EFFECT OF TEACHER CHARACTERISTICS ON THE ACQUISITION OF NUMBER WORK SKILLS BY PRE-SCHOOL CHILDREN IN UGUNJA DISTRICT, SIAYA COUNTY, KENYA.

By

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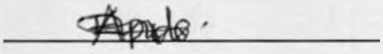
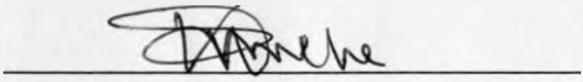
DECLARATION

The research project is my original work and has not been presented for a degree in any other University.



Elizabeth Akinyi Apudo

This research project has been submitted for examination with my approval as University Supervisor.



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DEDICATION

This project is dedicated to my parent (Agnes Apudo), husband (John Agutu) and children (Joy, Loveen and Effie).

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I am deeply indebted to the Almighty God for the sufficient grace and provision for the completion of this project. To Him be all the honour and glory. My sincere appreciation also goes to my Supervisor Mr. Kepha Marube, for his keen guidance and his patience. Lastly, I express my thanks to my mother, husband and children for their constant prayers, encouragements, moral and financial support, patience and sacrificed time.

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ABSTRACT

The purpose of this was to investigate the influence of teacher characteristics on children's acquisition of number work skills in Ugunja District. The study used questionnaires, documentary analysis and observation checklist to collect data. The population for the study comprises of 36 teachers out of 120 of the sampled schools from a population of 60 schools. The study used expost facto research design. The data was analyzed using descriptive statistics which involved tabulation of data into tables, and percentages. The findings of this study revealed that teacher's academic and professional qualification, teacher's teaching experience and teacher gender do influence children's acquisition of number work skills in Ugunja District. The result indicated that many years of experience contributes to high level of number works acquisition skills among pre-school children, high level of academic and professional among teachers help pre-school children to acquire more skills in mathematics activities. Most female teachers were better performance in imparting mathematics knowledge to preschool children compared to male teachers who were also few in numbers.

LIST OF ABBREVIATIONS

IQ	-	Intelligence Quotient
US	-	United States
UNCESCO	-	United Nation Educational, Scientific and Cultural Organization
NAEYC	-	National Association for the Education of Young Children
MOE	-	Ministry of Education
ECD	-	Early Childhood Development
ECE	-	Early Childhood Education

CHAPTER ONE: INTRODUCTION

1.0 Background of the problem

Mathematics education for young children is not new. Mathematics has been a key part of early childhood education around the world at various times during the past 200 years. Friedrich (1950), in Germany introduced a system of guided instruction centered on various 'gifts' including blocks that have been widely used to help young children learn basic mathematics, especially geometry, ever since Brosterman (1997) In the early 1900 in Italy, Maria Montessori (1964), working in slums of Rome, developed a structured series of mathematics activities to promote young children's mathematics learning.

In the United State, however, as the early childhood education field has been paid to teaching academics, especially social, emotional and physical development, not much attention has been paid to teaching mathematics especially to young children. Although there had been attempts from time to time to make early childhood programs more academically rigorous, focus was primarily on language and literacy development National Research council, (2009). In the early years, the early childhood education field in the United State has begun to take a big step forward in promoting early childhood mathematics education.

NAEYC (2000), jointly with the National Council of Teachers of Mathematics (NCTM) issued a position statement that advocates high quality, challenging, and accessible mathematics education for young children. They also provided research based essential recommendations to guide classroom practices. Since then, many national, state and local organizations have embraced this new vision Clements et al (2004) and NCTM,

(2000).As a result, early childhood teachers across the United States are now faced with a mandate to teach mathematics to young children.

The most pressing need in early mathematics education is to improve teacher preparation and ongoing professional development. Very few teacher preparation programs in the United States offer courses devoted specifically to mathematics education in early childhood. Most of them require theirs to take, at most, only one course in mathematics, compared to several courses in language and literacy. For practicing teachers, in-service professional development needs to move beyond one time workshops or occasional readings of articles on the topics. As in other areas, teachers need to keep up diligently with advances in research and best practices, by reading professional journals or books, taking courses, participating in conferences, and the like.

In order for teachers to implement effective early mathematics education, they need to be supported by better teacher preparation and ongoing professional development opportunities. The teacher is the key to effective, high quality mathematics education in early childhood classrooms. Therefore teachers need to find out what young children already understand and help them begin to understand these things mathematically.

The world today recognizes the importance of achieving high levels of literacy and numeracy. Studies have shown that societies with high levels of literacy and numeracy have lower levels of poverty (Policy investment Framework, 2000). Experiences regarding mathematics, which constitute a significant part of life, are realized in a long and difficult process. The importance of mathematics in most fields of human endeavor cannot be underestimated. Its usefulness in education, science and technology as well as

commerce, economics and even humanities is almost at par with the importance of education as a whole.

Fajemidagba (1991) is of the opinion that mathematics is very important to all human activities. Mathematics is all about finding solutions to problems. This implies the fact that before an individual can function well in the society the individual must possess relatively good knowledge of mathematics especially in this era of new technology.
The technological development is highly rooted in the study of mathematics. Okebukola (1992) opined that mathematics is referred to as central intellectual discipline of the technological societies; Kerlinger (1985) describes mathematics as a language of science. Aminu (1990) argued that mathematics is not only the language of science, but essential nutrient for thought, logical reasoning and progress. Mathematics liberates the mind and also gives individuals an assessment of the intellectual abilities of pointing towards the direction of improvement.

Application of mathematics in various fields like science, economics and others, cuts across all areas of human knowledge. Despite these wide applicability and importance of mathematics many pupils are still not finding their feet in the subject as a result of the many challenges they still encounter in the subject. The (1999) Monitoring Learning Achievements (MOE, 1999) survey conducted in eleven selected African countries including Malawi revealed that the level of numeracy in the eleven countries was very low. None of the eleven countries met the numeracy level targeted by the world conference in Jomtieme, Thailand in 1990 (MOE, 1999).

The National Council of Teachers(NCTM) and the National Association for the Education of young children (NAEYC) affirm that high quality, challenging, and accessible mathematics education for young children is vital foundation for future mathematics learning. In every early childhood setting, children should experience effective, research-based curriculum and teaching practices. Such high quality classroom practice requires policies, organizational supports, and adequate resources that enable teachers to do this challenging and important work.

