IMPACT OF INSTRUCTIONAL MATERIALS ON THE LEARNING OF NUMBER VALUE IN PRE-SCHOOLS IN MATHIRA EAST DISTRICT, KENYA

By

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A Research project submitted in partial fulfillment of the requirement for the award of a Masters of Education degree in Early Childhood Education to the department of Educational Communication and Technology, University of Nairobi

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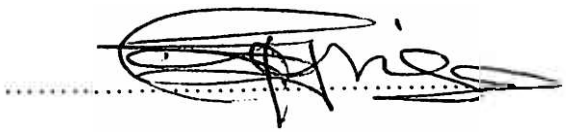
DECLARATION

This project is my original work and has not been presented for any academic award in any other university

..... 15/11/11.....

Eunice Wambui Gichuki Date

This project has been submitted for examination with our approval as university supervisors:



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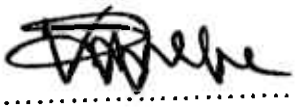

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DEDICATION

I dedicate this work to my family and most sincerely my daughters, Tracy and Stacy for supporting me during the time of the study. My mum who supported me through prayer and guidance, she was a source of strength.

ACKNOWLEDGEMENT

I wish to acknowledge those people whose contributions made it possible for me to complete the study. To my lead supervisor Dr. Japheth Origa whose effort and dedication I can't fail to recognize, and my second supervisor Mr. Kepha O. Marube for his guidance during the proposal writing and the final report writing. To the heads of preschools and preschool teachers for their consent and will to administer and conduct the teaching experiment in their schools, and the preschool children who participated in the study.

To the proprietors of Rafiki Bookshop Karatina, for the assistance offered in terms of materials and text books and guidance.

TABLE OF CONTENTS

CHAPTER THREE: RESEARCH METHODOLOGY

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The study investigated the impact of instructional materials on learning of number value in preschool in Mathira East District, Kenya. The study aimed at achieving the following objectives; determining the impact of instructional materials on transfer of number value skills to simple computations in preschool mathematics; examining the impact of instructional materials in helping children with learning difficulties in number value; and finding out the impact of learning materials minimizing the conceptual errors in learning number value in preschool. A teaching experiment that involved constructivism approach to determine the learning of number value was used. Preschool children aged between 4 to 6yrs participated in the study in Mathira East District in Kenya.

The study used quasi experimental design to test the effect of materials used to teach number value by incorporating an experimental group and a control group. The sampling method used combined stratified and random sampling procedures where the schools were stratified into urban and rural categories. Random sampling was applied in classifying the schools into experimental and control groups. Data for the study was collected from pretest scripts, post test scripts, questionnaire and observation schedule. The data was analyzed both quantitatively and qualitatively using averages, standard deviation and correlations, and presented through charts, tables and graphs.

The findings of the study suggest that use of instrumental materials on learning of number value has a positive impact. Children learn better when they construct their knowledge through use of manipulative materials. At the same time, learning materials help to minimize the learning difficulties and errors in number value. The study recommended the use of materials, instructional approach and production and supply of materials in order to boost acquisition of number work skills in young children.

CHAPTER ONE

INTRODUCTION

1.0 Background to the study

According to Kipkorir and Njenga (1997), the pre-school activities (mathematics activities) which provide mainly for early stimulation, emphasize the use of learning and play materials and real life experiences as a way of providing effective learning to children. As the children manipulate materials, explore and experiment, they develop language and reasoning skills and acquire concept of world around them.

Mutunga and Breakell (1992), say that the general aim of teaching mathematics should be to develop: a positive attitude to mathematics as an interesting subject; skills and knowledge enabling a quick recall of basic facts; an ability to think clearly and logically in mathematics with confidence and flexibility of mind; an appreciation of the creative and aesthetic characteristics of mathematics, especially of pattern and relationship and an appreciation of nature of numbers and space. They conceive teaching of mathematics as where students (children) engage in purposeful activities that grow out of problem situations requiring reasoning and applying information, discovery, inventing and communicating ideas.

In Kenya, mathematics is a compulsory subject up to the secondary school. The objective is to produce an individual who will be able to fit in the current world. The reason is that the subject is applied in almost all the school subjects and beyond. This means that good performance in mathematics is necessary, and Early Childhood

Education is the foundation for the learning of basic skills and further development of mathematical knowledge. Therefore a lot of emphasis should be put on teaching of mathematics at pre-school level. Mathematics for young children lays a foundation of the concepts and skills on which future learning and operations are built. Mathematics helps children to make sense of their world outside school as well as helping them construct a solid foundation for later success in school (Mwangi, 2009).

Early childhood activities should be practical with plenty of manipulative materials such as sticks, charts, stones, seeds, strings and bottle tops. These activities should enable children to expand their understanding of number, shape, size and pattern. Teaching of mathematics should enable children to understand number symbols and number value. Children should be provided with experiences through activities (Mwangi, 2009).

Due to a personal experience and interest in mathematics, a strong urge to conduct a research on pre-school mathematics has developed with time. This led me to conduct a pre-experimental survey in Mathira East District involving five private schools, five public schools and a local council school, aimed at finding out the common problems that children encounter during learning of pre-school mathematics (number work). The survey revealed that the most conspicuous problem in both the public and private pre-schools is the problem with number value. The pre-school teachers in all the schools indicated that children either count beyond the required number or skip the counting because of being too fast. The speed of counting was attributed to the rote counting, which is commonly used during introduction of number work.

The other very common problem was reverse of numbers, where children during number formation write them as mirror images. Recognition of numbers was also a problem to most pre-school children, where a child is not able to identify a number from a group of numbers this affects addition and subtraction. Teachers noted that when children are asked to sort out numbers some have difficulties identifying the required number. Some children also skip numbers during rote counting, which is the base to number work. The teachers seemed to have a general view that children at pre-school perform very well in mathematics, if introduction to number work is done well and especially by use of materials.

From the survey the teachers seemed to peg their problems and challenges when teaching mathematics to the children. They claimed that when a child or a few children have problems, they struggle to teach because they keep repeating. At the same time most of the children with these problems have to be given individual attention which sometimes is hard especially in public schools due to the large number of children in a class. Teachers from the public schools and the local council claimed that materials were a challenge to them, since they were not enough. This was because the parents in these schools did not provide for their children well.

From this survey the problem of number value among the pre-school children seemed to the researcher a drawback to future performance in mathematics in other levels. A child who has problems with number value cannot do simple calculations like putting together (adding) or counting of objects and writing the value. The researcher strongly felt that although the pre-school teachers are aware of the problems that the children encounter

in learning mathematics , the use of instructional materials seem to be rare or completely absent. Learning of number value at pre-school requires manipulative materials, which in this case becomes part of the learning environment which should be created by the teacher. Learning by use of manipulative materials brings better retention than by rote learning.

There was need therefore to conduct the present study to establish the impact of learning resources in teaching of number value in pre-schools.

1.1 Statement of the problem

Mathematics in early years is approached through practical activities that children are able to perform. During this time they need the support of concrete experiences to understand mathematics concepts. Materials should form a focal point and attract attention, arouse interest and promote a desire to learn. Use of materials promote retention and memory, and promote active participation of the children. In most pre-schools, as observed in the pre-survey experiment, instructional materials were not available. This meant that pre-school teachers used rote learning when teaching mathematics (number value). As indicated from the pre-survey experiment, number value was a challenge to most pre-school children. Lack of materials inhibits proper learning of number value and therefore affects the simple computations that the children perform at pre-school.

Children at pre-school have learning difficulties in number value, for instance a pre-school child know the proper counting sequence, but fail to maintain proper relationship between the objects being counted and the number names. The child rote counts and

points at the objects but does not provide a name for each of them. They lack number names in proper sequence or have no consistency in providing a number name for each object being counted.

Considering that children learn through play and through use of concrete materials which stimulates them to participate in activities, it was of importance therefore to carry out a study on the impact of instructional materials in learning of number value in pre-school.

1.2 Purpose of the study

The purpose of the study was to determine the impact of instructional materials on learning of number value by the pre-school child. The study also aimed at helping to identify the difficulties that the children experience when learning number value, and the errors that they make.

