO (2006) further reveals that children living in poverty have fewer opportunities of attending pre-school programmes hence lack of readiness to learn mathematics.

The study findings are consistent with those reported by Blanden & Gregg, (2004) who did a study in UK and found that income had a causal relationship with educational attainment. The study finding also confirms that of Bicer, Capraro & Robert (2012) who did a study to find out the effects of parents’ social economic status and education level on students’ mathematics achievement. Robert et.al found that parents’ income and education were related to pupils’ mathematics achievement. Similar findings were also reported by Jordan, Kaplan and Ramineni (2009) whose results had shown that low income children performed
poorly than their middle counter parts in mathematics achievement and progressed at a slower rate.

4.6 Pupils’ School Entrance Age and Readiness to Learn Mathematics

The researcher sought to establish if the schools complied with the MOE policies in relation to entrance age. The study thus investigated relationship between pupils’ entrance age and pupils’ readiness to learn mathematics. The objective was stated as:

*Objective 4: To explore the relationship between pupils’ school entrance age and their readiness to learn mathematics.*

To attain the objective, pupils’ age at the time of admission to class one was obtained from their birth certificates or well baby clinic cards. It was then categorized as under age (below six years), right age (six years) and overage (seven or more years). The results were as presented in Table 4.13.
Table 4.13: Pupils’ Readiness to Learn Mathematics by School Entrance Age

<table>
<thead>
<tr>
<th>Date of Birth</th>
<th>Readiness to learn mathematics</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ready</td>
<td>Not ready</td>
</tr>
<tr>
<td>Right Age (6 Years)</td>
<td>59</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>83.1%</td>
<td>16.9%</td>
</tr>
<tr>
<td>Under Age (5 years and Below)</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>54.2%</td>
<td>45.8%</td>
</tr>
<tr>
<td>Over Age (7 years and Above)</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60.7%</td>
<td>39.3%</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>72.4%</td>
<td>27.6%</td>
</tr>
</tbody>
</table>

As shown in Table 4.13, it is evident that the schools admitted pupils who were not of the right age. The results also show that more than 40% of the pupils were underage and not ready to learn mathematics. Results further reveal that more than 30% of the overage pupils were not ready to learn mathematics.

To establish the significance of the relationship between pupils’ school entrance age and the pupils’ readiness to learn mathematics the following null hypothesis was generated and tested.

\[ H_{03}: \text{There is no significant relationship between pupils’ school entrance age and their readiness to learn mathematics.} \]
A Chi-square test was employed to test the hypothesis. The results were as presented in Table 4.14.

**Table 4.14: Relationship between Pupils’ School Entrance age and Readiness to Learn Mathematics**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>9.964</td>
<td>2</td>
<td>.007</td>
</tr>
<tr>
<td>No. of Valid Cases</td>
<td>123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance at p<0.05

Table 4.14 shows that the chi-square value for pupils’ school entrance age and readiness to learn mathematics was 9.964, at 2 degree of freedom and with p-of 0.007. The results show that the relationship between pupils’ school entrance age and readiness to learn mathematics was highly significant and hence the null hypothesis was rejected.

The results were consistent with Perry (2010) findings. Perry conducted a study on age at kindergarten entrance and its relationship to early academic achievement. The study investigated whether age at kindergarten entrance had any effect on future language, arts and literacy. The results had revealed that young students were weaker in literacy.

The current study findings are consistent with that of Uwezo (2012) which had found that on average one out of ten children in a class was underage. The current study findings are also similar with the findings of NASMLA (2010) which
reported that large proportions of grade three pupils were overage. This then means that there were some children enrolled in schools without taking into consideration the ECD policy and Basic Education Act requirement of age.

The current research findings also concur with those from a study conducted by Nyamwaya and Mwaura (1996) on transition of children from pre-school to primary school. The study had found that children were entering school earlier or later than the legal age. Further the study found that 50% of children in pre-schools were older than expected, while 16% of the children enter school at an earlier age than the official school entry age of six years. The current findings indicate that the percentage of older children was 60.7% while that of underage was found to be 13%.