Throughout the early years of life, children notice and explore mathematics dimensions of their world. They compare quantities, find patterns, navigate in space, and grapple with real problems such as balancing a tall block building or sharing a bowl of crackers fairly with a playmate. Mathematics helps make sense of their world outside the school and helps them construct a solid foundation for success in school. In elementary and middle school, children need mathematical understanding and skills not only in math courses but also in science, social studies and other subjects.

Besides ensuring a sound mathematical foundation for all members of our society, the nation also needs to prepare increasing numbers of young people for work that requires a higher proficiency level. The National Commission on Mathematics and Science Teaching for the 21st Century (known as the Glenn Commission) in United States of America asks this question:"As our children move towards the day when their decision will be the one shaping the new world, will they be equipped with the mathematics and science tools needed to meet those challenges and capitalized on those opportunities?

Since the 1970s, a series of assessments of U.S students' performance has revealed an overall level of mathematical proficiency well below what is desired and needed. In recent years, NCTM and others have addressed these challenges with new standards and other resources to improve mathematics education and progress has been made at the elementary and middle school levels. Yet achievement in mathematics and other areas varies widely from state to state and from school district to school district.

"Mathematics educators and researchers like Ohuche et al (1978), in U.S have over the years carried out research on factors that are responsible for poor acquisition of number work skills among the learners. Ranging from shortages of qualified teachers, inexperienced teachers, among other variables have been generally identified as predictor of poor acquisition of number work skills among the learners in many countries including Kenya".

Agyeman (1993) reported that a teacher qualification would undoubtedly have a negative influence on the teaching and learning of his/her subject. Apart from qualification, other teacher characteristics still exist which can predict learner performance in mathematics either positively or negatively. In the Kenyan context, millions of young children are in child care or other early education settings where they can have significant early mathematics experiences. Research on children's capacities and learning in the first six years of life confirms that early experiences have- long lasting outcomes.

Although our knowledge is still far from complete, we now have a clear picture of mathematics young children are able to acquire and the practices to promote their understanding. This knowledge however is not yet in the hands of most early childhood

teachers in a form to effectively guide their teaching. It is not surprising then that many early childhood programs have a considerable distance to go to achieve high-quality mathematics education for young children.

Children's confidence, competence, and interest in mathematics flourish when new experiences are meaningful and connected with their prior knowledge and experience. At first young children's understanding of a mathematical concept is only intuitive. Lack of explicit concepts sometimes prevents the child from making full use of prior knowledge and connecting it to school mathematics. Therefore, teachers need to find out what young children already understand and help them begin to understand these things mathematically. From ages 3 through 6, children need many experiences that call on them to relate their knowledge to the vocabulary and conceptual framework of mathematics.

In developing early mathematics curriculum, teachers need to be alert to children's experiences, ideas and creations. To create coherence and power in the curriculum, however, teachers also must stay focused on the" big ideas" of mathematics and on the connection and sequences among those ideas. The big ideas or vital understandings in early childhood mathematics are those that are mathematically central, accessible to children at their present level of understanding, and generative learning.

In many early childhood programs, mathematics makes only fleeting, random appearance. Other programs give mathematics adequate time in the curriculum but attempt to cover so many mathematics topics that the result is superficial and uninteresting to children. In amore effective third alternative, children encounter concepts

in depth and in a logical sequence. Such depth and coherence allow children to construct, test and reflect on their mathematical understanding. This alternative also enhances teachers' opportunities to determine gaps in children's understanding and to take time to address these.

Curriculum depth and coherence are important, unplanned experiences with mathematics are clearly not enough. Effective programs also include intentionally organized learning experiences that build children's understanding over time. Thus early childhood educators need to plan for children's in-depth involvement with mathematics ideas, including helping families extend and develop these ideas outside school. Teachers of young children should learn the mathematics content that is directly relevant to their professional role, this is because content alone is not enough.

Effective professional programs weave together mathematics content, pedagogy and knowledge of child development. When high quality, well supervised field work is integrated throughout a training program, early childhood teachers can apply their knowledge in realistic context. But in Kenya there are challenges in early childhood education sector. This is because a higher percentage of teachers who teach in E.C.D centers especially in public school where this research was carried out are not qualified. Issues of experience and gender disparities are some of the characteristics among many that are likely to influence children's acquisition of number work skills.

Mathematics helps children make sense of the physical and social worlds around them, and children are naturally inclined to use mathematics in this way ("He has more than I do" "that wont fit in there"- "it is too big").By capitalizing on such moments and by

carefully planning a variety of experiences with mathematical ideas in mind, teachers cultivate and extend children's mathematical sense and interest. Most E.C.E teachers in Ugunja where this research is based posses' weak knowledge and narrow views of mathematics and mathematics pedagogy that include conceptions of mathematics as closed set of procedures, teaching and learning as the accumulation of information.

Many teachers in Ugunja typically have a very narrow concept of the mathematical content that young children should learn. Teachers often limit their focus to one to one correspondence, simple counting and numbers, and perhaps naming and sorting simple shapes, even when children are capable of learning far more complex content. Early childhood mathematics education is both deep and broad. It should cover the big ideas of mathematics in many areas- including number and operation, geometry (shape and space), measurement, algebra (particularly pattern). In order for mathematics education to include more than a superficial focus on simple numbers and shapes, teachers need to expand their concept of mathematics content for young children. And develop a deep appreciation and understanding of the fundamental mathematical ideas that young children should learn. It is against this background that this study has intended to examine how teacher characteristics can influence number work acquisition by pre-school children in Ugunja district.

1.2 Purpose of the study

The purpose of the study was to investigate the effect of teacher characteristics on number work acquisition skills by pre-school children in Ugunja.

1.3 Research Objectives: To

1. Determine a relationship between the academic qualifications of a teachers and a child's acquisition of number work skills.
2. Establish a relationship between gender and teacher and the acquisition of number work skills by a pre-school child.
3. Find out the relationship between teacher experience and the acquisition of number work skills by a pre-school child.