1.3 Objectives of the study

This study aimed at achieving the following objectives:

i. To determine the impact of instructional materials on mastery of number value in pre-school mathematics.

ii. To determine the effect of instructional materials on the transfer of number value skills to simple computations in pre-school mathematics.

iii. To examine the impact of learning materials in helping children with learning difficulties in number value.

iv. To find out the impact of materials in minimizing the conceptual errors in learning of number value in pre-school.

1.4 Research questions

i. How do instructional materials affect mastery of number value in pre-school children?

ii. What is the effect of instructional materials on the transfer of number value skills to simple addition and subtraction?

iii. How do instructional materials help children with learning difficulties in number value?

iv. What is the impact of materials on minimizing the conceptual errors in learning of number value in pre-school?

1.5 Significance of the study

This study is hoped to provide necessary foundation required for learning higher order mathematics. In addition, it will inform policy makers on the current practice of mathematics activities in pre-school and use of learning materials. Further, it will help the curriculum developers, implementers and the quality assurance officers in developing new strategies on use of materials in pre-school mathematics. The study will provide useful information in the making of policies pertaining to production of mathematics teaching materials that embrace child centered approaches.

1.6 Limitations of the study

Some sampled teachers felt insecure giving information and feared victimization from the administration. Some pre-school teachers in the treatment group did not adhere to the instructional techniques and conditions of the experiment. The researcher sampled four schools whose data was generalized to the whole district.

1.7 Delimitations of the study

The study covered pre-schools in Mathira East District, Nyeri County, Kenya. It targeted Pre-school children aged 4-6 years and pre-school teachers.

1.8 Basic assumptions of the study

The study assumed that pre-school teachers are trained, motivated and experienced in pre-school education and adhered to instructional techniques and conditions of the experiment and use of materials.

1.9 Definitions of key terms used in the study

Child: A person aged 4-6 yrs.

Conceptual errors: Misconceptions made by pre schools children when carrying out number value activities.

Impact referred to effect that the instructional materials had on performance. In the study impact was indicated by significant difference in the scores achieved.

Instructional materials are materials used to aid teaching and learning of number value in pre-school. In the study materials included abacus, bottle tops and seeds.

Learning difficulties: Disabilities encountered by preschool children when carrying out simple mathematical operations e.g. addition and subtraction.

Number value in the study was indicated by the ability to assign quantity to a number.

Number value skills: Abilities in working with numerals and numbers.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section reviews what other researchers have observed in the area of instructional materials and the learning of number value. It has eight subsections containing an introduction, instructional materials in pre-school, instructional materials on mastery of number value, instructional materials on transfer of number value skills to simple computations, learning difficulties in number value among pre-school children, errors in learning number value in pre-school children, theoretical framework and the conceptual framework.

2.1 Instructional materials in pre-school mathematics.

According to Sowell (1989) in her study on students from kindergarten to college age, on a variety of topics, mathematics achievement is increased through the long term use of concrete instructional materials. Students attitude towards mathematics is improved when instruction involve concrete materials provided by teachers. This is in line with Pestallozi of 19th century who advocated the use of manipulative materials in curricula of the 1930's.

Blosser (1985) research related to instructional materials for science, observed that use of instructional materials influence students performance, use of process skills and other outcomes. Instructional materials provide the physical media through which the intents of curriculum are experienced. This concurs with Dienes (1963) cited in Origa(2000),

whose study talked about free play among pre-school children. In free play, learning consists of unstructured activities that permit children to manipulate and experiment with physical representation of the concept to be learned. He proposed the creation of teaching materials that embody mathematical structures and bring them with the realm of concrete experience. Manipulative materials as observed from the studies are necessary in pre-school and especially since the children are in the stage of free play

2.2 Resource materials on mastery of number value.

Origa (2000) reported that the absence of practical activities in mathematics teaching imply that the use of manipulative materials that provide more opportunities for incorporating mathematical activities is a rare occurrence. Dienes (1963) cited in Origa (2000), proposed that teaching materials embody mathematical structures and bring them within the realm of concrete experience. Acquisition of new knowledge is largely attributed to the interaction between the learner and the learning environment since it is during the process of interaction that the learners existing structures are adjusted to accommodate new knowledge. This concurs with Jean Jacques Rousseau (1712-1778) when he observed that children interact actively with materials that appeal to their senses. He had the idea of naturalism where he felt that a child should be educated by his/her surrounding (Krough et al 2001). In keeping with the natural development, the materials are more open-ended and their use is determined by the children. For instance mathematics materials might be sticks brought in class by the children. .

Olatunde (2010), in the study showed that students exposed to the use of mathematics laboratory performed better than those that were not exposed. He noted that a

mathematics laboratory is supposed to have enough materials and equipment. The study recommended that mathematics laboratories be established in every school and more teaching aids be provided for effective students learning.

Gagne (1962), a cognitive behaviorist translated behaviorist and information processing principles into practical applications for instruction and training. He believed that in the system of instruction, intellectual skills must be developed structurally, linearly and in sequential steps. Higher level skills cannot be achieved until basic or fundamental skills (pre-school mathematics) are first established. He talked of learning hierarchies where the acquiring of lower skills prior to higher levels is important (Rebecca and Moncrief, 2007). Pre-school mathematics is the foundation to future and high order mathematics and it's therefore of importance to gain mastery of number value through use of materials so that children are actively involved.

2.3 Instructional materials on transfer of number values skills.

Khoima (2006), in his study noted that when learners are provided with the right learning environment their individual difference is minimized. In his study on mastery learning in mathematics, he noted that the key component when planning for mastery learning is activities and materials necessary as per the unit objectives. Learning by doing raises learners' level of recall and retention of mathematics concepts in long term memory. This is in line with Locke who said that materials must have a learning goal connected to them. He also believed that environment must be controlled so that children learn what they should know. For instance in mathematics games using

concrete materials, card boards cut-outs letters used in creating simple words or wooden puzzles, all are sensory and have a specific learning goal (Krough and Slentz 2001).

A study by Kananu (2005), found a strong relation between resource availability and effective use as related to achievement. She noted that physical facilities and teaching/learning materials are important determinants of pupil's performance in mathematics. Teaching /learning aids facilitate the process of teaching and learning in mathematics. Availability of these materials and resources determines the performance in mathematics, which requires a lot of practice, discussion and demonstration. Kananu observed that physical facilities and instructional materials largely determine what pupils learn in schools. Learning and teaching aids increase chances of greater perception, understanding and retention rate. Kipkorir and Njenga (1997) noted that curriculum and other support materials developed at the National level and the guideline for pre-schools in Kenya and the teacher Education syllabus, are merely guidelines allowing room for adaptation to suit different environments. Localized materials in form of stories, riddles, poems and children games and play are also available, and are culture specific.

Instructional materials as noted by the studies conducted will largely determine how the pre-school children learn number value and transfer the skill to simple computations such as addition (putting together) and subtraction (taking away).

2.4 Learning difficulties in number value.

Jordan (2010), in her study on early predictions of mathematics learning difficulties observed that the difficulties are widespread and up to 10% are diagnosed with learning disability in mathematics at some point in their school career. She revealed that most children with difficulties in mathematics are characterized by weaknesses in secondary symbolic number sense related to the whole numbers, number relations and number operations. She suggested that foundational number sense supports the learning of complex mathematics associated with computation as well as applied problem solving. The researcher noted that most children enter school with number sense that is relevant in learning school mathematics.

Dowker (2004) observed that many children have difficulties in, mathematics and a significant number have specific difficulties. However such difficulties appear to be equally common to boys and girls. Among the difficulties noted in the research is the representation of number value. The study suggested that intervention can take place successfully at any time but it's desirable at an early age, because mathematics difficulties can affect performance in other aspects of curriculum. Dowker (2004), proposed one strategy for dealing with mathematical difficulties within a class in pre-school as to expose such children to mathematical activities and games. She also emphasized the need of presenting materials in a variety of forms to cater for individual differences.