The current study findings also agree with those reported by Voyles (2011) from a study done in North Georgia. The study had shown that age had a significant impact on academic achievement for students in their first year’s mathematics assessment.

The current study findings are also similar to those of Lois (1996) who had found out that there was a correlation between chronological age at which a child enters kindergarten and overall reading ability. The current study findings concur with the ones of Naito & Miura (2001) who did a study to investigate the development of number concepts and addition skills in Japanese children. Three groups of kindergarten and first grade children who differed in age completed tasks on their numerical competencies. Results had shown that schooling is an important
determinant in developing Japanese-speaking children’s numerical competencies than age related factors. Lastly, the current study findings agree with that of Markku & Hautamaki (2006) who did a study on young children’s number sense in China and Finland. The study had examined the influence of nationality on age and gender on Chinese and Finnish pre-schoolers number sense. Results had shown that age was related in both aspects of number sense, whereas no gender differences were found.

The current findings however disagree with those from a study on the effect of kindergarten entry age on academic achievement (Buten, 2010). Results from the study had indicated that there was no significant difference in math and reading scores based on kindergarten entry age. The current study findings also vary from the ones of Barua & Lang, (2008) who conducted a study on kindergarten entry age and academic performance and found that older entrants performed better in test scores compared to young entrants in the same grade.

The current research findings also disagree with the findings of Fredrick, Denise & Griffithi (1997) who did a study on nature-nurture in the classroom; entrance age, school readiness and learning in children and found out that entrance age was not a good predictor of learning. The current study findings are also inconsistent with the ones of Kurdek, Laurence, Sinclair, and Ronald (2001) who did a study to determine the factors which predicted pupils’ reading and mathematics achievements in fourth-grade children from kindergarten readiness scores. The study had examined age and gender differences in achievement in reading and
mathematics at grade four and the link between verbal skills at kindergarten and later achievements, results had revealed that older children had higher verbal skills.

4.7 Parents’ Level of Education and Pupils’ Readiness to Learn Mathematics

The researcher was also interested to determine the relationship between parents’ level of education and pupils’ readiness to learn mathematics. As a result the objective was:

*Objective 5: To find out the relationship between pupils’ readiness to learn mathematics and their parents’ level of education.*

To achieve the objective, the researcher first established the highest level of education attained by mothers and fathers. The results have been presented in Table 4.15 and Table 4.16.
Table 4.15: Highest Level of Education of Mothers and Pupils’ Readiness to Learn Mathematics

<table>
<thead>
<tr>
<th>Highest level of education of mother</th>
<th>Readiness To Learn Mathematics</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ready</td>
<td>Not ready</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>No primary education certificate</td>
<td>Count</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>25.0%</td>
<td>75.0%</td>
<td>100%</td>
</tr>
<tr>
<td>Primary education certificate</td>
<td>Count</td>
<td>18</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>51.4%</td>
<td>48.6%</td>
<td>100%</td>
</tr>
<tr>
<td>Secondary education certificate</td>
<td>Count</td>
<td>22</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>73.3%</td>
<td>26.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Diploma</td>
<td>Count</td>
<td>25</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>83.3%</td>
<td>16.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Undergraduate Degree</td>
<td>Count</td>
<td>20</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>95.2%</td>
<td>4.8%</td>
<td>100%</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>Count</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>100%</td>
<td>.0%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>89</td>
<td>33</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>73%</td>
<td>27%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.15 shows that the higher the level of mothers’ education, the higher the percentage of pupils who were ready to learn mathematics. The results further reveal that majority of the pupils’ whose mothers’ did not have primary education were not ready to learn mathematics. The results on fathers’ highest level of education and pupils’ readiness to learn mathematics have been presented in Table 4.16.
Table 4.16: Highest Level of Education of Fathers and Pupils’ Readiness to Learn Mathematics