1.4 Research questions

- What is the relationship between the academic qualifications of a teacher and a child's acquisition of number work skills?
- What is the relationship between the gender of a teacher and a child's acquisition of number work skills?
- What is the relationship between a mathematics teacher's experience in the subject and the acquisition of number work skills by a pre- school child?

1.5 Significance of the study

The findings of this study may enable mathematics curriculum developers to increase their understanding of the effect of mathematics teacher characteristics on children's acquisition of number work skills. This will enable them to take appropriate measures on how to solve the problem of inadequacy in number work acquisition skills among preschool children. The study may also benefit teachers of mathematics because it can help them improve their teaching methods to enable children to acquire number work skills.

1.6 Limitation of the Study

The study was limited by the time factor in which the project should be completed. The researcher was not able to control the attitude of the respondents. The findings were applied to Ugunja only. One may replicate the study elsewhere.

1.7 Delimitation of the study

The study was confined only to teachers of mathematics. Teachers are involved because they are direct implementers of mathematics curriculum and are therefore well positioned to give feedback on the teaching and learning of mathematics. The study was carried out in public schools in Ugunja.

1.8 Basic assumptions

The study was based on the following assumptions:

It was assumed that the respondents were to provide truthful and honest responses to items in the study. All preschools were to use the same language as a medium of communication.

All preschools followed the Ministry of Education guidelines in terms of content taught within a stipulated length of time.

1.9 Definition of the key terms

Achievements: level of attainment of mathematics skills.

Performance: Refers to children's achievement scores in mathematics to be obtained by the achievement tests.

Realia: Are real objects which can be used for teaching.

Teacher experience: a teacher length of time spent on teaching mathematics.

Teacher characteristics: An attribute of a mathematics teacher which is useful in a child's acquisition of number work skills.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review and the current position of the literature in relation to the effect of teacher characteristics on children's acquisition of number work. It reviews the past studies done locally and globally. The literature review covers sub-sections such as teacher qualification, teacher gender, and teacher experience.

2.2 Teacher qualifications

According to the education Act Cap 211, the teaching staff in a school must be appropriately qualified and adequate in number. Teacher qualification tends to have positive effect on acquisition of number work skills among pre-school children: Hesehu Saha and Noonan (1978).

A teacher with good qualification, appropriate training and experience is the highest asset a school can have. A good mathematics teacher motivates, encourages, and checks, learners' work to enhance high standards in the subject. The social characteristics of the teacher do have an influence in the learners' learning. They also need to be familiar with young children's social, emotional and motor development, all of which are relevant to mathematical development.

The overwhelming majority of work on teacher quality has examined the relationship between teacher characteristics and learners participation at the individual and school level. Hanushek (2000) in his research with regard to teacher education and experience, he found "a majority of the cases the estimated coefficient are statistically insignificant.

Statistical significances and just looking at estimated observable signs do not make much of a case for the importance of these factors either "However, teacher quality may be unrelated to the observable characteristics.

Research in connection with teachers' qualification in early childhood and the quality of children's experience in their setting indicate that starting with more formal education provides higher quality care than those with less formal education. This is in accordance with Howes (1997). Barnet (2001) emphasizes on the importance of preschool teacher training by pointing out the high quality preschool education which produces substantial long-term educational, social and economic benefits. He strongly pointed out that large benefit occurs only when teachers are professionally prepared; this is because teacher preparedness helps in meeting the needs of children in the classroom.

Research work by National Institute of child Health and Human Development NICHD (2003) emphasizes on teacher training. The research explains that better educated and trained teachers have the required professional skills in handling learners. These teachers have the knowledge of how young learners learn and how they should be taught. In mathematics, as in any knowledge domain, learners benefit having a variety of ways to understand a given concept. Building on children's individual strengths and learning styles makes mathematics curriculum and instruction more effective and this is only possible with the help of a qualified teacher.

Looking at evidence from research studies, NMAP (2008) reviewed some variables such as teacher qualification and teacher experience for teachers' mathematical knowledge and

found that research findings about the impact of these variables on learner achievement were mixed. In terms of college preparation for teaching, US teachers appear as well – prepared as teachers in other countries. This is in accordance with the US Department of Education, (1996).however; successful completion of college may not be good evidence of a thorough understanding of foundational mathematics content Monk (1994).

Coursework in American Universities typically builds on and extend, but does not revisit early mathematics and thus may not sufficiently address the mathematical content that school mathematics teachers need most. A logical methodological conclusion is that measures of teachers' content knowledge should specifically focus on understanding of the mathematics they will teach.

A study conducted in North Carolina, on teachers mathematical knowledge was based on a 10 year data set of all North Carolina elementary school teachers and learners. Vigdor et al (2007) found that teachers with more experience and more knowledgeable (which include material on curriculum, instruction, assessment, and mathematical content), had more positive effects on learners achievement, and that these effects were particularly strong in mathematics education. Hill et al (2005) found that teachers' mathematical knowledge was significantly related to student achievement gains in both first and third grades after controlling for key student and teacher level covariates. These are equivalent to pre primary one and pre primary three in my country Kenya respectively.

Fox & Schwartz (1965) emphasizes that without effective and able teachers, intellectual gains in reading ability and 1Q which is crucial in the study of mathematics cannot be achieved adequately by the learners. At the end of the academic year when testing was

done, the experimental group showed significant gain in intellectual ability. Rosenthal & Jacobson (1968) attributed the intellectual gains to teacher's classroom behaviors. That is how well they were prepared and how effective they were.

Eshiwani (1974), points to a general agreement that qualification of teachers is of crucial importance in learners' performance in mathematics. Teacher training should therefore stress the quality. Kirembe (1991) found that both professional and level of educational attainment are important in ensuring good performance by learners in mathematics. Training and mastery of subject enhance a teacher's ability to comprehend and apply mathematical principles and knowledge. This improves performance in mathematics by learners who are taught by trained and well-educated teachers.