Gersten, Clarke and Jordan (2007) study intended to develop a screening measure to identify children with difficulties in mathematics. They observed that numerical

concepts that children acquire in early childhood lay the foundation for later acquisition of advanced mathematical concepts. The difficulties observed include students understanding of magnitude, ability to count and competence with basic arithmetic process.

2.5 Errors in learning number value among pre-school children.

Research in this area is rare and most studies have dealt with other areas at different levels. A study by Fong (1993) showed that children errors in mathematics centers on computation and word problems. The computation errors was in the four operations (that is addition, subtraction, multiplication and division) He noted that children who consistently commit the same type of errors were probably not careless, but the errors were a reflection of cognitive styles or stage of development. The study was done on children of 11+ years and therefore a study on pre-schoolers is necessary in order to help generalize or come up with new results.

Houssart and Weller (1999) study on misconception and errors in primary mathematics aimed at understanding the misconceptions and errors and understand how to remedy them. Some of the errors identified children over generalizing in their attempt to explain patterns that they notice, counting errors where children miss out objects when counting or counting more. On counting error, the study suggested that children should touch objects as they count. They also noted that careful explanation, discussion and interaction are the best way to tackle and overcome misconceptions and errors in the classroom. Other studies involve other areas of pre-schools like the attitude of teachers towards teaching of pre-school mathematics by Bitengo (2005). In her study she noted

that teacher's attitude towards teaching of mathematics are believed to be an important factor in determining the teaching and learning of mathematics.

The study on errors in number value is needed to generalize similar findings in preschool or come up with new findings. This study therefore is necessary since it will help to unravel the errors and the interventions to assist in solving the problems.

2.6 Theoretical Framework

This study was anchored on the constructivist theory which says that learners actively construct knowledge for themselves. Constructivism is a synthesis of multiple theories diffused into one form. It is the assimilation of behaviorist and cognitive ideals. According to constructivists, learning may be defined as a process of constructing meaning; it is how people make sense of their experience. Constructivists dismiss the active role of a teacher, but modify the role so the teacher helps children modify knowledge rather than reproduce. The theory views learner activities as paramount in the learning process that begins with relevant experience, background knowledge and proceeds through experimentation. A central idea within constructivism is that learners play an active role in their own learning process so their interests, prior knowledge and past experience should be taken into account when deciding the curriculum, the content, the method and evaluation of the learning process.

According to Rebecca and Moncrieff (2007), students (children) make concepts their own by manipulating concrete objects through hands on activities, by playing with realia and having a concrete relationship with their environment. Constructivists believe

that knowledge is not transmitted but constructed through hands on activities or personal experiences which generate knowledge. The activities should be learner centered rather than instructor led. The proponents of constructivism include: Jean Piaget who theorized that human intellectual development progresses chronologically through sequential stages. For purposes of this study the second phase is important, which is the pre-operational stage (2-6yrs). Children at this stage are very selfish and individualistic, and cannot reverse their thinking but can reverse their actions. Piaget sees children as continually interacting with the world around him/her solving problems that are presented by the environment and learning occurs through taking action to solve the problem.

Piaget's theory of constructivism emphasizes learning rather than teaching. He says that knowledge is constructed by the learner rather than transmitted by the teacher. He views learner activities as paramount in the learning process that begins with relevant experience, background and knowledge and proceeds through experimentation (Kieran, 1985).

Jerome Bruner (1915-1972) initially describes learning rather like Piaget; he was an advocate of learning by discovery and talked about improvement of learning .Bruner points out that one must consider three areas of learning, which are the environment, structure of knowledge and sequence of materials. Bruner points out that the teacher must create an environment where the desire to learn is stimulated and where children are free to discover mathematical concepts. As for the structure of knowledge , the content should be presented in a form that the child understand, so that the vocabulary, terminology, symbols and examples should only be at the child's level. As far as

sequence of presentation is concerned, Bruner says that there are three levels through which children move: enactive, iconic and symbolic. At the enactive level the child manipulates concrete materials or objects directly, while at the iconic, the child think of objects and deal with mental images or objects. At the symbolic level manipulation is strictly by use of language or words (Mutunga and Breakell (1992).

Bruner's discovery learning concepts supports the notion that learners construct knowledge concepts based on current or past experiences. It involves participation where learners explore concepts, relate ideas and find alternative solutions to problems. This theory is relevant to the study in that children at pre-school are at the pre-operational stage, and activities in pre-school should provide them with experiences to help them in constructing knowledge at primary and post-primary levels where concepts are tested. The activities used when learning number value form the environment from which children construct knowledge.

2.7 Conceptual Framework

The variables in this study included resources, content/number value and difficulties and errors which are the independent variables. Learning of number value is the output which may be through overcoming of difficulties and minimizing errors. The process involved the interventions/interactions and manipulation of materials.

Proper use and availability of teaching/learning materials enhanced learning of number value. The mathematics activities were facilitated by materials and the intervention, which involved manipulation of the materials by the children.

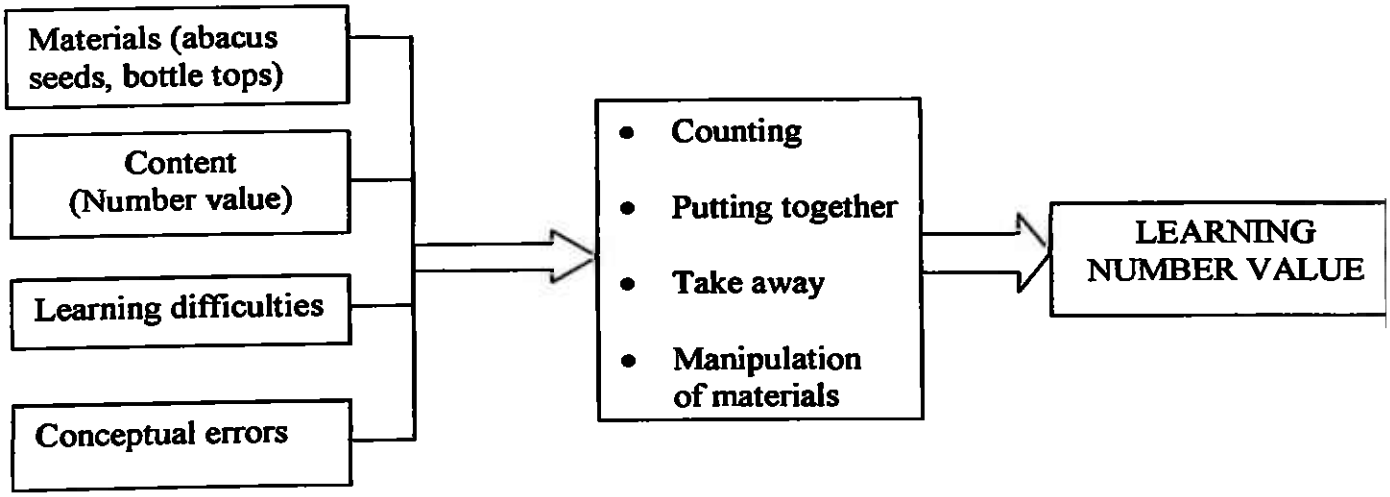


Fig 2: Conceptual framework

Source: Author (2011)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This part describes the research design, target population, sample size and sampling procedures. It also describes research instruments, instrument validity and reliability, data collection and data analysis techniques.

3.1 Research Design

This study was conducted using quasi experimental research design. The design was considered appropriate since the study involved the study of behavioural change which requires that the comparison of control and experimental groups. An experiment according to Ogula (1998) is a controlled project conducted for the purpose of testing a hypothesis or effect. It incorporated pre-test, a teaching experiment and a post test. It consisted of two groups, an experimental group and a control group. The experimental group received a new treatment while the control group received normal treatment. The experimental group learnt using materials for children to manipulate and perform hands on activities such as counting and matching.

The materials included abacus, bottle tops and seeds. The groups were identical in every way possible. In teaching experiments, more refined information is usually obtained with a small number of participants. According to the design, one experimental group required one control group; hence schools were purposefully selected from the District.

3.2 Target Population

A target population is the entire group of individuals, events and objects with common observable practice. It may also be defined as the entire group of population in a category. The research was done among the pre-school children in public in Mathira East District. According to statistics there are 37 public pre-schools in the district with a total of 2693 children.