<table>
<thead>
<tr>
<th>Highest level of education of father</th>
<th>Readiness to Learn Mathematics</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ready</td>
<td>Not ready</td>
<td>Total</td>
</tr>
<tr>
<td>Primary education certificate</td>
<td>Count</td>
<td>5</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>27.8%</td>
<td>72.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Secondary education certificate</td>
<td>Count</td>
<td>28</td>
<td>13</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>68.3%</td>
<td>31.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Diploma</td>
<td>Count</td>
<td>17</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>89.5%</td>
<td>10.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Undergraduate Degree</td>
<td>Count</td>
<td>28</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>87.5%</td>
<td>12.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>Count</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>88.9%</td>
<td>11.1%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>86</td>
<td>33</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>72.3%</td>
<td>27.7%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The results illustrate that pupils’ of fathers’ with higher levels of education were more ready to learn mathematics compared to those of fathers with low levels of education. The results further disclose that majority of pupils’ whose fathers’ had primary education certificate were not ready to learn mathematics.
To determine the relationship between parents’ level of education and pupils’ readiness to learn mathematics, the following null hypothesis was generated and tested.

**H04: There is no significant relationship between parents’ level of education and their pupils’ readiness to learn mathematics.**

To establish the significance of the relationship between parents’ level of education and pupils’ readiness to learn mathematics a chi-square test was administered and the results are presented in Table 4.17.

**Table 4.17: Relationship between Parents’ Level Education and Pupils’ Readiness to Learn Mathematics**

<table>
<thead>
<tr>
<th>Mothers level of education</th>
<th>Fathers level of education</th>
</tr>
</thead>
<tbody>
<tr>
<td>value df Asymp.sig. 2-sided</td>
<td>value df Asymp.Sig 2-sided</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Pearson Chi-square</td>
<td>N of valid cases</td>
</tr>
<tr>
<td>18.220 5 .003</td>
<td>123</td>
</tr>
<tr>
<td>25.853 4 .000</td>
<td>119</td>
</tr>
</tbody>
</table>

Significance at p<0.05

Table 4.17 shows that the chi-square value for mothers’ level of education and pupils’ readiness to learn mathematics was 18.220, at 5 degrees of freedom, and with 0.003 p-values. The table further shows that the chi-square value for fathers’ level of education and pupils’ readiness to learn mathematics was 25.853, at 4 degrees of freedom, and with 0.000 p-value. The results reveal that the
relationship between parents’ level of education and pupils’ readiness to learn mathematics was highly significant. The null hypothesis was thus rejected.

This study finding is similar with that of Uwezo (2010) report which was carried out in 70 districts, 2,160 schools with 74,861 children in Kenya. The study had revealed that in all districts, children’s literacy and numeracy competence increased with mothers’ level of education.

The findings of the study concurs with those reported by Halle, Brook-Gunn, and Klebanov, (1997) who had found that children’s mathematics success was related to parents’ educational level. The reason for this relationship was because highly educated parents held more positive attitudes towards mathematics and set higher success expectations from school than less educated parents. The study findings also concur with those found in a study which was done in Uganda by Onzima (2010). The results had shown that there was a positive correlation between parents’ level of education and pupils’ educational performance.

Similarly, Davis-Kean (2005) conducted a study to examine the process of how social economic status, specifically, parents education and income relates to children’s academic achievement. Results had shown that social economic factors (parents’ education, and family income) were related to children’s academic achievement.
4.8 Pupils’ Readiness to Learn Mathematics and Type of Pre-Primary School Attended

The researcher also wanted to find out if the type of pre-primary school the pupils had attended was related to their readiness to learn mathematics. The objective was thus stated as:

*Objective 6: To find out the relationship between pupils’ readiness to learn mathematics and the type of pre-primary school the pupils had attended.*

To achieve the objective, pupils were put in two categories; specifically in either public or private according to the pre-primary school attended. The figures have been presented in Table 4.18

**Table 4.18: Type of Pre-Primary School Pupils Attended**

<table>
<thead>
<tr>
<th>School</th>
<th>Number of Pupils</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>75</td>
<td>61%</td>
</tr>
<tr>
<td>public</td>
<td>48</td>
<td>39%</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.18 shows that majority of the pupils (61%) who participated in the study had attended private pre-primary schools. The results reveal that pupils who had attended public pre-primary schools were fewer than 40%.