In teaching mathematics, as in teaching all subject matter, success depends upon individualization, motivation, systematic teaching and a careful working out of methodology. Some children learn mathematics quickly and easily, but other children experience some difficulties therefore, teachers need to find out these difficulties and assist these children adequately. Children should always be given the time they need to explore, to understand, and to remember. This is because young children's understanding of a mathematical concept is only intuitive. They will not feel that learning mathematics is a chore and become discouraged if they are permitted to use a variety of objects and materials in learning. Young children do not perceive their world as if it were divided into separate cubbyholes such as "mathematics" or "literacy" for example, when children are lining up, teachers can build in many opportunities to develop an understanding of mathematics. Children wearing something red can be asked to get in first, those wearing

blue to get in second and so on. Children will need much guidance in developing each new concept, and the teaching of concepts must be explicit and detailed – no knowledge or understanding can be taken for granted. The method of teaching mathematics differs from that of reading, in that mathematics needs to be taught through manipulation of objects, so that it can be understood as denoting a change. "Two plus four equals six "is static to the child, an unalterable "given," a number fact. Children's everyday activities and routines can be used to introduce and to develop important mathematical ideas. Mathematics concepts should be concretized.

It is intuitively obvious that teachers must possess a professional knowledge base and exhibit knowledge of the subject matter. Successful teacher have a vast repertoire of instructional strategies and techniques that reflect their knowledge of the subject. They enhance children's mathematics learning when they ask questions that provokes clarification, extensions and development of new understanding.

2.3 Teacher gender and learners acquisition of number work skills.

Teachers play a crucial role in implementing mathematics education, whatever the formal organization of the setting in which mathematics is taught Fennema, (1990).Campbell points out that "teachers are part of the cause of the differential gender differences that exist... they have the power to contribute to helping to eliminate those practices that is gender differences "(1995).In theory, most teachers believe education should be a liberating and democratic influence (Skolnick, Langbort and Day,1982), but, in practice, mathematics teachers still seem to reinforce traditional behaviors and occupational plans for both males and females. Independent of where student interest or

talents may lie Eccles-Parson, (1984): and at times, they seem actively to discourage non-traditional (eg.mathemtical) female interest Fox, et al (1985).

Teacher gender influences learner achievement.

Unlike the ongoing interest with gender differences in learners" mathematics learning, teacher gender has been dealt with in a substantial way in the educational literature However, previous research has examined the influence of teacher gender on learner's achievements. Saha (1983) suggested that "whether a teacher is male or female does make a difference for learners' achievement". He reported the findings after a careful examination of the effects of teacher gender on students' mathematics achievements in 21 less developed Countries. The conclusion was that, in general, males are more capable than female in teaching mathematics and science. That is, learners with male teachers had better achievements in mathematics and science than those with female teachers.

Studies conducted by Carnoy (1971) and Rice (1974) had similar findings. By analyzing the data from the first national survey of primary schools in Pakistan, teacher gender has a much stronger influence on the learners' mathematics achievements than student gender. Learners of male teachers scored significantly higher on mathematics tests than those of female teachers. In addition, a gender gap favoring male teachers showed up most clearly in rural schools. In contrast Mwamwenda (1989) found out that learners of female teachers had significantly higher achievement scores in mathematics than those taught by male teachers. Similarly, Ryan (1972) also agreed that female teachers are more effective than male teachers.

Dee (2006) investigated the effect of teacher gender using National Education Longitudinal Survey (NELS) data on pre unit class from US and found that same gender teachers had a positive effect on performance, for example girls do better when taught by women and boys do better when taught by men. Dee (2006) also found that effect of teacher gender varies depending on the subject: for girls to benefit of being assigned to a female teacher are concentrated in history. A study by Michaelowa (2001) using data from Francophone sub-Saharan Africa similarly finds support for the same-gender effect.

A larger sample based study in the US shows that regardless of learners' gender, pupils taught by women perform better than those taught by men (Krieg, 2005). In accordance with Krieg, based on findings from the southern and eastern Africa consortium for monitoring education quality, a recent research (UNESCO 2000) finds that children in female teachers' classroom tend to perform better. With respect to the positive relationship between the presence of female teachers and improved school participation for girls, the argument is that the presence of a female teacher may help alleviate parental concerns about the safety and well being of their daughters in traditional gender-segregated societies and encourage them to send their daughters to school (Velkoff1998:UNESCO2000).

Teacher perception on learner gender differences

Studies have shown that perception of mathematics can partly explain gender gaps in mathematics achievement. For example in U.S, APU (1981) found that more girls than boys considered themselves lucky if they performed well in a math test. According to Bevan (2001) the main factors that explain pupils' perception of math include;

expectations, types of activities included in the math curriculum and the prevailing stereotypes. According to Plante et al,(2003) one of the contributing factors to gender stereotypes on girl's math performance is their female teacher's own math anxiety. Plante's study showed girls math performance decreased as a functional of their female teacher's math anxiety boy's math performance remained unaffected.

Teachers' perception has attracted considerable research attention. Studies of teachers' perception in mathematics education have investigated teachers' general conceptions of mathematics teaching and teaching. Ball, et al (1990), and their general beliefs about the curriculum and their beliefs about the nature of mathematics.

In the study done by Fenriema et al. (1990), information was gathered for the investigation of teacher perception in relation to gender and mathematics. The subjects for the study were 38 first-grade female teachers in 24 schools in the USA. These teachers were asked to identify their two most and least successful male and female students in mathematics, to attribute causation of these students' successes and failures and to describe their characteristics. Teachers' choices of most and least successful students were then compared to mathematics test scores of their students. After a careful analysis of the data, the researchers found that teacher perception about male and female students in mathematics were different.

Teachers perceived male students as being their best students and were inaccurate when selecting most successful male students. They tended to explain male success in mathematics in terms of ability more often than they did for females, whose success was

described more often in terms of effort. This way for attributing causation for female students is widely believed to have negative impact on students' achievement.

Also teachers thought their best male students, when compared to their best female students, were more competitive, more logical, more adventurous, volunteered answers more often to mathematics problems, enjoyed mathematics more and were more independent in mathematics.

In general, Fennema et al (1990) pointed out differences in teacher expectations of female students and male students which lead the teachers to overrate the males' mathematical capability and to underrate the females. Furthermore, when males fail in mathematics, teachers have indicated that it is because the teachers failed to help them. In addition, teachers frequently have higher educational expectations for boys than for girls Hilton and Berglund, (1974) and believe that boys are better than girls at mathematics Casserly, (1975). They even became fearful and the females would fail and became emotionally upset if the females were unable to solve difficult mathematics problems.