3.3 Sample size and sampling procedure

Best and Khan (1998), say that a sample is part of a population selected for observation and analysis. According to Borg and Gall (1998), sampling is a research technique used for selecting a given number of subjects from the target population. The study involved public schools as noted in the pre-experimental survey. To cater for both public rural and urban, the schools were sampled using stratified sampling procedure, where schools were categorized into rural public and urban public. Simple random sampling was used to select the experimental and the control groups from each stratum.

For the purpose of this study 2 rural public schools were sampled and 2 urban public schools translating to 4 schools. The schools with a low of 25 children to a high of 35 were used, translating to 120 children. Two schools were subjected to a treatment while the other four schools were the control groups.

3.4 Research Instruments

This study used, pre- tests and post-test after the experiment for the pre-school children, questionnaire for teachers and an observation schedule. The schedule was used to collect data on the errors and difficulties children make when learning number value.

The pre-test and the post-test were standardized to ensure consistency and uniform procedures, scoring and interpreting the behaviour of subjects is done. For the purpose of the study, the norm referenced test was used. This is a type of standardized test that compare subjects performance to that of others who have taken the same test (Mugenda and Mugenda 2003). The subjects must have similar characteristics like age and geographic region. In this case, the study involved pre-school children of 4-6 years from Mathira East District. The test was used to test learning of number value in pre-school mathematics. Questionnaire for teachers was used to collect information on use and impact of materials in preschool number work.

3.5 Instrument validity and reliability

Borg and Gall (1989), say that validity is the degree to which a test measures what it is intended to measure. Reliability on the other hand is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 1999). An instrument is reliable when it can measure a variable accurately and obtain same results under same conditions over a period of time.

In this study, in order to ensure validity of the questionnaire, a pilot study was done before the actual research. However the respondents used in the pilot study were not

included in the main study but helped the researcher to determine whether to alter some of the items in relation to the objectives. The tests were administered under normal school environment and by their teachers to minimize the effect of the researcher that would otherwise interfere with the children's response and in turn affect the outcome of the study. Post test was administered immediately after the experiment and interpreted to ensure validity of data.

Reliability of instruments was ensured by using test-retest technique. According to Mugenda and Mugenda (1999), test- retest involves administering the same test twice to the same group after a period of time. In this study the researcher administered the questionnaire to the sampled teachers and repeated after a period of two weeks. The results were compared using the Pearson-Product correlation between the pre test and the post test scores. The correlation obtained was high, and thus the instrument was proved to have high test retest reliability and thus was considered reliable.

3.6 Data collection procedure

The researcher obtained official permission from Mathira East district through the Ministry of Education. Communication to the head teachers of the schools to be visited was done through a letter of introduction and delivered personally. An explanation of the role of the school and the intended research was given.

A pre-test was administered to the sampled school and all the children completed the tests. The teachers in the experimental school were guided by the researcher on the administration of the treatment. Materials were provided to the experimental groups and

the researcher then administered the experiment using the pre-school teachers so that the children learn in their normal school environment. The control groups learnt normally and no materials were provided by the researcher. A post-test was then administered to all the schools sampled for data collection. Data was also collected using questionnaires to the teachers who were sampled from the same schools.

3.7 Data analysis procedure

Data from the experiment was collected and also from the control group. Quantitative data was analyzed through means and standard deviation, to describe children's performance in number value. Pearson correlation was used to determine any significance difference in learning number value between those who learnt through use of materials and those in the normal setup. Scores attained by the experimental and control groups after the tests was entered into the database for analysis to check whether the scores are correlated using the Pearson correlation coefficient.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction.

This chapter presents the findings of the study based on the research objectives that guided the study. The study was of descriptive nature and thus the data was largely analyzed using means, standard deviation, correlations coefficients and coefficients of determination and presented using descriptive methods; that is; pie charts, bar graphs and tables.

4.1 Response Rate:

The study involved four schools, two from the rural area and two from urban area. Out of each category; rural and urban, control and experimental groups were identified. A total of 120 children were involved in the study and eight teachers drawn from the four schools used in the study. All the children completed the two tests and all the teachers completed the questionnaires. Thus the response rate for the study was 100%.

4.2 Instructional materials

The entire sample of children sat for a pretest (Appendix I) which was aimed at determining the prior knowledge on number value. Learning was given whereby the control group was taught normally while the experimental group was taught using a variety of manipulative materials which included abacus, bottle tops and seeds for a period of one week after which a post test was done.

4.2.1 Pre test result analysis

The results of the pre tests for both categories; experimental and control groups were analyzed by finding their mean and standard deviations. The results analysis was as tabulated in table 1 to 4.

Table 1: Rural school experimental group pretest results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Rural school (experimental) pretest results	27	11	16	13.41	1.279

Table 2: Rural school control group pretest results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Rural school (Control Group) pretest results	28	12	17	14.00	1.491

Table 3: Urban school experimental group pretest results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Urban school (experimental) pretest results	30	15	20	17.03	1.273

Table 4: Urban school control group pretest results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Urban school control group pre test results	35	14	19	16.49	1.197

As evidenced in tables 1 to 4, the performance in number work for the rural schools is lower than that of their counterparts in urban schools as indicated by their mean scores (17.03 and 16.49 against 13.41 and 14.00). The analyses also indicate that the variability of the scores is greater for the rural schools as opposed to those of the urban schools as

indicated by the standard deviations (1.279 and 1.491 against 1.273 and 1.197). These findings indicate that the children have good back ground knowledge of number value.

4.2.2Post test result analysis

A lesson on number work was conducted on both groups whereby the control group was taught without concrete materials. The experimental group was taught the same content by their teachers under similar conditions, with use of instructional materials and a post test was administered to both groups. The analyses of the scores of the children in the post test are as shown in tables 5 to 8

Table 5: Rural school experimental group post test results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Rural school (experimental) post test results	27	16	20	17.81	1.145

Table 6: Rural school control group post test results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Rural school (Control Group) post test results	28	12	17	14.29	1.410

Table 7: Urban school experimental group post test results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Urban school (experimental)post test results	30	19	20	19.50	0.509

Table 8: Urban school control group post test results analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Urban school control group post test results	35	14	19	16.89	1.278

As evidenced from table 5 to 8, the scores of all the children improved as indicated by the means of the scores. The variability in the scores also decreased across the board after the lesson given. However, it can be observed that the performance of the experimental group in both rural and urban schools improved to a larger extent, that is the mean scores rose by 4.40 in the rural school experimental group and 1.47 in the urban school experimental group. This is remarkably higher than the improvement in the mean score in the control group where the mean score improved by 0.29 in the rural school control group and 0.4 in the urban school control group. It is also evident from the tables that the variability in the scores decreased to a larger extent in the experimental group (0.134 and 0.764) as opposed to (0.081 and 0.061) for the control group.

The fact that the mean improvement was higher in the experimental group than in the control group indicates that the number work lesson given to the experimental group was more effective in imparting number work skills in children than the one given to the control group. Further it can be noted that since the only difference in the lessons given was the use of materials, it implies that use of manipulative materials have a large impact on the mastery of number value.

4.2.3 Teacher's opinion on use of materials

Figure 2 shows the teacher's ratings of the effectiveness of use of instructional materials in assisting children grasp number value skills.