Pupils’ mathematics abilities by the type of pre-primary schools they had attended were determined through assessment of performance in selected activities. The results are presented in Table 4.19.
Table 4.19: Pupils Mathematics Abilities by Type of pre-primary School Attended.

<table>
<thead>
<tr>
<th>Abilities (skills)</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Able</td>
<td>Not able</td>
</tr>
<tr>
<td>Classifies objects</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Rote counts 1-50</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Recognizes number symbols</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to match numerals</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to say which number is bigger</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to recognize daily routine</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to write numerals dictated</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to put together objects</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to take away</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Able to give names of Kenyan currency</td>
<td>f</td>
<td>%</td>
</tr>
</tbody>
</table>

According to the results, it is evident that pupils who had attended private pre-primary schools had better numerical abilities as compared to those who had attended public pre-primary schools. The results further reveal that pupils who had attended public pre-primary schools had poor ability in recognizing daily routine, writing numerals dictated, subtraction, and recognition of Kenyan currency as compared to their counterparts who had attended private pre-primary schools. The results imply that readiness to learn mathematics among standard
one pupils’ was influenced by the type of pre-primary school they had attended. The standard one pupils who had attended private pre-primary schools demonstrated more readiness to learn mathematics than their counterparts who had attended public pre-primary schools.

The current study findings are consistent with those reported by Uwezo (2010) and Uwezo (2013). The two studies had revealed that in Kenya children who had attended private schools were better grounded in basic numeracy skills as compared to those in public schools.

To understand pupils’ overall readiness to learn mathematics by type of pre-primary school attended, simple arithmetic mean was used to calculate the overall pupils’ readiness to learn mathematics. To calculate the means, pupils’ readiness to learn mathematics scores for all pupils were added and then divided by the total number of pupils and the results are presented in Table 4.20.

**Table 4.20: Overall Mean Scores in Pupils’ Readiness to Learn Mathematics by Type of Pre-primary School Attended**

<table>
<thead>
<tr>
<th>Type of School</th>
<th>N</th>
<th>Mean</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readiness to Learn Mathematics</td>
<td>Public</td>
<td>48</td>
<td>7.52</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>75</td>
<td>8.24</td>
</tr>
</tbody>
</table>

Table 4.20 shows that the overall mean score of pupils’ readiness to learn mathematics among pupils who had attended public primary schools was 7.52, while that of those who had attended private pre-primary schools was 8.24. The
mean for pupils who had attended private pre-primary schools was higher as compared with their counterparts in public pre-primary schools.

To find out if there was a correlation between type of pre-primary school pupils attended and their readiness to learn mathematics, the following null hypothesis was generated and tested.

**H0**: There is no significant relationship between type of pre-primary school pupils’ attended and pupils’ readiness to learn mathematics.

Table 4.21: Relationship between Type of pre-primary school pupils’ attended and readiness to Learn Mathematics

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>42.734a</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>No. of Valid Cases</td>
<td>123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance at p<0.05

Table 4.21 shows that the chi-square value for pupils’ readiness to learn mathematics and type of pre-primary school attended was 42.734, at 1 degree of freedom and with 0.000 p-value. The results imply that relationship between type of pre-primary school pupils’ attended and pupils’ readiness to learn mathematics was highly significant. The null hypothesis was thus rejected.

This study finding agree with those reported by Ngaruiya (2004) who did a study to explore the influence of different pre-school models on school readiness among pre-school children from different urban socio-economic status neighbourhoods in Kenya. The findings had shown that pre-school children who attended private pre-
school models outperformed their peers from public pre-schools in school readiness. The findings are also consistent with those from Uwezo (2010) that had found that children attending private schools were better grounded in basic literacy and numeracy.