The results from the same study showed that female students themselves reported that the teacher appeared to believe that mathematical problem solving was not useful for them. As pointed out by Fennema, while there is no conclusive evidence that teachers believe that mathematics is more appropriate for males than for females, wherever evidence exists, it indicates that teachers tend to stereotype mathematics as a male domain. Such stereotyping results partially in differential treatment of males and females

in classrooms and undoubtedly influences the development of gender differences in mathematics.

Reyes and Stanic (1988) described that the important teacher beliefs that influence the development of gender differences in mathematics are their attitudes about 'the aptitudes of students and the appropriateness of their achieving at a high level in mathematics that differs on the basis of sex'. Fennema generalizes that: While there is not always conclusive data about teachers' beliefs in relationship to females, males and mathematics, when data are available they indicate that teachers' beliefs are somewhat negative about females and the learning of mathematics, there are some negative consequences of what could be interpreted as negative teacher beliefs.

Nevertheless, at the same time, she cautioned us that it is inappropriate to over generalize the data and thereby conclude that teachers are overtly biased against female students.

2.4 Teacher experience and learner acquisition of number work

Experience can be seen as a reliable prediction of a person's ability to handle a certain job. According to Irumbi (1990) teaching experience is frequently included as a variable in educational research. Kimani (1991) found out that mathematics teaching and experience and mathematics grade achieved in primary teacher examination were significantly related, the assumption being that those with high grades will be better teachers of mathematics. He found out that none of those who had taught mathematics for six or less years attained a distinction as compared to 20 who got a distinction after having taught for six or more years.

Kimani (1991) found out that the practice of teaching Mathematics and keeping up with new knowledge could have influenced the achievement in mathematics. He recommended that to produce quality mathematics teachers, teaching experience should be sufficient before admission is in service course. Bell (1978) noted that experience should be useful in ensuring that teachers select an appropriate teaching model. Barne (1985) observed otherwise by pointing out that teachers select effectiveness, while it may increase through the early years of teaching, it may not directly follow the same pattern in later years of teaching. Barnes also observed that the teaching career probably does not continue to do so, he assert that the teaching career does not do so in a linear fashion. He noted that a suggested in a substantial proportion of the studies, increases in teaching experiences at least after the early years in the classroom are associated with tendency for teachers to reject innovations and alterations in educational policies.

Teacher experience is a topic of potential concern to policy makers, because experienced teachers often try to move to classrooms with a more knowledge and higher resources. Thus, if teacher experience is related to student achievement and more experienced teachers are able to some extent select the schools and districts in which they teach, or even their teaching assignments within a school, poor students and students at risk of educational failure may end up being doubly disadvantaged because they are more likely to be taught by inexperienced teachers.

Greenwald, et al (1996) found in their meta-analytical study that teaching experience had a positive and significant effect on student achievement. Hawkins, et al (1998) found evidence that although teaching experience appears to be related to student achievement,

the relationship may not be linear, students whose teachers had fewer than 5 years experience had lower levels of mathematics achievement as measured by the NAEP mathematics assessment. But there were no difference in mathematics achievement among students whose teachers had more than 5 years experience.

A number of writers have focused on studying what experienced teachers think about the skills they use in teaching. Leinhardt and Eireeno (1996), for example, argue that teaching is a complex cognitive skill based on knowledge about how the content should be taught. The skill enables the teacher to construct plan and make rapid decisions in the light of changing circumstances. They argue that experienced teachers develop sets of organized actions which they can apply with little mental effort in appropriate situations. Experienced teachers have a ready recourse to an appropriate set of behaviors from which to select. The behavior most appropriate to the immediate demands of the situation whether it is dealing with a child who is unable to answer a question posed or noticing a child who is not concentrating and day-dreaming.

A teacher's interpretation and implementation of reform recommendations and a new curriculum material are influenced by his or her conceptions of mathematics teaching and teaching Lloyd (1999). Several records reports suggest that because teachers' existing beliefs and current practices are often deeply tied to traditional mathematics pedagogy, innovative curricula can be very difficult to implement Cohen et al (1990) and Wilson & Lloyd (2000). Further research is needed to understand how teachers' goals and conceptions influence the ways they interpret reform recommendations and materials in the classroom.

A teacher's past experience acts as the teacher and sharpener for better understanding of subject to be learnt as one is able to relate new concepts to similar ones learnt earlier. Experience depends on what one had acquired earlier, and how one applies it to new learning. Studies conducted by Bandura(1977) and Gumo (2003) on the above explanation, suggested that a teacher with many years of teaching has learnt more on job and is able to make comparisons, inter-relationships and connection which enhance refinement of what they already know. This makes a more experienced teacher better to handle mathematics activities in the process of teaching appropriately than a teacher who has just completed his or her training.

2.6 Theoretical Framework

The work was based on constructivist theory as stipulated by Piaget(1980).Constructivist approach refers to what the teacher does in order to empower the children to interact with the environment so that they construct knowledge and get meaning from it.

The teacher's role is researching on children's experiences and to provide opportunities for children to explore the environment. He or she should use concrete materials from the children's environment while teaching so that they interact with familiar experiences. Piaget adds that the teacher should also plan activities for learning that have problems for children to solve as this makes them responsible and better problem solvers. Constructive learning makes children to be active searchers of their knowledge; they take responsibility of their learning which aids in their scaffolding. In turn this helps them in acquisition of higher level skills and enhances their social learning especially through interaction with each other.

Intellectual development in Piaget's theory is further determined by two main interactive factors which are maturation and experience. The application of Piaget's formal schooling is based on timing or readiness, Curriculum content and teaching strategies. The teaching strategies are more than what the curriculum has in order to effect on the intellectual development Kamui (1974).Piagetian concepts of teaching strategies have more advantages over other strategies in the sense that the children are active, purposeful, goal seeking and continuously interact with the environment.