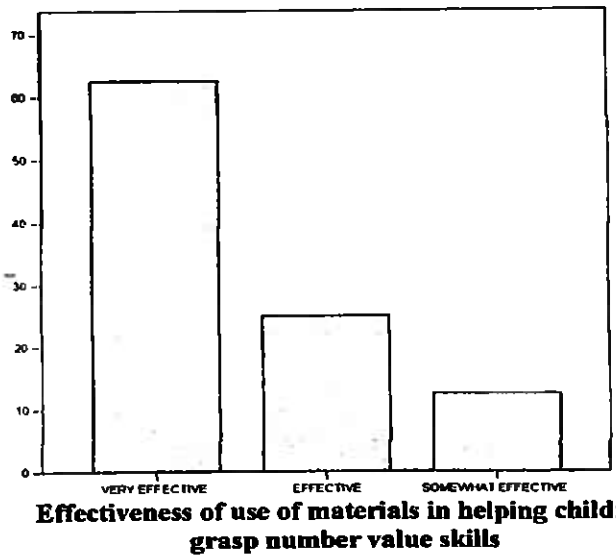
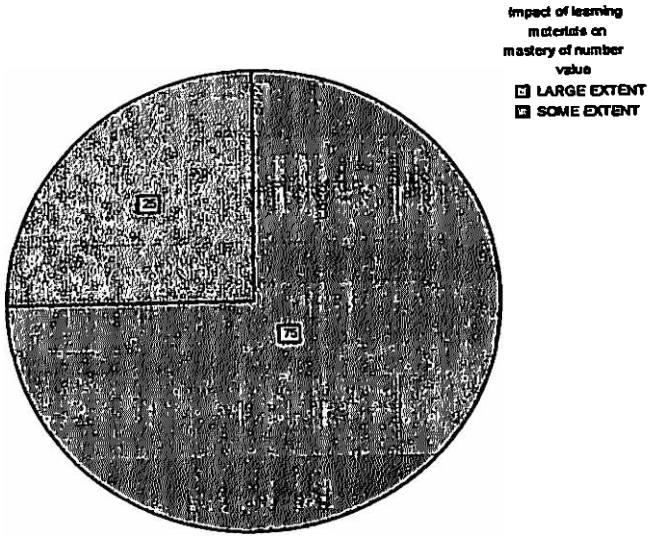


Figure 2: Effectiveness of use of materials.

When asked about their opinion on the effectiveness of use of instructional materials by way of questionnaire, 62% of the teachers said that they were very effective, 25% felt that they were effective while only 13% felt that they were somehow effective. This implies that majority of teachers consider materials very effective in assisting children grasp number value. This is in line with Olatunde (2010) who recommended more teaching aids to be provided for students' learning mathematics in schools.

4.2.4 Impact of materials on mastery of number value

Figure 3 shows the impact of learning materials on mastery of number value as obtained from the teachers' questionnaire.



When teachers were asked to rate the impact of learning materials on the mastery of number work, 75%of the teachers felt that use of materials helps to a large extent in the mastery of number value, while only 25% felt that materials assist to some extent. This is in line with Origa (2000) who reported that acquisition of new knowledge is attributed largely to the interaction between learner and the environment (materials).

4.2.5 Children's attitude towards use of materials.

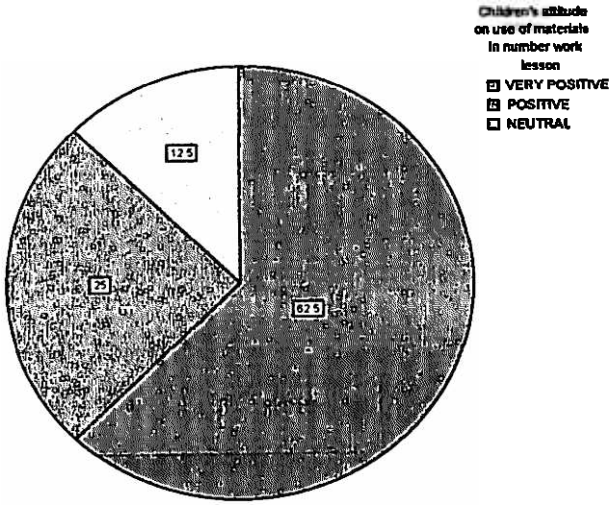


Figure 4: Children's attitude towards use of materials.

According to figure 4, majority of the children are very positive about the use of materials when learning number work and only a small proportion is indifferent to the use of materials. Majority (62.5%) of the teachers noted children's attitude towards use of materials in number work lessons is very positive, 25% felt that it is positive while 12.5% observed that it is neutral.

In general, the analysis of the data indicate that majority of teachers consider the use of materials to be very effective in assisting children learn number value. Also majority of the teachers felt that use of materials impact positively and promote mastery of number value in children. Further, majority of the respondent's rate attitude of children towards use of materials to be very positive. The findings of the study demonstrated that materials have a high impact in assisting preschool children achieve mastery of number value.

4.3 Number value skills

The pre-test and the post tests were designed to aid in establishing the extent to which the children have demonstrated mastery of number value skills and the extent to which they transfer the skills to simple computations such as addition and subtraction. The correlation between the pre-test and the post test scores indicates the effectiveness of the lesson in improving the transfer of number value skills. The greater the correlation, between the tests, the smaller the impact of the lesson in imparting transfer of number value skills.

4.3.1 Pearson correlations

The Pearson correlations calculations are as presented in tables 9 to 12.

Table 9: Urban control group pre test and post test correlations

		Urban school control group pre test results	Urban school control group post test results
Urban school control group pre test results	Pearson Correlation	1	.806(**)
	Sig. (2-tailed)	.	.000
	N	35	35
Urban school control group post test results	Pearson Correlation	.806(**)	1
	Sig. (2-tailed)	.000	.
	N	35	35

** Correlation is significant at the 0.01 level (2-tailed).

Table 10: Rural control group pre test and post test correlations

		Rural school 2 (Control Group) pretest results	Rural school 2 (Control Group) post test results
Rural school (Control Group) pretest results	Pearson Correlation	1	.863(**)
	Sig. (2-tailed)	.	.000
	N	28	28
Rural school (Control Group) post test results	Pearson Correlation	.863(**)	1
	Sig. (2-tailed)	.000	.
	N	28	28

** Correlation is significant at the 0.01 level (2-tailed).

The correlation tables 9 and 10 indicate that the scores for the control groups is significant and positive, that is r=0.863 for the rural school control group and r=0.806 for the urban control group. The coefficient of determination for the rural control group is r^2=0.7448 and that of urban school control group is 0.65. This implies that the previous knowledge as indicated by the pre-test score account for 74.48% and 65% of the post test score. Further, this implies that the number work lesson given contributed to partly 25.52% and 35% to the post test scores.

Table 11: Urban experimental pre test and post test correlations

		Urban school experimental pre test results	Urban school experimental post test results
Urban school (experimental) pre test results	Pearson Correlation	1	.506(**)
	Sig. (1-tailed)	.	.002
	N	30	30
Urban school (experimental) post test results	Pearson Correlation	.506(**)	1
	Sig. (1-tailed)	.002	.
	N	30	30

** Correlation is significant at the 0.01 level (1-tailed).

Table 12: rural experimental pre test and post test correlations

		Rural school pretest results	Rural school post test results
Rural school (experimental) pretest results	Pearson Correlation	1	.369
	Sig. (2-tailed)	.	.058
	N	27	27
Rural school(experimental) post test results	Pearson Correlation	.369	1
	Sig. (2-tailed)	.058	.
	N	27	27

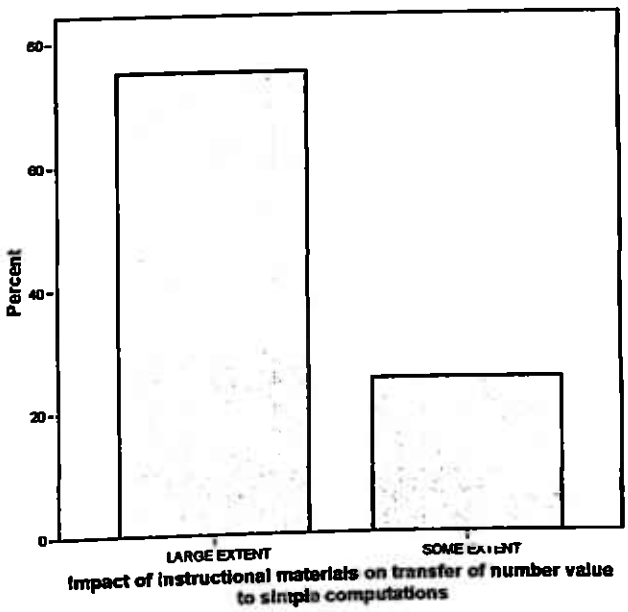
On the other hand, the correlation tables 11 and 12 show that there is weak positive correlation between the pre-test scores and post test scores; that is r=0.506 and r=0.369 for urban school experimental group and rural school experimental groups respectively.