The study findings are also confirmed by Uwezo (2013) report carried out across East Africa which found out that students in private schools perform better than public schools in all the three countries; Kenya, Uganda and Tanzania. In both literacy and numeracy skills, in Tanzania they recorded 75% pass rate for private schools as compared to 47% in public schools. In Kenya the pass rate in private schools was 83% compared to 75% in public schools, while in Uganda the gap was 53% in private schools to 36% in public schools. NASMLA (2010) study had also found that private schools had performed better than public schools.
5.0 Introduction

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

5.1 Summary of Findings

The result shows that the majority of the pupils had acquired basic mathematics skills to enable them to learn mathematics. The results also showed that more than 25% of the pupils were not ready to learn mathematics as they entered standard one.

The study established that girls were more ready to learn mathematics than boys and that in all numerical abilities except in recognizing daily routine, girls were better than boys. The study explored the relationship between pupils’ family economic class and readiness to learn mathematics. The results revealed that the higher the family class, the more ready pupils were to learn mathematics. The relationship between pupils’ family economic class and pupils’ readiness to learn mathematics was significant.

In regard to the relationship between pupils’ school entrance age and readiness to learn mathematics, the pupils who were six years old were more ready to learn mathematics compared to those who were either underage or overage. The
relationship between pupils’ school entrance age and readiness to learn mathematics was highly significant.

On the relationship between pupils’ readiness to learn mathematics and parents’ level of education, results revealed that the association was highly significant. Results indicated also that the higher the level of parents’ education, the more pupils were ready to learn mathematics.

Finally in relation to the type of pre-school the children had attended and its linkage to readiness to learn mathematics, majority of the pupils (61%) who had participated in the study had attended private pre-primary schools. They also had better numerical abilities compared to their counterparts who had attended public pre-primary schools. Consequently, the relationship between type of pre-primary school pupils’ attended and pupils’ readiness to learn mathematics was highly significant.

5.2 Conclusion

This study came up with the following conclusions. Firstly, the study established that more than 25% of the standard one pupils’ had not acquired basic mathematics skills to enable them to learn mathematics and hence they were not ready to learn mathematics. Secondly, gender differences were noted in relation to readiness to learn mathematics whereby girls had better numerical skills as compared to boys. It is thus logical to conclude that there are gender differences in readiness to learn mathematics
Thirdly, it was evident from the study findings that family economic class influenced pupils’ readiness to learn mathematics as pupils from middle and upper class families were more ready to learn mathematics than their peers from low class families.

Fourthly, parents’ level of education influenced pupils’ readiness to learn mathematics as pupils’ of parents with higher levels of education were more ready to learn mathematics compared to those of parents with low levels of education. Pupils’ school entrance age also influenced pupils’ readiness to learn mathematics.

Lastly, it was also clear that the type of pre-primary school pupils attended influenced pupils’ readiness to learn mathematics given that pupils who had attended private pre-primary schools had better numerical abilities compared to those who had attended public pre-primary schools.

5.3 Recommendations

Based on the study findings and conclusions, recommendations were made for policy, practice and further research. The recommendations for the different stakeholders are as follows:

5.3.1 School Management

They should fully comply with education policies by not admitting pupils who are underage. The results from the current study revealed that majority of underage children enrolled in standard one were not ready to learn mathematics. The results
had shown that schools admitted some pupils who were underage which is contrary to the Ministry of Education policies.

5.3.2 Pre-Primary School Teachers

They should ensure that children have adequate mathematics readiness skills to enable them to learn standard one mathematics. Results from the study had shown that pupils in public primary schools had poor abilities in recognizing daily routine, writing numerals dictated, subtraction, and recognition of Kenyan currency as compared to their counterparts in private primary schools. Pre-primary school teachers specifically those in public primary schools should regularly assess children’s readiness to learn mathematics so as to enable them identify pupils with mathematics difficulties early enough to enable them go through intervention. Teachers should encourage parents to enroll their children in pre-primary schools and attend at least two years of pre-primary school.