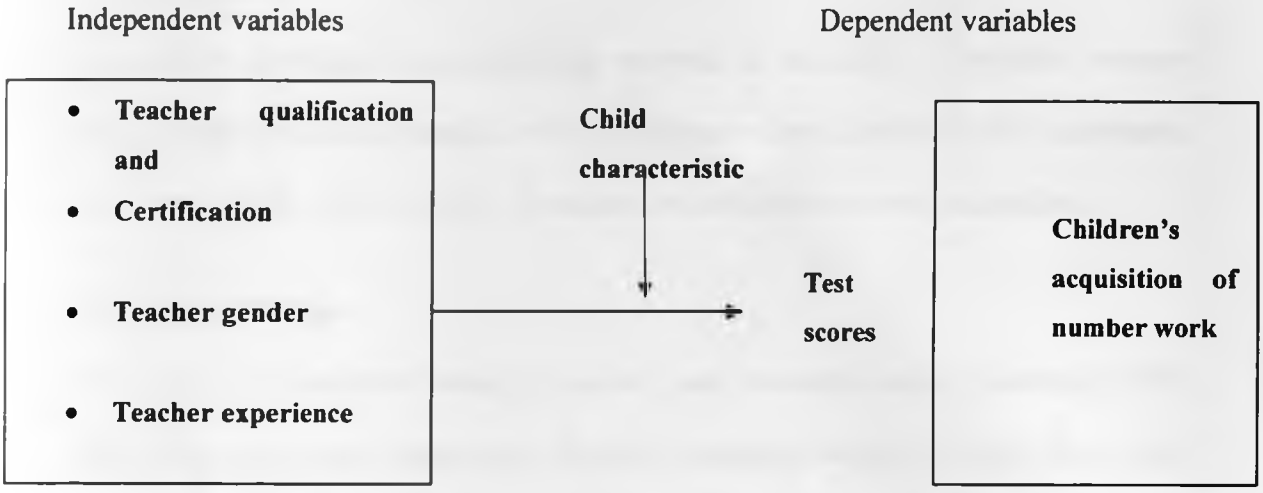
Piaget said that education given to children should be functional and useful for future life. It should be pragmatic centering more on what the child should do. Therefore teacher characteristics are very important in facilitating how children construct knowledge for higher level achievement, independence and self actualization.

2.7 Conceptual Framework

The conceptual framework shown below describes the various factors, which interact, hence determine how children acquire number work skills in the process of learning. Some of these factors include: Teacher qualification, teacher gender, and teacher experience.

The conceptual framework is shown below;

Figure 1: Conceptual Framework



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the methodology adopted in the study. It includes: research design, target population, sample and sampling procedures, data collection instruments, instrument validity and reliability, procedure for data collection and data analysis.

3.2 Research Design

The study was conducted using an *ex-post facto* research design. Kerlinger (1973) defined an *ex-post facto* design as "a system of empirical enquiry in which the scientist does not have direct control of independent variable because their manifestations have already occurred and because they are inherently not manipulable". 'The independent variables in ex-post facto design cannot be manipulated because they are genetically fixed circumstances do not allow manipulation or the cause as culturally ingrained.

An *ex-post facto* design was useful because the variables for this study namely: teacher experience, teacher qualification among others had already occurred. The *ex-post facto* design was recommended as the most suitable for educational and social research since many research problems in social and educational research do not bend themselves to experimental inquiry Kerlinger (1973).

3.3 Target population

The target population refers to a group of items objects, people from which samples are taken for measurement (Mugenda and Mugenda (1999). The population of the study consisted of pre-school teachers and children in public pre schools in Ugunja district.

There were one hundred and twenty teachers and one thousand two hundred children where the study was conducted.

3.4 Sample and Sampling procedures

Sampling is the procedure a researcher uses to gather people, places or things for study. It is a procedure of selecting a sample from a population such that the sample is representative of the characteristics of the entire group Orodho and Kombo (2002).

In this study, the sampling technique was simple random sampling because the population was clearly defined and relatively small. A sample size of 30% of the population is enough (Mugenda & Mugenda 2003). The researcher therefore randomly selected 30% of 120 teachers in public pre-school in Ugunja district which gave a total of 36 teachers.

All the pre-school children of the sampled school were selected using simple random techniques this was done by identifying the children to be involved in the research by picking 10 names to form the sample for the children.

Data for achieving objectives of the study was obtained from primary sources. The study used primary data because such information is original, unaltered and is a direct description of occurrence by an individual researcher (Mugenda and Mugenda(1999), primary data was sourced through self administered questionnaires and personal observation by an investigator from the samples picked.

3.5 Data collection instruments

Three instruments were used to collect data for this study: questionnaires, documentary analysis and observation checklists.

Data collection instruments are used in securing information concerning phenomenon under study from a selected number of respondents' Mulusa (1988).

3.5.1 Questionnaires

The questionnaires used in this study were for teachers because they were literate and capable of answering questionnaire items adequately.

3.5.2 Documentary analysis

Documentary analysis was appropriate for the study because it gives valid information since it cannot withhold any information needed. It enabled the researcher to obtain information regarding teachers' preparation records like schemes of work, lesson plans and various class activities done by children, majorly in number work. Its usage was critical since the researcher obtained data at convenient and it saved time. However, the researcher did not have control over the respondents because she relied on recorded information.

3.5.3 Observation checklists

This is a form in which observation of an object or a phenomenon is recorded. The purpose was to check: teacher preparation, classroom management and the mathematics learning corners. The researcher recorded evidence or observed phenomenon by placing a check in the appropriate column and comments written down in the section following each checklist.

3.5.4 Pre-testing of research instrument

Piloting was done in two pre- schools with two teachers on the basis of ability to generalize data. The purpose of pre-testing was to assess validity and reliability of each of the items in the questionnaire and the suitability of the language used in the instrument (Mulusa 1988). Drafted items were piloted in order to avoid threats to reliability, revealing vague questions and unclear instructions Gay (1991).

3.6 Validity of the research instrument

Validity of the instruments represents the degree to which a test measures accuracy and relevance of inference made based on research results (Mugenda and Mugenda, 2003). A pilot test was used to test content validity of the instruments in the schools that were not included in the sample school to discover weakness, inadequacies and ambiguities among other problems associated with the items in the instruments. Two teachers were involved in pilot testing of the questionnaires. The findings from the pilot study helped to improve the final instruments and to remove ambiguity.