This means that the coefficient of determination for the scores are r^2 =0.256 and r^2=0.136 respectively. It further implies that the post test scores are dependent on the past previous knowledge to an extent of 25.6% and 13.6% respectively and that the number work lesson contributed to the post test scores to an extent of 74.4% and 86.4% for the urban school experimental group and rural experimental group respectively.

The findings from the correlations indicate that the number work lesson contributed more in the experimental group than in the control group to the post test scores of the children. The lessons which utilized concrete materials were therefore more effective in imparting number value transfer skills than the lessons that were conducted without them. This confirms that use of manipulative materials when teaching children number work has a greater effect on transfer of number work skills to simple computations.

4.3.2 Impact of learning materials on transfer of number value

Figure 5 shows the impact of learning materials on transfer of number value to simple computation as obtained from teachers' responses.



From figure 5, 76% of the respondents felt that the use of instructional materials impact to a large extent on the transfer of number value to simple computations, while 24% felt that materials impact only to some extent. This is in line with Khoima (2006) who reported that learning by doing raises the learners' level of recall and retention, and Kananu (2005) who said that learning and teaching aids increase chances of greater perception, understanding and retention rate. The findings from the graph indicate that instructional materials have a high impact on transfer of number value to simple computations.

4.4 Learning difficulties

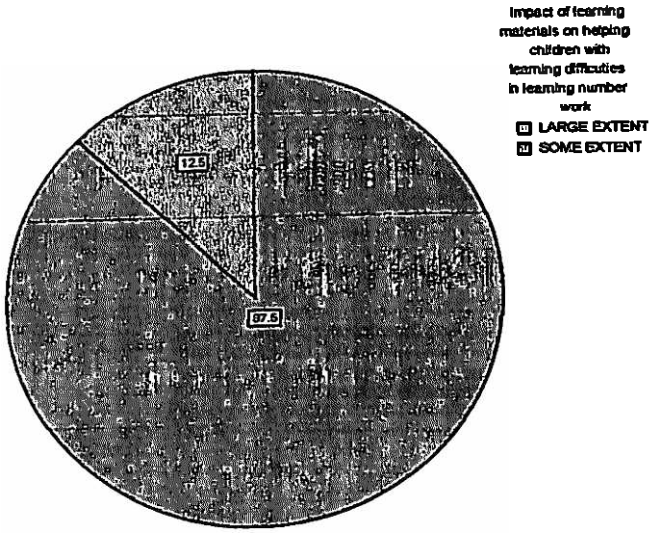
As noted in the literature review, most children with difficulties in mathematics (number value) are characterized by weaknesses in secondary symbolic number sense related to the whole numbers, number relations and number operations like addition and

subtraction (Jordan, 2010). Among the interventions recommended is use of mathematical activities and games as well as presenting materials in a variety of forms.

4.4.1 Impact of materials in minimizing learning difficulties

On the use of materials in helping children with learning difficulties, the teachers' responses were as shown in figure 6

Figure 6: Impact of learning materials on helping children with learning difficulties.



It is evident that instructional materials to a large extent help learners with learning difficulties when learning number value skills. From the pie chart 87.5% of the respondents felt that instructional materials help children with learning difficulties in number value and only 12.5% felt that materials help children with learning difficulties to some extent. This concurs with Dowker (2004) who proposed that children in a preschool class with mathematical difficulties should be exposed to mathematical activities and games.

4.5 Conceptual errors

4.5.1 Errors in number work.

The researcher with aid of an observation schedule found out that the errors commonly made by children include; writing the next number after counting, missing out the objects, counting more or less, counting same object twice or more times and failure to recognize the number even when the child is able to count. In addition, when teachers were asked whether children make errors when carrying out number work activities, the data collected was as presented in table 13

Errors in number work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	6	75.0	75.0	75.0
	NO	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

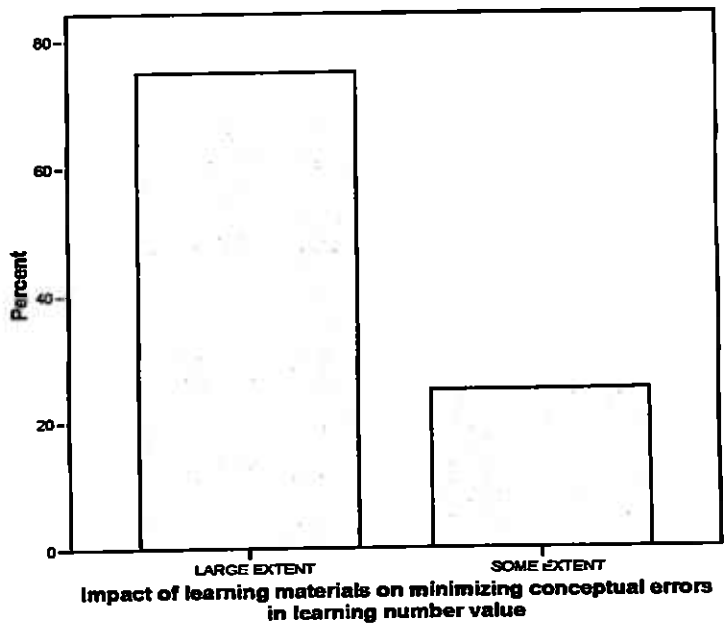
Table13. : Errors in number work

It is evident from the table that majority (75%) of the children make errors when carrying out number work activities. Only 25% of the teachers said that children do not make errors when carrying out number work activities. This implies that to a large extent children make errors when doing number work activities.

4.5.2 Use of learning materials in minimizing errors

The researcher, using a questionnaire administered to the teachers sought to establish the impact of learning materials in minimizing conceptual errors in children. Figure 7 summarizes the responses obtained.

Figure 7: Impact of learning materials on minimizing conceptual errors.



It is clear from figure 7 that majority (77%) of the respondents rate the impact of instructional materials on conceptual errors of learning number value as "To a large extent". It further implies that 23% of the respondents felt that use of learning materials helps to some extent to minimize the conceptual errors in preschool children. All the respondents agree to the fact that instructional materials impact positively on minimizing conceptual errors in children. A study by Houssart and Weller (1999) suggested one remedy for errors and misconceptions that children should touch objects as they count. The objects in this case are the materials used in carrying out activities in number work. The findings of the study have indicated that use of materials help in minimizing conceptual errors.

4.6. Teacher characteristics

Since the teachers formed part of the sample for the study, the researcher sought to find out their demographic information. This was important for the purposes of ascertaining the credibility of the information provided by the teachers. The demographic information included academic, training and experience. It also aimed at shedding light on whether the teachers were engaged in teaching number work. The information would therefore indicate whether the teachers engaged in the study were resourceful enough to provide the information for the study.

4.6.1 Teacher's academic background

Figure 8 is a bar graph showing the data on the academic background of the teachers.

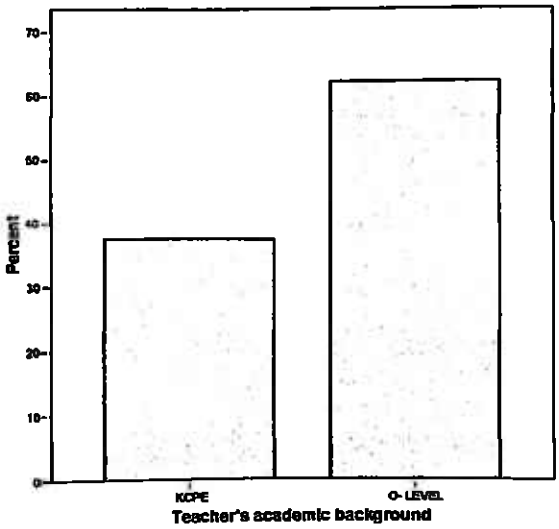


Figure 8: Teacher's academic background

According to figure 8, majority (62%) of the teachers are educated to O-level while 38% are educated up to elementary level. This implies that the teacher's academic background may not be adequate to cater for all the academic and professional demands of the occupation.