5.3.3 Kenya Institute of Curriculum Development (KICD)

The KICD should develop and validate a standard tool to be used by pre-primary school teachers to assess children’s readiness to learn mathematics. It may also help to create a standard readiness test to evaluate pupils’ readiness to learn mathematics at school entry, which may help in providing intervention measures for pupils with mathematics difficulties early enough. The results from the study had shown that 27.6% of the standard one pupils were not ready to learn mathematics which has a negative effect in their performance in mathematics.
5.4 Recommendations for Further Research

This study focused on pupils’ readiness to learn mathematics and the factors influencing it; there is need to conduct a study to investigate pupils’ readiness to learn mathematics and pupils’ academic achievement. The study was conducted in Nairobi County and its findings cannot be generalized to the divergent regions in Kenya, and thus a national survey should be done to find out pupils readiness to learn mathematics at school entry-standard one in Kenya. This may help to create a standard readiness test to evaluate pupils’ readiness to learn mathematics at school entry, which may also help in providing intervention measures for pupils with mathematics difficulties early enough.
REFERENCES


Lawrence, K., & Ronald, S.J. (2001). Predicting reading and mathematics achievement in fourth-grade children from kindergarten readiness scores. *Journal of Educational Psychology vol 93 (3).*


Qualitative Approaches. ACTS Press; Nairobi.


National Association for the Education of Young Children. (2009).


APPENDICES

APPENDIX I

PUPILS’ READINESS TO LEARN MATHEMATICS CHECK-LIST

Section A: Background Information
The researcher will tick or write the appropriate response about the pupil.

1. Code……………………………………

2. Gender of the pupil: Girl ( ) Boy ( )

3. Pupil’s Date of Birth…………………………………………

4. Pupil attended two years pre-primary school: Yes ( ) No ( )
   If yes, type of pre-primary school attended: Public ( ) Private ( )

Section B: Mathematics Abilities
The researcher will indicate whether the pupil has developed the skills using “Yes” (the skill has already developed) or “No” (the skill has not yet developed or is developing slowly).

1. Classification of objects by physical features (classification). Yes/No
   Colour and shape, Colour and size, size and shape
   Notes: _______________________________________________________________

2. Rote counting 1 to 50 (counting) Yes/No
   Notes: _______________________________________________________________

3. Recognition of number symbols 1-20 (number recognition). Yes/No
   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
   Notes: _______________________________________________________________
4. Matching numerals with corresponding number of objects (number value). Yes/No

Notes:

5. Saying which number is bigger from a given set of numbers (number sequence). Yes/No

2, 3  9, 5  4, 8

Notes:

6. Recognizing time through daily routine (time concept skills). Yes/No

Arrival, break, lunch

Notes:

7. Writing numerals dictated (number writing). Yes/No

3 6 10 22 30 40

Notes:

8. Putting together (add) objects with sums not exceeding 9. Yes/No

00+000 =

0000000+00=

Notes:
9. Taking away (subtract) objects from a set not exceeding 9. Yes/No

0000-00=

00000000-000

Notes:

10. Giving names of Kenya currency in form of coins (Money value) Yes/No

5, 10, 20, 40

Notes:
APPENDIX II

QUESTIONNAIRE FOR PARENTS

I am a student at Kenyatta University conducting a study on readiness for mathematics learning among standard one pupils’ in Kasarani district. I humbly request you to complete the questionnaire honestly. The information you provide will only be used for research and will be kept very confidential. The information will help to improve pupils’ mathematics performance in the district. Please as you go through the questionnaire, write or tick the appropriate response.

1. Pupil’s Code…………………………………………………………

2. Please indicate the range of your family monthly expenditure?
   - Kshs. 23, 669 and below ( )
   - Kshs. 23 670 – 199, 999 ( )
   - Kshs. 200, 000 or more ( )

3. What is the highest level of education attained by the mother of the pupil?
   - No Primary Education Certificate ( )
   - Primary Education Certificate ( )
   - Secondary Education Certificate ( )
   - Diploma ( )
   - Undergraduate Degree ( )
   - Masters Degree
   - Phd Degree ( )
4. What is the highest level of education attained by father of the pupil?