3.7 Reliability of the research instrument

This is the ability of the research instruments to produce same results consistently. The reliability of a test is usually expressed as a correlation coefficient. In this study, researcher used split halves, stability of items techniques to establish the reliability of the research instruments. To establish reliability, the researcher checked objectives, research questions and the literature review to ensure that the items on the questions covered the objectives and research questions. The instruments were piloted before the actual data

collection in the two schools which involved two teachers in the schools which were not under the study to avoid contamination of the results.

3.8 procedures for data collection

Before presenting the instruments to the subject study, the researcher first did the pre – test to some teachers and a few children. The researcher also trained three teachers who were to help in the study by collecting data from their colleagues. In the field, the researcher introduced herself and also explained the purpose of the study.

The reception from the interviewees was warm and they were ready for the interview. The interviewees preferred to go through the questionnaires of which the researcher gave time to do so. Some teachers went through the questionnaires and answered immediately but some requested for some time of which the researcher accepted.

Finally the researcher collected and assembled all the data sorted and read through all of them. Each questionnaire was analyzed by the researcher. Due to the nature of the study, findings from the observation were analyzed qualitatively.

Thus the procedure for data collection conducted allowed a thorough analysis of finding out teacher characteristics on acquisition of number work skills among pre school children in Ugunja District of Siaya County.

3.9 Procedures for data Analysis

After pre-testing the instrument with the teachers, research was carried out. Data obtained from the field in raw form is difficult to interpret (Mugenda and Mugenda 1999). Such data must be cleaned, coded and key-punched into a computer and analyzed, using statistical packages for social Sciences [SPSS].

The researcher gathered all the instruments, for data coding and subsequent analysis. Simple descriptive statistics such as frequencies and percentages were used because they can easily be interpreted by many people. For every item in the questionnaire responses was coded in a tally sheet, the percentages were calculated from frequencies obtained. Information obtained from documentary analysis was compared against findings from observation checklist and questionnaires. The results are reported in the tables showing the frequencies and percentages, the result of the analysis are discussed in the preceding chapter.

CHAPTER FOUR: FINDINGS AND DISCUSSIONS

4.0 Introduction

The purpose of this study was to investigate teacher characteristics on the acquisition of number work skills by pre-school children in Ugunja District of Siaya County. This chapter presents analysis and interpretation of data collected with the aim of establishing the extent to which teacher characteristics can influence children's acquisition of number work skills.

4.1 The relationship between Teachers' academic qualifications and children's acquisition of number work skills.

Table 4.1 shows all the 36 teachers who indicated their academic level in interview schedule.

Table 4.1 Teacher's academic qualifications

Academic qualification	Number	Percentage
KCPE	9	25
KCSE	24	66.7
CPE	3	8.3
TOTAL	**36**	**100**

Table 4.2 Teachers' professional

Qualification	Number	Percentage
Untrained	9	25
ECDE Certificate	18	50
ECDE Diploma	9	25
ECDE Degree	0	
Total	**36**	**100**

Table 4.3 Teachers' academic qualification and number work performance

Academic qualification	Frequency	Percentage	Performance in number work activities Mean score
KCPE	9	25	44
KCSE	24	66.7	80
CPE	3	8.3	42
TOTAL	**36**	**100**	**55.3**

Table 4.4: Teachers' professional qualification and number work performance

Academic qualification	Frequency	Percentage	Performance in number work activities Mean score
Untrained	9	25	42
ECDE Certificate	18	50	60
ECDE Diploma	9	25	78
ECDE Degree	0	0	
TOTAL	**36**	**100**	**60**

Table 4.3 and 4.4 indicates that most of the pre-school teachers were of secondary school education with a percentage of 66.7 % KCPE represented a percentage of 24% and CPE had 8.3%. Gumo (2003) who conducted a study in Kilifi on the relationship between academic qualification and children's achievements noted that low academic achievement of children are as a result of teachers' low academic achievements.

In addition, Piaget (1980) emphasized that since children have their own perception of the world, to explore it in order to broaden their perspective, they need to be provided with stimulating materials with which to construct knowledge. A well trained teacher

would therefore research on the children's experiences and provide them with opportunities to explore the environment using concrete materials for their environment.

From the findings, it was true that most teachers were academically and professionally adequate to provide the necessary instruments that would help children acquire the skills in mathematics activities.

4.2 The relationship between Teachers Experience and children's acquisition of Number work skills.

Information on the amount of experience in the teaching profession and in the teaching of mathematics was sought from the teachers. The results are summarized below:

Table 4.5 Teachers' experience

Years of experience	Number	Percentage
4-6	9	25
6-8	12	33.3
8-10	15	41.7
TOTAL	**36**	**100**

Table 4.6 Teachers Experience and Number work Performance

Years of experience	Number	Percentage	Performance in number work activities Mean score
4-6	9	25	55
6-8	12	33.3	68
8-10	15	41.7	85
TOTAL	**36**	**100**	**69.3**

From the interview 25% the teachers had taught for between 4 – 6 years, 33.3% had taught between 6-8 years and 41.7% had taught between 8-10 years.

Table 4.5 indicates that there were more teachers 41.7% who had a lot of experience in the teaching of pre-school children. Very few teachers had less length of service (4-6 years).

Gumo (2003) and Otieno (1980) asserts that a teacher's past experience acts as the sharpener for better understanding of subject to be learnt as one is able to relate new concepts to similar ones learnt earlier. In this case there is evidence that there is high level of number acquisition skills among pre-school children due to many years of experience among pre-school teachers.

4.3 The relationship between teacher gender and children's acquisition of number work skills.

Table 4.7 Teachers by Gender

Teachers' Gender	Number	Percentage
Male	4	11.1
Female	32	88.9
TOTAL	**36**	**100**

Table 4.8 Teacher gender and number work performance.

Teachers Gender	Frequency	Percentage	Performance in number work activities Mean score
Male	4	11.1	57
Female	32	88.9	86
TOTAL	**36**	**100**	**71.5**

From the table above there is evidence that female teachers were better in teaching mathematics compared to male teachers. This is because the means score performance in number work activities was 86% by female teachers and 57% by male teachers. Unfortunately there were only four male teachers in the teaching force. At this point it is good to incorporate at least some more male teachers for affirmative action. This will give a chance for children to get some role models especially the boy child. It is also important for identity purposes.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter gives an overview of what ahs been tackled in the chapters above in a summary. It also highlights the conclusions made based on the findings of the study as well as the recommendations that can be employed by stakeholders to improve on number acquisition skills by pre-school children.