4.6.2 Teacher's training background

Figure 9 is a bar graph showing the data on the training background of the preschool teachers.

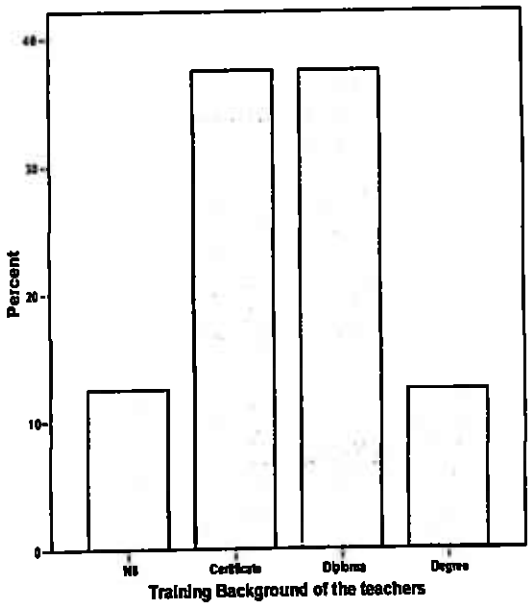


Figure 9 Teacher's training background

According to the figure, 12.5% of the teachers hold degrees, the larger proportion of teachers are trained to diploma and certificate levels; accounting for 37.5% each, however, 12% of the teachers have no training in early childhood education. This implies that preschool teachers are well trained to handle number work. The highest percentage of teachers have diploma, which implies that they are professionals in the area of number work and preschool in general.

4.6.3 Teacher's teaching experience

Figure 10 represents the data on the years of experience of the teachers. This information sheds light on the length of time the teachers have been working with the children and specifically in number work. The findings indicate that 12% of the teachers

have more than 5 years of teaching experience, 37.5% have an experience of between 3-5 years, 25% between 1-3 years and another 25% less than 1 year experience.

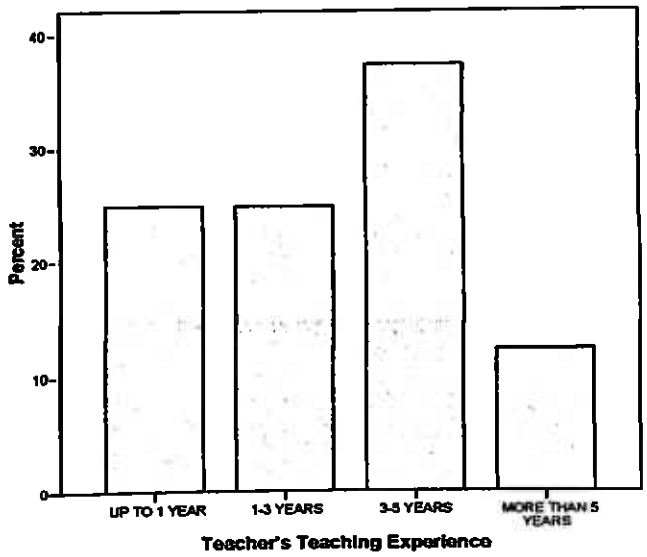


Figure 10: Teacher's teaching experience

The data collected shows that majority of the teachers have been teaching for more than 3 years with a large proportion with more than 5 years of experience. This implies that the teachers are well endowed with experience concerning how children learn number work.

The findings of the study indicate that the teacher characteristics helped in the achievement of the objectives of the study. Their experience levels and training background indicated that they were able to use the instructional materials and guide the children in learning of number value. This indicates that the teachers had adequate capacity to administer the experiment and give useful responses to the questionnaire administered.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter addresses the summary of the findings of the study in relation to the objectives outlined in chapter one. It also presents the conclusion of the study together with the recommendations of the researcher based on the findings. Suggestions for further research are also given.

5.1 Summary of the research findings.

A quasi experimental design was used to determine the impact of instructional materials on learning of number value by the pre-school child. The study also aimed at identifying the difficulties that the children experience when learning number value, and the errors that they make.

A sample of 120 preschool children drawn from 4 schools, two from rural areas and two from urban areas was used. The respondents used for the study also included eight teachers from the respective schools. The children completed a pre-test after which a number work lesson was given. The lesson for the experimental group involved use of concrete materials (abacus, seeds, bottle tops), while for the control group no materials were used. The data collected was analyzed using means, standard deviation, correlations and presented with aid of tables and charts for clarity. The findings are summarized as follows according to the research objectives that guided the study:

5.1.1 Impact of instructional materials on mastery of number value.

The findings of the study indicated that the mean score of the children improvement was higher in the experimental group than in the control group between the pre test and the post test. This indicates that the number work lesson given to the experimental group was more effective in imparting number work skills in children than the one given to the control group. The only difference in the nature of lessons given being the use of manipulative materials, it implies that use of manipulative materials have a large impact on the mastery of number value.

It was further found out that majority of teachers consider materials very effective in assisting children grasp number value which concurs with Olatunde (2010) who recommended more teaching aids to be provided for students' learning. On the impact of learning materials on the mastery of number work, majority of the teachers felt that the use of materials helps to a large extent in the mastery of number value which is in line with Origa (2000) who reported that acquisition of new knowledge is attributed largely to the interaction between learner and the environment (materials).

It was also established that majority of teachers consider use of materials to be very effective in assisting children learn number value and that use of materials impact and promote mastery of number value in children. Further, majority of the respondents rated attitude of children towards use of materials to be very positive. The findings of the

study also demonstrated that use of instructional materials has a high impact on assisting preschool children achieve mastery of number value.

The findings of the study therefore show clearly that use of instructional materials affect mastery of number value in pre-school children. It was demonstrated that when instructional materials are used in number work lessons, children develop mastery of number work more efficiently and effectively.

5.1.2 Effect of instructional materials on the transfer of number value

The scores of the children in the pre test and post test were found to be highly positively correlated in the control group (r=0.863 and r=0.806) for the rural and urban schools respectively compared to those of the experimental groups(r=0.506 and r=0.369) for rural and urban experimental groups. This implies that the number work lessons given to the experimental group was more effective and therefore there was more significant change in number value skills in the children after the lesson compared to that in the control group.

Further, the coefficients of determination in the analysis of the data showed that previous knowledge as indicated by the pre test score account for 74.48% and 65% of the post test score in the rural and urban control groups respectively while it contributed partly 25.6% and 13.6% to the post test scores of the rural and urban experimental groups respectively.

The findings from the correlations indicate that the number work lesson contributed more in the experimental group than in the control group to the post test scores of the

children. The lessons which utilized concrete materials were therefore more effective in promoting transfer of number value skills than the lessons that were conducted without them. This confirms that use of manipulative materials when teaching children number work has a greater effect on transfer of number work skills to simple computations.

Majority of the teachers (76%) felt that the use of instructional materials impact to a large extent on the transfer of number value to simple computations which is in line with Khoima (2006) who reported that learning by doing raises the learners' level of recall and retention, and Kananu (2005) who said that learning and teaching aids increase chances of greater perception, understanding and retention rate.

The findings of the study therefore establish that indeed the use of instructional materials when teaching children number work lessons has a large effect on the development of transfer of number value skills to simple addition and subtraction in children.

5.1.3 Impact of instructional materials on children with learning difficulties in number value

The findings of the study established that majority (87.5%) of the respondents felt that instructional materials help children with learning difficulties in number value which concurs with Dowker (2004) who proposed that children in a preschool class with mathematical difficulties be exposed to mathematical activities and games.

These findings show that use of instructional materials in number work lessons have the capacity to help learners with learning difficulties acquire, develop, master and transfer number value skills.

5.1.4 Impact of materials on minimizing the conceptual errors in learning of number value

The researcher with aid of an observation schedule found out that the errors commonly made by children include; writing the next number after counting, missing out the objects, counting more or less, counting same object twice or more times and failure to recognize the number even when the child is able to count. In addition, when teachers were asked whether children make errors when carrying out number work activities, majority (75%) of the teachers felt that they do. This implies that to a large extent children make errors when doing number work activities.