- No Primary Education Certificate ( )
- Primary Education Certificate ( )
- Secondary Education Certificate ( )
- Diploma ( )
- Undergraduate Degree ( )
- Masters Degree
- Phd Degree ( )
APPENDIX III

PARENTS’ CONSENT TO PARTICIPATE IN THE STUDY

My name is Phyllis Moraa Magoma. I am a Master of Education student at Kenyatta University, the Department of Early Childhood Studies. I am carrying out a study on readiness for learning Mathematics among standard one pupils in Kasarani District, Nairobi County. The study will shed light on the factors which correlate with standard one pupils’ readiness to learn mathematics. The findings of the study will help teachers to understand the competencies in the form of readiness skills which enhance learning of mathematics in standard one.

Procedure to be followed

The study will use pupils’ readiness to learn mathematics check-list to be filled by teachers during class time and questionnaire for parents to be filled by the parents of the pupils. In this regard, your child has been chosen to participate in this study because he/she is in standard one.

Discomforts and Risks

There will be no discomforts and risks involved because the information about the pupils readiness to learn mathematics will be obtained from teachers of the children.

Benefits

The Ministry of Education may use the findings of this study when revising the existing policies affecting learning of mathematics in order to improve pupils’ performance in mathematics in Nairobi County and in Kenya.

Reward

Intrinsic reward will be offered in terms of thanking the parents for sparing their time to provide the important information.

Confidentiality

The information provided by parents will be kept confidential and be used only for academic purpose. Teachers will not be required to write the names of pupils on the questionnaire. The parents will also not be required to write their names nor of the pupils on the questionnaires.

Contact information

In case of further clarification, please do not hesitate to contact Ms. Phyllis M. Magoma, Mobile Phone No. 0710193269 or Kenyatta University Ethical Review Committee Secretariat on kuerc@ku.ac.ke.
Parents’ Statement

The above information regarding my participation in the study is clear to me, I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that the information provided will be kept private and will not be used against my child and he/she can leave the study at any time.

Name of Parent……………………………………………………………….

Signature/Thumbprint……………………………….. Date…………………

Investigator’s Signature

I, the undersigned, have explained to the volunteer in a language he or she understands, the procedures to be followed in the study, and benefits involved.

Name of the interviewer……………………………………………………..

Signature…………………………. Date……………………………………. 
APPENDIX IV

PARENTS’ CONSENT FOR THEIR CHILDREN TO PARTICIPATE IN THE STUDY

My name is Phyllis Moraa Magoma. I am a Master of Education student at Kenyatta University, the Department of Early Childhood Studies. I am carrying out a study on readiness for learning Mathematics among standard one pupils in Kasarani District, Nairobi County. The study will shed light on the factors which correlate with standard one pupils’ readiness to learn mathematics. The findings of the study will help teachers to understand the competencies in the form of readiness skills which enhance learning of mathematics in standard one.

Procedure to be followed

The study will use pupils’ readiness to learn mathematics check-list to be filled by teachers during class time and questionnaire for parents to be filled by the parents of the pupils. In this regard, your child has been chosen to participate in this study because he/she is in standard one.

Discomforts and Risks

There will be no discomforts and risks involved because the information about the pupils will be obtained from teachers of the pupils.

Benefits

The Ministry of Education may use the findings of this study when revising the existing policies affecting learning of mathematics in order to improve pupils’ performance in mathematics in Nairobi County and in Kenya.

Reward

Intrinsic reward will be offered in terms of thanking the parents for sparing their time to provide the important information.

Confidentiality

The information provided by teachers and parents will be kept confidential and be used only for academic purpose. Teachers and parents will also not be required to write the names of children on the check list and questionnaire.

Contact information

In case of further clarification, please do not hesitate to contact Ms. Phyllis M. Magoma, Mobile Phone No. 0710193269 or Kenyatta University Ethical Review Committee Secretariat on kuerc@ku.ac.ke.
Parents’ Statement

The above information regarding my child’s participation in the study is clear to me, I have been given a chance to ask questions and my questions have been answered to my satisfaction. My child’s participation in this study is entirely voluntary. I understand that the information provided will be kept private and will not be used against my child and he/she can leave the study at any time.

Name of Parent……………………………………………………………………

Signature/Thumbprint……………………………….. Date……………………

Investigator’s Signature

I, the undersigned, have explained to the volunteer in a language he or she understands, the procedures to be followed in the study, and benefits involved.