5.1 Summary

The study sought to find out the influence of teacher characteristics on the acquisition of number work skills by pre-school children in Ugunja District of Siaya County. The relationship between the academic qualifications of a teacher and a child's acquisition of number work skills, the relationship between gender of a teacher and the acquisition of number work skills by a preschool child, and the relationship between teacher experience on the acquisition of number work skills by a preschool child.

The study population involved all the teachers in public preschools as well as the children. The specific sample constituted of 36 teachers and 10 children. The instruments in collection of data were questionnaires, documentary analysis and observation checklist. These were designed to suit the different groups of respondents depending on the kind of information that was collected from each group. The data collected during the study was then coded and presented in tables. The responses from various respondents formed the basis for this analysis as well as the information obtained from data review.

5.2 Conclusion

From the research analysis in respect to the objectives of the study, the findings of the study established that out of the 36 teachers sampled, only four were male, this showed that all the preschools are dominated by almost all female teachers, majority of the teachers have secondary education.

Most teachers under the study were academically, professionally qualified except a few who hold CPEand KCPE certificate and were not trained.

The finding also revealed that teachers' teaching experience influence children acquisition on number work skills in Ugunja District. Teachers who had a highest experience interacted well with the children hence higher mastery of the number work skills by the preschool children.

5.3 Recommendations

Since this study was only interested in teacher's characteristics (in terms of academic qualifications, experience and gender on number acquisition among preschool children). There is also need to conduct a further research on why male teachers are not venturing so much in teaching pre school children.

The study was conducted in Ugunja district, there is need to conduct a similar study in the other district of Nyanza province in order to find out how teacher characteristic affect number acquisition among preschool children. A study should also be conducted among the preschool parents and managers to seek their view in regard to provision of teaching/learning materials to enhance number work skills among preschool children.

The research study was limited to the teacher characteristics influencing children's acquisition of number work skills. Further research can also be carried out on the influence of the teacher characteristics on other activities in the early childhood programme.

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APPENDICES

APPENDIX I: QUESTIONNAIRE FOR MATHEMATICS TEACHERS

INSTRUCTION

The questionnaire is designed to gather information on number work acquisition among pre-school children in Ugunja to be used in the study of "Effect of teacher characteristics on the acquisition of numbers work among pre-school children.

The questionnaire is divided in 4 sections, please complete each section as instructed and respond to each question by ticking (√) the appropriate response or by giving your own opinion as truthfully as possible.

Your responses will be completely anonymous and will be used by the researcher for the purpose of this study only. All information in this questionnaire is CONFIDENTIAL. DO NOT WRITE YOUR NAME OR THE NAME OF YOUR SCHOOL anywhere in this questionnaire

Please tick (√) the appropriate response to the question below;

What is your age in years?

What is your gender?

Male ☐ Female ☐

What is your highest academic qualification?

Form 4 ☐

Certificate ☐

Diploma ☐

Degree ☐

What is your mathematics teaching experience in years_____?

How many times do you teach mathematics in a week?

Are you rewarded for making children do well in mathematics?

Yes ☐ No ☐

If yes how are you rewarded?

Thanked ☐

Certificate ☐

Tokens ☐

Certificate and tokens ☐

Do you have any formal training in E.C.E?

Yes ☐ No ☐

Have you ever attended a refresher course in teaching mathematics in E.C.E.?

Yes ☐ No ☐

How many years have you taught in E.C.E. school?

0-2 years ☐ 3-6 ☐ 7-10 ☐ 11 and above ☐

Which activity area do you teach?

1 ☐

2 ☐

3 ☐

What is the level of children in learning number work?

Low achievers ☐ Average ☐ High Achievers ☐

How do you help children that are low achievers in mathematics activities? Explain briefly.

a) Are there children in your class who do not enjoy doing number work \

b) If yes, how do you ensure they develop a liking in number work?

Section B: Mathematic Teaching and Learning methods

1) Please fill in the table below the teaching methods you use to teach mathematics in your class by putting a tick (√) against the methods applicable to you.

		Frequency used		
No.	Methods	Frequency used	Occasional used	Never used
1	Role learning			
2.	Drill and practice			
3	Programmed learning			
4	Directed discovery			
5	Guided discovery			
6	Exploratory discovery			
7	Free discovery			
8	Experimentation			
9	Lecture			
10	Deductive			
11	Inductive			

2) How often do you assess children's number work?

Everyday ☐

Weekly ☐

Termly ☐

3) How often do you give tests?

a)

b)

c)

Section C: Mathematics Teaching & Learning materials

1) Please indicate the status of the mathematics teachings and learning materials in your school by ticking the appropriate response.

2) Indicate the answers that most likely approximate your opinions concerning the contribution of instructional resources in the learning and teaching mathematics.

	Instructional materials make learning more concrete				
	Cater for children's individual differences				
	Create a better understanding of mathematics concept				
	Are valuable teaching tools for mathematic				
	Arouse learning interest in children				

APPENDIX II: OBSERVATION CHECKLIST

Planning and preparation

Scheme of work has clear and suitable aims and objectives yes No N/A

The lesson planned with objectives

Appropriate learning activities

The work undertaken by learners is well matched to their needs

Material resources and aids are used Yes No N/A

Comments.....

Classroom management Yes No N/A

Teacher interaction with the children

Evidence of class control

Appropriate time management

Gives clear directions

Discipline

Active participation

Comments.....

Physical environment

Clean Yes No N/A

Colorful Yes No N/A

Safe Yes No N/A

APPENDIX III: DOCUMENTARY ANALYSIS

All information provided will be treated with strict confidence.

Name of the pre-school_____

Name of the teacher _____

Progress record

Class _____ Age_____

Activity area: mathematics activities

Name of the child	Sorting and grouping by color	Pairing and matching	Number recognition	Rote counting
x				
y				
z				
p				