Further, it was found out that majority (77%) of the teachers rate the impact of instructional materials on minimizing conceptual errors in number value as "To a large extent". They contend that instructional materials impact positively on minimizing conceptual errors in children. This is in line with the findings of a study by Houssart and Weller (1999) which suggested that one remedy for errors and misconceptions is that children touch objects as they count. The objects in this case are the materials used in carrying out activities in number work. The findings of the study have indicated that use of materials help in minimizing conceptual errors.

5.2 Conclusions

The purpose of the study was to determine the impact of instructional materials on learning of number value by the pre-school child. The study also aimed at determining

the impact of materials on the difficulties that the children experience when learning number value, and minimizing errors.

The study demonstrated that use of instructional materials influence the acquisition of number work skills. The mean improvement in the experimental group being higher than in the control group indicated that the number work lesson given to the experimental group was more effective in imparting number work skills in children than the one given to the control group. In addition the correlations between the pre test and post test scores indicated that the lessons which utilized concrete materials were therefore more effective in imparting number work skills than the lessons that were conducted without them. This further confirmed that use of concrete materials when teaching children number work promotes the acquisition of number work skills.

On errors and difficulties, it was evident from the findings of the study that majority of the children make errors when carrying out number work activities. Some of the errors identified were counting an object twice or more times, writing the next number after counting, not recognizing numbers, wrong entry on number values and skipping some objects when counting.

All the respondents agreed to the fact that instructional materials impact on the mastery of number value in children. Thus instructional materials to a large extent impact on the mastery of number value ,transfer of number value, help in minimizing learning difficulties in the learning of number work and also help in minimizing conceptual errors in learning of number value in preschool children, all of which contribute to learning number vale in children.

5.3 Recommendations

Based on the findings of the study, the following were recommendations from study; first, children should be provided with plenty of instructional materials to help them acquire number work skills more efficiently, secondly, in trying to minimize learning difficulties in the learning of number work skills, children should be allowed to manipulate materials as this helps them internalize number work skills like number recognition, number value and number writing skills. Children should touch objects as they count, and careful explanation and intervention be provided to help children with errors.

Thirdly, in formulating the syllabus for number work, more time should be allocated to allow children manipulate materials sufficiently to enable them develop lasting number concept which is vital to learning of mathematics in higher levels. At the same time supply of materials should be enhanced since the preschools teachers are expected to improvise, which in return may affect proper use and standard materials.

5.4 Suggestions for further research.

Based on the research findings, the researcher recommends that more research work needs to be carried out in a number of areas for instance attitude of teachers, level of motivation of teachers and family socio-economic background. The current study was carried out in only a small population. Future studies in the area could widen the scope by using of a larger population. This would make the findings of the studies more representative. More research work needs to be done on errors and difficulties in

number value at preschool, reversing numbers and effect of teacher characteristics on acquisition of number work skills.

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APPENDIX I

Pre-test

Draw circles

5 =_____

4=_____

3=_____

2=_____

1=_____

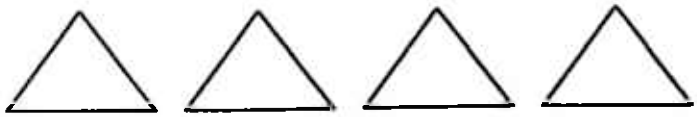
Count and circle

1 3 2 4

2 4 5 6

2 1 3 5

7 6 5 4



3 2 4 1

Count and match

5

6

3

1

2

Put together using objects

4 + 0 = _____

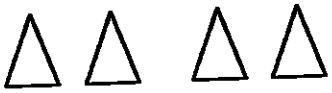
7 + 2 = _____

9 + 1 = _____

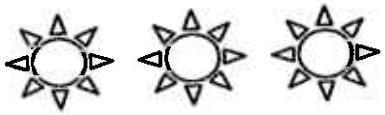
APPENDIX II

Post-test

Count and circle



2 3 4



5 3 4

6 7 8

2 3 4

9 8 6

Draw circles

3 = ----------

6 = ----------

2 = ----------

4 = ----------

1 = ----------

8 = ----------

Put together

2 + 5 = _____

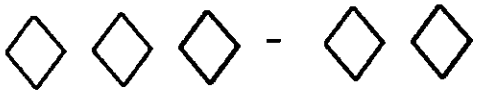
3 + 7 = _____

5 + 0 = _____

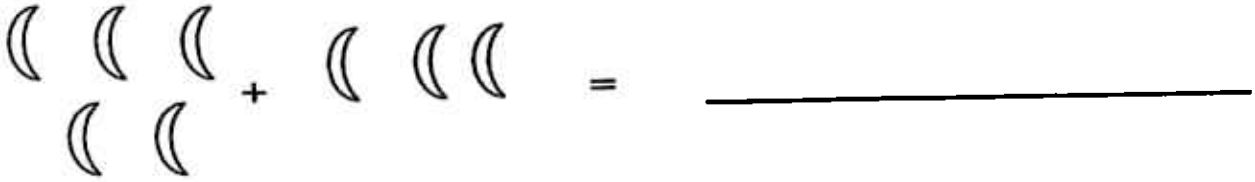
3	1	4	0
+ 3	+ 1	+ 3	+ 0
_____	_____	_____	_____
_____	_____	_____	_____

Write the value

 = _____

 = _____

 = _____



APPENDIX III

QUESTIONNAIRE TO TEACHERS

This questionnaire is for the purposes of collecting information relating to the impact of instructional materials on the learning of number value in pre- schools.

All the information will be used for the purpose of the study only and will be treated with uttermost confidence. Kindly respond to all the questions as honestly as possible.

Your co-operation will be highly appreciated.

INSTRUCTIONS

Kindly use tick (✓) inside the boxes to indicate correct answer(s) where the answers are given in choices.

SECTION A: BACKGROUND INFORMATION

1. Which of the following best describes your academic background?

   a) KCPE ( )

   b) O-Level ( )

   c) Degree ( )

2. To what level have you trained in Early Childhood Education?

   a) Nil ( )

   b) Certificate ( )

   c) Diploma ( )

   d) Degree ( )

3. For how long have you been working as an ECDE teacher?

a) Up to 1 year ( )

b) 1-3 years ( )

c) 3-5 years ( )

SECTION B: TEACHING NUMBERWORK

4. In course of your work, do you teach number work?

YES ( ) NO ( )

5. Which teaching method do you use when teaching number work?

_____

_____

_____

_____

_____

_____

6. How often do you use materials as you teach number work?

a) Very often ( )

b) Often ( )

c) Rarely ( )

d) Never ( )

7. If your answer in 6 above is VERY OFTEN or OFTEN, list the materials you frequently use as you teach.

_____

_____

_____

8. In your own opinion how effective are the materials in assisting children grasp number value concepts?

   a) Very effective ( )

   b) Effective ( )

   c) Somehow effective ( )

   d) Not effective ( )

9. In your own estimation, what is the attitude of the children towards materials?

   a) Very positive ( )

   b) Positive ( )

   c) Neutral ( )

   d) Negative ( )

   e) Very negative ( )

10. If your answer in Question 6 above was NO, what are the main reasons for not using materials in teaching mathematics?

_____

_____

_____

_____

_____

SECTION C: ERRORS AND DIFFICULTIES

11. In your teaching experience, do the children make errors and face difficulties as the carry out number activities?

YES ( ) NO ( )

12. If your answer in Question 11 above is YES, list down the specific errors and difficulties children often make.

Difficulties:

Errors:

13. In your own opinion, to what extent does the use of concrete instructional materials in teaching enhance the following?

Construct	Very large extent	Large extent	Some extent	Little extent	Very little extent
Mastery of number value					
Transfer of number value					
Children with learning difficulties learn number value					
Minimizing conceptual errors					

THANK YOU FOR CO-OPERATION.

APPENDIX IV

OBSERVATION SCHEDULE

ACTIVITY	ERRORS MADE	DIFFICULTIES OBSERVED
Counting with aid of materials		
Assigning number value		
Putting together using materials		

Performing take away using materials		
Performing group activities using materials		
Performing matching and pairing activities		
Performing classification activities using materials		