Name of the interviewer………………………………………………………..

Signature…………………………. Date………………………………………..
APPENDIX V

MAP OF KASARANI

KEY
1. WESTLANDS DISTRICT
2. DAGO REI DISTRICT
3. STAREHE DISTRICT
4. KAMUKUNJI DISTRICT
5. MARADARA DISTRICT
APPENDIX VI

APPROVAL OF RESEARCH PROPOSAL 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. 810901 Ext. 57930

FROM: Dean, Graduate School
DATE: 21st May, 2014

TO: Ms. Phyllis M. Magoma
C/o Early Childhood Studies Dept.
Kenyatta University
REF: E55/20067/12

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board meeting of 27th March, 2014 approved your Research Proposal for the M.Ed. Degree, entitled “Readiness for Learning Mathematics amongst Standard One Pupils in Kasarani District, Nairobi County, Kenya”.

Thank you.

JOSEPHINE KENDI
FOR DEAN, GRADUATE SCHOOL

cc. Chairman, Early Childhood Studies Dept.

Supervisors:
1. Dr. Teresa Mwoma
   C/o Early Childhood Studies Dept.
   KENYATTA UNIVERSITY

1. Dr. Esther Wairimu
   C/o Early Childhood Studies Dept.
   KENYATTA UNIVERSITY

JK/cao

Committed to Creativity, Excellence & Self-Reliance
APPENDIX VII

APPROVAL LETTER KENYATTA UNIVERSITY ETHICS COMMITTEE

KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@kunec.ke
secretary.kuerc@kunec.ke
orci2000@gmail.com
Website: www.ku.KE

Our Ref: KU/R/COMA/51/350

Date: 5th September, 2014

Phyllis L. Magona,
Kenyatta University,
P.O Box 435644

Dear Ms. Magona,

RE: APPLICATION NUMBER PKE/221/1197 – “READINESS FOR LEARNING MATHEMATICS AMONG STANDARD ONE PUPILS IN KASARANI DISTRICT, NAIROBI COUNTY, KENYA” – VERSION 2.

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic “Readiness for learning mathematics among standard one pupils in Kasarani District, Nairobi County, Kenya” version 2 received on 24th July, 2014.

2. APPLICANT

Phyllis L. Magona, Department of Early Childhood.

3. STUDY SITE

Kasarani, Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 5th September, 2014.

5. ADVICE/CONDITIONS

i. Progress reports are submitted to the KU-ERC every six months and a final report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

 Signed: [signature]

PROF. NICHOLAS K. GIRONTO
CHAIRMAN ETHICS REVIEW COMMITTEE

Phyllis L. Magona, accept the advice given and will fulfill the conditions therein.

Signature: [signature]

Dated this day of 9th Sep, 2014.

cc: Vice- Chancellor
Director: Institute for Research Science and Technology
APPENDIX VIII

RESEARCH AUTHORIZATION NACOSTI

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2261349, 310571, 2219420
Fax: +254-20-318245, 318245
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote
Ref: No.

NACOSTI/P/14/5544/3629

Phyllis Moraa Magome
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Readiness for learning mathematics among standard one pupils in Kasarani District, Nairobi County, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Nairobi County for a period ending 31st December, 2014.

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

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

DR. S. K. HANGAT, OGW
FOR: SECRETARY/CEO

Copy to:
The County Commissioner
The County Director of Education
Nairobi County.

APPENDIX IX

RESEARCH CLEARANCE PERMIT NACOSTI

THIS IS TO CERTIFY THAT:
MS. PHYLLIS MORAA MAGOMA
of KENYATTA UNIVERSITY, 43844-100
Nairobi, has been permitted to conduct
research in Nairobi County.

on the topic: READINESS FOR LEARNING
MATHEMATICS AMONG STANDARD ONE
PUPILS IN KASARANI DISTRICT, NAIROBI
COUNTY, KENYA

for the period ending:
31st December, 2014

Applicant's
Signature

Secretary
National Commission for Science,
Technology & Innovation